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APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/094,136	10/04/2016	9457487	MFP0031US (T10212PUS)	1104

23413 7590 09/14/2016

CANTOR COLBURN LLP
20 Church Street
22nd Floor
Hartford, CT 06103

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The Patent Term Adjustment is 0 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

APPLICANT(s) (Please see PAIR WEB site http://pair.uspto.gov for additional applicants):

Textor Maschinenbau GmbH, Wolfertschwenden, GERMANY;
Josef Mayer, Memmingerberg, GERMANY;

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The USA offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to encourage and facilitate business investment. To learn more about why the USA is the best country in the world to develop technology, manufacture products, and grow your business, visit SelectUSA.gov.

Provisur EX1002
U.S. Patent No. 9,457,487

AMENDMENTS TO THE SPECIFICATION

61

Change(s) applied to document, /A.B./ 6/8/2016

Please replace Paragraph [0062] of the U.S. Pub. with the following amended paragraph:

[0062] The embodiments described herein differ with respect to different aspects: Figs. 1 to 5 describe a single-track traction conveyor in which the conveyor belt unit 13 is configured as a traction belt. Such a traction conveyor is in particular a component of a product supply of a slicer with which one or more food products to be sliced are supplied to a cutting plane together. For example, Fig. 2 illustrates a cutting plane 90.

Please replace Paragraph [0064] of the U.S. Pub. with the following amended paragraph:

[0064] The embodiment of Figs. 8 to 10 relates to a single-track portioning conveyor in which a single removable conveyor belt unit 13 comprises two individual conveyors, namely a short portioning belt 71 and a long portioning belt 73. Fig. 8 illustrates a cutting plane 92.

PTO/SB/08a (01-10)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	14094136
Filing Date	2013-12-02
First Named Inventor	Josef Mayer
Art Unit	3651
Examiner Name	Harp, William Ray
Attorney Docket Number	MFP0031US (T10212PUS)

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1					

If you wish to add additional U.S. Patent citation information please click the Add button. Add

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Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
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Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1	2006103348	WO	A1	10-2006 ~~2011-08-17~~	NEOLUTION		☐
Change(s) applied to document, /R.F./ 6/17/2016	2	2357063	EP	A1	2011-08-17	KRAFT FOODS GLOBAL BRANDS LLC		☐

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ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /WH/

Electronic Acknowledgement Receipt

EFS ID:	26759951
Application Number:	14094136
International Application Number:	
Confirmation Number:	1104
Title of Invention:	High Performance Slicing Apparatus With At Least One Removable Conveyor Belt Unit
First Named Inventor/Applicant Name:	Josef Mayer
Customer Number:	23413
Filer:	David Fox/Heather Downs
Filer Authorized By:	David Fox
Attorney Docket Number:	MFP0031US (T10212PUS)
Receipt Date:	26-AUG-2016
Filing Date:	02-DEC-2013
Time Stamp:	13:53:41
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$975
RAM confirmation Number	082616INTEFSW13542800
Deposit Account	061130
Authorized User	Heather Downs

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

37 CFR 1.16 (National application filing, search, and examination fees)

37 CFR 1.17 (Patent application and reexamination processing fees)

37 CFR 1.19 (Document supply fees)

37 CFR 1.20 (Post Issuance fees)

37 CFR 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Issue Fee Payment (PTO-85B)	7NC9939.PDF	185163 b99f4a103bbf9ba92e21402c48db96e1e55e0769	no	1
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	32665 ea33e2ae703644b0a48890428d11a9c131751d58	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	217828		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

23413 7590 06/07/2016
CANTOR COLBURN LLP
20 Church Street
22nd Floor
Hartford, CT 06103

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission
I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/094,136	12/02/2013	Josef Mayer	MFP0031US (T10212PUS)	1104

TITLE OF INVENTION: High Performance Slicing Apparatus With At Least One Removable Conveyor Belt Unit

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$960	$0	$0	$960	09/07/2016

EXAMINER	ART UNIT	CLASS-SUBCLASS
HARP, WILLIAM RAY	3651	198-817000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.
1 CANTOR COLBURN LLP
2
3

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE: TEXTOR MASCHINENBAU GMBH

(B) RESIDENCE: (CITY and STATE OR COUNTRY): WOLFERTSCHWENDEN, GERMANY

Please check the appropriate assignee category or categories (will not be printed on the patent) : ☐ Individual ☒ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:
☒ Issue Fee
☐ Publication Fee (No small entity discount permitted)
☒ Advance Order - # of Copies Five (5)

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**
☐ A check is enclosed.
☒ Payment by credit card. Form PTO-2038 is attached.
☒ The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number 061130 (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)
☐ Applicant certifying micro entity status. See 37 CFR 1.29
NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
☐ Applicant asserting small entity status. See 37 CFR 1.27
NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
☐ Applicant changing to regular undiscounted fee status.
NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature /David A. Fox/ Date August 26, 2016
Typed or printed name David A. Fox Registration No. 38,807

PTOL-85 Part B (10-13) Approved for use through 10/31/2013. OMB 0651-0033 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Electronic Patent Application Fee Transmittal

Application Number:	14094136
Filing Date:	02-Dec-2013
Title of Invention:	High Performance Slicing Apparatus With At Least One Removable Conveyor Belt Unit
First Named Inventor/Applicant Name:	Josef Mayer
Filer:	David Fox/Heather Downs
Attorney Docket Number:	MFP0031US (T10212PUS)

Filed as Large Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Utility Appl Issue Fee	1501	1	960	960

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
Printed Copy of Patent - No Color	8001	5	3	15
		Total in USD ($)		**975**

Electronic Acknowledgement Receipt

EFS ID:	26759951
Application Number:	14094136
International Application Number:	
Confirmation Number:	1104
Title of Invention:	High Performance Slicing Apparatus With At Least One Removable Conveyor Belt Unit
First Named Inventor/Applicant Name:	Josef Mayer
Customer Number:	23413
Filer:	David Fox/Heather Downs
Filer Authorized By:	David Fox
Attorney Docket Number:	MFP0031US (T10212PUS)
Receipt Date:	26-AUG-2016
Filing Date:	02-DEC-2013
Time Stamp:	13:53:41
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$975
RAM confirmation Number	082616INTEFSW13542800
Deposit Account	1039
Authorized User	Heather Downs

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

37 CFR 1.16 (National application filing, search, and examination fees)

37 CFR 1.17 (Patent application and reexamination processing fees)

37 CFR 1.19 (Document supply fees)

37 CFR 1.20 (Post Issuance fees)

37 CFR 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Issue Fee Payment (PTO-85B)	7NC9939.PDF	185163 b99f4a103bbf9ba92e21402c48db96e1e55e0769	no	1
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	32665 ea33e2ae703644b0a48890428d11a9c131751d58	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	217828		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

23413 7590 06/07/2016

CANTOR COLBURN LLP
20 Church Street
22nd Floor
Hartford, CT 06103

EXAMINER
HARP, WILLIAM RAY

ART UNIT	PAPER NUMBER
3651	

DATE MAILED: 06/07/2016

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/094,136	12/02/2013	Josef Mayer	MFP0031US (T10212PUS)	1104

TITLE OF INVENTION: High Performance Slicing Apparatus With At Least One Removable Conveyor Belt Unit

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$960	$0	$0	$960	09/07/2016

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-2885

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CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

23413 7590 06/07/2016
CANTOR COLBURN LLP
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Hartford, CT 06103

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission
I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/094,136	12/02/2013	Josef Mayer	MFP0031US (T10212PUS)	1104

TITLE OF INVENTION: High Performance Slicing Apparatus With At Least One Removable Conveyor Belt Unit

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$960	$0	$0	$960	09/07/2016

EXAMINER	ART UNIT	CLASS-SUBCLASS
HARP, WILLIAM RAY	3651	198-817000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
- ❑ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- ❑ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.
1 _____
2 _____
3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. The following fee(s) are submitted:
- ❑ Issue Fee
- ❑ Publication Fee (No small entity discount permitted)
- ❑ Advance Order - # of Copies _____

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**
- ❑ A check is enclosed.
- ❑ Payment by credit card. Form PTO-2038 is attached.
- ❑ The director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)
- ❑ Applicant certifying micro entity status. See 37 CFR 1.29 — NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
- ❑ Applicant asserting small entity status. See 37 CFR 1.27 — NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
- ❑ Applicant changing to regular undiscounted fee status. — NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

PTOL-85 Part B (10-13) Approved for use through 10/31/2013. OMB 0651-0033 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/094,136	12/02/2013	Josef Mayer	MFP0031US (T10212PUS)	1104

23413 7590 06/07/2016

CANTOR COLBURN LLP
20 Church Street
22nd Floor
Hartford, CT 06103

EXAMINER	
HARP, WILLIAM RAY	

ART UNIT	PAPER NUMBER
3651	

DATE MAILED: 06/07/2016

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Notice of Allowability	Application No. 14/094,136	Applicant(s) MAYER, JOSEF	
	Examiner WILLIAM R. HARP	Art Unit 3651	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *claims of 28 January 2016*.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on_____.
2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.
3. ☒ The allowed claim(s) is/are *33-41,43-45,50-53 and 56-63*. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov .
4. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   Certified copies:

   a) ☒ All b) ☐ Some *c) ☐ None of the:
   1. ☒ Certified copies of the priority documents have been received.
   2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
   3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .
5. ☐ Examiner's Amendment/Comment
6. ☐ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

/WILLIAM R HARP/
Primary Examiner, Art Unit 3651

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S1	2	"US 20140174891"	US-PGPUB; USPAT; USOCR; DERWENT	OR	ON	2015/01/08 11:14
S2	34	((Josef) near2 (Mayer)).INV.	US-PGPUB; USPAT	OR	ON	2015/01/08 14:50
S3	921	198/817.ccls.	US-PGPUB; USPAT; USOCR	OR	ON	2015/01/08 15:02
S5	163	harp.xa.	US-PGPUB; USPAT	OR	ON	2015/01/08 15:03
S6	14	dolan.in. and "198".clas.	US-PGPUB; USPAT	OR	ON	2015/01/08 15:06
S7	52	("2564090" | "2578871" | "3180475" | "3474893" | "3718197" | "3807546" | "3934706" | "4096937" | "4369617" | "4421228" | "5020659" | "5141099" | "5143200" | "5174435" | "5197591" | "5213322" | "5215185" | "5253749" | "5303818" | "5307923" | "5346059" | "5562572" | "5566817" | "5598916" | "5697492" | "5706934" | "5743378" | "5775480").PN. OR ("5934449" | "5964340" | "5967296").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2015/01/08 15:08
S8	2	("20080073185" | "6371283").PN.	US-PGPUB; USPAT; USOCR	OR	ON	2015/01/08 15:11
S9	25	("1785141" | "2541080" | "3118315" | "3718197" | "3751122" | "4803804" | "5174435" | "6161683" | "6209715").PN. OR ("2008/0073185" | "6371283").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2015/01/08 15:12
S10	26	"1816092"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/01/08 15:16
S11	1	("7467704").PN.	US-PGPUB; USPAT	OR	OFF	2015/01/08 15:17
S12	50	"2239108"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2015/01/08 15:18
S13	30	"40622476".FMID.	US-PGPUB; USPAT;	OR	ON	2015/01/08 15:19

			FPRS			
S14	88	("1748301" | "1776419" | "1877194" | "1944296" | "2413339" | "2504948" | "2583471" | "2624444" | "2639802" | "2680509" | "3701413" | "3743078" | "3773167" | "3779368" | "3878937" | "3964800" | "3993185" | "4142625" | "4225034" | "4325480" | "4720008" | "4906345" | "4938336" | "4951809" | "4989723" | "5044485" | "5082108" | "5096045" | "5156260" | "5174435" | "5186314" | "5190145" | "5203447" | "5310047" | "5456349" | "5562199" | "5584373" | "5605222" | "5695042" | "5749454" | "5871085" | "5938006" | "5967296" | "6109427" | "6164435" | "6170649" | "6209715" | "6227355" | "6298981" | "6318545" | "6367619" | "6371283" | "6422362" | "6422382" | "6427831" | "6481567" | "6523679" | "6685009" | "6871737").PN. OR ("6523679" | "6959803" | "7681719").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2015/01/08 15:34
S15	16	("1944296" | "3993185" | "5316125" | "5332083" | "5456349" | "5562199").PN. OR ("5871085").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2015/01/08 15:36
S16	18	S13 and slicer	US-PGPUB; USPAT; FPRS	OR	ON	2015/01/08 15:46
S17	668	198/817.ccls.	US-PGPUB; USPAT	OR	ON	2015/08/21 11:36
S18	35	("2610725" | "3004572" | "3583327" | "3638743" | "3921793" | "4023668" | "4146126" | "4433774" | "4556143" | "4803804" | "4925009" | "5129507" | "5304745" | "5562202").PN. OR ("5797481").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/21 14:18
S19	51	("3108648" | "3180475" | "3276525" | "3446298" | "3446299" | "3484813" | "3545611" | "3596750" | "3714401" | "3724720" | "3770069" | "4023668" | "4100984" | "4102421" | "4136749" | "4137567" | "4137568" | "4214640" | "4231439" | "4241407" | "4363408" | "4440249" | "4488635" | "4768600" | "4838705" | "4848479" | "4951763" | "5170857" | "Re29944").PN. OR ("5304745").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/21 14:22
S20	17	("3456776" | "3743078" | "3944054" | "4511028" | "4846338" | "5022514" | "5205400" | "5304745" | "6161683").PN. OR ("6509533").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/21 14:27
S21	40	("0299537" | "1224384" | "1240119" | "1461707" | "1845066" | "2577926" | "2579348" | "2710089" | "2781892" | "3554353" | "3563179").PN. OR ("3743078").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/24 08:37
S22	9	("3205958" | "3351179").PN. OR ("3596750").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/24 08:42

S23	20	("3456776" | "4938336" | "5022514" | "5086911" | "5692593" | "5715930" | "6509533").PN. OR ("6708813").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2015/08/24 08:44
S24	1	("8757361").PN.	US-PGPUB; USPAT	OR	OFF	2016/05/16 12:56
S25	0	("8757361").URPN.	USPAT	OR	ON	2016/05/16 12:58
S26	8	("20030145700" | "20040031363" | "5802803" | "6248013" | "6715947" | "6763750" | "6935215" | "7581474").PN. OR ("8757361").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2016/05/16 12:58
S27	595	198/835.ccls.	US-PGPUB; USPAT	OR	ON	2016/05/16 13:03
S28	2	("2536412").URPN.	USPAT	OR	ON	2016/05/31 00:56
S29	811	(b26d7/0625 b26D7/32).cpc. and belt	US-PGPUB; USPAT; USOCR	OR	ON	2016/05/31 01:14
S30	648	S29 and drive	US-PGPUB; USPAT; USOCR	OR	ON	2016/05/31 01:14
S31	88	b65g15/12.cpc.	US-PGPUB; USPAT	OR	ON	2016/05/31 01:22

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S32	92	(conveyor and belt and drive and mount and base).clm.	US-PGPUB; USPAT	OR	ON	2016/05/31 01:28

5/31/2016 2:08:45 AM
C:\Users\wharp\Documents\EAST\Workspaces\14\14094136.wsp

Issue Classification

Application/Control No.	Applicant(s)/Patent Under Reexamination
14094136	MAYER, JOSEF
Examiner	**Art Unit**
WILLIAM R HARP	3651

CPC						
Symbol					**Type**	**Version**
B26D		7	/	0625	F	2013-01-01
B26D		7	/	32	I	2013-01-01
B26D		2210	/	02	A	2013-01-01
B65G		15	/	00	A	2013-01-01
			/			
			/			
			/			
			/			
			/			
			/			
			/			
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			/			
			/			
			/			

CPC Combination Sets							
Symbol					**Type**	**Set**	**Ranking**	**Version**
			/					
			/					

NONE (Assistant Examiner)	(Date)	**Total Claims Allowed:** 24	
/WILLIAM R HARP/ Primary Examiner.Art Unit 3651 (Primary Examiner)	5/31/2016 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 1

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14094136	MAYER, JOSEF
	Examiner	**Art Unit**
	WILLIAM R HARP	3651

US ORIGINAL CLASSIFICATION		INTERNATIONAL CLASSIFICATION										
CLASS	SUBCLASS	CLAIMED					NON-CLAIMED					
198	817	B	6	5	G	15 / 10 (2006.01.01)						

CROSS REFERENCE(S)					
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)				

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	24	
/WILLIAM R HARP/ Primary Examiner.Art Unit 3651	5/31/2016	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14094136	MAYER, JOSEF
	Examiner	**Art Unit**
	WILLIAM R HARP	3651

☒ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original

NONE

(Assistant Examiner) (Date)

Total Claims Allowed:

24

/WILLIAM R HARP/
Primary Examiner.Art Unit 3651 5/31/2016

(Primary Examiner) (Date)

O.G. Print Claim(s)	O.G. Print Figure
1	1

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14094136	MAYER, JOSEF
	Examiner	Art Unit
	WILLIAM R HARP	3651

CPC- SEARCHED		
Symbol	Date	Examiner
B26D7/0625	5/31/2016	/wrh/
B26D7/32	5/31/2016	/wrh/
B65G15/12	5/31/2016	/wrh/

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
198	817	1/8/2015	/wrh/

SEARCH NOTES		
Search Notes	Date	Examiner
EAST search	1/8/2015	/wrh/
interference search	5/31/2016	/wrh/

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner
	see history	5/31/2016	/wrh/

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14094136	MAYER, JOSEF
	Examiner	**Art Unit**
	WILLIAM R HARP	3651

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	01/08/2015	09/08/2015	05/31/2016						
	1	-	-	-						
	2	-	-	-						
	3	-	-	-						
	4	-	-	-						
	5	-	-	-						
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	31	-	-	-						
	32	-	-	-						
	33	✓	✓	=						
	34	✓	✓	=						
	35	✓	✓	=						
	36	✓	✓	=						

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14094136	MAYER, JOSEF
	Examiner	Art Unit
	WILLIAM R HARP	3651

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	01/08/2015	09/08/2015	05/31/2016						
	37	✓	✓	=						
	38	✓	✓	=						
	39	✓	✓	=						
	40	✓	✓	=						
	41	✓	✓	=						
	42	✓	✓	-						
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	57	✓	✓	=						
	58			=						
	59			=						
	60			=						
	61			=						
	62			=						
	63			=						

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number	Filing Date	☐ To be Mailed
14/094,136	12/02/2013	

ENTITY: ☒ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED – PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT **01/28/2016**

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	* 24	Minus	** 25	= 0	X $80 =	0
Independent (37 CFR 1.16(h))	* 8	Minus	***3	= 5	X $420 =	2100
☐ Application Size Fee (37 CFR 1.16(s))						
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
					TOTAL ADD'L FEE	**2100**

AMENDMENT

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =	
Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =	
☐ Application Size Fee (37 CFR 1.16(s))						
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
					TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

LIE
/BRENDA TURNER/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

MFP0031US (T10212PUS)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT: Textor Maschinenbau Gmbh	) Group Art Unit: 3651
	)
SERIAL NUMBER: 14/094,136	) Examiner: William Ray Harp
	)
	)
FILED: December 12, 2013	) Confirmation No. 1104
	)
FOR: HIGH PERFORMANCE SLICING APPARATUS WITH AT LEAST ONE REMOVABLE CONVEYOR BELT UNIT	)

AMENDMENT

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Dear Sir:

This is in response to the outstanding Office Action of September 11, 2015, wherein pending claims 33-57 were rejected. Reconsideration is respectfully requested in view of the following amendments and remarks.

Please make the following amendments to the Application as set forth below.

CLAIMS

Please amend the claims and add new claims as indicated below.

1-32. (Canceled)

33. (Currently Amended) A slicing apparatus for food products ~~having products~~, the slicing apparatus comprising: ~~at least one belt conveyor which is designed as~~ a removable conveyor belt unit (13) having at least one track and a base (25); a substructure (41) having a mount (11) coupled to the base (25); and~~, wherein the conveyor belt unit is designed for a multitrack operation and is able to be coupled to a plurality of independent drives which are each associated with at least one track~~ a drive (15) coupled to the conveyor belt unit (13) by a drive belt (27), the conveyor belt unit (13) is configured to be cancelled by relaxing the drive belt (27) and is configured to be established by tautening the drive belt (27), with the relaxing and tautening of the drive belt (27) each being provided by a relative movement between the drive (15) and the conveyor belt unit (13).

34. (Previously Presented) The apparatus in accordance with claim 33, wherein the conveyor belt unit (13) is arranged in front of a cutting plane of the slicing apparatus, viewed in the conveying direction.

35. (Previously Presented) The apparatus in accordance with claim 33, wherein the conveyor belt unit (13) is arranged behind a cutting plane of the slicing apparatus, viewed in the conveying direction.

36. (Previously Presented) The apparatus in accordance with claim 33, wherein the conveyor belt unit (13) has, viewed in the conveying direction, a belt length or conveyor length which amounts to less than 500 mm.

37. (Previously Presented) The apparatus in accordance with claim 33, wherein at least one direct drive (15) for the conveyor belt unit (13) is provided.

38. (Currently Amended) The apparatus in accordance with claim 33, ~~further comprising at least one of~~further comprising:

wherein at least one drive motor (15) for the conveyor belt unit (13) is provided, with the drive motor (15) being directly coupled with the conveyor belt unit (13), and/or unit; and

wherein the drive motor (15) is arranged beneath the conveyor belt unit (13).

39. (Currently Amended) The apparatus in accordance with claim 33, ~~further comprising at least one of~~further comprising:

wherein a drive motor (15) for the conveyor belt unit (13) has a drive shaft (51) and the conveyor belt unit (13) has a drive wheel (44), with the drive shaft (51) and the drive wheel (44) being directly coupled to one another; and

wherein the drive motor (15) is arranged beneath the conveyor belt unit (13).

40. (Currently Amended) The apparatus in accordance with claim 33, ~~further comprising at least one of~~further comprising:

wherein the conveyor belt unit (13) has a supported belt roller (53), with a drive wheel (44) of the conveyor belt unit (13) being supported via the support of the belt roller; and

wherein the drive wheel (44) is arranged coaxially to the belt roller (53).

41. (Currently Amended) The apparatus in accordance with claim 33, ~~further comprising at least one of~~further comprising:

wherein a respective relative movement is provided between the drive motor (15) and the conveyor belt unit (13) for cancelling and establishing a coupling between a drive motor (15) for the conveyor belt unit (13) and the conveyor belt unit; and

wherein the spacing between a drive axle of the drive motor (15) and a

drive axle of the conveyor belt unit (13) is configured to be varied by the relative movement.

42. (Canceled)

43. (Previously Presented) The apparatus in accordance with claim 33, wherein a mount (11) is provided for the conveyor belt unit (13) which remains at the apparatus with a removed conveyor belt unit (13) and at which the conveyor belt unit (13) is configured to be latched, with the latched connection configured to be cancelled for removing the conveyor belt unit (13) and configured to be established for installing the conveyor belt unit (13).

44. (Previously Presented) The apparatus in accordance with claim 33, wherein a coupling between a drive (15) for the conveyor belt unit (13) and the conveyor belt unit (13) is configured to be cancelled or established simultaneously with a latching of the conveyor belt unit (13) for removing or installing the conveyor belt unit (13).

45. (Previously Presented) The apparatus in accordance with claim 33, wherein the coupling between a drive (15) for the conveyor belt unit (13) and the conveyor belt unit (13) is configured to be carried out simultaneously with a removal movement or installation movement of the conveyor belt unit (13) after the cancelling or before the establishing of a latched connection of the conveyor belt unit (13) for removing or for installing the conveyor belt unit (13).

46.-49. (Canceled)

50. (Currently Amended) The apparatus in accordance with claim 33, ~~further comprising at least one of~~further comprising:

wherein the conveyor belt unit (13) comprises a plurality of individual conveyors (71, 73) which are arranged, viewed in the conveying direction, behind one another and with which a separate drive (15) is associated; and

wherein viewed in the conveying direction, at least one drive (15) is coupled to the conveyor belt unit (13) at the left side and at least one further drive (15) at the right side.

51. (Previously Presented) The apparatus in accordance with claim 33, wherein the conveyor belt unit (13) has a conveying width in the range from approximately 300 mm to 700 mm.

52. (Previously Presented) The apparatus in accordance with claim 33, wherein at least one continuous belt or continuous band (55) or a plurality of parallel continuous straps (57) is/are provided as conveying means of the conveyor belt unit (13).

53. (Previously Presented) The apparatus in accordance with claim 33, wherein the conveyor belt unit (13) is configured to be removed and/or installed without tools.

54.-55. (Canceled)

56. (Currently Amended) The apparatus in accordance with claim 33, ~~further comprising at least one of~~further comprising:

wherein a plurality of conveyor belt units (13) are arranged behind one another viewed in the conveying direction; and

wherein the plurality of conveyor belt units are arranged beside one another, viewed in the conveying direction.

57. (Currently Amended) A conveying device for food products to be sliced or for sliced food products, the conveying device comprising at least one ~~belt conveyor that is a~~ removable conveyor belt unit (13), ~~wherein the conveyor belt unit is configured for a multitrack operation and is coupled to a plurality of independent drives each associated with at least one track of the multitrack operation~~having at least one track and a base (25);

a substructure (41) having a mount (11) provided with coupling elements (37) that

engage corresponding cut-outs (59) of the base (25); and

a drive (15) arranged at the substructure (41), the drive (15) connected to a drive shaft (51) that drives a drive wheel (44) of the conveyor belt unit (13) by a drive belt (27).

58. (New) A slicing apparatus for food products, the slicing apparatus comprising at least one removable conveyor belt unit (13) having at least one track and a base (25);

a substructure (41) having a mount (11) coupled to the base (25);

a drive (15) coupled to the conveyor belt unit (13) by an actuation device, the actuation device having a lever (19), a shaft (29) extending from the lever (19), a latching member (21) extending from the shaft (29) that cooperates with a slit (23) formed in the base (25) to latch the conveyor belt unit (13) to the mount (11), and a linkage (35) carrying the drive (15) for the conveyor belt unit (13) being pivotable about a pivot axis (33) by rotating the shaft (29) to move the latching member (21) between a latched position and a release position; and

a drive belt (27) that runs around a driveshaft (51) of the drive (15) and a drive wheel (44) of the conveyor belt unit (13), the conveyor belt unit (13) is configured to be cancelled by relaxing the drive belt (27) and is configured to be established by tautening the drive belt (27), with the relaxing and tautening of the drive belt (27) each being provided by a relative movement between the drive (15) and the conveyor belt unit (13).

59. (New) A slicing apparatus for food products, the slicing apparatus comprising at least one removable conveyor belt unit (13) having at least one track and a base (25);

a substructure (41) having a mount (11) coupled to the base (25); and

an actuation device that is provided as a coupling that is configured to be cancelled and established between a drive (15) for the conveyor belt unit (13) and the conveyor belt unit (13), and is configured as a latching of the conveyor belt

unit (13) to the mount (11), the actuation device comprises

a lever (19) having a shaft (29);

a linkage (35) carrying a drive (15) for the conveyor belt unit (13) being pivotable about a pivot axis (33) by rotating the shaft; and

a latching member (21) for the conveyor belt unit (13) being movable between a latched position (21) and a release position.

60. (New) A slicing apparatus for food products, the slicing apparatus comprising:

at least one removable conveyor belt unit (13) having at least one track and a base (25); and

a substructure (41) having a mount (11) coupled to the base (25), the conveyor belt unit (13) is movable relative to the drive (15) for cancelling and establishing a coupling between a drive (15) of the conveyor belt unit (13) and the conveyor belt unit (13), and the conveyor belt unit (13) is movable by at least one of folding over and pivoting.

61. (New) A slicing apparatus for food products, the slicing apparatus comprising:

at least one removable conveyor belt unit (13) having at least one track and a base (25);

a substructure (41) having a mount (11) coupled to the base (25); and

a first drive (15) is coupled to the conveyor belt unit (13) at the left side and at a second drive (15) at the right side, when viewed in the conveying direction, the coupling between the drives (15) and the conveyor belt unit (13) is configured to be simultaneously cancelled and established for at least one of the first drive (15) and the second drive (15).

62. (New) A slicing apparatus for food products, the slicing apparatus comprising:

at least one removable conveyor belt unit (13) having at least one track and a base (25); and

a substructure (41) having a mount (11) coupled to the base (25), the conveyor belt unit (13) is configured to first be movable with a component in or against the conveying direction relative to the mount (11) and is configured to subsequently

be raised from the mount (11) for at least one of removing and installing the conveyor belt unit (13) with a cancelled latched connection between the conveyor belt unit (13) and a mount (11) remaining at the apparatus.

63. (New) A slicing apparatus for food products, the slicing apparatus comprising:

at least one removable conveyor belt unit (13) having at least one track and a base (25); and

a substructure (41) having a mount (11) coupled to the base (25), the conveyor belt unit (13) is configured to first be pivoted about one of two supports (65, 67) of the mount (11), and is configured to subsequently be raised from the supports (65, 67) for at least one of removing and installing the conveyor belt unit (13) with a cancelled latched connection between the conveyor belt unit (13) and a mount (11) remaining at the apparatus.

REMARKS

Applicant gratefully acknowledges the withdrawal of the objections to the drawings and the withdrawal of the rejection of claims 33-35, 38-50, and 53-57 under 35 USC 112 made in the prior office action. Upon entry of the present Amendment, claims 33-41, 43-45, 50-53, and 56-63 will be pending in the application.

Claims 33, 38-41, 50, 56, and 57 have been amended. Claims 42, 46-49, 54, and 55 have been canceled. New claims 58-63 have been added. No new matter has been introduced by these amendments. Reconsideration is respectfully requested in view of the foregoing amendments and following remarks.

Rejection under 35 U.S.C. §112

Claims 33-57 were rejected under 35 USC 112, second paragraph. It is respectfully submitted that in view of the amendments to claims 33, 38 - 41, 50, 56, and 57 and the cancellation of claims 46 - 49, the rejection under 35 U.S.C. §112 is now cured. Reconsideration and withdrawal of the rejection is respectfully requested.

Rejection under 35 USC 102

Claims 33, 37, 38, 52, 53, and 57 were rejected under 35 USC 102(b) as being anticipated by U.S. Patent No. 7,909,159 to Zats et al. (hereinafter "Zats"). Claim 33 has been amended to include the limitations of claim 42 that has been indicated allowable by the Office Action. In view of the amendment to claim 33, the Applicant submits that claim 33 is allowable over the cited references. Reconsideration and withdrawal of the rejection of claim 33 is respectfully requested. Claims 37, 38, 52, and 53 depend on claim 33 and are allowable for at least the same reasons as claim 33.

Claim 57 has been amended to recite a conveying device for food products to be sliced or for sliced food products that includes "at least one removable conveyor belt unit (13) having at least one track and a base (25); a substructure (41) having a mount (11) provided with coupling elements (37) that engage corresponding cut-outs (59) of the base (25); and a drive (15) arranged at the substructure (41), the drive (15) connected to a

drive shaft (51) that drives a drive wheel (44) of the conveyor belt unit (13) by a drive belt (27)." Zats fails to disclose a conveying device for food products to be sliced or for sliced food products as claimed. Instead, Zats discloses a conveyor 5 that includes a primary frame 10a that supports a number of independent and elongate conveying units 15a-15f where each unit includes its own frame 20 and an independently driven conveyor element 25 by drive motor 35. Zats fails to disclose at least one removable conveyor belt unit having at least one track in a base; a substructure having a mount provided with coupling elements that engage corresponding cutouts of the base; and a drive arranged at the substructure, the drive connected to a drive shaft that drives a drive wheel of conveyor belt unit by drive belt. Reconsideration and withdrawal of the rejection of claim 57 is respectfully requested.

Rejection under 35 USC 103

Claims 34-36 and 51 were rejected under 35 USC 103(a) as being unpatentable over Zats. Claims 34-36 and 51 depend on claim 33 and are allowable for at least the same reasons as recited above relative to claim 33. Reconsideration and withdrawal of the rejection of claims 34-36 and 51 is respectfully requested.

Claims 39, 40, 50, and 56 were rejected under 35 USC 103(a) as being unpatentable over Zats and further in view of U.S. Patent Publication 2008/0073185 to Brayman et al (hereinafter "Brayman"). The addition of Brayman fails to cure the deficiencies of Zats. Claims 39, 40, 50, and 56 depend on claim 33 and are allowable for at least the same reasons as recited above relative to claim 33. Reconsideration and withdrawal of the rejection of claims 39, 40, 50, and 56 is respectfully requested.

Claims 41, 43, 44, and 45 were rejected under 35 USC 103(a) as being unpatentable over Zats and further in view of U.S. Patent No. 6,509,533 to Tanaka et al. (hereinafter "Tanaka"). The addition of Tanaka fails to cure the deficiencies of Zats. Claims 41, 43, 44, and 45 depend on claim 33 and are allowable for at least the same reasons as recited above relative to claim 33. Reconsideration and withdrawal of the rejection of claims 41, 43, 44, and 45 is respectfully requested.

New claim 58 includes the limitations of claim 46 that has been indicated allowable by the Office Action. In view of the incorporation of the limitations of allowable claim 46, the Applicant submits that new claim 58 is allowable over the cited references.

New claim 59 includes the limitations of claim 47 has been indicated allowable by the Office Action. In view of the incorporation of the limitations of allowable claim 47, the Applicant submits that new claim 59 is allowable over the cited references.

New claim 60 includes the limitations of claim 48 that has been indicated allowable by the Office Action. In view of the incorporation of the limitations of allowable claim 48, the Applicant submits that new claim 60 is allowable over the cited references.

New claim 61 includes the limitations of claim 49 that has been indicated allowable by the Office Action. In view of the incorporation of the limitations of allowable claim 49, the Applicant submits that new claim 61 is allowable over the cited references.

New claim 62 includes the limitations of claim 54 that has been indicated allowable by the Office Action. In view of the incorporation of the limitations of allowable claim 54, the Applicant submits that new claim 62 is allowable over the cited references.

New claim 63 includes the limitations of claim 55 that has been indicated allowable by the Office Action. In view of the incorporation of the limitations of allowable claim 55, the Applicant submits that new claim 63 is allowable over the cited references.

CONCLUSION

A two month extension of time is respectfully requested. Applicant hereby petitions under 37 CFR 1.136 or other applicable rule to have the response period extended the number of months necessary to render the attached communication timely if a petition is required. The Commissioner is hereby authorized to charge to Deposit Account 06-1130 any fees necessary for entry of this amendment and/or extension of time.

For all of the above reasons, it is respectfully submitted that pending claims 33-41, 43-45, 50-53, and 56-63 are patentable in view of the foregoing remarks. A Notice of Allowance is earnestly solicited. The Examiner is encouraged to contact the undersigned by telephone if direct conversation would be helpful.

Respectfully submitted,

CANTOR COLBURN LLP

By: /Justin D. Spurlock/

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Electronic Patent Application Fee Transmittal

Application Number:	14094136
Filing Date:	02-Dec-2013
Title of Invention:	High Performance Slicing Apparatus With At Least One Removable Conveyor Belt Unit
First Named Inventor/Applicant Name:	Josef Mayer
Filer:	Justin D. Spurlock
Attorney Docket Number:	MFP0031US (T10212PUS)

Filed as Large Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Independent claims in excess of 3	1201	5	420	2100
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Extension - 2 months with $0 paid	1252	1	600	600
Miscellaneous:				
			Total in USD ($)	**2700**

Electronic Acknowledgement Receipt

EFS ID:	24732391
Application Number:	14094136
International Application Number:	
Confirmation Number:	1104
Title of Invention:	High Performance Slicing Apparatus With At Least One Removable Conveyor Belt Unit
First Named Inventor/Applicant Name:	Josef Mayer
Customer Number:	23413
Filer:	Justin D. Spurlock
Filer Authorized By:	
Attorney Docket Number:	MFP0031US (T10212PUS)
Receipt Date:	28-JAN-2016
Filing Date:	02-DEC-2013
Time Stamp:	14:56:15
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$2700
RAM confirmation Number	1319
Deposit Account	061130
Authorized User	MCBAIN, SCOTT A

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

Charge any Additional Fees required under 37 CFR 1.16 (National application filing, search, and examination fees)

Charge any Additional Fees required under 37 CFR 1.17 (Patent application and reexamination processing fees)

Charge any Additional Fees required under 37 CFR 1.19 (Document supply fees)

Charge any Additional Fees required under 37 CFR 1.20 (Post Issuance fees)

Charge any Additional Fees required under 37 CFR 1.21 (Miscellaneous fees and charges)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		7JF5952.PDF	55652 705a3e208872bdc5990d32a4ff470d1a0d02d858	yes	12

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Amendment/Req. Reconsideration-After Non-Final Reject	1	1
	Claims	2	8
	Amendment/Req. Reconsideration-After Non-Final Reject	9	12

Warnings:

Information:

2	Fee Worksheet (SB06)	fee-info.pdf	32655 c2569fc2cf7951c4403bea06a016b96ea34c82de	no	2

Warnings:

Information:

Total Files Size (in bytes):	88307

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/094,136	12/02/2013	Josef Mayer	MFP0031US (T10212PUS)	1104

23413 7590 09/11/2015

CANTOR COLBURN LLP
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EXAMINER
HARP, WILLIAM RAY

ART UNIT	PAPER NUMBER
3651	

NOTIFICATION DATE	DELIVERY MODE
09/11/2015	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

usptopatentmail@cantorcolburn.com

Office Action Summary	Application No. 14/094,136	Applicant(s) MAYER, JOSEF	
	Examiner WILLIAM R. HARP	Art Unit 3651	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 May 2015*.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5)☒ Claim(s) *33-57* is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☒ Claim(s) *33-57* is/are rejected.

8)☐ Claim(s) _____ is/are objected to.

9)☐ Claim(s) _____ are subject to restriction and/or election requirement.

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☒ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date *1/30/2015*.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

4) ☐ Other: _____.

1. The present application is being examined under the pre-AIA first to invent provisions.

Response to Amendment

2. Examiner acknowledges the submission entered May 13, 2015 in response to an Office Action mailed January 13, 2015.

3. Claims 33-57 are pending. Claim(s) 1-32 is/are cancelled. Claim(s) 33-35,38-50,53-57 is/are currently amended.

4. The examiner withdraws the objections to the drawings presented in the Office Action listed above.

5. The examiner withdraws the rejection(s) of claim(s) 33-35,38-50, 53-57 under 35 U.S.C. 112 as presented in the aforementioned Office Action.

Information Disclosure Statement

6. The information disclosure statement(s) (IDS) was/were submitted on January 30, 2015. The submission(s) is/are in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement(s) is/are being considered by the examiner.

Claim Rejections - 35 USC § 112

7. The following is a quotation of 35 U.S.C. 112(b):

> (b) CONCLUSION.—The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the inventor or a joint inventor regards as the invention.

The following is a quotation of 35 U.S.C. 112 (pre-AIA), second paragraph:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

8. Claims 33-57 are rejected under 35 U.S.C. 112(b) or 35 U.S.C. 112 (pre-AIA), second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject

matter which the inventor or a joint inventor, or for pre-AIA the applicant regards as the invention.

9. Claim 33 recites "wherein the conveyor belt unit is designed for a multitrack operation and is able to be coupled to a plurality of independent drives which are associated with at least one track". The claim is indefinite because the recitation "designed for a multitrack operation" does not set forth definitive structure, yet the recitation "able to be coupled to a plurality of independent drives which are associated with at least one track" seems to require the presence of drives and tracks. It is not clear if the tracks and drives are required by the claim language. Claim 57 also suffers from the same deficiency.

10. Claim 38 recites "at least one drive motor for the conveyor belt unit is provided", yet it is unclear how the drive motor relates to the "drives" recited in claim 33.

11. In claim 38, the language "comprising at least one of" implies the listing of alternatives in the claim; however, the rest of the claim language only sets forth a drive motor and how the drive motor is arranged. Therefore, there are no alternatives to be considered in the claim language and the scope of the claim is unclear. The claim language should be amended to either recite alternatives or remove the "at least one of".

12. Claim 39 recites "a drive motor for the conveyor belt unit…", yet it is unclear how the drive motor relates to the "drives" recited in claim 33.

13. In claim 39, the language "comprising at least one of" implies the listing of alternatives in the claim; however, the rest of the claim language only sets forth a drive motor, drive shaft, drive wheel and how the drive motor is arranged. Therefore, there are no alternatives to be considered

in the claim language and the scope of the claim is unclear. The claim language should be amended to either recite alternatives or remove the "at least one of".

14. In claim 40, the language "comprising at least one of" implies the listing of alternatives in the claim; however, the rest of the claim language only sets forth a belt roller, drive wheel and how they are arranged. Therefore, there are no alternatives to be considered in the claim language and the scope of the claim is unclear. The claim language should be amended to either recite alternatives or remove the "at least one of".

15. Claim 41 recites "the drive motor" , yet fails to provide antecedent basis for the limitation.

16. In claim 41, the language "comprising at least one of" implies the listing of alternatives in the claim; however, the claim does not set forth alternatives. Therefore, there are no alternatives to be considered in the claim language and the scope of the claim is unclear. The claim language should be amended to either recite alternatives or remove the "at least one of".

17. In claim 46, the language "comprising at least one of" implies the listing of alternatives in the claim; however, the claim does not set forth alternatives. Therefore, there are no alternatives to be considered in the claim language and the scope of the claim is unclear. The claim language should be amended to either recite alternatives or remove the "at least one of".

18. In claim 47, the language "comprising at least one of" implies the listing of alternatives in the claim; however, the claim does not set forth alternatives. Therefore, there are no alternatives to be considered in the claim language and the scope of the claim is unclear. The claim language should be amended to either recite alternatives or remove the "at least one of".

19. In claim 48, the language "comprising at least one of" implies the listing of alternatives in the claim; however, the claim does not set forth alternatives. Therefore, there are no alternatives to be considered in the claim language and the scope of the claim is unclear. The claim language should be amended to either recite alternatives or remove the "at least one of".

20. Regarding Claim 48, the recitation "the conveyor belt unit or an assembly or a component of the conveyor belt unit…" renders the claim indefinite because it is not clear what is encompassed by "an assembly or a component of the conveyor belt unit".

21. In claim 49, the language "comprising at least one of" implies the listing of alternatives in the claim; however, the claim does not set forth alternatives. Therefore, there are no alternatives to be considered in the claim language and the scope of the claim is unclear. The claim language should be amended to either recite alternatives or remove the "at least one of".

22. In claim 50, the language "comprising at least one of" implies the listing of alternatives in the claim; however, the claim does not set forth alternatives. Therefore, there are no alternatives to be considered in the claim language and the scope of the claim is unclear. The claim language should be amended to either recite alternatives or remove the "at least one of".

23. In claim 56, the language "comprising at least one of" implies the listing of alternatives in the claim; however, the claim does not set forth alternatives. Therefore, there are no alternatives to be considered in the claim language and the scope of the claim is unclear. The claim language should be amended to either recite alternatives or remove the "at least one of".

24. Claims 34-56 are rejected as being dependent upon a rejected base claim.

25. The prior art has been applied as best understood.

Claim Rejections - 35 USC § 102

26. In the event the determination of the status of the application as subject to AIA 35 U.S.C. 102 and 103 (or as subject to pre-AIA 35 U.S.C. 102 and 103) is incorrect, any correction of the statutory basis for the rejection will not be considered a new ground of rejection if the prior art relied upon, and the rationale supporting the rejection, would be the same under either status.

27. The following is a quotation of the appropriate paragraphs of pre-AIA 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

28. Claim(s) 33, 37, 38, 52, 534, 57 is/are rejected under pre-AIA 35 U.S.C. 102b as being anticipated by Zats et al. (USPN 7909159).

29. Regarding Claims 33, 57, Zats et al. (USPN 7909159) teaches an apparatus comprising at least one belt conveyor (5) which is designed as a removable conveyor belt unit, wherein the conveyor belt unit is designed for a multitrack operation (the conveyor has multiple tracks 15a-15f) and is able to be coupled to a plurality of independent drives (35) which are associated with at least one track. While not clear (as described above), the claim language has been interpreted to mean that multiple tracks are present ("multitrack") and each track has a drive. The conveyor of Zats is capable of use in a slicing apparatus, as the claim does not require any further structure regarding the slicing apparatus.

30. Regarding Claim 37, Zats et al. teaches a direct drive (35).

31. Regarding Claim 38, Zats et al. teaches a drive motor (35), the drive motor arranged beneath the conveyor belt.

32. Regarding Claim 52, Zats et al. teaches continuous belts.

33. Regarding Claim 53, the recitation "configured to be removed and/or installed without tools" does not set forth structure. It would be up to one of ordinary skill how to remove and/or install the conveyor belt unit.

Claim Rejections - 35 USC § 103

34. The following is a quotation of pre-AIA 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

35. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under pre-AIA 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.

2. Ascertaining the differences between the prior art and the claims at issue.

3. Resolving the level of ordinary skill in the pertinent art.

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

36. Claims 34-36, 51 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Zats et al.

37. Regarding Claim 34, 35, Zats et al. fails to teach the arrangement of the belt unit relative to the cutting plane; however, it has been held that rearranging parts of an invention involves only routine skill in the art. *In re Japikse*, 86 USPQ 70. It would have been obvious to one of

ordinary skill at the time of the invention to select the location of the belt unit as an obvious design choice.

38. Regarding Claim 36, Zats et al. fails to teach the belt length, however, a change in the size of a prior art device is a design consideration within the skill of the art. *In re Rose*, 220 F.2d 459, 105 USPQ 237 (CCPA 1955). It would have been obvious to one of ordinary skill at the time of the invention to select the length of the belt as engineering expedient.

39. Regarding Claim 51, Zats et al. fails to teach the conveying width. However, a change in the size of a prior art device is a design consideration within the skill of the art. *In re Rose*, 220 F.2d 459, 105 USPQ 237 (CCPA 1955). It would have been obvious to one of ordinary skill at the time of the invention to select the width of the conveyor belt unit as engineering expedient.

40. Claim(s) 39, 40, 50 is/are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Zats et al. as applied to claim 33 above, and further in view of Brayman et al. (US Pub 20080073185 A1).

41. Regarding Claim 39, Zats et al. teaches a drive motor (35), the drive motor beneath the conveyor belt unit, yet fails to teach a drive shaft and drive wheel. Brayman et al. (US Pub 20080073185 A1) teaches a drive motor (22) having a drive shaft (22'), a conveyor belt unit (12) having a drive wheel (34), the drive shaft and drive wheel being directly coupled to one another. It would have been obvious to one of ordinary skill at the time of the invention to use a drive shaft and drive wheel to power a conveyor belt unit since the elements were known in the art and one of ordinary skill, using known methods, could have combined them with no change in their respective functions, and yielded nothing more than predictable results.

42. Regarding Claim 40, Zats et al. fails to teach a supported belt roller with a drive wheel. Brayman et al. teaches a drive motor (22) having a drive shaft (22'), a conveyor belt unit (12) having a drive wheel (34), and a supported belt roller (24) arranged coaxially to the drive wheel. It would have been obvious to one of ordinary skill at the time of the invention to use a belt roller with drive wheel to power a conveyor belt unit since the elements were known in the art and one of ordinary skill, using known methods, could have combined them with no change in their respective functions, and yielded nothing more than predictable results.

43. Regarding Claims 50 and 56, Zats et al. teaches conveyor belt units arranged beside one another, yet fails to teach a plurality of individual conveyors which are arranged behind one another and with which a separate drive (22) is associated. Brayman et al. teaches a plurality of individual conveyors (see Figure 1) arranged behind one another and with which a separate drive is associated. It would have been obvious to one of ordinary skill at the time of the invention to use a plurality of individual conveyors to increase the distance over which articles can be conveyed. Regarding the arrangement of the drives, it has been held that rearranging parts of an invention involves only routine skill in the art. *In re Japikse*, 86 USPQ 70. It would have been obvious to one of ordinary skill at the time of the invention to arrange the drives as engineering expedient.

44. Claim(s) 41 is/are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Zats et al. as applied to claim 33 above, and further in view of Tanaka et al. (USPN 6509533).

45. Regarding Claim 41, Zats et al. fails to teach a relative movement is provided between the drive motor and the conveyor belt unit. Tanaka et al. (USPN 6509533) teaches a motor (4) and conveyor belt unit (3) and discloses a relative movement between the two to cancelling and

establishing a coupling between the drive motor and the conveyor belt unit. It would have been obvious to one of ordinary skill at the time of the invention to provide a relative movement between a motor and belt unit as taught by Tanaka et al.

46. Regarding Claim 43, Zats et al. fails to teach a mount. Tananka teaches a mount (2) and a latch connection (30) so that the belt unit may be separated from the mount. It would have been obvious to one of ordinary skill at the time of the invention to use a mount and latch connection since the elements were known in the art and one of ordinary skill, using known methods, could have combined them with no change in their respective functions, and yielded nothing more than predictable results.

47. Regarding Claims 44, 45, Zats et al. fails to teach a coupling between the drive and the conveyor belt unit is configured to be cancelled or established simultaneously with a latching of the conveyor belt unit. Tanaka teaches a coupling between the drive and the conveyor belt unit is configured to be cancelled or established simultaneously with a latching of the conveyor belt unit [Col 9, Line 21-24]. It would have been obvious to one of ordinary skill at the time of the invention to use a coupling between the drive and conveyor belt unit since the elements were known in the art and one of ordinary skill, using known methods, could have combined them with no change in their respective functions, and yielded nothing more than predictable results.

Allowable Subject Matter

48. Claims 42, 46, 47, 48, 49, 54 and 55 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112(b) or 35 U.S.C. 112 (pre-AIA), 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to WILLIAM R. HARP whose telephone number is (571)270-5386. The examiner can normally be reached on Monday - Thursday, 8:30 AM - 5:00 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gene Crawford can be reached on (571) 272-6911. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/WILLIAM R HARP/
Primary Examiner, Art Unit 3651

Notice of References Cited	Application/Control No. 14/094,136	Applicant(s)/Patent Under Reexamination MAYER, JOSEF	
	Examiner WILLIAM R. HARP	Art Unit 3651	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-6,509,533 B1	01-2003	Tanaka; Osamu	B65G15/00	177/126
*	B	US-7,909,159 B1	03-2011	Zats; Alexander	B65G15/12	198/586
	C	US-				
	D	US-				
	E	US-				
	F	US-				
	G	US-				
	H	US-				
	I	US-				
	J	US-				
	K	US-				
	L	US-				
	M	US-				

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*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
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	P					
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	R					
	S					
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*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
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	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14094136	MAYER, JOSEF
	Examiner	**Art Unit**
	WILLIAM R HARP	3651

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	01/08/2015	09/08/2015							
	1	-	-							
	2	-	-							
	3	-	-							
	4	-	-							
	5	-	-							
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	32	-	-							
	33	✓	✓							
	34	✓	✓							
	35	✓	✓							
	36	✓	✓							

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14094136	MAYER, JOSEF
	Examiner	Art Unit
	WILLIAM R HARP	3651

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	01/08/2015	09/08/2015							
	37	✓	✓							
	38	✓	✓							
	39	✓	✓							
	40	✓	✓							
	41	✓	✓							
	42	✓	✓							
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	56	✓	✓							
	57	✓	✓							

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14094136	MAYER, JOSEF
	Examiner	Art Unit
	WILLIAM R HARP	3651

CPC- SEARCHED		
Symbol	Date	Examiner

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
198	817	1/8/2015	/wrh/

SEARCH NOTES		
Search Notes	Date	Examiner
EAST search	1/8/2015	/wrh/

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	14094136
Filing Date	2013-12-02
First Named Inventor	Josef Mayer
Art Unit	3651
Examiner Name	Harp, William Ray
Attorney Docket Number	MFP0031US (T10212PUS)

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	1	2006103348	WO	A1	2011-08-17	NEOLUTION		☐
	2	2357063	EP	A1	2011-08-17	KRAFT FOODS GLOBAL BRANDS LLC		☐

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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Application Number	14094136
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First Named Inventor	Josef Mayer
Art Unit	3651
Examiner Name	Harp, William Ray
Attorney Docket Number	MFP0031US (T10212PUS)

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1	European Search Report for European Application No. 13195533.8 dated December 10, 2014.	☐

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EXAMINER SIGNATURE

Examiner Signature	/WILLIAM HARP/	Date Considered	08/20/2015

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /WH/

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	14094136
Filing Date	2013-12-02
First Named Inventor	Josef Mayer
Art Unit	3651
Examiner Name	Harp, William Ray
Attorney Docket Number	MFP0031US (T10212PUS)

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☒ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☐ See attached certification statement.

☐ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☐ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/SCOTTAMcBAIN/	Date (YYYY-MM-DD)	2015-01-30
Name/Print	Scott A. McBain	Registration Number	37181

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

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2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

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MFP-0031US

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

INVENTOR: Joseph Mayer	) Group Art Unit: 3651
APPLICANT: Textor Maschinenbau Gmbh	)
SERIAL NUMBER: 14/094,136	) Examiner: William Ray Harp
FILED: DECEMBER 2, 2013	) Confirmation No.: 1104
FOR: HIGH PERFORMANCE SLICING APPARATUS WITH AT LEAST ONE REMOVABLE CONVEYOR BELT UNIT	)

Filed via EFS-web
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

AMENDMENT

This is in response to the outstanding Office Action of January 13, 2015, wherein pending claims 33-57 were rejected. Reconsideration is respectfully requested in view of the following amendments and remarks.

Please make the following amendments to the Application as set forth below.

AMENDMENTS TO THE SPECIFICATION

Please replace Paragraph [0062] of the U.S. Pub. with the following amended paragraph:

[0062] The embodiments described herein differ with respect to different aspects: Figs. 1 to 5 describe a single-track traction conveyor in which the conveyor belt unit 13 is configured as a traction belt. Such a traction conveyor is in particular a component of a product supply of a slicer with which one or more food products to be sliced are supplied to a cutting plane together. For example, Fig. 2 illustrates a cutting plane 90.

Please replace Paragraph [0064] of the U.S. Pub. with the following amended paragraph:

[0064] The embodiment of Figs. 8 to 10 relates to a single-track portioning conveyor in which a single removable conveyor belt unit 13 comprises two individual conveyors, namely a short portioning belt 71 and a long portioning belt 73. Fig. 8 illustrates a cutting plane 92.

IN THE CLAIMS:

Please amend the claims as follows:

1-32. (Canceled)

33. (Currently Amended) A slicing apparatus for food ~~products having~~ products, the slicing apparatus comprising at least one belt conveyor which is designed as a removable conveyor belt unit (13), wherein the conveyor belt unit is designed for a multitrack operation and is able to be coupled to a plurality of independent drives which are each associated with at least one track.

34. (Currently Amended) The apparatus in accordance with claim 33, wherein the conveyor belt unit (13) is arranged in front of [[the]] a cutting plane of the slicing apparatus, viewed in the conveying direction.

35. (Currently Amended) The apparatus in accordance with claim 33, wherein the conveyor belt unit (13) is arranged behind [[the]] a cutting plane of the slicing apparatus, viewed in the conveying direction.

36. (Previously Presented) The apparatus in accordance with claim 33, wherein the conveyor belt unit (13) has, viewed in the conveying direction, a belt length or conveyor length which amounts to less than 500 mm.

37. (Previously Presented) The apparatus in accordance with claim 33, wherein at least one direct drive (15) for the conveyor belt unit (13) is provided.

38. (Currently Amended) The apparatus in accordance with claim 33, further comprising at least one of:

wherein at least one drive motor (15) for the conveyor belt unit (13) is provided, with the drive motor (15) being directly coupled with the conveyor belt ~~unit (13), and/or~~ unit; and

wherein the drive motor (15) is arranged beneath the conveyor belt unit (13).

39. (Currently Amended) The apparatus in accordance with claim 33, further comprising at least one of:

wherein a drive motor (15) for the conveyor belt unit (13) has a drive shaft (51) and the conveyor belt unit (13) has a drive wheel (44), with the drive shaft (51) and the drive wheel (44) being directly coupled to one ~~another, and/or~~ another; and

wherein the drive motor (15) is arranged beneath the conveyor belt unit (13).

40. (Currently Amended) The apparatus in accordance with claim 33, further comprising at least one of:

wherein the conveyor belt unit (13) has a supported belt roller (53), with a drive wheel (44) of the conveyor belt unit (13) being supported via the support of the belt ~~roller (53), and/or~~ roller; and

wherein the drive wheel (44) is arranged coaxially to the belt roller (53).

41. (Currently Amended) The apparatus in accordance with claim 33, further comprising at least one of:

wherein a respective relative movement is provided between the drive motor (15) and the conveyor belt unit (13) for cancelling and establishing a coupling between a drive motor (15) for the conveyor belt unit (13) and the conveyor belt ~~unit (13), and/or~~ unit; and

wherein the spacing between a drive axle of the drive motor (15) and a drive axle of the conveyor belt unit (13) [[can]] is configured to be varied by the

relative movement.

42. (Currently Amended) The apparatus in accordance with claim 33, wherein a coupling between a drive (15) for the conveyor belt unit (13) and the conveyor belt unit (13) [[can]] is configured to be cancelled by relaxing a drive belt (27) and can be established by tautening the drive belt (27), with the relaxing and tautening of the drive belt (27) each being provided by a relative movement between the drive (15) and the conveyor belt unit (13).

43. (Currently Amended) The apparatus in accordance with claim 33, wherein a mount (11) is provided for the conveyor belt unit (13) which remains at the apparatus with a removed conveyor belt unit (13) and at which the conveyor belt unit (13) [[can]] is configured to be latched, with the latched connection ~~being able~~ configured to be cancelled for removing the conveyor belt unit (13) and ~~being able~~ configured to be established for installing the conveyor belt unit (13).

44. (Currently Amended) The apparatus in accordance with claim 33, wherein a coupling between a drive (15) for the conveyor belt unit (13) and the conveyor belt unit (13) [[can]] is configured to be cancelled or established simultaneously with a latching of the conveyor belt unit (13) for removing or installing the conveyor belt unit (13).

45. (Currently Amended) The apparatus in accordance with claim 33, wherein the coupling between a drive (15) for the conveyor belt unit (13) and the conveyor belt unit (13) [[can]] is configured to be carried out simultaneously with a removal movement or installation movement of the conveyor belt unit (13) after the cancelling or before the establishing of a latched connection of the conveyor belt unit (13) for removing or for installing the conveyor belt unit (13).

46. (Currently Amended) The apparatus in accordance with claim 33, further comprising at least one of:

wherein an actuation device (19) is provided for a coupling between a drive (15) for the conveyor belt unit (13) and the conveyor belt unit (13) and/or for a latching of the conveyor belt unit (13) to a ~~mount (11), and/or~~ mount; and

wherein the actuation device comprises a lever (19) having a shaft (29), with a linkage (35) carrying a drive (15) for the conveyor belt unit (13) being pivotable about a pivot axis (33) by rotating the shaft (29) and/or with a latching member (21) for the conveyor belt unit (13) being movable between a latched position (21) and a release position.

47. (Currently Amended) The apparatus in accordance with claim 33, further comprising at least one of:

wherein an actuation device (19) is provided with which a coupling [[can]] is configured to be simultaneously cancelled and established between a drive (15) for the conveyor belt unit (13) and the conveyor belt unit (13), on the one hand, and a latching of the conveyor belt unit (13) to a mount (11) of the apparatus, on the other ~~hand, and/or~~ hand; and

wherein the actuation device comprises a lever (19) having a shaft (29), with at least one of:

a linkage (35) carrying a drive (15) for the conveyor belt unit (13) being pivotable about a pivot axis (33) by rotating the ~~shaft (29) and/or with~~ shaft; and

a latching member (21) for the conveyor belt unit (13) being movable between a latched position (21) and a release position.

48. (Currently Amended) The apparatus in accordance with claim 33, further comprising at least one of:

wherein the conveyor belt unit (13) or an assembly or a component of the

conveyor belt unit (13) is movable relative to the drive (15) for cancelling and establishing a coupling between a drive (15) for the conveyor belt unit (13) and the conveyor belt ~~unit (13) and/or~~ unit; and

wherein the conveyor belt unit (13) or an assembly or a component of the conveyor belt unit (13) is movable by folding over or pivoting.

49. (Currently Amended) The apparatus in accordance with claim 33, ~~wherein the conveyor belt unit (13) is designed for a multitrack operation, and/or~~ further comprising at least one of:

wherein viewed in the conveying direction, at least one drive (15) is coupled to the conveyor belt unit (13) at the left side and at least one further drive (15) at the right ~~side, and/or~~ side; and

wherein the coupling between the drives (15) and the conveyor belt unit (13) [[can]] is configured to be simultaneously cancelled and established at least for a plurality of drives (15).

50. (Currently Amended) The apparatus in accordance with claim 33, further comprising at least one of:

wherein the conveyor belt unit (13) comprises a plurality of individual conveyors (71, 73) which are arranged, viewed in the conveying direction, behind one another and with which a separate drive (15) is ~~associated, and/or~~ associated; and

wherein viewed in the conveying direction, at least one drive (15) is coupled to the conveyor belt unit (13) at the left side and at least one further drive (15) at the right side.

51. (Previously Presented) The apparatus in accordance with claim 33, wherein the conveyor belt unit (13) has a conveying width in the range from

approximately 300 mm to 700 mm.

52. (Previously Presented) The apparatus in accordance with claim 33, wherein at least one continuous belt or continuous band (55) or a plurality of parallel continuous straps (57) is/are provided as conveying means of the conveyor belt unit (13).

53. (Currently Amended) The apparatus in accordance with claim 33, wherein the conveyor belt unit (13) [[can]] is configured to be removed and/or installed without tools.

54. (Currently Amended) The apparatus in accordance with claim 33, wherein the conveyor belt unit (13) [[can]] is configured to first be moved with a component in or against the conveying direction relative to the mount (11) and [[can]] is configured to subsequently be raised from the mount (11) for removing and/or for installing the conveyor belt unit (13) with a cancelled latched connection between the conveyor belt unit (13) and a mount (11) remaining at the apparatus.

55. (Currently Amended) The apparatus in accordance with ~~claim 1~~ claim 33, wherein the conveyor belt unit (13) [[can]] is configured to first be pivoted about [[the]] one of two supports (65, 67) of the mount (11), and [[can]] is configured to subsequently be raised from the supports (65, 67) for removing and/or for installing the conveyor belt unit (13) with a cancelled latched connection between the conveyor belt unit (13) and a mount (11) remaining at the apparatus.

56. (Currently Amended) The apparatus in accordance with claim 33, further comprising at least one of:

wherein a plurality of conveyor belt units (13) are arranged behind one another ~~and/or~~ viewed in the conveying direction; and

wherein the plurality of conveyor belt units are arranged beside one

another, viewed in the conveying direction.

57. (Currently Amended) A conveying device for food products to be sliced or for sliced food ~~products which comprises~~ products, the conveying device comprising at least one belt conveyor ~~which is designed as~~ that is a removable conveyor belt unit (13), wherein the conveyor belt unit is configured for a multitrack operation and is coupled to a plurality of independent drives each associated with at least one track of the multitrack operation.

AMENDMENTS TO THE DRAWINGS

The attached "Replacement Sheet(s)" of drawings include(s) changes to Figure(s) 2 and 8. The attached "Replacement Sheet(s)," which include(s) Figure(s) 1, 2, and 8, replace(s) the original sheet(s) including Figure(s) 1, 2, and 8.

Attachment: Replacement Sheet(s)

REMARKS

Claims 33-57 are now pending in the application. Claims 33-35, 38-50, and 53-57 have been amended. No new matter has been introduced by these amendments. Reconsideration is respectfully requested in view of the foregoing amendments and following remarks.

Drawings

Concerning the objections to the drawings applicants have amended the drawings in accordance with the guidelines provided in the outstanding office action. Applicant(s) have attached revised drawings for the Examiner's approval. More specifically, FIGS. 2 and 8 have been amended to illustrate the claimed cutting planes. No new matter has been added. Therefore, Applicant respectfully requests withdrawal of the drawing objections.

Claim Objections

The claims are objected to because they are generally narrative, using passive language such as "at least one direct drive (15) for the conveyor belt (13) is provided." Claim 33 has been amended as suggested by the Examiner to use positive language such as --comprising--.

Rejections Under 35 U.S.C. § 112

Claims 34, 35, 38-50 and 53-56 stand rejected under 35 U.S.C. § 112(b) or 35 U.S.C. § 112 (pre-AIA), second paragraph, as being indefinite for failing to particularly point and distinctly claim the subject matter which Applicant regards as the invention. This rejection is respectfully traversed.

Regarding claims 34 and 35, the claims have been amended to provide antecedent basis for the limitation "cutting plane."

Regarding claims 38-41, 46-50, and 53-56, Applicant has removed most instances of the term "and/or" and has amended the claims to clarify the claim language. However, Applicant respectfully submits that the term "and/or" is not indefinite. Rather, the term merely provides several alternatives. For example, the phrase "A and/or B" is taken to mean A or B or both. As stated in MPEP § 2173.04, "breadth of a claim is not to be equated with indefiniteness." The claims should merely be given their broadest reasonable interpretation in line with MPEP §2111. As such, the term "and/or" remains in some claims where Applicant believes the claim is clearer with the term included.

Regarding claims 41-45, 47, 49, and 53-55, the term "can be" has been removed from the claims. Accordingly, Applicant submits the claims are definite.

In light of the foregoing, Applicant respectfully requests withdrawal of the rejection.

Rejections Under 35 U.S.C. § 102

Claims 33-35, 52 and 57 stand rejected under pre-AIA 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,967,296 to Dolan ("Dolan") or U.S. Patent No. 6,959,803 to Layne et al. ("Layne") or U.S. Patent No. 3,878,937 to Glaser et al. ("Glaser"). This rejection is respectfully traversed.

Claim 33 recites a slicing apparatus for food products, the slicing apparatus comprising "at least one belt conveyor which is designed as a removable conveyor belt unit….wherein the conveyor belt unit is designed for a multitrack operation and is able to be coupled to a plurality of independent drives which are each associated with at least one track."

Dolan, Layne, and Glaser fail to describe or suggest each and every feature of amended claim 33. Specifically, Dolan, Layne, and Glaser fail to describe or suggest a slicing apparatus with at least one belt conveyor designed as a removable conveyor belt

unit, where the conveyor belt unit is designed for a multitrack operation and is able to be coupled to a plurality of independent drives each associated with at least one track.

In contrast, Dolan, Layne, and Glaser only describe a single drive for the whole conveyor belt unit. Moreover, Layne describes a conveyor belt unit (belt assembly) that is substantially fully releasable from a corresponding base for servicing or clearing a jam (see Abstract). However, as can be seen in FIG. 7, the drive unit includes a motor for driving the conveyor. This avoids the need for providing a separate electric motor or other motive device for the conveyor (see col. 8, lns. 60+). Thus only a single drive for the whole conveyor belt unit is disclosed. Neither Dolan, Layne, nor Glaser discloses that the conveyor belt unit is designed for multitrack operation and is coupleable to a plurality of independent drives which are each associated with at least one track.

Claim 57 recites a conveying device for food products to be sliced or for sliced food products, the conveying device comprising "at least one belt conveyor that is a removable conveyor belt unit, wherein the conveyor belt unit is configured for a multitrack operation and is coupled to a plurality of independent drives each associated with at least one track of the multitrack operation."

Dolan, Layne, and Glaser fail to describe or suggest each and every feature of amended claim 57. Specifically, Dolan, Layne, and Glaser fail to describe or suggest a conveying device with at least one removable conveyor belt unit, where the conveyor belt unit is configured for a multitrack operation and is coupled to a plurality of independent drives each associated with at least one track of the multitrack operation.

In contrast, Dolan, Layne, and Glaser only describe a single drive for the whole conveyor belt unit. Moreover, Layne describes a conveyor belt unit (belt assembly) that is substantially fully releasable from a corresponding base for servicing or clearing a jam (see Abstract). However, as can be seen in FIG. 7, the drive unit includes a motor for driving the conveyor. This avoids the need for providing a separate electric motor or other motive device for the conveyor (see col. 8, lns. 60+). Thus only a single drive for

the whole conveyor belt unit is disclosed. Neither Dolan, Layne, nor Glaser discloses that the conveyor belt unit is used for a multitrack operation and is coupled to a plurality of independent drives which are each associated with at least one track of the multitrack.

Rejections Under 35 U.S.C. § 103

Claims 36 and 51 stand rejected under pre-AIA 35 U.S.C. § 103(a) as being unpatentable over Dolan in view of Glaser or Layne in view of Glaser. This rejection is respectfully traversed.

As discussed above, claim 33 is patentable over Dolan, Glaser, and Layne. Claims 36 and 51 depend from independent claim 33 and are patentable for at least the same reasons.

CONCLUSION

Applicants hereby petition under 37 CFR 1.136 or other applicable rule to have the response period extended the number of months necessary to render the attached communication timely if a petition is required. The Commissioner is hereby authorized to charge to Deposit Account 06-1130 any fees necessary for entry of this amendment and/or extension of time.

For all of the above reasons, it is respectfully submitted that pending claims 33-57 are patentable in view of the foregoing remarks. A Notice of Allowance is earnestly solicited. The Examiner is encouraged to contact the undersigned by telephone if direct conversation would be helpful.

Respectfully submitted,

By: /LUKAS M. BALDRIDGE/

LUKAS M. BALDRIDGE
Reg. No. 65,187
Cantor Colburn LLP
(248) 524-2300

Fig.1

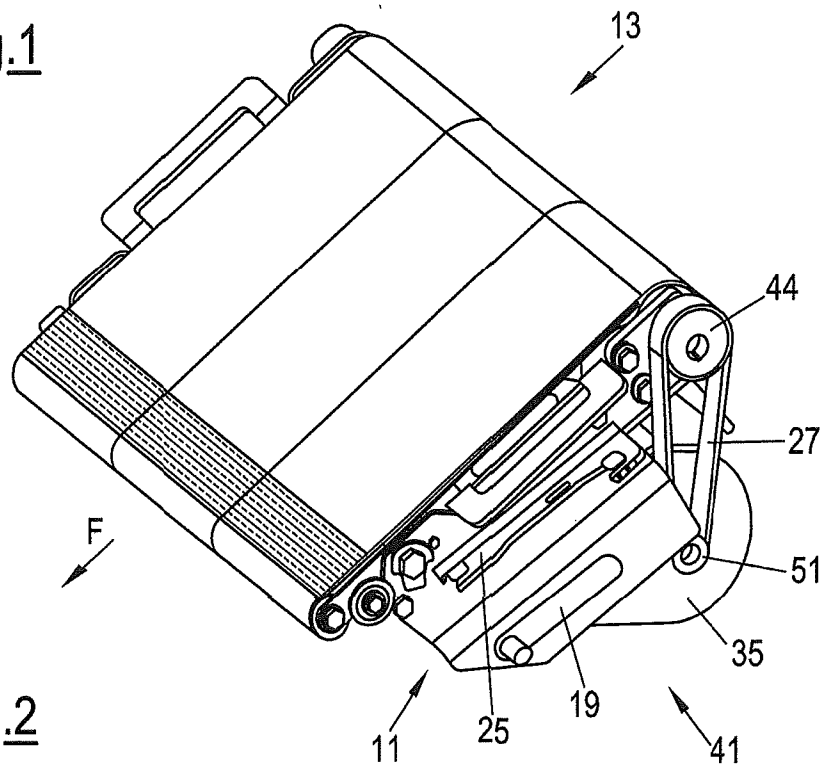


Fig.2

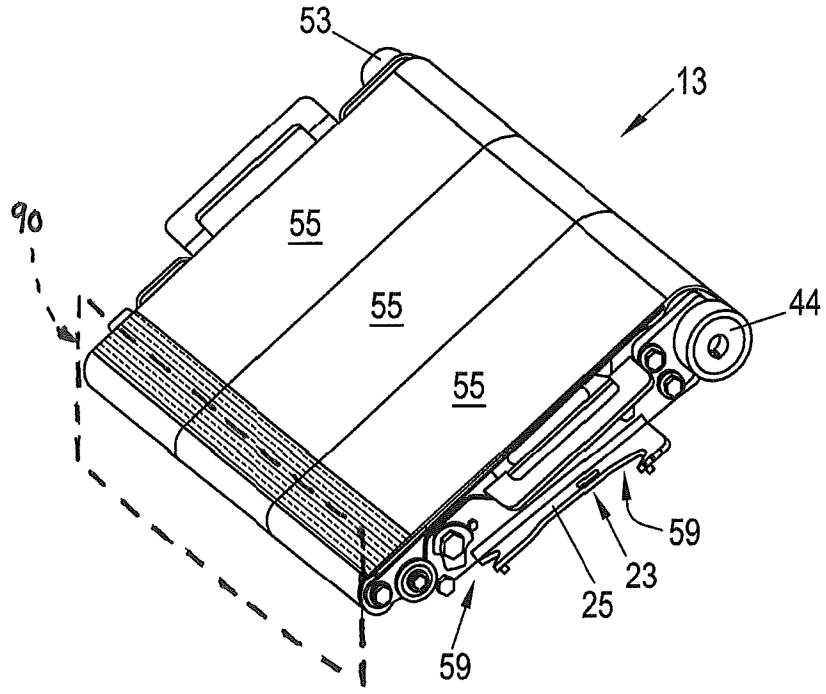
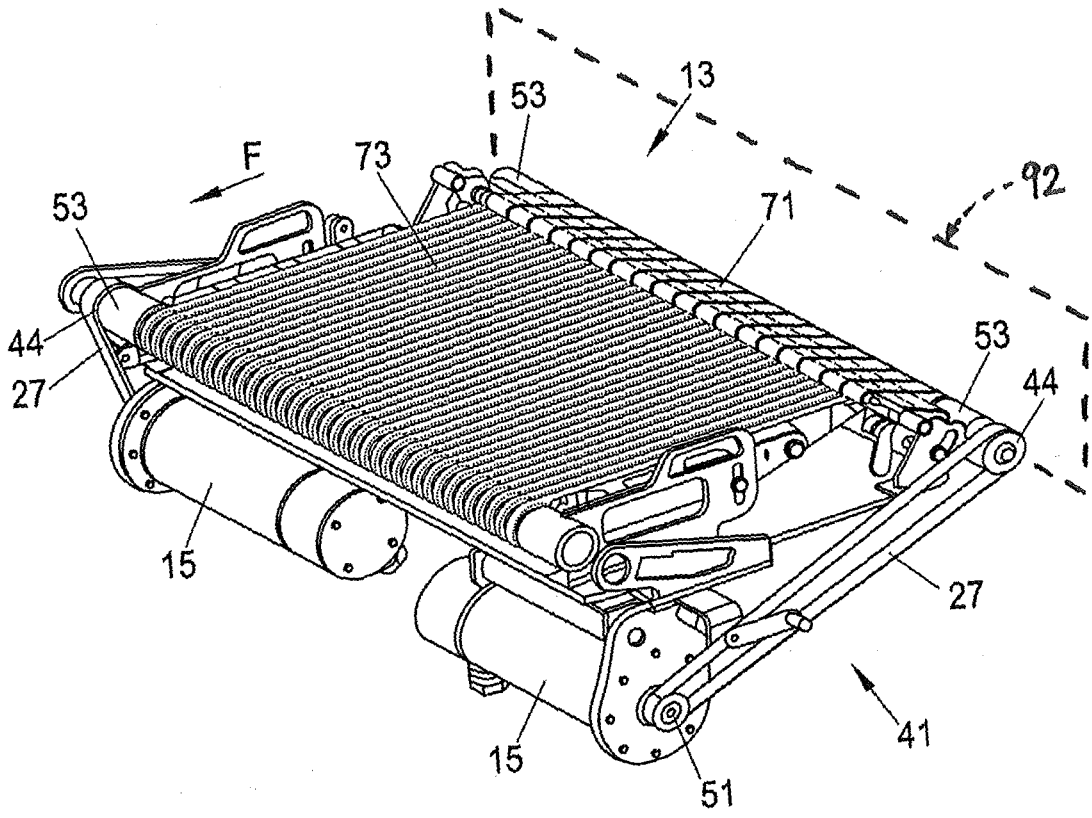


Fig.8



Electronic Patent Application Fee Transmittal

Application Number:	14094136
Filing Date:	02-Dec-2013
Title of Invention:	High Performance Slicing Apparatus With At Least One Removable Conveyor Belt Unit
First Named Inventor/Applicant Name:	Josef Mayer
Filer:	Lukas M Baldridge/Patience Morin
Attorney Docket Number:	MFP0031US (T10212PUS)

Filed as Large Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension - 1 month with $0 paid	1251	1	200	200
Miscellaneous:				
			Total in USD ($)	**200**

Electronic Acknowledgement Receipt

EFS ID:	22330636
Application Number:	14094136
International Application Number:	
Confirmation Number:	1104
Title of Invention:	High Performance Slicing Apparatus With At Least One Removable Conveyor Belt Unit
First Named Inventor/Applicant Name:	Josef Mayer
Customer Number:	23413
Filer:	Lukas M Baldridge
Filer Authorized By:	
Attorney Docket Number:	MFP0031US (T10212PUS)
Receipt Date:	13-MAY-2015
Filing Date:	02-DEC-2013
Time Stamp:	10:25:06
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$200
RAM confirmation Number	7919
Deposit Account	061130
Authorized User	MCBAIN, SCOTT A

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Amendment/Req. Reconsideration-After Non-Final Reject	7E69740.PDF	146757 2912ec5b2e7ea1fd0692f0f5b26cb82193340393	no	15
Warnings:					
Information:					
2	Drawings-only black and white line drawings	7DR6582.PDF	85342 ff9f748612a1ecfea5bcf4bb3370ef2f231039ed	no	2
Warnings:					
Information:					
3	Fee Worksheet (SB06)	fee-info.pdf	31048 f89c2058df36ec9374984a45f3502f57b72cff64	no	2
Warnings:					
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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/SB/06 (09-11)
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PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number	Filing Date	☐ To be Mailed
14/094,136	12/02/2013	

ENTITY: ☒ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED – PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT **05/13/2015**

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	* 25	Minus	** 25	= 0	X $80 =	0
Independent (37 CFR 1.16(h))	* 2	Minus	***3	= 0	X $420 =	0
☐ Application Size Fee (37 CFR 1.16(s))						
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
					TOTAL ADD'L FEE	0

AMENDMENT

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =	
Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =	
☐ Application Size Fee (37 CFR 1.16(s))						
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
					TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

LIE
/ERIC V. BURNS/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

PTO/SB/08a (01-10)
Approved for use through 07/31/2012. OMB 0651-0031
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	14094136
Filing Date	2013-12-02
First Named Inventor	Josef Mayer
Art Unit	3651
Examiner Name	Harp, William Ray
Attorney Docket Number	MFP0031US (T10212PUS)

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	1	2006103348	WO	A1	2011-08-17	NEOLUTION		☐
	2	2357063	EP	A1	2011-08-17	KRAFT FOODS GLOBAL BRANDS LLC		☐

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	14094136
Filing Date	2013-12-02
First Named Inventor	Josef Mayer
Art Unit	3651
Examiner Name	Harp, William Ray
Attorney Docket Number	MFP0031US (T10212PUS)

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1	European Search Report for European Application No. 13195533.8 dated December 10, 2014.	☐

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EXAMINER SIGNATURE

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[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	14094136
Filing Date	2013-12-02
First Named Inventor	Josef Mayer
Art Unit	3651
Examiner Name	Harp, William Ray
Attorney Docket Number	MFP0031US (T10212PUS)

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☒ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

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A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/SCOTTAMcBAIN/	Date (YYYY-MM-DD)	2015-01-30
Name/Print	Scott A. McBain	Registration Number	37181

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(12) DEMANDE INTERNATIONALE PUBLIÉE EN VERTU DU TRAITÉ DE COOPÉRATION EN MATIÈRE DE BREVETS (PCT)

(19) Organisation Mondiale de la Propriété Intellectuelle
Bureau international

(43) Date de la publication internationale
5 octobre 2006 (05.10.2006)

PCT

(10) Numéro de publication internationale
WO 2006/103348 A1

(51) Classification internationale des brevets :
B65G 15/24 (2006.01)

(21) Numéro de la demande internationale :
PCT/FR2006/000686

(22) Date de dépôt international : 30 mars 2006 (30.03.2006)

(25) Langue de dépôt : français

(26) Langue de publication : français

(30) Données relatives à la priorité :
0503079 30 mars 2005 (30.03.2005) FR

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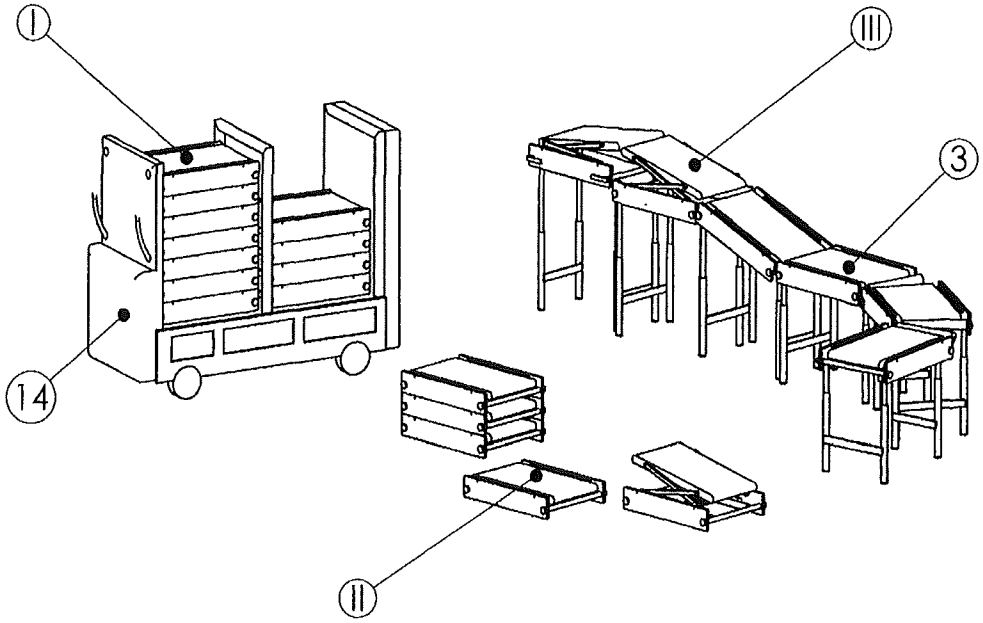
(81) États désignés *(sauf indication contraire, pour tout titre de protection nationale disponible)* : AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, LY, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) États désignés *(sauf indication contraire, pour tout titre de protection régionale disponible)* : ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), eurasien (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), européen (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT,

[Suite sur la page suivante]

(54) Title: DEVICE FOR CONVEYING ISOLATED LOADS

(54) Titre : DISPOSITIF DE CONVOYAGE DE CHARGES ISOLEES



(57) Abstract: The invention concerns an assembly of conveying modules (3). The invention is characterized in that each of the conveying modules (3) consists of a frame (1), a continuous handling conveyor, height and inclination adjusting means (18) and (2), and mechanical and electrical linking means (8) and (13) enabling the different modules to be linked so as to form a route capable of causing the transported loads to follow straight and/or curved trajectories with adjustable inclination.

[Suite sur la page suivante]

WO 2006/103348 A1

RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Publiée :

— *avec rapport de recherche internationale*

En ce qui concerne les codes à deux lettres et autres abréviations, se référer aux "Notes explicatives relatives aux codes et abréviations" figurant au début de chaque numéro ordinaire de la Gazette du PCT.

(57) Abrégé : Ce dispositif comprend un ensemble de modules de convoyage (3). Selon l'invention, chacun des modules de convoyage (3) se compose d'un châssis (1), d'un convoyeur de manutention continue, de moyens (18) et (2) de réglage en hauteur et en inclinaison, et de moyens (8) et (13) de liaison mécanique et électrique permettant une liaison entre les différents modules de manière à former un cheminement pouvant faire suivre aux charges transportées des trajectoires droites et/ou courbe avec des inclinaisons réglables.

DISPOSITIF DE CONVOYAGE DE CHARGES ISOLEES

La présente invention concerne un dispositif de convoyage de charges isolées comprenant un ensemble de modules de convoyage, portables et articulés entre eux de sorte à former un chemin multidirectionnel pour le transport et l'accumulation de charges isolées.

Il concerne le domaine industriel de la fabrication de matériel pour la manutention continue (mécanisée) de charges isolées (colis, bacs, cartons, fardeaux ou tout autres types de charges unitaires). Il est destiné à équiper toutes installations de traitement de flux de marchandises (entrepôts, centres de tri, usines, centres logistiques, gare de fret, etc.).

Actuellement, les équipements utilisés pour le convoyage de flux dans de telles installations sont des appareils dédiés à une fonction, dimensionnés pour convenir à une forme de circuit (exemple : une partie droite n'est pas configurable en une partie courbe, une partie plane ne peut pas accepter d'inflexion, etc.).

La conception de ces appareils a été épurée au maximum pour réduire les coûts, et ce au détriment de leur polyvalence.

Il existe des tapis transporteurs droits, des tapis transporteurs courbes, d'autres éléments élévateurs, d'autres éléments qui sont descendeurs, etc. et leur ossature mécanique ne leur permet pas intrinsèquement de changer de fonction.

Généralement, l'industriel ou le logisticien qui investi dans l'acquisition d'un circuit de manutention automatisé doit en modifier la forme à court ou moyen terme, car l'application d'origine évolue très vite. Des tronçons de convoyeurs doivent alors être modifiés pour être réutilisés dans une configuration différente, ce qui entraîne des coûts supplémentaires et des problèmes techniques potentiels ainsi que des délais de mise en œuvre. Bien souvent, de nouveaux équipements doivent être acquis pour compléter les équipements réutilisés.

Si un nouveau besoin de manutention soudain et/ou éphémère survient, les utilisateurs devront s'en accommoder avec les moyens dont ils disposent, ce qui se traduit généralement par une manutention manuelle ou avec des moyens inadaptés, impliquant une baisse importante de la productivité et une dégradation des conditions de travail.

Ce phénomène est devenu moins acceptable depuis quelques temps, où plusieurs nouveaux facteurs sont apparus :

- les contraintes marketing des entreprises utilisatrices impliquent une plus grande variété de conditionnement des produits (promotions commerciales, nombreux et différents formats d'emballage, changement fréquents des conditionnements...) ;

- les fonctions logistiques (réception, stockage, préparation de commande, expédition) mais également d'emballage et de fabrication (co-packing, co-manufacturing) sont de plus en plus sous-traitées par les entreprises utilisatrices à des fournisseurs de prestations extérieures. Ces derniers doivent donc parfois traiter des flux de marchandises pour plusieurs clients utilisateurs différents. Les équipements de manutention continue doivent, dans ce cas également, pouvoir traiter des produits de dimensions très variées ;

- la durée de vie des produits et des réseaux de distribution diminue, ce qui impose une modification fréquente des structures logistiques ;

- la diminution des stocks entraîne une tension des flux : il est opportun de pouvoir ajouter ou déplacer très rapidement des équipements de manutention permettant de faciliter, d'accélérer ou de rendre moins pénibles le traitement des flux.

Ceci entraîne une demande des utilisateurs en moyens de manutention mécanisés universels et flexibles.

D'où l'intérêt de cumuler différentes fonctions avec un même équipement :

- être configurable en parties droites ET courbes ET/OU inclinées
- transporter ET accumuler,
- s'adapter à des hauteurs de travail très variables,

et de compléter ces nouvelles exigences par :

- un déploiement rapide lorsqu'un besoin spécifique se présente,
- une facilité réelle de mise en œuvre,
- une mise en œuvre directe par l'utilisateur sans recours à des prestations spécialisée (montage mécanique, câblage électrique, automatisme,...), généralement sous-traitées.

Le dispositif selon la présente invention a pour objectif de remédier à cet état de choses.

Selon un aspect de l'invention, chacun des modules de convoyage se compose d'un châssis, d'un convoyeur de manutention continue, de moyens et de réglage en hauteur et en inclinaison, et de moyens et de liaison mécanique et électrique permettant une liaison entre les différents modules de manière à former un cheminement pouvant faire suivre aux charges transportées des trajectoires droites et/ou courbe avec des inclinaisons réglables.

Selon un autre aspect de l'invention, le dispositif de convoyage de charges isolées comprend un chariot de support des modules de convoyage et/ou d'alimentation électrique de ceux-ci.

Selon un autre aspect de l'invention, chaque module de convoyage est équipé d'un moyen de transfert entre modules des charges à transporter suivant une trajectoire courbe.

Selon un autre aspect de l'invention, chaque module de convoyage est équipé d'un moyen (5, 7) de guidage des charges à transporter.

Selon un autre aspect de l'invention, le moyen de réglage en hauteur et en inclinaison est réalisé au moyen d'un système de bipieds télescopiques et escamotables, comportant chacun un moyen de blocage angulaire et en hauteur dudit bipied.

Selon un autre aspect de l'invention, le moyen de blocage angulaire et en hauteur de chaque bipied est réalisé grâce à la combinaison, d'une part, d'une poignée excentrique, de quatre bagues dentées, d'un tirant horizontal, agencés de façon à bloquer angulairement les bipieds par rapport au châssis, et, d'autre part, de deux cônes de commandes, de deux tirants verticaux, de quatre montants verticaux et, de deux ressorts annulaires, agencés de façon à bloquer le mouvement de réglage en hauteur des bipieds.

Selon un autre aspect de l'invention, le moyen de réglage supplémentaire en hauteur et en inclinaison est du type à simple ciseau.

Selon un autre aspect de l'invention, le moyen permettant une liaison mécanique entre les différents modules comprend des moyens à allongement télescopique et à liaison à rotule, agencés de façon à pouvoir former entre les modules de convoyage un angle variable sur plusieurs plans.

Selon un autre aspect de l'invention, les moyens à allongement télescopique sont ajustables sans outil, par une rotation de 90° de la rotule ou de la chape autour de leurs axes.

Selon un autre aspect de l'invention, le moyen de transfert entre modules des charges à transporter comprend un rouleau conique, motorisé grâce à un contre galet en appui sur la partie tournante du convoyeur, ledit rouleau conique étant mis en œuvre de façon à faire suivre aux produits à transporter une trajectoire courbe et étant monté sur un support télescopique permettant de s'adapter aux différentes longueurs d'entrefer induites par la configuration de l'installation : partie droite vers autre partie droite, partie droite vers partie courbe, partie courbe vers partie courbe.

Selon un autre aspect de l'invention, le moyen de guidage des charges à transporter comprend des rives de guidage, constituées d'un tube déformable en matière plastique ou autre, fixé sur un support mécanique ou magnétique, et agencé de façon à éviter aux produits transportés de tomber à terre.

Selon un autre aspect de l'invention, les moyens et de liaison mécanique et électrique sont montés sur des convoyeurs de manière à pouvoir retransmettre les signaux d'informations ainsi que la puissance électrique nécessaire à la connexion d'un autre module de convoyage situé après un convoyeur classique, de façon à pouvoir insérer des convoyeurs classiques au sein d'un circuit constitué de modules de convoyage objets de la présente invention.

Selon un autre aspect de l'invention, chaque module de convoyage est conçu pour être portable et se mettre en place sans outil, par une personne seule.

Le dispositif selon l'invention permet entre autres choses de mettre en œuvre rapidement, facilement et directement par l'utilisateur, un ensemble de modules de convoyage motorisés et portables, permettant de transporter et/ou d'accumuler un flux de charges isolées, en formant, selon le cheminement choisi, des parties soit droites, soit courbes, soit montantes, soit horizontales, soit descendantes, ou une combinaison de ces dernières.

Le raccordement mécanique et électrique des différents modules de convoyage s'effectue rapidement et sans outil. L'ensemble des actions nécessaires pour configurer ou re-configurer le réseau de convoyeurs portables est réalisable par une seule personne, homme comme femme.

La légèreté et la facilité d'emploi de chacun des modules de convoyage permettent à l'utilisateur d'employer l'équipement sans retenue et aussi fréquemment que possible, ce qui, d'une part augmente la productivité

quotidienne des centres de production et, d'autre part diminue la fatigue liée à la manutention manuelle et ponctuelle des charges unitaires.

Par ailleurs, l'objet de la présente invention peut couvrir un large champ d'applications, contrairement aux convoyeurs connus jusqu'à ce jour. Avec le même dispositif, la possibilité est donnée de modifier instantanément la forme d'un réseau de convoyage en cas de panne de machine de production par exemple, de rajouter soudainement un poste de travail, de charger et décharger des véhicules roulants (camions, wagons, ...), de transporter des flux à un étage supérieur ou inférieur (plateforme, sous-sol,...),... Bien d'autres applications sont possibles.

Le dispositif objet de l'invention peut également donner un caractère évolutif et configurable à tous les réseaux de convoyage. Il est en effet possible de modifier profondément le cheminement du réseau de convoyage sans recours à des prestataires spécialisés (monteurs mécaniciens, câbleurs électriques, informaticiens,...), ce qui n'est pas le cas avec les convoyeurs de technologie existante.

Les modules de convoyage peuvent se connecter mécaniquement et électriquement à des convoyeurs de technologie traditionnelle qui doivent être équipés d'interfaces compatibles. Le convoyeur traditionnel sert alors de transmetteur de puissance électrique et de signaux de commande au module de convoyage suivant. L'intérêt est de pouvoir mixer sur un circuit de convoyage les tronçons destinés à ne pas évoluer structurellement (utilisant des convoyeurs de technologie traditionnelle) et ceux qui sont amenés à de fréquents changements (utilisant des modules de convoyage objet de la présente invention).

L'utilisation de l'objet de l'invention peut donc être généralisée à un grand nombre d'applications de convoyage de charges isolées.

Un jeu de cellules photoélectriques et de cartes électroniques de commande, embarquées sur le convoyeur, peut permettre au système un fonctionnement d'accumulation sans pression, c'est-à-dire que les différents convoyeurs sont commandés selon l'état d'occupation du convoyeur suivant. Grâce à ce type de fonctionnement, les différentes charges isolées ne rentrent pas en contact les unes des autres, évitant ainsi les risques de dégradation ou de chute à terre. Cette fonction peut être occultée pour un convoyage

classique (sans accumulation) par simple reconfiguration des cavaliers de la carte de commande.

Un chariot de support et d'alimentation électrique complète le dispositif objet de l'invention. L'alimentation électrique équipant le chariot est amovible et peut être amenée seule à proximité de l'un des quelconques convoyeurs portables lorsque des contraintes d'encombrement ne permettent pas l'accès du chariot.

En outre, le chariot d'alimentation permet le stockage optimisé de 1 à 20 modules de convoyage lorsque ces derniers ne sont pas utilisés (figure 3) ainsi que leur transport jusqu'au lieu d'utilisation.

Le cheminement de l'énergie électrique 24Vcc s'effectue de convoyeur en convoyeur grâce à une connexion électrique à chaque extrémité des modules de convoyage.

Dans des applications particulières en extérieur, les modules de convoyage peuvent s'empiler dans un véhicule roulant pour être transportés jusqu'au point de chargement ou déchargement du véhicule. L'alimentation électrique basse tension nécessaire aux modules de convoyage peut alors être fournie par la batterie du véhicule roulant.

Description technique

Terminologie :

Dans tout ce qui suit, le terme "module de convoyage" désigne un module complet comprenant différents sous-ensembles comme le châssis (1), le convoyeur (36) ...

Le terme "convoyeur" sera utilisé pour désigner le sous-ensemble du "module de convoyage" exclusivement consacré à la fonction de convoyage.

Sur les dessins annexés, donnés à titre d'exemple non limitatif d'une des formes de réalisation de l'objet de l'invention

- la figure 1 représente une vue en perspective du dispositif selon la présente invention permettant de réaliser différentes formes de circuit de convoyage. Les modules de convoyage (3) sont représentés stockés sur le chariot 14 (repère I), en position d'attente d'utilisation (repère II), et en position dépliée d'utilisation (repère III) ;

- la figure 2 représente une vue en perspective - ainsi que trois vues en deux dimensions - d'une première forme de réalisation du dispositif selon la présente invention, représentant un module de convoyage (3) ;

- la figure 3 représente une vue de coté schématique du chariot d'alimentation électrique ;

- les figures 4 et 5 représentent une des formes de réalisation du dispositif de liaison mécanique entre deux convoyeurs portables. La figure 4 est une vue de dessous de deux modules de convoyage (3). Le détail A montre la liaison mécanique grâce au système rotule et chape.

La figure 5 montre plus précisément ce dispositif isolé : le détail C montre le système de télescopie, identique pour le système male (rotule 42) et femelle (chape 43). Les détails D et E représentent une vue agrandie de la rotule (42) et de la chape (43) ;

- les figures 6 et 7 représentent une des formes de réalisation de support mécanique ou magnétique de rive de guidage ;

- la figure 8 représente une des formes de réalisation du dispositif à rouleau conique 6 de transfert des charges isolées entre deux convoyeurs portables ;

- la figure 9 représente une des formes de réalisation du système de blocage en rotation des pieds télescopiques ;

- la figure 10 est une vue en coupe partielle du bipieds télescopique (coté poignée) ;

- la figure 11 est une vue en coupe partielle du bipieds télescopique (coté opposé à la poignée) ;

- la figure 12 est une vue en coupe partielle du système de blocage en hauteur des bipieds télescopiques ;

- la figure 13 représente une des formes de réalisation d'un module de convoyage à rouleaux motorisés.

Le dispositif de convoyage de charges isolées selon la présente invention (figures 1 à 13) est constitué d'un ensemble de modules de convoyage (3) et d'un chariot (14) de support et d'alimentation électrique, ledit dispositif étant destiné à équiper toutes installations de traitement de flux de marchandises (entrepôts, centres de tri, usines, centres logistiques, gare de fret, etc.).

Chacun des modules de convoyage (3) se compose d'un châssis (1), d'un convoyeur de manutention continue, de moyens (18) et (2) de réglage en hauteur et en inclinaison, de moyens (8) et (13) de liaison mécanique et électrique de façon à permettre une liaison démontable entre les différents

modules de sorte à former un cheminement pouvant faire suivre aux charges transportées des trajectoires droites et/ou courbes avec des inclinaisons réglables permettant ainsi le changement d'altitude, d'un moyen (6) de transfert de la charge à transporter entre les modules de convoyage et d'un moyen (5, 7) de guidage de la charge à transporter

Le réglage en hauteur et en inclinaison de chaque module de convoyage (3) sera de préférence réalisé au moyen d'un système de bipieds télescopiques escamotables (18).

Les deux bipieds télescopiques (18) peuvent être escamotés complètement (en position horizontale, ils sont complètement intégrés dans le châssis (1)), ou, grâce à un mouvement de rotation permis par le déblocage de la poignée excentrique (19), être orientés verticalement ou dans une position angulaire intermédiaire entre la position horizontale et verticale.

L'arrêt en rotation des bipieds (18) est effectué grâce à des bagues dentées (20) qui sont maintenues en prise par la poignée (19) (figures 9, 10 et 11) : le mouvement de rotation de la poignée (19) est transformé en mouvement de translation par la forme excentrique de ladite poignée (19) et transmis au tirant horizontal (24). Les cônes de commande (23), fixés sur le tirant horizontal (24), transmettent ce mouvement aux tirants verticaux (27). Le matériau utilisé pour les cônes de commande (23) présente une bonne résistance au frottement (POM, PA,...) de façon à permettre le glissement de l'extrémité des tirants verticaux sur les cônes de commandes (23) lors de la rotation des bipieds (18).

La longueur de chacun des deux bipieds (18) (agissant directement sur la hauteur du module de convoyage (3)) est réglable grâce à un dispositif de glissière tubulaire : les montants verticaux males (41) coulissent dans les montants verticaux femelles (Figure 11 et 12). Le blocage en position est effectué par le coincement d'un ressort annulaire (29) entre le guide ressort conique (31) et le montant vertical femelle (30) (figure 12). Lors de l'ouverture de la poignée (19), le tirant vertical (27) descend et décoince le ressort (29), libérant ainsi le mouvement de télescopie de la glissière (30, 41). De la sorte, l'ouverture de la poignée (19) provoque simultanément le déblocage du bipied (18) en rotation et en télescopie.

Inversement, sa fermeture maintient le bipied (18) dans une position angulaire et une hauteur donnée.

L'action directe sur les deux poignées (19) permet de régler la hauteur et l'inclinaison du convoyeur portable, sans outil.

L'angle d'inclinaison maximum permis par la différence de hauteur des bipieds (18) est de 20° et la hauteur maximum de la surface de transport des charges peut être de 1200 mm par rapport au sol.

Ce dispositif peut être complété par un système d'élévation (2) qui permet d'augmenter la course de réglage en hauteur et en inclinaison par élévation du convoyeur par rapport au châssis (1). Le système d'élévation (2) est de préférence du type à simple ciseau (figure 2). De la sorte, l'angle maximum d'inclinaison peut être de 25° et l'élévation supplémentaire en hauteur d'environ 300 mm. De la sorte, la hauteur maximum de la surface de transport des charges peut atteindre 1500 mm par rapport au sol.

Le module de convoyage (3) comporte un moyen de liaison mécanique (8) et un moyen de connexion électrique (13) à chacune de ses extrémités afin de pouvoir se lier mécaniquement et électriquement au module précédent et/ou suivant. De préférence, le moyen de liaison mécanique (8) sera du type télescopique à rotule (figures 4 et 5) de façon à pouvoir former entre les modules de convoyage un angle variable sur plusieurs plans. Ceci est réalisé de façon à permettre à l'ensemble de présenter un cheminement selon une trajectoire multidirectionnelle (droite et/ou courbe, dans des inclinaisons différentes) du flux des produits à transporter (figure 1).

Le dispositif de liaison mécanique (8) est constitué d'une partie male, la rotule (42) (figure 5, détail D) et d'une partie femelle, la chape (43) (figure 5, détail E).

Chacune de ces parties est télescopique de façon à s'adapter aux différents intervalles induits par la configuration de l'installation : partie droite vers autre partie droite, partie droite vers sur partie courbe, partie courbe vers partie courbe.

Le réglage de la télescopie s'effectue par une rotation de 90° de la chape (43) ou de la rotule (42) autour de son axe (figure 5, détail C). Un ressort de torsion peut être utilisé pour le retour en position initiale. Le maintien en position de la rotule et la chape est effectué grâce à un tourillon du commerce (figure 5, détail E).

De préférence, le moyen de liaison électrique sera un connecteur électrique du commerce, assurant la transmission des signaux de commande

(photocellule et informations de commande) et de l'alimentation de puissance (24Vcc). Ce connecteur peut se situer sous le dispositif télescopique (8) de sorte à concentrer sur une même zone l'intervention de l'utilisateur effectuant la liaison de deux modules.

Le châssis (1) est de préférence conçu pour permettre aux modules de convoyage (3) de s'empiler les uns sur les autres lorsqu'ils ne sont plus utilisés (figure 1).

Le convoyeur de manutention continue est de technologie connue : à rouleaux commandés par rouleaux moteurs, par tapis à mailles plastiques ou par bande transporteuse en matière plastique ou caoutchouc.

Dans le cas du convoyeur à rouleaux commandés (figure 13), ce dernier est de préférence constitué par une ossature (32), d'un ensemble de rouleaux libres (11) à gorges, commandés par des rouleaux à moteur électrique intégrés (17) (communément appelé "rouleaux moteurs"), et ceci par l'intermédiaire de courroies rondes en polyuréthane disposées en relais entre les rouleaux.

Le moyen de transfert (6) de la charge à transporter entre modules peut être du type rouleau conique. L'effet de la conicité du rouleau permet le transport des charges suivant une trajectoire courbe. Quelle que soit la technologie de convoyage retenue, chacun des modules de convoyage peut être muni d'un tel rouleau conique motorisé (6) à chacune de ses extrémités de façon à faire suivre aux produits à transporter une trajectoire courbe.

Ce rouleau conique (6) est motorisé par la bande transporteuse du convoyeur au moyen d'un contre galet (22) (figure 8). Chaque rouleau conique (6) est monté sur un support télescopique permettant de s'adapter aux différentes longueurs d'entrefers induites par la configuration de l'installation, partie droite vers autre partie droite, partie droite vers partie courbe, partie courbe vers partie courbe.

Par ailleurs, des rouleaux cylindriques motorisés peuvent être montés en lieu et place des rouleaux coniques lorsque l'utilisateur désire augmenter sensiblement la longueur du module de convoyage concerné.

Le moyen de guidage (7) de la charge à transporter est de préférence du type rives de guidage, constituées d'un tube déformable en matière plastique ou autre, qui est fixé sur un support (5) (figure 7), réalisé de façon à éviter aux produits transportés de tomber à terre.

Ce dispositif de rive de guidage (7) se monte sur les différents convoyeurs motorisés (36) par fixation mécanique et/ou magnétique (5) et assure ainsi une continuité de guidage sur tout le cheminement de convoyage, selon toutes trajectoires multidirectionnelles (figure 7 et 8).

Les modules de convoyage peuvent être munis de roues blocables qui permettent un déplacement au sol facile et rapide. Ces roues se montent en extrémité des bipieds (18). Des sabots optionnels peuvent se monter autour de ces roues pour permettre le passage d'escaliers ou de changements de niveaux.

Un jeu de cellules photoélectriques (10) et de cartes électroniques de commande (21), embarqué sur le convoyeur (figure 2), peut permettre au système un fonctionnement d'accumulation sans pression.

Le chariot d'alimentation (14) (figure 3) comprend l'alimentation électrique (15) pouvant se connecter à n'importe quel module de convoyage (3), ainsi que de dispositifs permettant le support des différents accessoires des convoyeurs, soit au minimum :

- rives de guidage (7) à l'emplacement 33
- rouleaux coniques (6) à l'emplacement 39
- rouleaux cylindriques pour transfert droit à l'emplacement 34
- support de rives (5) et pièces de rechange de première urgence à l'emplacement 38
- ... .

Des roues (40) peuvent permettre un déplacement roulant du chariot (14). Les emplacements 37 peuvent être utilisés pour la reprise par chariot de type élévateur ou transpalette.

Exemple de mise en œuvre

Les modalités de mise en œuvre du dispositif objet de la présente invention sont les suivantes : l'utilisateur prélève un à un les modules de convoyage du chariot d'alimentation (si ce dernier est utilisé, ce qui n'est pas obligatoire) et les dispose sur le sol à sa convenance.

Il procède aux réglages de hauteur et d'inclinaison (grâce aux deux poignées (19)) ou de trajectoire courbe en montant les rouleaux coniques de transfert (6).

Il connecte ensuite mécaniquement et électriquement entre eux les différents convoyeurs portables grâce au dispositifs (8) et (13).

Puis, il relie l'alimentation électrique (du chariot (14) ou déportée) à n'importe quel module de convoyage.

Enfin, il connecte le chariot au réseau électrique et appuie sur le bouton de mise en marche de l'alimentation électrique : les convoyeurs se mettent alors en fonctionnement selon la configuration du mode de fonctionnement de la carte de commande (21).

Le système peut fonctionner suivant plusieurs modes de fonctionnements différents :

- un mode de marche en accumulation sans pression,
- un mode de marche en transport simple.

Le changement des modes de fonctionnement peut se faire très simplement grâce à l'ajustement de cavaliers sur la carte de commande (21) de chaque module de convoyage.

La mise en œuvre des divers éléments constitutifs donne à l'objet de la présente invention un maximum d'effets utiles qui n'avaient jamais été, à ce jour, obtenus par des dispositifs existants.

Il va de soi que l'invention n'est pas limitée à la forme de réalisation décrite ci-dessus à titre d'exemple mais qu'elle s'étend à toutes les formes de réalisations couvertes par les revendications ci-annexées.

REVENDICATIONS

1. Dispositif de convoyage de charges isolées comprenant un ensemble de modules de convoyage (3), caractérisé en ce que chacun des modules de convoyage (3) se compose d'un châssis (1), d'un convoyeur de manutention continue, de moyens (18) et (2) de réglage en hauteur et en inclinaison, et de moyens (8) et (13) de liaison mécanique et électrique permettant une liaison entre les différents modules de manière à former un cheminement pouvant faire suivre aux charges transportées des trajectoires droites et/ou courbe avec des inclinaisons réglables.

2. Dispositif de convoyage de charges isolées selon la revendication 1, caractérisé en ce qu'il comprend un chariot (14) de support des modules de convoyage (3) et/ou d'alimentation électrique de ceux-ci.

3. Dispositif de convoyage de charges isolées selon la revendication 1 ou la revendication 2, caractérisé en ce que chaque module de convoyage (3) est équipé d'un moyen (6) de transfert entre modules des charges à transporter suivant une trajectoire courbe.

4. Dispositif de convoyage de charges isolées selon l'une des revendications 1 à 3, caractérisé en ce que chaque module de convoyage (3) est équipé d'un moyen (5, 7) de guidage des charges à transporter.

5. Dispositif de convoyage de charges isolées selon l'une des revendications 1 à 4, caractérisé en ce que le moyen (18) de réglage en hauteur et en inclinaison est réalisé au moyen d'un système de bipieds (18) télescopiques et escamotables, comportant chacun un moyen de blocage angulaire et en hauteur dudit bipied (18).

6. Dispositif de convoyage de charges isolées selon la revendication 5 caractérisé en ce que le moyen de blocage angulaire et en hauteur de chaque bipied (18) est réalisé grâce à la combinaison, d'une part, d'une poignée excentrique (19), de quatre bagues dentées (20), d'un tirant horizontal (24), agencés de façon à bloquer angulairement les bipieds (18) par rapport au châssis (1), et, d'autre part, de deux cônes de commandes (23), de deux tirants verticaux (27), de quatre montants verticaux (30) et (41), de deux ressorts annulaires (29), agencés de façon à bloquer le mouvement de réglage en hauteur des bipieds (18).

7. Dispositif de convoyage de charges isolées selon l'une des revendications 1 à 6 caractérisé en ce que le moyen (2) de réglage supplémentaire en hauteur et en inclinaison est du type à simple ciseau.

8. Dispositif de convoyage de charges isolées selon l'une des revendications 1 à 7, caractérisé en ce que le moyen (8) permettant une

liaison mécanique entre les différents modules comprend des moyens à allongement télescopique et à liaison à rotule, agencés de façon à pouvoir former entre les modules de convoyage un angle variable sur plusieurs plans.

9. Dispositif de convoyage de charges isolées selon la revendication 8 caractérisé en ce que les moyens à allongement télescopique sont ajustables sans outil, par une rotation de 90° de la rotule (42) ou de la chape (43) autour de leurs axes.

10. Dispositif de convoyage de charges isolées selon l'une des revendications 3 à 9, caractérisé en ce que le moyen (6) de transfert entre modules des charges à transporter comprend un rouleau conique, motorisé grâce à un contre galet (22) en appui sur la partie tournante du convoyeur, ledit rouleau conique (6) étant mis en œuvre de façon à faire suivre aux produits à transporter une trajectoire courbe et étant monté sur un support télescopique permettant de s'adapter aux différentes longueurs d'entrefer induites par la configuration de l'installation : partie droite vers autre partie droite, partie droite vers partie courbe, partie courbe vers partie courbe.

11. Dispositif de convoyage de charges isolées selon l'une des revendications 4 à 10, caractérisé en ce que le moyen (7) de guidage des charges à transporter comprend des rives de guidage, constituées d'un tube déformable en matière plastique ou autre, fixé sur un support (5) mécanique ou magnétique, et agencé de façon à éviter aux produits transportés de tomber à terre.

12. Dispositif de convoyage de charges isolées selon l'une quelconque des revendications précédentes, caractérisé en ce que les moyens (8) et (13) de liaison mécanique et électrique sont montés sur des convoyeurs de manière à pouvoir retransmettre les signaux d'informations ainsi que la puissance électrique nécessaire à la connexion d'un autre module de convoyage (3) situé après un convoyeur classique, de façon à pouvoir insérer des convoyeurs classiques au sein d'un circuit constitué de modules de convoyage (3) objets de la présente invention.

13. Dispositif de convoyage de charges isolées selon l'une quelconque des revendications précédentes, caractérisé en ce que chaque module de convoyage (3) est conçu pour être portable et se mettre en place sans outil, par une personne seule.

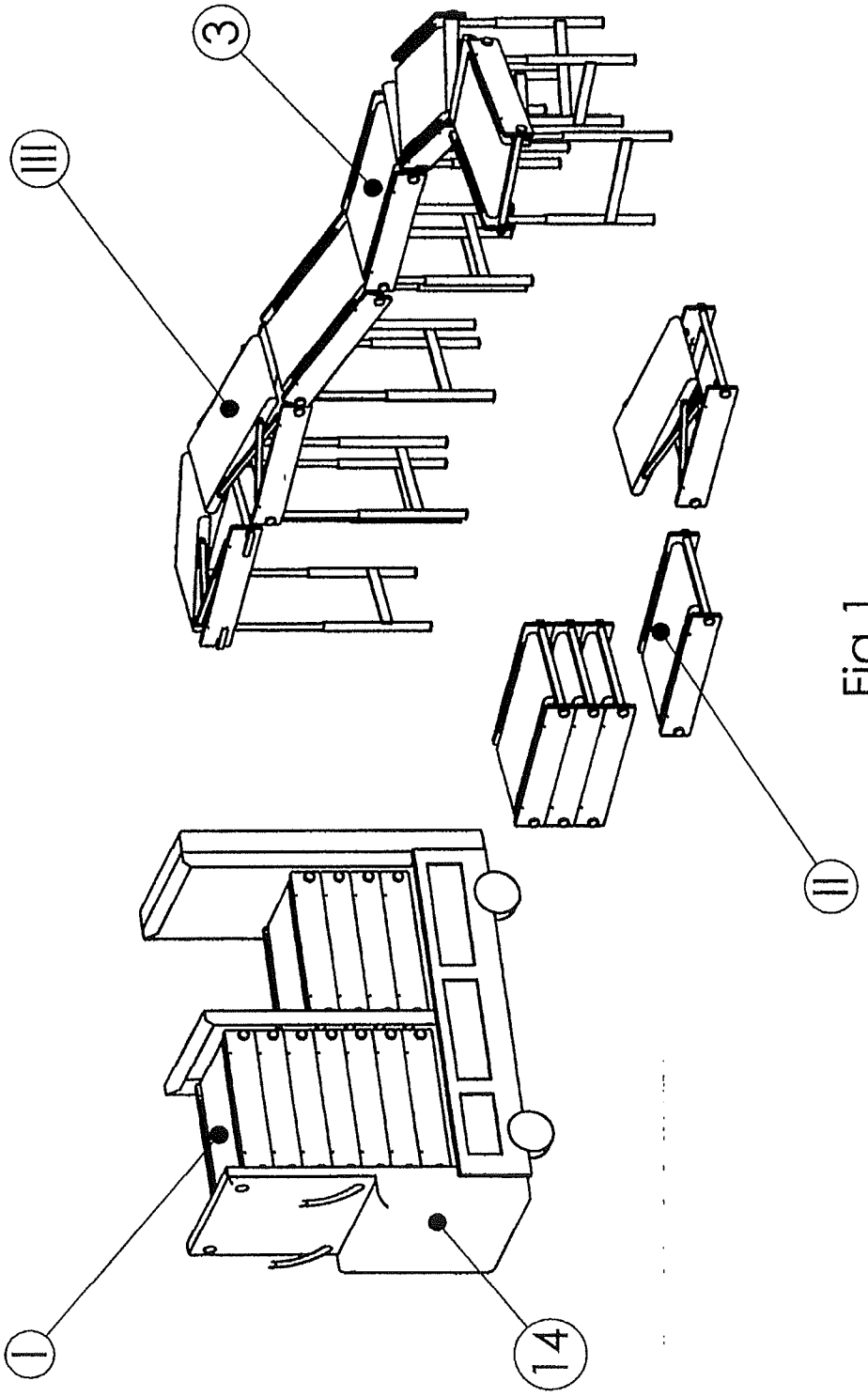


Fig.1

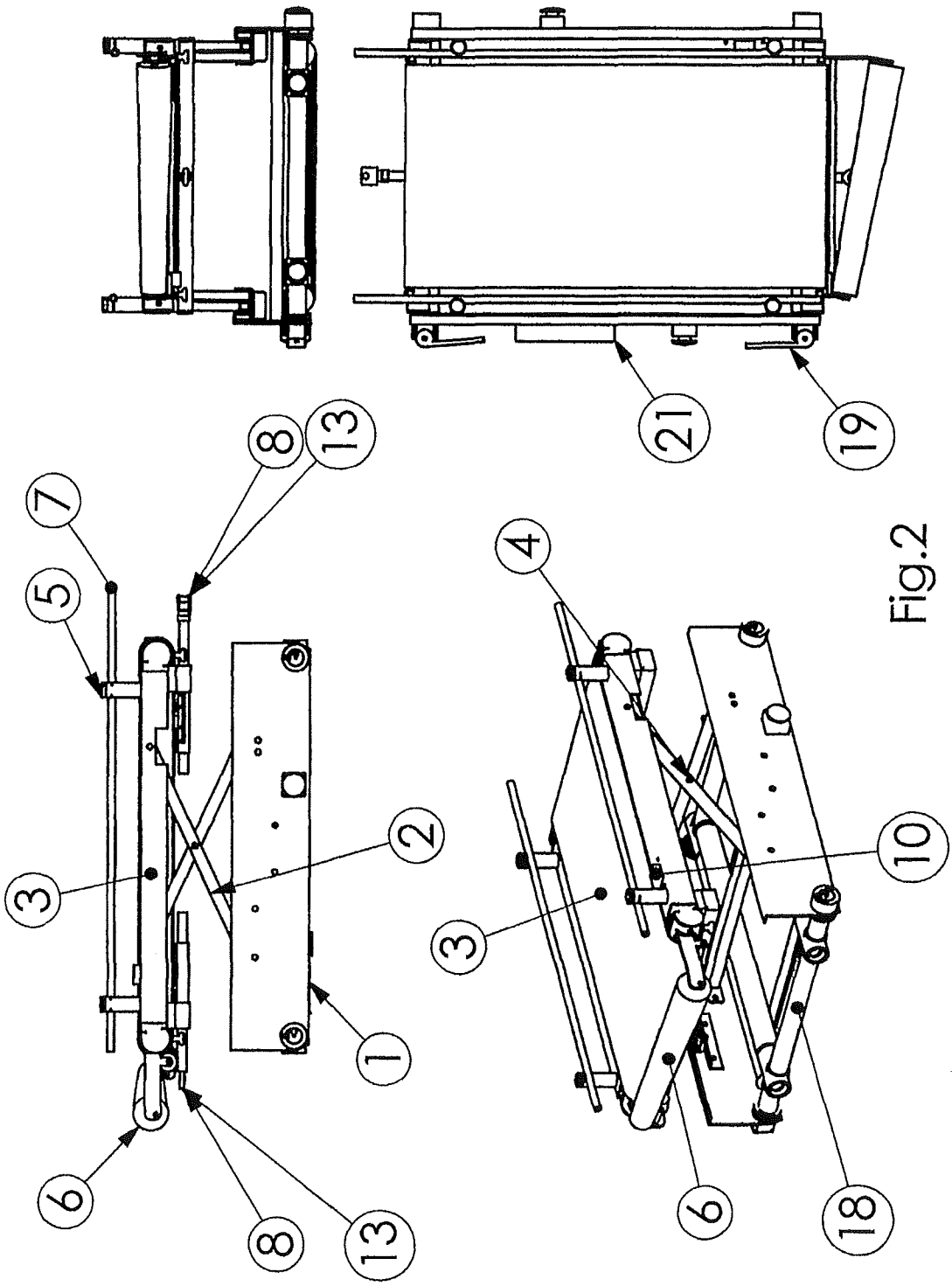


Fig.2

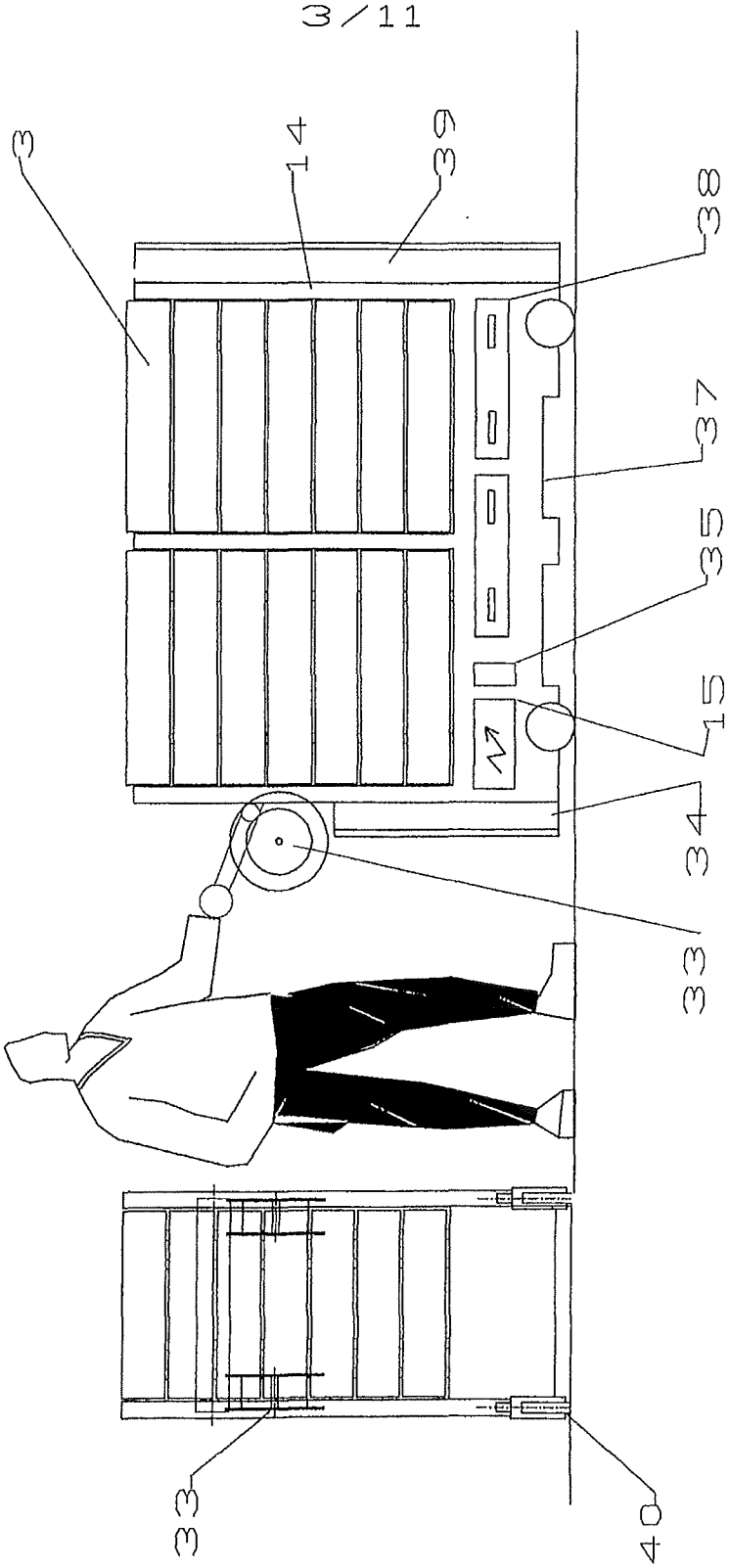
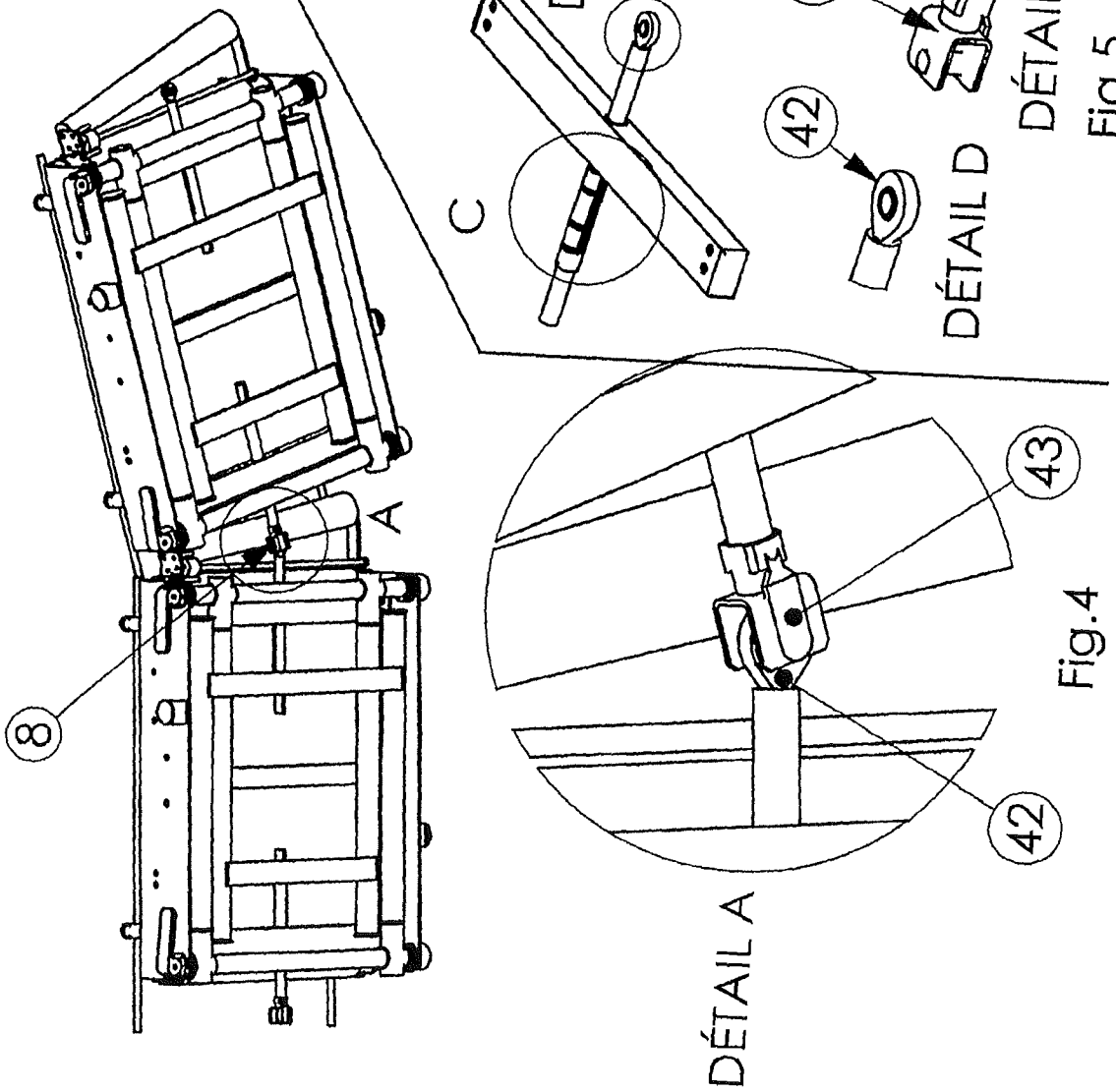


Fig.3


8
A
DÉTAIL A
43
42
Fig.4
C
D
E
DÉTAIL C
DÉTAIL D
DÉTAIL E
43
42
Fig.5

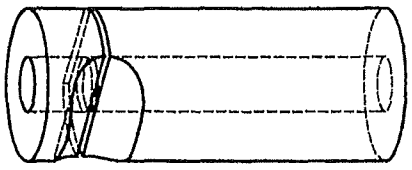
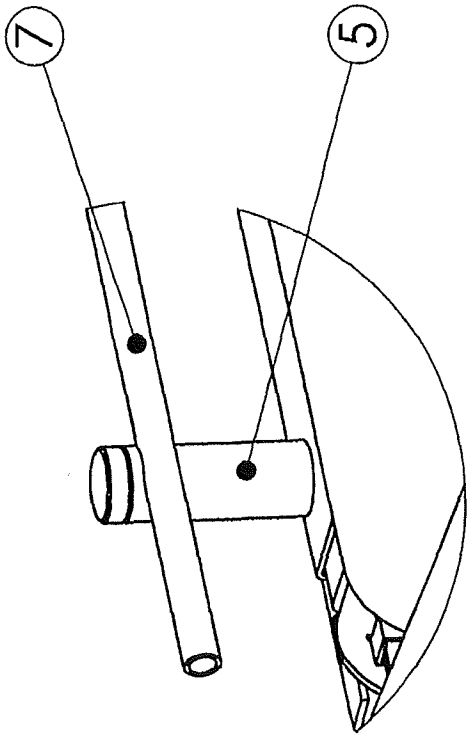


Fig.7



DÉTAIL A

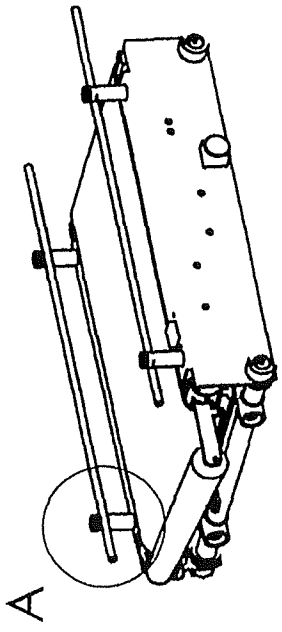


Fig.6

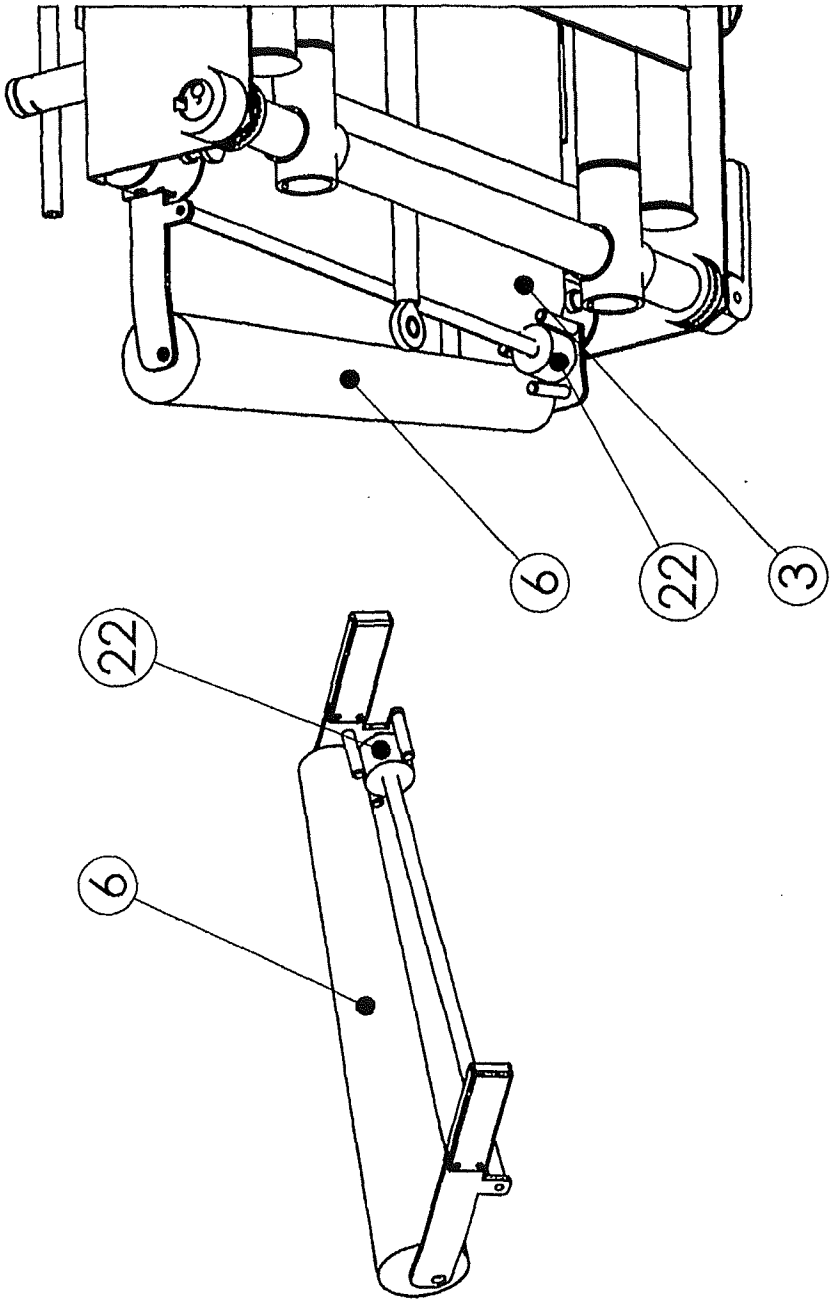


Fig.8

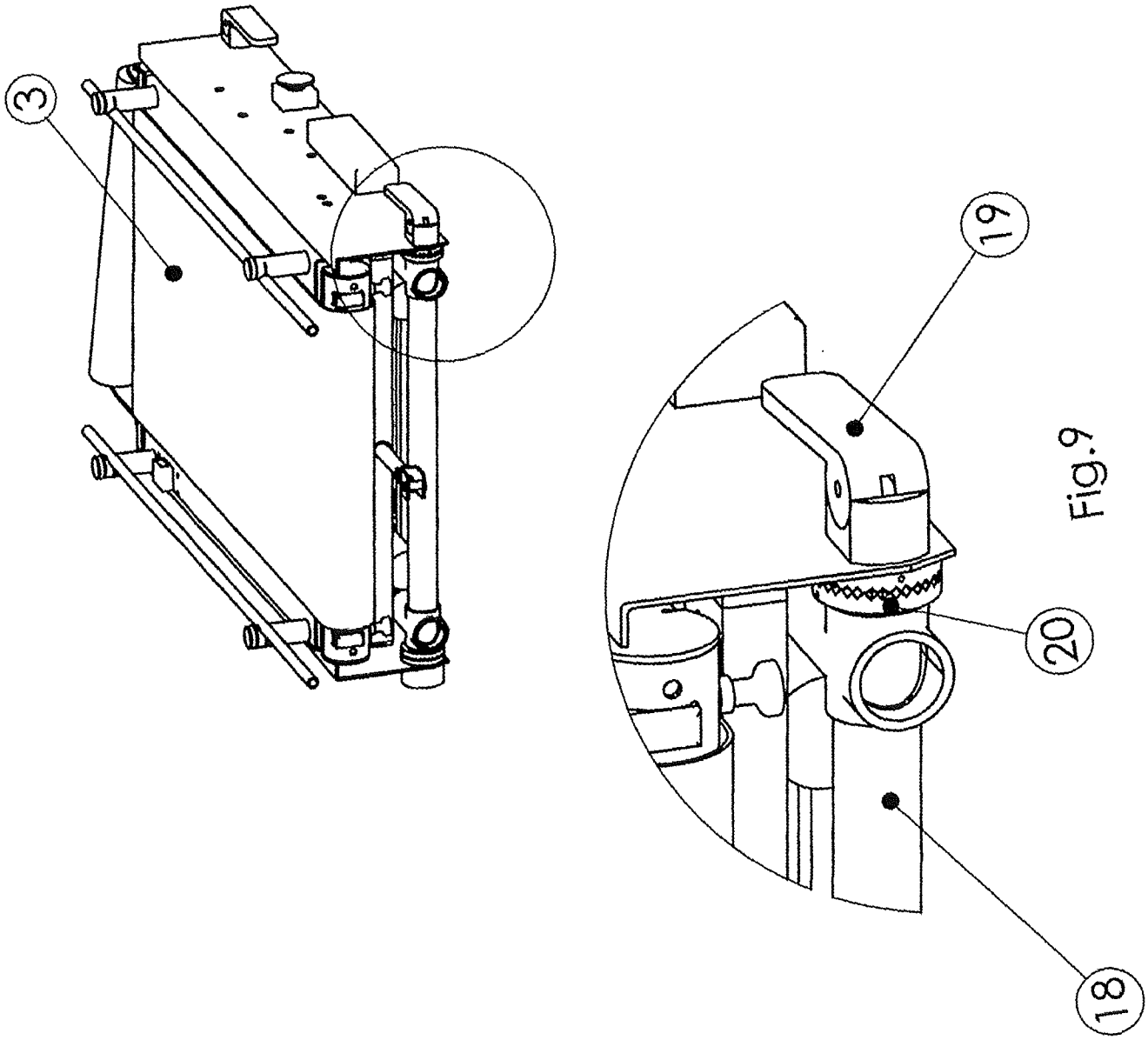


Fig.9

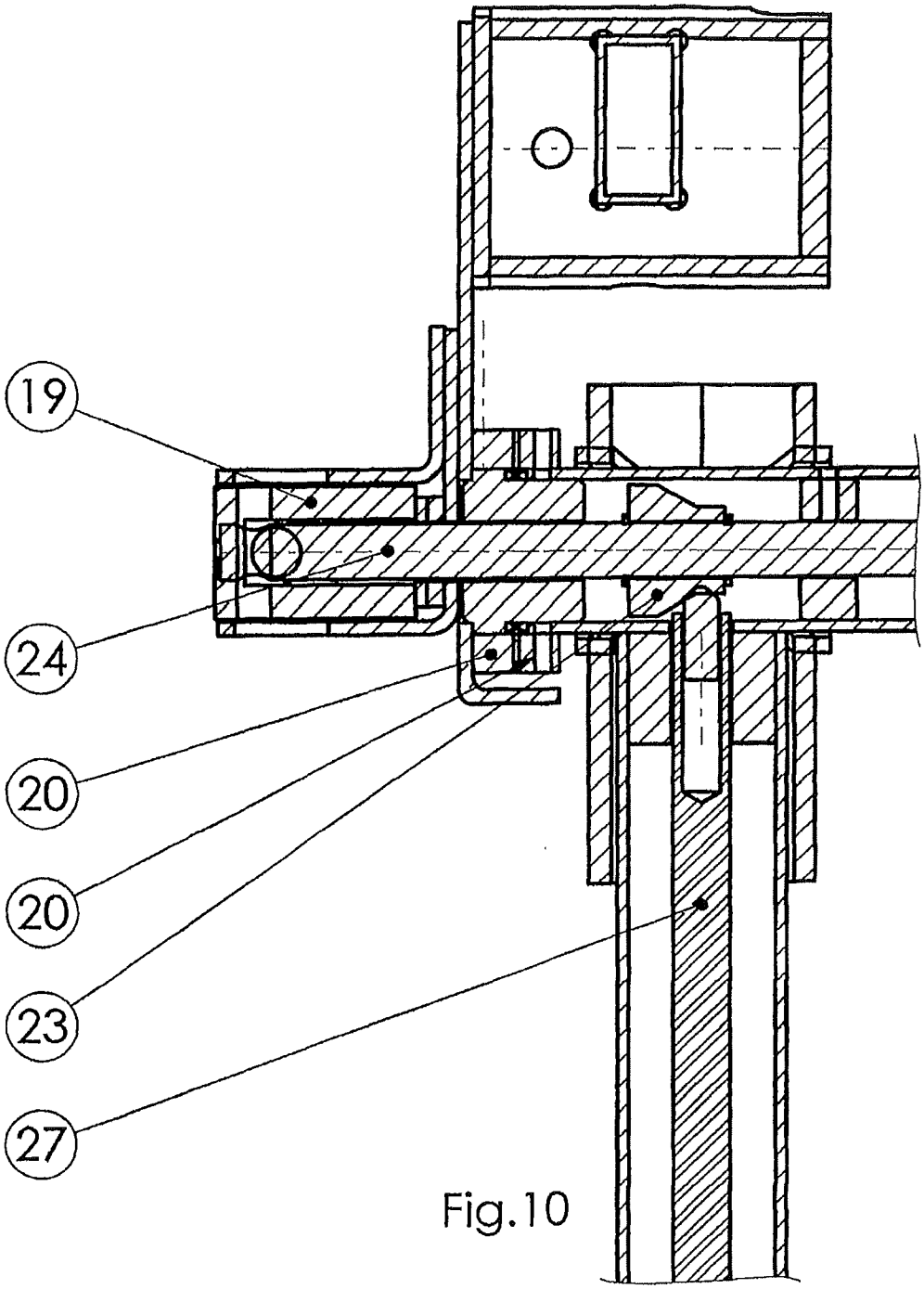


Fig.10

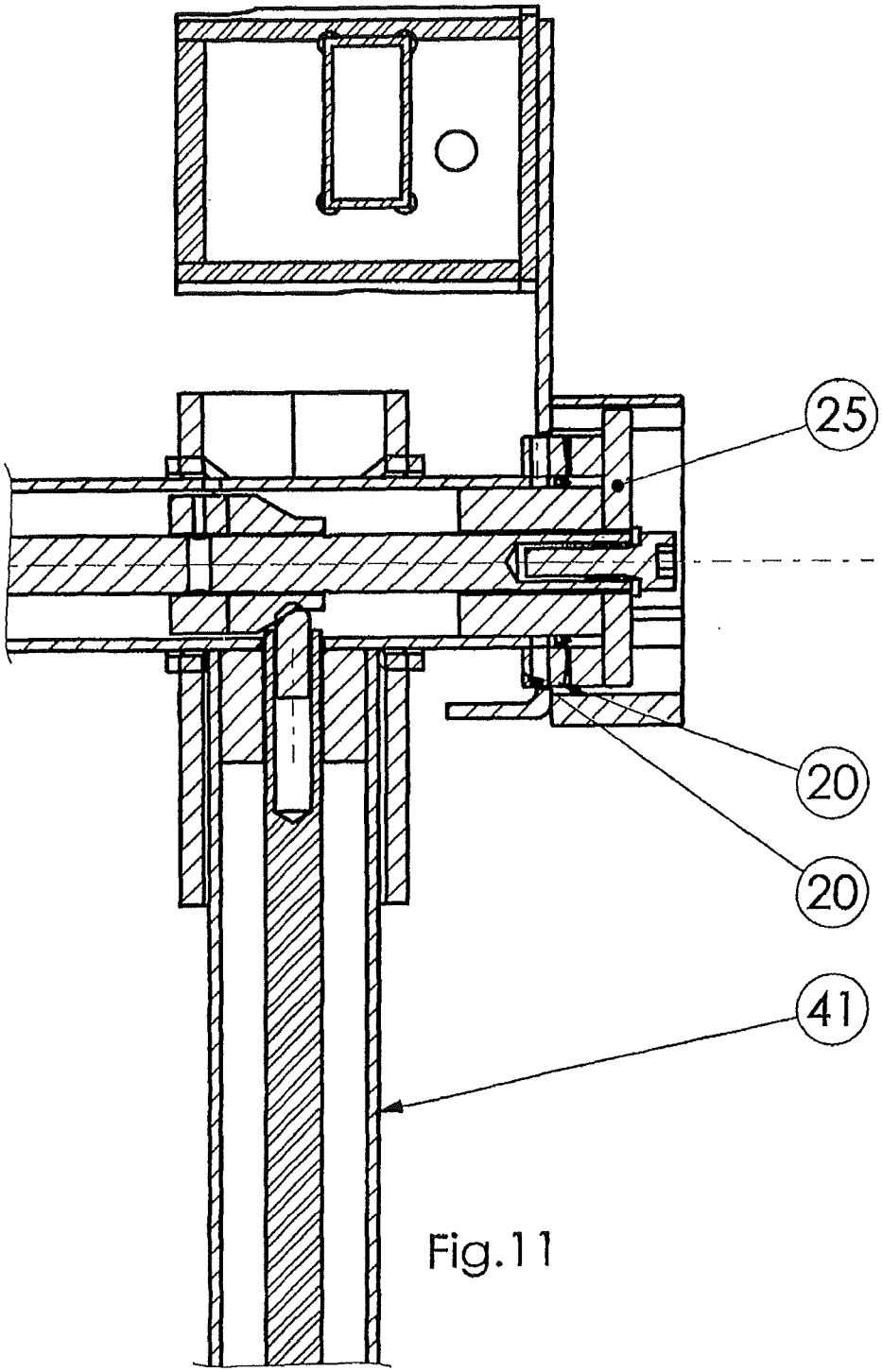


Fig.11

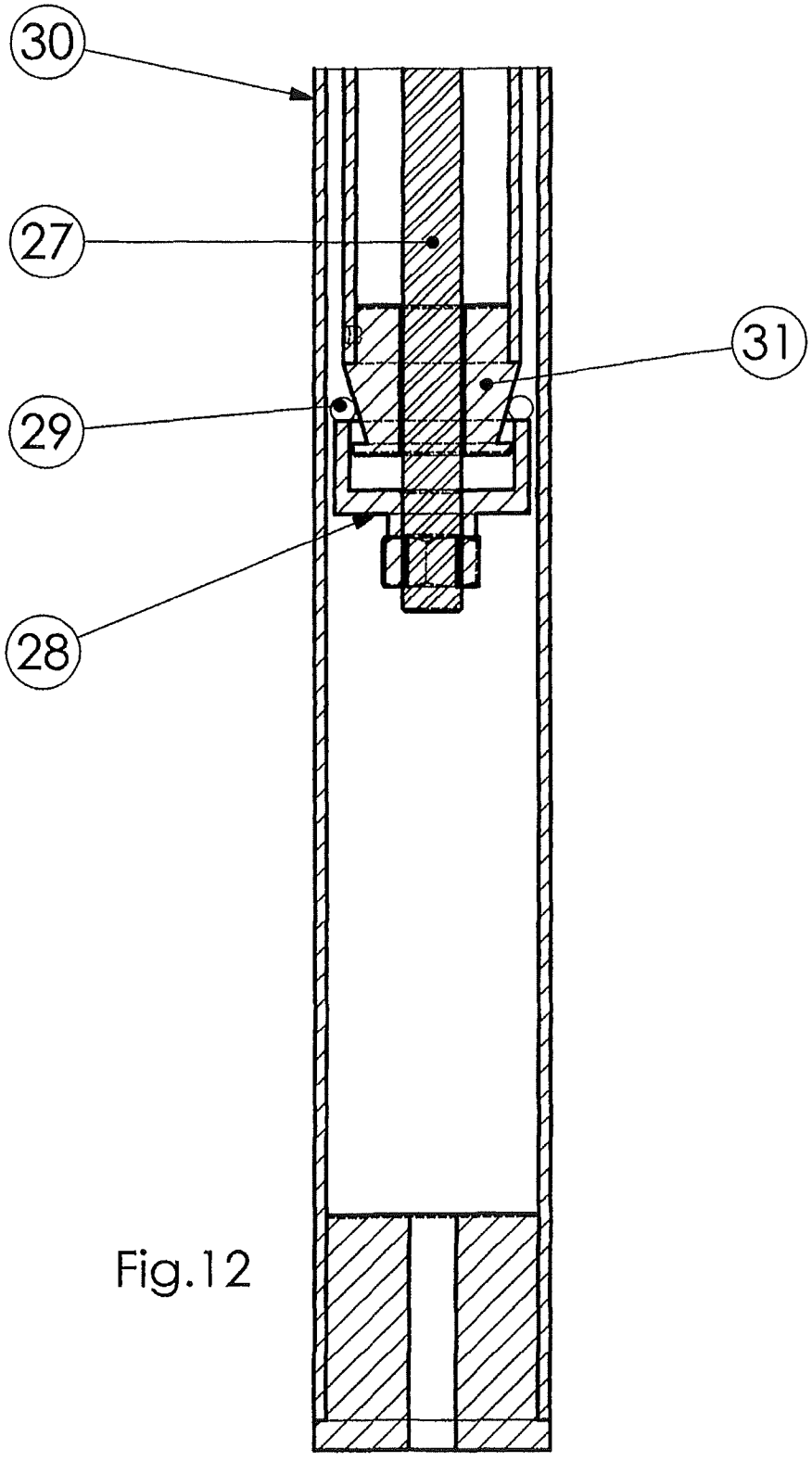


Fig.12

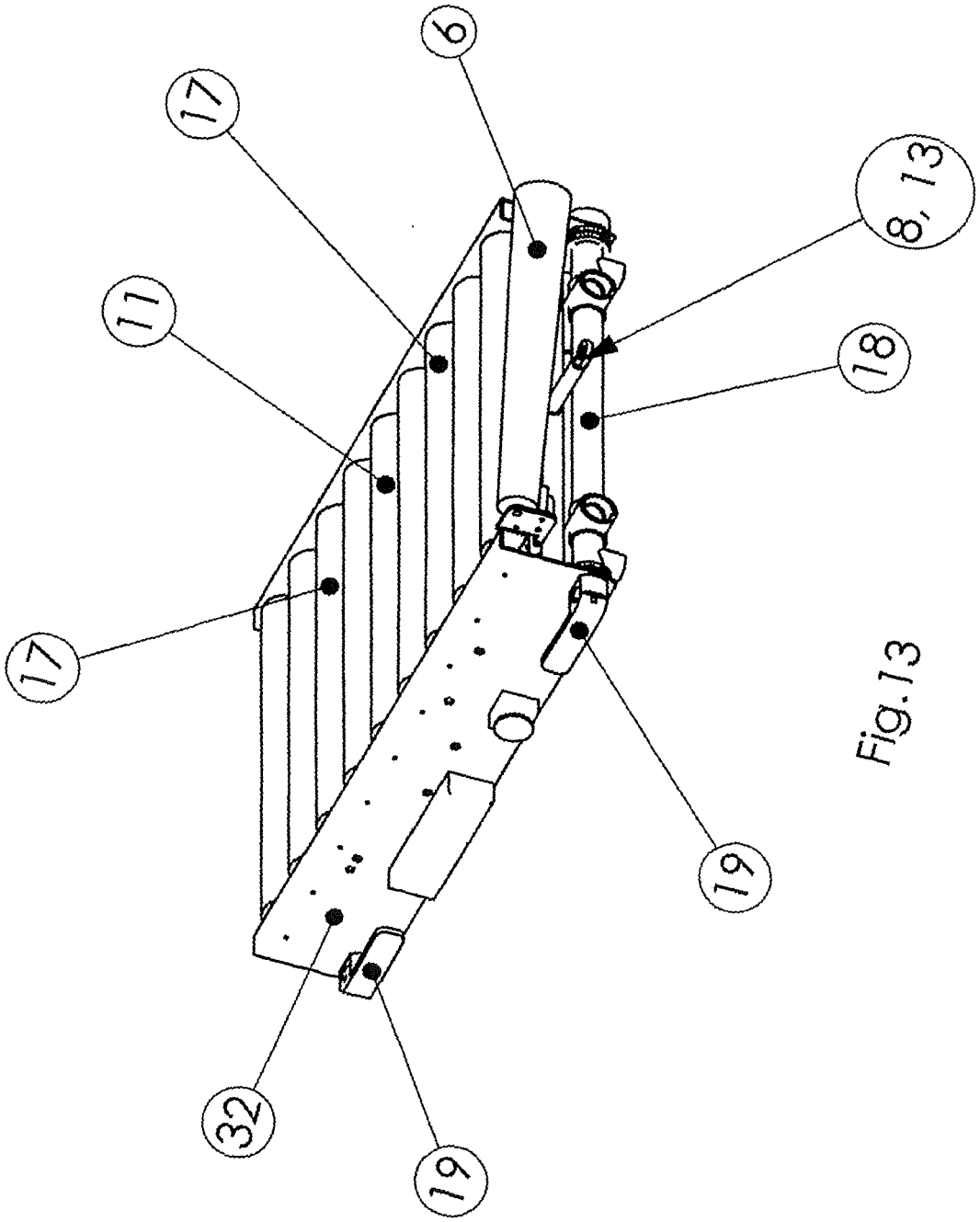


Fig.13

INTERNATIONAL SEARCH REPORT

International application No
PCT/FR2006/000686

A. CLASSIFICATION OF SUBJECT MATTER
INV. B65G15/24

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
B65G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, PAJ, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 662 209 A (RADMALL ET AL) 2 September 1997 (1997-09-02) colonne 1, lignes 6,7; colonne 2, lignes 39-57; colonne 3, lignes 37-67; revendication1; figure 1	1-13
A	US 2004/089522 A1 (SHAUM FRANK-PETER ET AL) 13 May 2004 (2004-05-13) page 1, paragraphes 2,7; page 3, paragraphes 33,35,36; page 4, paragraphes 39-41; revendication 1, figures	
A	PATENT ABSTRACTS OF JAPAN vol. 006, no. 232 (M-172), 18 November 1982 (1982-11-18) & JP 57 131609 A (NISSAN JIDOSHA KK), 14 August 1982 (1982-08-14) abstract; figures	1-13

-/--

[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
16 June 2006	30/06/2006

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Clivio, E

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INTERNATIONAL SEARCH REPORT

International application No
PCT/FR2006/000686

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 096 045 A (FELDL ET AL) 17 March 1992 (1992-03-17) colonne 1, lignes 5-10; colonne 2, ligne 40 - colonne 3, ligne 46; colonne 4, lignes 7-34; figure 1	1-13
A	US 1 603 634 A (NELSON LEWIS D) 19 October 1926 (1926-10-19) the whole document	1-13

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/FR2006/000686

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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		DE 69320645 T2	11-03-1999
		DE 69330725 D1	11-10-2001
		DE 69330725 T2	11-07-2002
		DK 0850859 T3	07-01-2002
		EP 0663886 A1	26-07-1995
		WO 9407781 A2	14-04-1994
		GB 2271543 A	20-04-1994
		JP 8501762 T	27-02-1996
US 2004089522 A1	13-05-2004	NONE	
JP 57131609 A	14-08-1982	NONE	
US 5096045 A	17-03-1992	NONE	
US 1603634 A	19-10-1926	NONE	

RAPPORT DE RECHERCHE INTERNATIONALE

Demande internationale n°
PCT/FR2006/000686

A. CLASSEMENT DE L'OBJET DE LA DEMANDE
INV. B65G15/24

Selon la classification internationale des brevets (CIB) ou à la fois selon la classification nationale et la CIB

B. DOMAINES SUR LESQUELS LA RECHERCHE A PORTE

Documentation minimale consultée (système de classification suivi des symboles de classement)
B65G

Documentation consultée autre que la documentation minimale dans la mesure où ces documents relèvent des domaines sur lesquels a porté la recherche

Base de données électronique consultée au cours de la recherche internationale (nom de la base de données, et si cela estréalisable, termes de recherche utilisés)
EPO-Internal, PAJ, WPI Data

C. DOCUMENTS CONSIDERES COMME PERTINENTS

Catégorie*	Identification des documents cités, avec, le cas échéant, l'indication des passages pertinents	no. des revendications visées
A	US 5 662 209 A (RADMALL ET AL) 2 septembre 1997 (1997-09-02) colonne 1, lignes 6,7; colonne 2, lignes 39-57; colonne 3, lignes 37-67; revendication1; figure 1	1-13
A	US 2004/089522 A1 (SHAUM FRANK-PETER ET AL) 13 mai 2004 (2004-05-13) page 1, paragraphes 2,7; page 3, paragraphes 33,35,36; page 4, paragraphes 39-41; revendication 1, figures	
A	PATENT ABSTRACTS OF JAPAN vol. 006, no. 232 (M-172), 18 novembre 1982 (1982-11-18) & JP 57 131609 A (NISSAN JIDOSHA KK), 14 août 1982 (1982-08-14) abrégé; figures	1-13

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[X] Voir la suite du cadre C pour la fin de la liste des documents

[X] Les documents de familles de brevets sont indiqués en annexe

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Date à laquelle la recherche internationale a été effectivement achevée	Date d'expédition du présent rapport de recherche internationale
16 juin 2006	30/06/2006

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Formulaire PCT/ISA/210 (deuxième feuille) (avril 2005)

RAPPORT DE RECHERCHE INTERNATIONALE

Demande internationale n°
PCT/FR2006/000686

C(suite). DOCUMENTS CONSIDERES COMME PERTINENTS

Catégorie*	Identification des documents cités, avec, le cas échéant, l'indication des passages pertinents	no. des revendications visées
A	US 5 096 045 A (FELDL ET AL) 17 mars 1992 (1992-03-17) colonne 1, lignes 5-10; colonne 2, ligne 40 - colonne 3, ligne 46; colonne 4, lignes 7-34; figure 1	1-13
A	US 1 603 634 A (NELSON LEWIS D) 19 octobre 1926 (1926-10-19) le document en entier	1-13

RAPPORT DE RECHERCHE INTERNATIONALE

Renseignements relatifs aux membres de familles de brevets

Demande internationale n°
PCT/FR2006/000686

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(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 2 357 063 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
17.08.2011 Bulletin 2011/33

(21) Application number: **11154064.7**

(22) Date of filing: **10.02.2011**

(51) Int Cl.:
B26D 1/143 *(2006.01)* ***B26D 7/08*** *(2006.01)*
B26D 3/28 *(2006.01)* ***B26D 7/00*** *(2006.01)*

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME

(30) Priority: **12.02.2010 US 704972**

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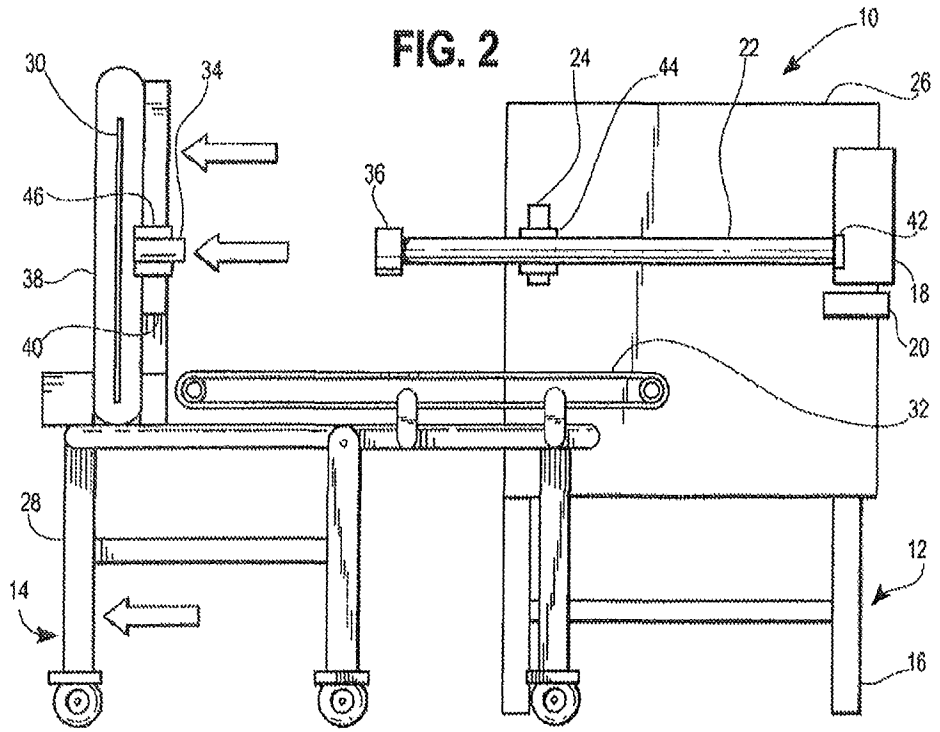
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(54) Systems and methods for slicing food products

(57) Systems (10) and methods are provided for cutting slices of food product from a larger portion of the food product, whereby the systems and methods can reduce down-time associated with some of the portions of the equipment during cleaning. Components (24,32) of the system requiring more frequent cleaning can be readily disconnected from those components (18) requiring less frequent cleaning. Further, substitute components can be connected to those components requiring less frequent cleaning to reduce their down-time while the other components are being cleaned.

FIG. 2



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Description

Field

[0001] Systems and methods are described herein relating to cutting slices of food product from a larger portion of the food product and, in particular, systems and methods configured for simplified cleaning.

Background

[0002] In the formation of food product slices, one common method is to advance a larger portion of the food product to a slicing blade. The advancement of the food product in conjunction with the rotation of the slicing blade results in slices of food product being cut from the larger portion of the food product. Typical types of food products that are sliced include meats and cheeses. For example, cheese slices may be cut from an end of a larger portion of cheese. Also by way of example, meat slices may be cut from an end of a larger portion of meat, such as bacon slices from a pork belly or deli meat slices from a meat log.

[0003] Various configurations of equipment can be used for the formation of food product slices from a larger portion of the food product. This equipment can include a machinery framework supporting a slicing blade, a motor and a shaft operably connected between the slicing blade and the motor for driving the slicing blade for rotation using the motor. The equipment can also include a conveyor, such as a belt conveyor, for advancing the larger portion of the food product to the slicing blade. A motor can be associated with the conveyor for driving the conveyor.

[0004] In high speed commercial production, a controller can be used to synchronize the operation of the components on the framework. For example, a controller can be used to control the motor operably connected to the slicing blade and to control the operation of the conveyor. The controller can adjust the speeds of the motors to control the thickness of the sliced food product, such as by speeding up or slowing down the speeds of the motors to thereby control the speeds of the slicing blade and the conveyor. The controller can also be connected to other electronic components of the platform, such as sensors for sensing the position of the larger portion of the food product and sensors for sensing the speeds of the motors.

[0005] Depending upon the specific type of equipment arrangement, differing in-feed mechanisms can be used. One type of in-feed mechanism is a hold-down drive roller, driven for rotation. Another type of in-feed mechanism is a gripper supported by a cantilevered arm, which arm is movable. Yet another type of in-feed mechanism is a pusher associated to move with the conveyor belt.

[0006] Many of the surfaces of the platform and its components that come into contact with the food product are periodically cleaned. For instance, the slicer blade, an associated housing, and the conveyor can come in contact with the food product and be periodically cleaned. As the components are supported by the framework, operation of the entire piece of equipment is halted so that some of the components can be cleaned. This disadvantageously results in unnecessary down-time for components that do not need to be cleaned or need cleaning on less frequent bases. Furthermore, care is taken during cleaning so as to not damage the electronic components associated with the framework, such as the sensors, motors and controller. Protecting the electronic components during cleaning can increase the time associated with the cleaning process, thereby disadvantageously increasing the down-time of the equipment. For example, the electronic components can be wrapped or otherwise protect, or certain components can be removed from the framework, both of which can add to the down-time of the equipment.

[0007] Attempts have been made to simplify cleaning of food slicing equipment. In one example, heat treatments can be applied to the exterior of the equipment in order to avoid having to disassemble. However, such exterior heat treatments can require significant preparation work, thereby disadvantageously contributing to down-time of the equipment. In another example, a hot air heater can be associated with a target area, such as the slicing blade, for cleaning purposes. However, the hot air heater can disadvantageously create a heated zone adjacent to the target area.

Summary

[0008] A system for slicing food products from a larger portion of a food product is provided, whereby the system is configured for simplified cleaning or sterilization. The simplified cleaning can advantageously result in reduced down-time of the system, thereby providing for improved efficiencies in commercial production of food slices, including improved shelf life.

[0009] In one aspect, those portions of the food processing systems for which more frequent cleaning is desired can be readily separable from those portions which do not require the same frequency of cleaning. Regions of the system that regularly come into contact with the food product, such as the conveyor and the slicing blade, can be in modular form with respect to regions of the system that do not need as frequent cleaning and/or electronic components, such as motors, controllers and sensors. This advantageously permits select components to be readily disconnected from other components to facilitate cleaning. Further, separating at least some of the electronic components from those requiring more frequent cleaning can simplify the cleaning because the electronic components do not need to be specially protected in order to clean the components requiring more frequent cleaning, as they can simply be disconnected or otherwise isolated and remain with the regions of the system that do not need as frequent cleaning.

[0010] A further advantage is that when the module

containing the components needing more frequent cleaning is separated from the remainder of the system, a substitute module can be operably connected to the remainder of the system. This reduces the down-time associated with the remainder of the system, permitting the remainder of the system to be operational using the substitute module while the original module is being cleaned. This can result in significant maximization of the use of the remainder of the system.

[0011] In another aspect, those portions of the food processing systems for which more frequent heating and/or cleaning is desired can be readily separable from electronic components. This advantageously permits for the cleaning of certain components without the preparations necessary to protect the electronic components during cleaning. For instance, drive mechanisms can either be moved from the product contact areas, isolated from the product contact areas, or associated with the equipment requiring less frequent cleaning.

[0012] In yet another aspect, the system can include localized cleaning systems, such as integrated heating elements, for cleaning specific areas of the system without adversely impacting adjacent areas. The localized cleaning systems can be disposed adjacent areas of the system where there is the potential for interaction between areas that regularly come into contact with food products and those areas that do not regularly come into contact with food products during routine food processing operations. Localized heating elements can be disposed proximate seals, supports, gaps (such as areas lacking continuous welds) and the like for cleaning those specific areas, while being configured so as to not significantly heat adjacent areas.

[0013] The invention therefore provides a modular slicing system for cutting slices of food from a larger piece of food, the modular slicing system comprising: a slicer blade for cutting slices of food from a larger piece of food, the slicer blade being operably connected to a driven shaft; a conveyor for advancing the meat log toward the slicer blade; a motor operably connected to a driving shaft for driving the driving shaft for rotation; a coupling selectively joining the driven shaft and the driving shaft, thereby permitting the driving shaft to drive the driven shaft and the slicer blade for rotation; a first platform for supporting the slicer blade and the conveyor; and a second platform for supporting the motor independent of the first platform such that the first platform, along with the slicer blade and the conveyor, can be moved away from the second platform, along with the motor, when the coupling between the driven shaft and the driving shaft are decoupled.

[0014] Preferably a controller is operably connected to the motor for controlling operation of the motor, the controller being supported by the second platform. An infeed gripper may be supported by the second platform for controlling at least in part the infeed of a larger piece of food to the conveyor, the infeed gripper and the conveyor being operably connected to the controller.

[0015] The slicer blade is preferably disposed within a housing, the housing having an upstream opening allgned with the conveyor for the introduction of a larger piece of food into the housing and a downstream opening through which slices of food from the larger piece of food can exit the housing. One of the drive and drive shafts may extend at least partially into the housing through a shaft opening of the housing. An integrated heating element may be disposed adjacent the shaft opening of the housing to provide localized sterilization.

[0016] Preferably a support for the driving shaft is disposed on the second platform between the coupling and the motor. An integrated heating element may be disposed adjacent the support for the driving shaft to provide localized sterilization. At least one integrated heating element may be disposed to provide localized sterilization. At least one integrated heating element may be disposed adjacent one of a support for the driving shaft, a support for the driven shaft, the slicing blade and the motor to provide localized sterilization.

[0017] The invention further provides a slicing system for cutting slices of food from a larger piece of food, the slicing system comprising: product contact areas including a slicer blade for cutting slices of food from a larger piece of food; a shaft operably connected to the slicer blade; drive areas including a motor operably connected to the shaft for driving the shaft and the slicer blade for rotation; a housing for one of the slicer blade and the motor, the housing having one of a connection point to adjacent components not suitable for being continuously welded and a sealing zone where a seal is used to separate the drive areas from the product contact areas; and at least one integrated heating element disposed to provide localized sterilization at one of the connection point and the sealing zone.

[0018] Preferably the housing contains the slicer blade and the shaft preferably extends through an opening in the housing to define the sealing zone, the integrated heating element disposed to provide localized sterilization at the sealing zone. The housing may contain the motor and the shaft may extend through an opening in the housing to define the sealing zone, the integrated heating element may be disposed to provide localized sterilization at the sealing zone. A support is preferably provided for the shaft between the slicing blade and the motor and within the housing to define the connection point, the integrated heating element may be disposed to provide localized sterilization at the connection point.

[0019] The housing of the slicing system preferably contains the slicer blade and the shaft may extend through an opening in the housing to define the sealing zone, the integrated heating element may be a first heating element disposed to provide localized sterilization at the sealing zone; and a motor housing may be provided for the motor and the shaft may extend through an opening in the motor housing to define a motor sealing zone, a second integrated heating element may be disposed to provide localized sterilization at the motor sealing

zone.

[0020] A support is preferably provided for the shaft between the slicing blade and the motor, a third integrated heating element is preferably disposed to provide localized sterilization at the support. A plurality of integrated heating elements may be provided, each of the heating elements being independently operable using a controller.

[0021] The invention further provides a method of cutting food slices from a larger portion of a food product, the method comprising: providing a first platform having a slicer blade rotatable to cut food slices from a larger portion of a food product; providing a second platform having a motor operably connected to the drive shaft to drive the drive shaft for rotation; operably connecting the drive shaft to the slicer blade of the first platform; advancing the larger portion of a food product toward the slicer blade; driving the slicer blade for rotation using the drive shaft and motor to cut food slices from the larger portion of a food product as the larger portion of a food product is advanced toward the slicer blade of the first platform; operably disconnecting the drive shaft from the slicer blade; moving the first platform, along with the slicer blade, away from the second platform; providing a third platform having a slicer blade rotatable to cut food slices from a larger portion of a food product; operably connecting the drive shaft to the slicer blade of the third platform; advancing the larger portion of a food product toward the slicer blade; and driving the slicer blade for rotation using the drive shaft and motor to cut food slices from the larger portion of a food product as the larger portion of a food product is advanced toward the slicer blade of the third platform.

[0022] Preferably the first platform includes a conveyor and the step of advancing the larger portion of a food product to the slicer blade of the first platform includes using the conveyor of the first platform; and the third platform includes a conveyor and the step of advancing the larger portion of a food product to the slicer blade of the third platform includes using the conveyor of the third platform. Preferably the step of applying localized heating adjacent at least one of a seal and a bearing associated with the shaft is further included.

Brief Description of the Figures

[0023] FIGURE 1 is a schematic side elevation view of a system configured for simplified cleaning or sanitization, including a first platform with a slicing blade and a conveyor, a second platform with a motor, and a shaft operably connected between the motor and the slicing blade, as well as a plurality of integrated heating elements adjacent the shaft;

[0024] FIGURE 2 is a schematic side elevation view of the system of FIGURE 1, but showing the shaft disconnected and the first platform, along with the slicing blade and the conveyor, and the second platform, along with the motor, moved apart; and

[0025] FIGURE 3 is a flow diagram of methods for using the system of FIGURE 1 to cut food slices from a larger portion of food product.

Detailed Description

[0026] Exemplary embodiments of systems and methods for cutting slices of food products from larger portions of food product while facilitating cleaning or sanitization and reducing down-time are described herein and illustrated in FIGURES 1-3. In a first aspect, the system is modular in order to permit ready separation of the components requiring more frequent cleaning from those components that do not. Further, electronic components can be associated with the components that do not require as frequent cleaning, thereby facilitating the cleaning of those components that do require more frequent cleaning.

[0027] Turning to one exemplary embodiment, illustrated schematically in FIGURES 1 and 2, the system 10 is modular and includes a first platform 12 and a second platform 14. The first platform 12 and the second platform 14 can be operably disconnected from each other so that the second platform 14 and the components associated therewith can be moved away from the first platform 12 for cleaning or other maintenance. When the second platform 14 is moved away from the first platform 12, a substitute second platform 14 (hereinafter referred to as a third platform) can be operably connected to the first platform 12. The third platform can be functionally identical to the second platform 14. This advantageously permits the first platform 12 and its components to be utilized in conjunction with the third platform with minimized down-time while the second platform 14 is being cleaned.

[0028] The first platform 12 includes components that do not need cleaning as frequently or that would need to be protected during cleaning. These components include a motor 18 operably connected to a driving shaft 22 for rotating the driving shaft 22. Also included is a support 24 for the driving shaft 22 spaced from the motor 18 and a controller 20. A motor for operating a conveyor 32 of the second platform 14 may also be provided as part of the first platform 12. Other drive mechanisms can be incorporated into the first platform 12. Sensors, such as for sensing the placement and positioning of the product, and other electronics can optionally be provided, and may be part of the first platform 12. Some or all of the components of the first platform 12 may be provided in a housing 26 which can facilitate separation of areas with food contact from those areas lacking food conduct. The first platform 12 can be supported by a framework 16, and may be stationary or may be configured to be readily moved.

[0029] The second platform 14 includes components for which it is desirable to provide more frequent cleaning, such as those components that regularly contact food products. These components include a slicer blade 30 and the conveyor 32 for advancing the food product to-

ward the slicer blade 30. The conveyor 32 may be of the belt type, or any other type suitable for use with commercial food processing equipment. A driven shaft 34 may be attached to the slicer blade 24 such that rotation of the driven shaft 34 causes the slicer blade 24 to rotate. The slicer blade 24 may be disposed in a housing 38 having an opening 40 through which the food product can be advanced toward the slicing blade 24 and an opposite opening through which the sliced food product can exit the housing. A jump conveyor, stacking conveyor, or other mechanisms for controlling the slices of food product downstream of the slicer blade 24 can also be part of the second platform 14. The slicer blade 24, housing 38 and driven shaft 34 of the second platform 14 can be supported on a framework 28 that is configured to be readily moved, such as by having selectively lockable wheels or the like.

[0030] Preferably, the number of physical connections between the first and second platforms is minimized in number and/or the types of physical connections are readily connected and disconnected. For example, quick connect and disconnect features can be used for joining electrical wires or controllers, as well as for mechanical components. Anchor pins and/or alignment pins and associated receiving apertures can also be provided, such as in the frames, to facilitate proper alignment of the first and second platforms 12 and 14 when connected for operation. With reference to the exemplary embodiment of FIGURES 1 and 2, the first platform 12 and second platform 14 can be operably connected by coupling the driving shaft 22 and the driven shaft 34 such that rotation of the driving shaft 22 (via the motor 18) causes the driven shaft 34 (and hence the slicing blade 30) to rotate. A coupling 36 can be provided for joining the two shafts 22 and 34, and may be in the form of a collar that can be clamped to the adjacent ends of the shafts 22 and 34. To this end, the adjacent ends of the shafts 22 and 34 may be splined and may cooperate with corresponding structures of the coupling 36. A bolt or quick-release clamp can be used to quickly disconnect the coupling 36. However, other suitable couplings can also be used.

[0031] The system 10 optionally includes integrated heating elements in a variety of locations to provide for localized sterilization. Locations amenable to inclusion of the heating elements include seal areas, gaps where housings or other structures are not continuously welded and other areas where it can be desirable to provide for localized sterilization. The heating elements are preferably contact-type heaters, which may be formed of a high resistance heating element, and are connected to the controller. The heating elements could also use infrared energy to heat the substrate. The integrated heating elements can provide targeting heating, such as about 165-180 degrees Fahrenheit, for heating the substrate for select periods of time, such as about 30 minutes. A thermocouple or other feedback mechanism can be associated with the substrate to provide feedback to the controller for adjusting the output of the integrated heating elements. They optionally may be capable of independent operation and variable heat application. Preferably, the integrated heating elements provide for localized heating without significantly raising the temperature of adjacent areas. In the exemplary embodiment, an integrated heating element 42 is provided adjacent to a connection point between the motor 18 and the driving shaft 22 or an opening in the motor housing 18. Another integrated heating element 44 can be provided adjacent the support 24 for the driving shaft 22. Another integrated heating element 46 can be provided adjacent to an opening in the housing 38 of the slicing blade 30, where the driven shaft 34 passes through. Other locations can include inside bearing areas (such as shaft supports or conveyor components) and joints (such as lap joints) in the housings or internal components.

[0032] Turning now to an exemplary method of operating the system to cut slices of food product from a larger portion of food product, and with reference to FIGURE 3, the first platform 12, having the motor 18, is provided, as is the second platform 14, having the slicing blade 30. The slicing blade 30 is operably connected to the motor 18 such that rotation of the motor 18 causes the slicing blade 30 to rotate. In the exemplary embodiment of FIGURES 1 and 2, one or more shafts 22 and 34 are coupling together to operably connect the motor 18 and the slicing blade 30. Next, the larger portion of the food product is advanced toward the slicing blade 30. In the exemplary embodiment of FIGURES 1 and 2, the conveyor 32 is operated to advance the larger portion of the food product. When it is desired to clean or otherwise maintain the slicing blade 30, the conveyor 32, and/or other components associated with the second platform 14, the slicing blade 30 is operably disconnected from the motor 18. As described above with reference to FIGURES 1 and 2, this can involve decoupling the shafts 22 and 34. Other components, such as electronics, can also be disconnected. The second platform 14 can then be moved away from the first platform 12. Optionally, a third platform (functionally identical to the second platform 14) can be provided. The third platform can be moved into the place vacated by the second platform 14 and operably connected to the first platform 12 in much if not the same manner as the second platform 14. The third platform can have a conveyor and slicing blade, and the slicing process can resume using the first platform 12 and the third platform instead of the first platform 12 and the second platform 14. This substitution of equipment can be continued as desired, and multiple replacements can be provided to permit the minimization of down-time associated with the first platform 12.

[0033] The drawings and the foregoing descriptions are not intended to represent the only forms of the systems and methods. While one suitable arrangement is diagrammatically illustrated in FIGURES 1 and 2, the inventions described herein can be applied to other slicing arrangements. Changes in form and in proportion of parts, as well as the substitution of equivalents, are con-

templated as circumstances may suggest or render expedient.

Claims

1. A modular slicing system for cutting slices of food from a larger piece of food, the modular slicing system comprising:

   a slicer blade for cutting slices of food from a larger piece of food, the slicer blade being operably connected to a driven shaft;
   a conveyor for advancing the meat log toward the slicer blade;
   a motor operably connected to a driving shaft for driving the driving shaft for rotation;
   a coupling selectively joining the driven shaft and the driving shaft, thereby permitting the driving shaft to drive the driven shaft and the slicer blade for rotation;
   a first platform for supporting the slicer blade and the conveyor; and
   a second platform for supporting the motor independent of the first platform such that the first platform, along with the slicer blade and the conveyor, can be moved away from the second platform, along with the motor, when the coupling between the driven shaft and the driving shaft are decoupled.

2. The modular slicing system of claim 1, wherein a controller is operably connected to the motor for controlling operation of the motor, the controller being supported by the second platform.

3. The modular slicing system of claim 2, wherein an infeed gripper is supported by the second platform for controlling at least in part the infeed of a larger piece of food to the conveyor, the infeed gripper and the conveyor being operably connected to the controller.

4. The modular slicing system of any of the preceding claims, wherein the slicer blade is disposed within a housing, the housing having an upstream opening aligned with the conveyor for the introduction of a larger piece of food into the housing and a downstream opening through which slices of food from the larger piece of food can exit the housing.

5. The modular slicing system of claim 4, wherein one of the drive and drive shafts extends at least partially into the housing through a shaft opening of the housing.

6. The modular slicing system of claim 5, wherein an integrated heating element is disposed adjacent the shaft opening of the housing to provide localized sterilization.

7. The modular slicing system of any of the preceding claims, wherein a support for the driving shaft is disposed on the second platform between the coupling and the motor.

8. The modular slicing system of claim 7, wherein an integrated heating element is disposed adjacent the support for the driving shaft to provide localized sterilization.

9. The modular slicing system of claim 1, further comprising:

   product contact areas including the slicer blade;
   drive areas including the motor;
   a housing for one of the slicer blade and the motor, the housing having one of a connection point to adjacent components not suitable for being continuously welded and a sealing zone where a seal is used to separate the drive areas from the product contact areas; and
   at least one integrated heating element disposed to provide localized sterilization at one of the connection point and the sealing zone.

10. The slicing system of claim 9, wherein:

    the housing contains the slicer blade and the shaft extends through an opening in the housing to define the sealing zone, the integrated heating element is a first heating element disposed to provide localized sterilization at the sealing zone; and
    a motor housing is provided for the motor and the shaft extends through an opening in the motor housing to define a motor sealing zone, a second integrated heating element disposed to provide localized sterilization at the motor sealing zone.

11. The slicing system of claim 10, wherein a support is provided for the shaft between the slicing blade and the motor, a third integrated heating element disposed to provide localized sterilization at the support.

12. The slicing system of any one of claims 9 to 11, wherein a plurality of integrated heating elements are provided, each of the heating elements being independently operable using a controller.

13. A method of cutting food slices from a larger portion of a food product, the method comprising:

    providing a first platform having a slicer blade rotatable to cut food slices from a larger portion

of a food product;
providing a second platform having a motor operably connected to the drive shaft to drive the drive shaft for rotation;
operably connecting the drive shaft to the slicer blade of the first platform;
advancing the larger portion of a food product toward the slicer blade;
driving the slicer blade for rotation using the drive shaft and motor to cut food slices from the larger portion of a food product as the larger portion of a food product is advanced toward the slicer blade of the first platform;
operably disconnecting the drive shaft from the slicer blade;
moving the first platform, along with the slicer blade, away from the second platform;
providing a third platform having a slicer blade rotatable to cut food slices from a larger portion of a food product;
operably connecting the drive shaft to the slicer blade of the third platform;
advancing the larger portion of a food product toward the slicer blade; and
driving the slicer blade for rotation using the drive shaft and motor to cut food slices from the larger portion of a food product as the larger portion of a food product is advanced toward the slicer blade of the third platform.

14. The method of claim 13, wherein:

the first platform includes a conveyor and the step of advancing the larger portion of a food product to the slicer blade of the first platform includes using the conveyor of the first platform; and
the third platform includes a conveyor and the step of advancing the larger portion of a food product to the slicer blade of the third platform includes using the conveyor of the third platform.

15. The method of claims 13 and 14, further including the step of applying localized heating adjacent at least one of a seal and a bearing associated with the shaft.

FIG. 1

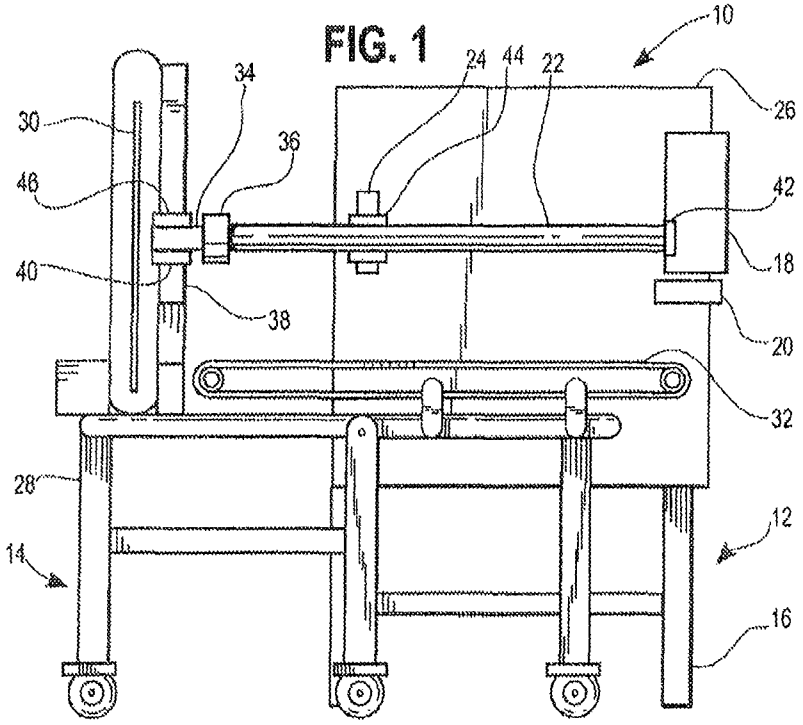

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FIG. 2

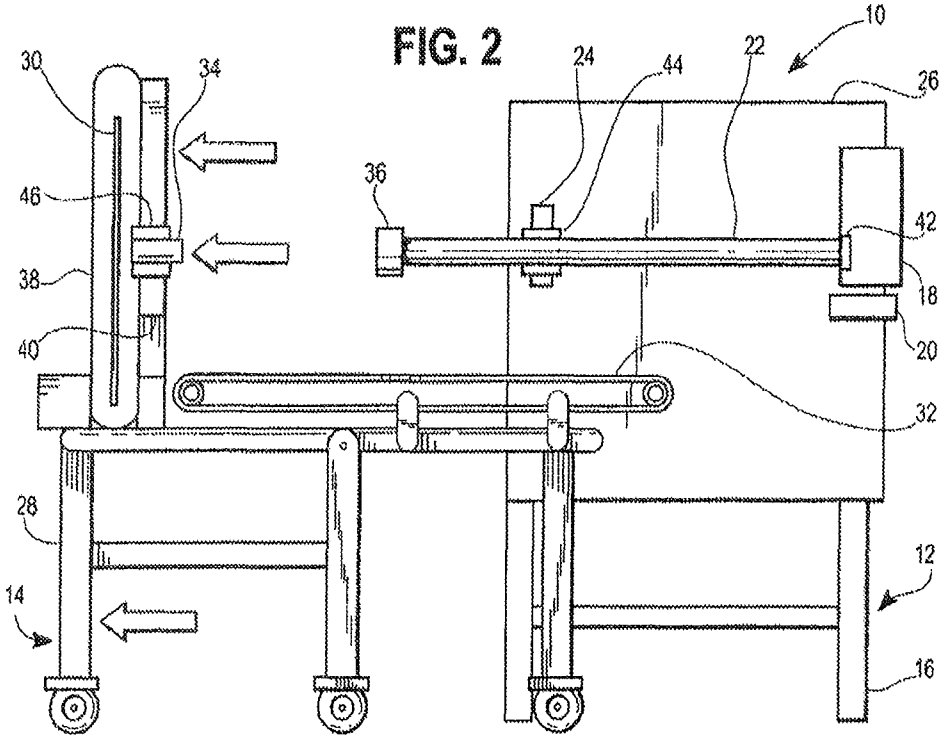
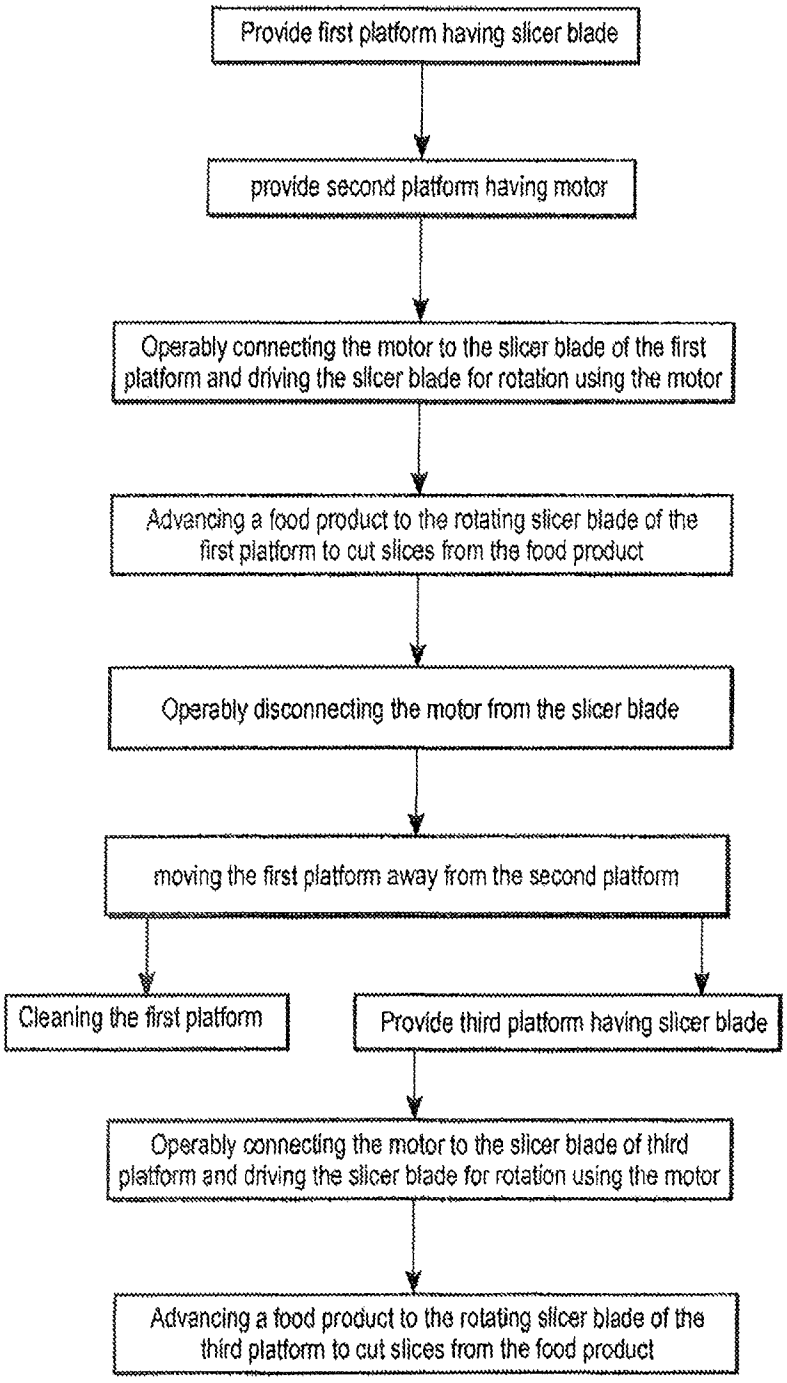

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FIG. 3


Provide first platform having slicer blade
provide second platform having motor
Operably connecting the motor to the slicer blade of the first platform and driving the slicer blade for rotation using the motor
Advancing a food product to the rotating slicer blade of the first platform to cut slices from the food product
Operably disconnecting the motor from the slicer blade
moving the first platform away from the second platform
Cleaning the first platform
Provide third platform having slicer blade
Operably connecting the motor to the slicer blade of third platform and driving the slicer blade for rotation using the motor
Advancing a food product to the rotating slicer blade of the third platform to cut slices from the food product

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 11 15 4064

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 2007/062353 A1 (BODEY TODD L [US] ET AL) 22 March 2007 (2007-03-22) * paragraph [0001] - paragraph [0011] * * paragraph [0043] - paragraph [0044]; figures 6,7 *	1-15	INV. B26D1/143 B26D7/08 B26D3/28 B26D7/00
A	FR 2 688 732 A1 (EBERLE FRANCE [FR]) 24 September 1993 (1993-09-24) * page 5, line 8 - page 8, line 27; figures 1-7 *	1-15	
A	US 3 442 312 A (KARP EDWARD C) 6 May 1969 (1969-05-06) * column 3, line 65 - column 4, line 12; figure 1 *	1-15	

TECHNICAL FIELDS SEARCHED (IPC)

B26D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	4 May 2011	Maier, Michael

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

1 EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 11 15 4064

This annex lists the patent family members relating to the patent doouments cited in the above-mentioned European searoh report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

04-05-2011

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2007062353 A1	22-03-2007	DE 102006043972 A1	26-04-2007
		GB 2430353 A	28-03-2007
FR 2688732 A1	24-09-1993	NONE	
US 3442312 A	06-05-1969	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

Electronic Acknowledgement Receipt

EFS ID:	21358347
Application Number:	14094136
International Application Number:	
Confirmation Number:	1104
Title of Invention:	High Performance Slicing Apparatus With At Least One Removable Conveyor Belt Unit
First Named Inventor/Applicant Name:	Josef Mayer
Customer Number:	23413
Filer:	Scott A. McBain/Aimee Peluyera
Filer Authorized By:	Scott A. McBain
Attorney Docket Number:	MFP0031US (T10212PUS)
Receipt Date:	30-JAN-2015
Filing Date:	02-DEC-2013
Time Stamp:	14:41:54
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	7C46241.PDF	612201 6136d1ed86e3b10d3214fc9d3fb533b4cc87e8fd	no	4

Warnings:	
Information:	

A U.S. Patent Number Citation or a U.S. Publication Number Citation is required in the Information Disclosure Statement (IDS) form for autoloading of data into USPTO systems. You may remove the form to add the required data in order to correct the Informational Message if you are citing U.S. References. If you chose not to include U.S. References, the image of the form will be processed and be made available within the Image File Wrapper (IFW) system. However, no data will be extracted from this form. Any additional data such as Foreign Patent Documents or Non Patent Literature will be manually reviewed and keyed into USPTO systems.

2	Foreign Reference	7C46192.PDF	2765094 141421ea44bced12cae42793eec54631148496c4	no	33
Warnings:					
Information:					
3	Foreign Reference	7C46180.PDF	1233195 bd033bf6776d71bc8d3d689d27e9a754f0dcc285	no	11
Warnings:					
Information:					
4	Non Patent Literature	7C92941.PDF	579255 ef53d75d033bda0deaf54dcf11e02c5e5f5a63ad	no	5
Warnings:					
Information:					
		Total Files Size (in bytes):	5189745		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/094,136	12/02/2013	Josef Mayer	MFP0031US (T10212PUS)	1104

23413 7590 01/13/2015

CANTOR COLBURN LLP
20 Church Street
22nd Floor
Hartford, CT 06103

EXAMINER
HARP, WILLIAM RAY

ART UNIT	PAPER NUMBER
3651	

NOTIFICATION DATE	DELIVERY MODE
01/13/2015	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

usptopatentmail@cantorcolburn.com

Office Action Summary	Application No. 14/094,136	Applicant(s) MAYER, JOSEF	
	Examiner WILLIAM R. HARP	Art Unit 3651	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *26 February 2014*.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5)☒ Claim(s) *33-57* is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☒ Claim(s) *33-57* is/are rejected.

8)☐ Claim(s) _____ is/are objected to.

9)☐ Claim(s) _____ are subject to restriction and/or election requirement.

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☒ The drawing(s) filed on *2 December 2013* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☒ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☒ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date *2/26/2014*.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

4) ☐ Other: _____.

1. The present application is being examined under the pre-AIA first to invent provisions.

Priority

2. Receipt is acknowledged of certified copies of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Information Disclosure Statement

3. The information disclosure statement(s) (IDS) was/were submitted on February 26, 2014. The submission(s) is/are in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement(s) is/are being considered by the examiner.

Drawings

4. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the **cutting plane** must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet"

pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

5. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Objections

6. The claims are generally narrative, using passive language such as "at least one direct drive (15) for the conveyor belt (13) is provided." Though not required, it is suggested the claims be amended to use positive language such as -- comprising --.

Claim Rejections - 35 USC § 112

7. The following is a quotation of 35 U.S.C. 112(b):

> (b) CONCLUSION.—The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the inventor or a joint inventor regards as the invention.

The following is a quotation of 35 U.S.C. 112 (pre-AIA), second paragraph:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

8. Claim(s) 34, 35, 38-50, 53-56 is/are rejected under 35 U.S.C. 112(b) or 35 U.S.C. 112 (pre-AIA), second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the inventor or a joint inventor, or for pre-AIA the applicant regards as the invention.

9. Claim 34 recites the limitation "the cutting plane" in Line 2. There is insufficient antecedent basis for this limitation in the claim.

10. Claim 35 recites the limitation "the cutting plane" in Line 2. There is insufficient antecedent basis for this limitation in the claim.

11. Regarding Claims 38, 39, 40, 41, 46, 47, 48, 49, 50, 53, 54, 55, 56, the use of "and/or" renders the claims indefinite because it is not clear what is required by the claim language. These claims have not been treated with respect to the prior art because the scope of the claims in not clear.

12. Regarding Claim 41, 42, 43, 44, 45, 47, 49, 53, 54, 55, the use of "can be" renders the claims indefinite because it is not clear if the claim language following the term is required. These claims have not been treated with respect to the prior art because the scope of the claims in not clear.

Claim Rejections - 35 USC § 102

13. The following is a quotation of the appropriate paragraphs of pre-AIA 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

14. Claim(s) 33-35, 52, 57 is/are rejected under pre-AIA 35 U.S.C. 102b as being anticipated by Dolan (USPN 5967296) or Layne et al. (USPN 6959803) or Glaser et al. (USPN 3878937).

15. Regarding Claims 33 and 57, Dolan or Layne et al. or Glaser et al. teaches an apparatus having at least one belt conveyor which is designed as a removable conveyor (see Figures of either reference). The recitations to "slicing" or "for food products" are considered to be recitations of the intended use of the apparatus and are not considered to limit the structure of the apparatus. See MPEP 2114.

16. Claims 34 and 35 do not provide specify what structure constitutes a "cutting plane". Therefore, any plane could be considered a cutting plane, and since the devices of Dolan, Layne et al., or Glaser et al. have planes in front of and behind them, the devices are considered to be arranged in front of or behind the cutting plane.

17. Regarding Claims 37, Dolan teaches a drive (5). Layne et al. teaches a drive (motor M). Glaser et al. teaches a drive (70).

18. Regarding Claim 52, Dolan teaches a continuous belt (23). Layne et al. teaches a belt (B). Glaser et al. teaches a belt (40).

Claim Rejections - 35 USC § 103

19. The following is a quotation of pre-AIA 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

20. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under pre-AIA 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.

2. Ascertaining the differences between the prior art and the claims at issue.

3. Resolving the level of ordinary skill in the pertinent art.

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

21. Claims 36, 51 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Dolan in view of Glaser or Layne et al. in view of Glaser or Glaser et al. (USPN 3878937).

22. Regarding Claims 36, 51, none of the applied reference teaches the claimed length or width. However, it has been shown that a change in the size of a prior art device is a design consideration within the skill of the art. *In re Rose*, 220 F.2d 459, 105 USPQ 237 (CCPA 1955). Further, Glaser et al. discloses [Col 4, Line 24-35] the length and width may be easily changed. It would have been obvious to one of ordinary skill at the time of the invention to select the dimensions of the device as engineering expedient, absent evidence of the criticality of the claimed dimensions.

Conclusion

23. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to WILLIAM R. HARP whose telephone number is (571)270-5386. The examiner can normally be reached on Monday - Thursday, 8:30 AM - 5:00 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gene Crawford can be reached on (571) 272-6911. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/WILLIAM R HARP/
Primary Examiner, Art Unit 3651

Notice of References Cited	Application/Control No. 14/094,136	Applicant(s)/Patent Under Reexamination MAYER, JOSEF	
	Examiner WILLIAM R. HARP	Art Unit 3651	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-3,878,937 A	04-1975	Glaser et al.	198/835
*	B	US-5,871,085 A	02-1999	Yagi, Shigeru	198/835
*	C	US-5,934,449 A	08-1999	Dolan, Rex H.	198/853
*	D	US-5,967,296 A	10-1999	Dolan, Rex H.	198/853
*	E	US-5,964,340 A	10-1999	Dolan, Rex H.	198/853
*	F	US-6,959,803 B1	11-2005	Layne et al.	198/600
*	G	US-7,308,979 B1	12-2007	Layne et al.	198/600
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
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	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	14094136
Filing Date	2013-12-02
First Named Inventor	Joseph Mayer
Art Unit	NYA
Examiner Name	NYA
Attorney Docket Number	MFP-0031US

U.S.PATENTS Remove

Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	6371283	B1	2002-04-16	Manchester	

If you wish to add additional U.S. Patent citation information please click the Add button. Add

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Examiner Initial*	Cite No	Publication Number	Kind Code[1]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20080073185	A1	2008-03-27	Brayman, et al.	

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Examiner Initial*	Cite No	Foreign Document Number[3]	Country Code[2] i	Kind Code[4]	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	T[5]
	1	102008024314	DE	A1	2009-11-26	Bizerba GmbH & Co KG	English abstract provided	☐
	2	102010001969	DE	A1	2011-08-18	Robert Bosch GmbH	Machine translation of abstract provided	☐
	3	1584580	EP	A1	2005-10-12	R.J. Herbert Engineering Limited		☐

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /W.H./

Receipt date: 02/26/2014	Application Number	14094136	14094136 - GAU: 3651
INFORMATION DISCLOSURE STATEMENT BY APPLICANT	Filing Date	2013-12-02	
(Not for submission under 37 CFR 1.99)	First Named Inventor	Joseph Mayer	
	Art Unit	NYA	
	Examiner Name	NYA	
	Attorney Docket Number	MFP-0031US	

	4	1816092	EP	A1	2007-08-08	Vanderlande Industries		☐
	5	1877328	EP	B1	2008-11-05	Neolution	English abstract provided	☐
	6	2041315	GB	A	1980-09-10	Cope Whelon & Company		☐
	7	2239108	EP	A2	2010-10-13	Formax, Inc.		☐

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Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T[5]
	1	Search Report regarding related Application No. 10 2013 206 510.8; dated November 8, 2013; 5 pgs.	☐
	2	English Translation of German Search Report dated November 8, 2013; DE Pat. App. No. 10 2013 206 510.8; 6 pgs.	☐

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EXAMINER SIGNATURE

Examiner Signature	/William Harp/	Date Considered	01/08/2015

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /W.H./

Receipt date: 02/26/2014	Application Number	14094136	14094136 - GAU: 3651
INFORMATION DISCLOSURE STATEMENT BY APPLICANT (**Not for submission under 37 CFR 1.99)**	Filing Date	2013-12-02	
	First Named Inventor	Joseph Mayer	
	Art Unit	NYA	
	Examiner Name	NYA	
	Attorney Docket Number	MFP-0031US	

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☐ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☐ See attached certification statement.

☐ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Lukas M. Baldridge/	Date (YYYY-MM-DD)	2014-02-26
Name/Print	Lukas M. Baldridge	Registration Number	65,187

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /W.H./

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

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2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /W.H./

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14094136	MAYER, JOSEF
	Examiner	Art Unit
	WILLIAM R HARP	3651

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	01/08/2015								
	1	-								
	2	-								
	3	-								
	4	-								
	5	-								
	6	-								
	7	-								
	8	-								
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	28	-								
	29	-								
	30	-								
	31	-								
	32	-								
	33	✓								
	34	✓								
	35	✓								
	36	✓								

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14094136	MAYER, JOSEF
	Examiner	**Art Unit**
	WILLIAM R HARP	3651

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	01/08/2015								
	37	✓								
	38	✓								
	39	✓								
	40	✓								
	41	✓								
	42	✓								
	43	✓								
	44	✓								
	45	✓								
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	53	✓								
	54	✓								
	55	✓								
	56	✓								
	57	✓								

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	14094136	MAYER, JOSEF
	Examiner	Art Unit
	WILLIAM R HARP	3651

CPC- SEARCHED		
Symbol	Date	Examiner

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
198	817	1/8/2015	/wrh/

SEARCH NOTES		
Search Notes	Date	Examiner
EAST search	1/8/2015	/wrh/

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner

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BIB DATA SHEET

CONFIRMATION NO. 1104

SERIAL NUMBER	FILING or 371(c) DATE RULE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
14/094,136	12/02/2013	198	3651	MFP0031US (T10212PUS)

APPLICANTS

Textor Maschinenbau GmbH, Wolfertschwenden, GERMANY, Assignee (with 37 CFR 1.172 Interest);

INVENTORS

Josef Mayer, Memmingerberg, GERMANY;

**** CONTINUING DATA ***************************

**** FOREIGN APPLICATIONS ***************************

GERMANY 102012222042.9 12/03/2012
GERMANY 102013206510.8 04/12/2013

**** IF REQUIRED, FOREIGN FILING LICENSE GRANTED ****

12/20/2013

Foreign Priority claimed ☑ Yes ☐ No 35 USC 119(a-d) conditions met ☑ Yes ☐ No Verified and Acknowledged /WILLIAM RAY HARP/ Examiner's Signature	☐ Met after Allowance Initials	STATE OR COUNTRY	SHEETS DRAWINGS	TOTAL CLAIMS	INDEPENDENT CLAIMS
		GERMANY	15	25	2

ADDRESS

CANTOR COLBURN LLP
20 Church Street
22nd Floor
Hartford, CT 06103
UNITED STATES

TITLE

High Performance Slicing Apparatus With At Least One Removable Conveyor Belt Unit

FILING FEE RECEIVED		
2280	FEES: Authority has been given in Paper No._____ to charge/credit DEPOSIT ACCOUNT No._____ for following:	☐ All Fees ☐ 1.16 Fees (Filing) ☐ 1.17 Fees (Processing Ext. of time) ☐ 1.18 Fees (Issue) ☐ Other _____ ☐ Credit

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
14/094,136	12/02/2013	Josef Mayer	MFP0031US (T10212PUS)

CONFIRMATION NO. 1104

23413
CANTOR COLBURN LLP
20 Church Street
22nd Floor
Hartford, CT 06103

PUBLICATION NOTICE

OC00000006930651 1

Title: High Performance Slicing Apparatus With At Least One Removable Conveyor Belt Unit

Publication No.US-2014-0174891-A1
Publication Date:06/26/2014

NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publically available Searchable Databases via the Internet at www.uspto.gov. The direct link to access the publication is currently http://www.uspto.gov/patft/.

The publication process established by the Office does not provide for mailing a copy of the publication to applicant. A copy of the publication may be obtained from the Office upon payment of the appropriate fee set forth in 37 CFR 1.19(a)(1). Orders for copies of patent application publications are handled by the USPTO's Office of Public Records. The Office of Public Records can be reached by telephone at (703) 308-9726 or (800) 972-6382, by facsimile at (703) 305-8759, by mail addressed to the United States Patent and Trademark Office, Office of Public Records, Alexandria, VA 22313-1450 or via the Internet.

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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
14/094,136	12/02/2013		2280	MFP0031US (T10212PUS)	25	2

CONFIRMATION NO. 1104

UPDATED FILING RECEIPT

23413
CANTOR COLBURN LLP
20 Church Street
22nd Floor
Hartford, CT 06103



Date Mailed: 03/19/2014

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)

Josef Mayer, Memmingerberg, GERMANY;

Applicant(s)

Textor Maschinenbau GmbH, Wolfertschwenden, GERMANY

Assignment For Published Patent Application

Textor Maschinenbau GmbH, Wolfertschwenden, GERMANY

Power of Attorney: None

Domestic Applications for which benefit is claimed - None.

A proper domestic benefit claim must be provided in an Application Data Sheet in order to constitute a claim for domestic benefit. See 37 CFR 1.76 and 1.78.

Foreign Applications (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.)
GERMANY 102012222042.9 12/03/2012
GERMANY 102013206510.8 04/12/2013

Permission to Access - A proper **Authorization to Permit Access to Application by Participating Offices** (PTO/SB/39 or its equivalent) has been received by the USPTO.

If Required, Foreign Filing License Granted: 12/20/2013
The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 14/094,136**
Projected Publication Date: 06/26/2014
Non-Publication Request: No

Early Publication Request: No
Title

High Performance Slicing Apparatus With At Least One Removable Conveyor Belt Unit

Preliminary Class

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

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Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

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PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 14/094,136

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	280
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	600
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	720
TOTAL CLAIMS (37 CFR 1.16(i))	25 minus 20 =	* 5			OR	x 80 =	400
INDEPENDENT CLAIMS (37 CFR 1.16(h))	2 minus 3 =	*				x 420 =	0.00
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						0.00
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							0.00
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	2000

APPLICATION AS AMENDED - PART II

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT A	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT B	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

MFP-0031US

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

INVENTOR: Joseph Mayer	) Group Art Unit: N/A
APPLICANT: Textor Maschinenbau Gmbh	)
SERIAL NUMBER: 14/094,136	) Examiner: N/A
FILED: DECEMBER 2, 2013	) Confirmation No.: 1104
FOR: HIGH PERFORMANCE SLICING APPARATUS WITH AT LEAST ONE REMOVABLE CONVEYOR BELT UNIT	)

Filed via EFS-web
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

PRELIMINARY AMENDMENT

Prior to the examination of the above-identified patent application please amend the application by considering the attached substitute specification submitted herewith in accordance with 37 CFR 1.125. A marked copy and a clean copy are submitted. Further, this preliminary amendment includes an amendment to the claims.

IN THE CLAIMS:

Please amend the claims as follows:

1-32. (Canceled)

33. (New) A slicing apparatus for food products having at least one belt conveyor which is designed as a removable conveyor belt unit (13).

34. (New) The apparatus in accordance with claim 33, wherein the conveyor belt unit (13) is arranged in front of the cutting plane, viewed in the conveying direction.

35. (New) The apparatus in accordance with claim 33, wherein the conveyor belt unit (13) is arranged behind the cutting plane, viewed in the conveying direction.

36. (New) The apparatus in accordance with claim 33, wherein the conveyor belt unit (13) has, viewed in the conveying direction, a belt length or conveyor length which amounts to less than 500 mm.

37. (New) The apparatus in accordance with claim 33, wherein at least one direct drive (15) for the conveyor belt unit (13) is provided.

38. (New) The apparatus in accordance with claim 33, wherein at least one drive motor (15) for the conveyor belt unit (13) is provided, with the drive motor (15) being directly coupled with the conveyor belt unit (13), and/or wherein the drive motor (15) is arranged beneath the conveyor belt unit (13).

39. (New) The apparatus in accordance with claim 33, wherein a drive motor (15) for the conveyor belt unit (13) has a drive shaft (51) and the conveyor belt unit (13) has a drive wheel (44), with the drive shaft (51) and the drive wheel (44) being

directly coupled to one another, and/or wherein the drive motor (15) is arranged beneath the conveyor belt unit (13).

40. (New) The apparatus in accordance with claim 33, wherein the conveyor belt unit (13) has a supported belt roller (53), with a drive wheel (44) of the conveyor belt unit (13) being supported via the support of the belt roller (53), and/or wherein the drive wheel (44) is arranged coaxially to the belt roller (53).

41. (New) The apparatus in accordance with claim 33, wherein a respective relative movement is provided between the drive motor (15) and the conveyor belt unit (13) for cancelling and establishing a coupling between a drive motor (15) for the conveyor belt unit (13) and the conveyor belt unit (13), and/or wherein the spacing between a drive axle of the drive motor (15) and a drive axle of the conveyor belt unit (13) can be varied by the relative movement.

42. (New) The apparatus in accordance with claim 33, wherein a coupling between a drive (15) for the conveyor belt unit (13) and the conveyor belt unit (13) can be cancelled by relaxing a drive belt (27) and can be established by tautening the drive belt (27), with the relaxing and tautening of the drive belt (27) each being provided by a relative movement between the drive (15) and the conveyor belt unit (13).

43. (New) The apparatus in accordance with claim 33, wherein a mount (11) is provided for the conveyor belt unit (13) which remains at the apparatus with a removed conveyor belt unit (13) and at which the conveyor belt unit (13) can be latched, with the latched connection being able to be cancelled for removing the conveyor belt unit (13) and being able to be established for installing the conveyor belt unit (13).

44. (New) The apparatus in accordance with claim 33, wherein a coupling between a drive (15) for the conveyor belt unit (13) and the conveyor belt unit (13) can be cancelled or established simultaneously with a latching of the conveyor belt unit (13) for removing or installing the conveyor belt unit (13).

45. (New) The apparatus in accordance with claim 33, wherein the coupling between a drive (15) for the conveyor belt unit (13) and the conveyor belt unit (13) can be carried out simultaneously with a removal movement or installation movement of the conveyor belt unit (13) after the cancelling or before the establishing of a latched connection of the conveyor belt unit (13) for removing or for installing the conveyor belt unit (13).

46. (New) The apparatus in accordance with claim 33, wherein an actuation device (19) is provided for a coupling between a drive (15) for the conveyor belt unit (13) and the conveyor belt unit (13) and/or for a latching of the conveyor belt unit (13) to a mount (11), and/or wherein the actuation device comprises a lever (19) having a shaft (29), with a linkage (35) carrying a drive (15) for the conveyor belt unit (13) being pivotable about a pivot axis (33) by rotating the shaft (29) and/or with a latching member (21) for the conveyor belt unit (13) being movable between a latched position (21) and a release position.

47. (New) The apparatus in accordance with claim 33, wherein an actuation device (19) is provided with which a coupling can be simultaneously cancelled and established between a drive (15) for the conveyor belt unit (13) and the conveyor belt unit (13), on the one hand, and a latching of the conveyor belt unit (13) to a mount (11) of the apparatus, on the other hand, and/or wherein the actuation device comprises a lever (19) having a shaft (29), with a linkage (35) carrying a drive (15) for the conveyor belt unit (13) being pivotable about a pivot axis (33) by rotating the shaft (29) and/or with a latching member (21) for the conveyor belt

unit (13) being movable between a latched position (21) and a release position.

48. (New) The apparatus in accordance with claim 33, wherein the conveyor belt unit (13) or an assembly or a component of the conveyor belt unit (13) is movable relative to the drive (15) for cancelling and establishing a coupling between a drive (15) for the conveyor belt unit (13) and the conveyor belt unit (13) and/or wherein the conveyor belt unit (13) or an assembly or a component of the conveyor belt unit (13) is movable by folding over or pivoting.

49. (New) The apparatus in accordance with claim 33, wherein the conveyor belt unit (13) is designed for a multitrack operation, and/or wherein viewed in the conveying direction, at least one drive (15) is coupled to the conveyor belt unit (13) at the left side and at least one further drive (15) at the right side, and/or wherein the coupling between the drives (15) and the conveyor belt unit (13) can be simultaneously cancelled and established at least for a plurality of drives (15).

50. (New) The apparatus in accordance with claim 33, wherein the conveyor belt unit (13) comprises a plurality of individual conveyors (71, 73) which are arranged, viewed in the conveying direction, behind one another and with which a separate drive (15) is associated, and/or wherein viewed in the conveying direction, at least one drive (15) is coupled to the conveyor belt unit (13) at the left side and at least one further drive (15) at the right side.

51. (New) The apparatus in accordance with claim 33, wherein the conveyor belt unit (13) has a conveying width in the range from approximately 300 mm to 700 mm.

52. (New) The apparatus in accordance with claim 33, wherein at least one continuous belt or continuous band (55) or a plurality of parallel continuous straps (57) is/are provided as conveying means of the conveyor belt unit (13).

53. (New) The apparatus in accordance with claim 33, wherein the conveyor belt unit (13) can be removed and/or installed without tools.

54. (New) The apparatus in accordance with claim 33, wherein the conveyor belt unit (13) can first be moved with a component in or against the conveying direction relative to the mount (11) and can subsequently be raised from the mount (11) for removing and/or for installing the conveyor belt unit (13) with a cancelled latched connection between the conveyor belt unit (13) and a mount (11) remaining at the apparatus.

55. (New) The apparatus in accordance with claim 1, wherein the conveyor belt unit (13) can first be pivoted about the one of two supports (65, 67) of the mount (11), and can subsequently be raised from the supports (65, 67) for removing and/or for installing the conveyor belt unit (13) with a cancelled latched connection between the conveyor belt unit (13) and a mount (11) remaining at the apparatus.

56. (New) The apparatus in accordance with claim 33, wherein a plurality of conveyor belt units (13) are arranged behind one another and/or beside one another, viewed in the conveying direction.

57. (New) A conveying device for food products to be sliced or for sliced food products which comprises at least one belt conveyor which is designed as a removable conveyor belt unit (13).

CONCLUSION

By way of amendment, claims 1-32 have been cancelled, and new claims 33-57 have been added to also improve readability and conform to U.S. practice. No new matter has been introduced.

A marked copy and a clean copy of a substitute specification in conformance with 37 CFR 1.125 are attached herewith and replace any prior versions of the specification. The substitute specification contains no new matter.

Applicant hereby petitions under 37 CFR 1.136 or other applicable rule to have the response period extended the number of months necessary to render the attached communication timely if a petition is required. The Commissioner is hereby authorized to charge to Deposit Account 06-1130 any fees necessary for entry of this amendment and/or extension of time. No new matter has been entered.

Substantive examination of the application based upon this preliminary amendment, is respectfully requested.

Respectfully submitted,

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ABSTRACT DE102010001969

The invention relates to a conveyor comprising a frame (2), and a Transportgurteinheit (3), wherein the Transportgurteinheit (3) a first side member (4) and a second side member (5), a drive roller (6) in the first side rail (4) and the second side member (5) is fixedly mounted, a tension roller (8) in the first side member (4) and the second side member (5) is adjustably mounted, a closed conveyor belt (10) around said drive roller (6) and the clamping roller (8) is disposed around, and a clamping device (11) having a first clamping element (12) and a second clamping element (13) which is arranged on the tensioning roller (8), wherein the tension roller (8) by means of the first clamping member (12) and the second clamping member (13) on the side rails (4, 5) is adjustable without tools and can be fixed.



(19) Deutsches Patent- und Markenamt

(10) **DE 10 2010 001 969 A1** 2011.08.18

(12) # Offenlegungsschrift

(21) Aktenzeichen: **10 2010 001 969.0**
(22) Anmeldetag: **16.02.2010**
(43) Offenlegungstag: **18.08.2011**

(51) Int Cl.: ***B65G 23/44*** (2006.01)

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(56) Für die Beurteilung der Patentfähigkeit in Betracht gezogene Druckschriften:

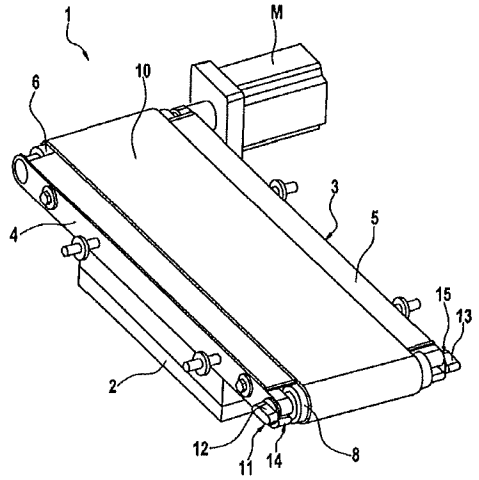
DE	10 2008 024314	A1
DE	199 00 134	A1
DE	603 20 086	T2
GB	20 41 315	A
GB	4 24 504	A
US	67 52 261	B1

Rechercheantrag gemäß § 43 Abs. 1 Satz 1 PatG ist gestellt.

Die folgenden Angaben sind den vom Anmelder eingereichten Unterlagen entnommen

(54) Bezeichnung: **Fördereinrichtung**

(57) Zusammenfassung: Die Erfindung betrifft eine Fördereinrichtung, umfassend ein Gestell (2), und eine Transportgurteinheit (3), wobei die Transportgurteinheit (3) einen ersten Seitenholm (4) und einen zweiten Seitenholm (5), eine Antriebsrolle (6), die im ersten Seitenholm (4) und im zweiten Seitenholm (5) fest gelagert ist, eine Spannrolle (8), die im ersten Seitenholm (4) und im zweiten Seitenholm (5) verstellbar gelagert ist, einen geschlossenen Transportgurt (10), der um die Antriebsrolle (6) und die Spannrolle (8) herum angeordnet ist, und eine Klemmvorrichtung (11) mit einem ersten Klemmelement (12) und einem zweiten Klemmelement (13) aufweist, welche an der Spannrolle (8) angeordnet ist, wobei die Spannrolle (8) mittels des ersten Klemmelements (12) und des zweiten Klemmelements (13) an den Seitenholmen (4, 5) werkzeuglos einstellbar und fixierbar ist.



Beschreibung

Stand der Technik

[0001] Die vorliegende Erfindung betrifft eine Fördervorrichtung mit einer Transportgurteinheit zum Transport von Gütern.

[0002] Fördervorrichtungen des Standes der Technik, weisen im Wesentlichen einen geschlossenen Transportgurt auf, der zwischen zwei Umlenkrollen umläuft, von denen eine fest gelagert und antrieben wird und die andere in Längsrichtung zum Spannen und Justieren verstellbar gelagert ist. Hierbei erfolgt die Montage/Demontage und Justierung der Spannrolle bei einem erforderlichen Wechsel des Transportgurts im Allgemeinen werkzeuggebunden, was mit einem erheblichen Zeitaufwand verbunden ist.

Offenbarung der Erfindung

[0003] Die erfindungsgemäße Fördervorrichtung mit den Merkmalen des Anspruchs 1 weist demgegenüber den Vorteil auf, dass sie ein Gestell und eine Transportgurteinheit umfasst, wobei die Transportgurteinheit einen ersten Seitenholm und einen zweiten Seitenholm, eine Antriebsrolle, die im ersten Seitenholm und im zweiten Seitenholm fest gelagert ist, und eine Spannrolle aufweist, die im ersten Seitenholm und im zweiten Seitenholm verstellbar gelagert ist. Ferner weist die Fördervorrichtung einen geschlossenen Transportgurt auf, der um die Antriebsrolle und die Spannrolle herum angeordnet ist, sowie eine Klemmvorrichtung mit einem ersten Klemmelement und einem zweiten Klemmelement auf, welche an der Spannrolle angeordnet ist, wobei die Spannrolle mittels des ersten Klemmelements und des zweiten Klemmelements an den Seitenholmen werkzeuglos einstellbar und fixierbar ist. Hierdurch wird eine Montage/Demontage der Spannrolle für einen erforderlichen Transportgurtwechsel, und das anschließende Spannen des Transportgurts sowie Justieren der Spannrolle ohne den Einsatz von speziellen Werkzeugen in wesentlich kürzerer Zeit ermöglicht.

[0004] Die Unteransprüche zeigen bevorzugte Weiterbildungen der Erfindung.

[0005] Vorzugsweise ist das erste Klemmelement in einen ersten Endbereich der Spannrolle und das zweite Klemmelement in einen zweiten Endbereich der Spannrolle werkzeuglos einschraubbar. Hierdurch wird eine kompakte Bauform mit einer minimalen Anzahl von Bauteilen erreicht. Weiterhin bevorzugt sind das erste Klemmelement und das zweite Klemmelement als Flügelmutter oder als Schnellverschlusshebel ausgebildet. Durch die Formgebung wird eine gute manuelle Bedienung der Klemmelemente ohne großen Kraftaufwand und mit einer ausreichenden Hebelwirkung zum Spannen und Fixieren der Spannrolle sichergestellt. Ferner sind die vorzugsweise aus Edelstahl gefertigten Flügelmuttern leicht zu reinigen.

[0006] Gemäß einer weiteren bevorzugten Ausgestaltung der Erfindung weisen die ersten und zweiten Endbereiche der Spannrolle jeweils zwei einander gegenüberliegende Abflachungen mit jeweils einem Absatz auf. Hierdurch wird eine exakte Führung im Inneren der Seitenholme bei einer Verschiebung der Spannrolle zum Spannen des Transportgurts in Längsrichtung gewährleistet. Außerdem wird durch die Absätze auf der Achse eine gute Anlagefläche für die axial einwirkende Klemmkraft in Bezug auf die jeweils gegenüberliegende Fläche der Seitenholme erreicht.

[0007] Weiterhin bevorzugt weisen die ersten und zweiten Klemmelemente einen jeweils einer Stirnseite der Spannrolle zugewandten Bundbereich auf, und klemmen die ersten und zweiten Seitenholme zwischen dem Bundbereich und dem Absatz der Endbereiche. Durch die Bundbereiche der Klemmelemente wird auf bauteilminimierte Weise eine homogene Übertragung der beim Einschrauben der Klemmelemente erzeugten Klemmkaft auf die Seitenholme und die Absätze der Spannrollenachse erreicht.

[0008] Vorzugsweise umfasst die Fördereinrichtung ferner eine erste und zweite Verstelleinrichtung mit jeweils einer Gewindespindel mit einer Rändelmutter zur werkzeuglosen Verstellung des ersten und des zweiten Endbereichs der Spannrolle in Längsrichtung der Transportgurteinheit, wobei die Verstelleinrichtung im ersten und zweiten Seitenholm angeordnet ist. Hierdurch wird eine werkzeuglose exakte Feineinstellung bzw. Winkelausrichtung auf beiden Seiten der Achse der Spannrolle in Bezug auf den Transportgurt mit geringem manuellen Kraftaufwand ermöglicht. Ferner sind die im Inneren der Seitenholme angeordneten Bauteile der Verstelleinrichtung vor Verschmutzung geschützt und weisen eine hohe Dauerhaltbarkeit auf. Zyklische Wartungs- oder Reinigungsarbeiten sind hierfür nicht erforderlich.

[0009] Gemäß einer weiteren bevorzugten Ausgestaltung der Erfindung ist die Transportgurteinheit werkzeuglos mit dem Gestell verbindbar und lösbar. Weiterhin bevorzugt sind Fixiervorrichtungen am ersten und zweiten Seitenholm vorgesehen, welche mit einem dritten und vierten Klemmelement mit dem Gestell werkzeuglos verbindbar sind. Hierdurch wird ein rascher und kostengünstiger Austausch der Transportgurteinheit ohne Werkzeugeinsatz ermöglicht. Darüber hinaus werden dadurch die Rüstzeiten bei einem Maschinenumbau wesentlich verkürzt.

[0010] Vorzugsweise umfasst die Fixiervorrichtung eine Passschraube mit einer Flügelmutter, welche in

einer Aufnahme des Gestells werkzeuglos fixierbar und lösbar ist. Aufgrund der Ausbildung als Flügelmutter wird das Aufbringen der zur Befestigung der Transportgurteinheit am Gestell erforderlichen manuellen Kraft erleichtert und sichergestellt. Ferner weist die Fixiervorrichtung einen kompakten und kostengünstigen Aufbau mit einer minimalen Anzahl von Bauteilen auf. Weiter bevorzugt sind am Gestell mehrere Transportgurteinheiten platzierbar. Durch den modularen Aufbau wird ein Maschinenstillstand bei erforderlichen Reparatur- und/oder Wartungsarbeiten auf ein Minimum verkürzt. Durch den Einsatz von Flügelmuttern aus Edelstahl auch für die Befestigung der Transportgurteinheit am Gestell werden die Reinigung bzw. die hygienischen Eigenschaften der gesamten Maschineneinheit erheblich verbessert.

Kurze Beschreibung der Zeichnungen

[0011] Nachfolgend wird ein Ausführungsbeispiel der Erfindung unter Bezugnahme auf die begleitende Zeichnung im Detail beschrieben. In der Zeichnung ist:

[0012] Fig. 1 eine perspektivische Darstellung einer Transportgurteinheit gemäß einem Ausführungsbeispiel der Erfindung,

[0013] Fig. 2 eine perspektivische Teilansicht der Transportgurteinheit,

[0014] Fig. 3 eine schematische Schnittdarstellung einer Spannrolle der Transportgurteinheit,

[0015] Fig. 4 eine perspektivische Darstellung der Fördereinrichtung mit einem Gestell,

[0016] Fig. 5 eine perspektivische Darstellung einer Fixiervorrichtung der Fördereinrichtung am Gestell, und

[0017] Fig. 6 eine alternative Ausführungsform der Fixiervorrichtung.

Ausführungsform der Erfindung

[0018] Nachfolgend wird unter Bezugnahme auf die Fig. 1 bis Fig. 6 eine Fördereinrichtung gemäß einem bevorzugten Ausführungsbeispiel der Erfindung im Detail beschrieben.

[0019] Wie aus der perspektivischen Darstellung des Ausführungsbeispiels der erfindungsgemäßen Fördereinrichtung **1** von Fig. 1 ersichtlich, umfasst die Fördereinrichtung **1** ein Gestell **2**, auf dem eine Transportgurteinheit **3** befestigt ist. Die Transportgurteinheit **3** weist einen ersten Seitenholm **4** und einen zweiten Seitenholm **5** sowie eine Antriebsrolle **6** auf, die in den ersten und zweiten Seitenholmen **4**, **5** fest gelagert ist und von einem Motor M angetrieben wird. Die Transportgurteinheit **3** weist zudem eine Spannrolle **8** auf, die in den ersten und zweiten Seitenholmen **4**, **5** verstellbar gelagert ist, sowie einen geschlossenen Transportgurt **10** auf, der um die Antriebsrolle **6** und die Spannrolle **8** herum angeordnet ist. Wie aus Fig. 1 weiter ersichtlich, weist die Transportgurteinheit **3** eine Klemmvorrichtung **11** mit einem ersten Klemmelement **12** und einem zweiten Klemmelement **13** auf, welche in diesem Ausführungsbeispiel als Flügelmuttern ausgebildet sind. Alternativ können die Klemmelemente **12**, **13** auch als Schnellverschlusshebel ausgebildet sein. Das erste Klemmelement **12** ist hierbei in einen ersten Endbereich **14** der Spannrolle **8** eingeschraubt und das zweite Klemmelement **13** ist in einen zweiten Endbereich **15** der Spannrolle **8** eingeschraubt. Die Klemmelemente **12**, **13** können somit werkzeuglos von Hand in die Endbereiche **14**, **15** der Spannrolle **8** eingeschraubt werden.

[0020] Wie aus der Schnittansicht der Spannrolle **8** von Fig. 3 ersichtlich, weist der erste Endbereich **14** der Spannrolle **8** zwei einander gegenüberliegende Abflachungen **16** mit jeweils einem Absatz **17** auf, welche an Innenflächen **4a** des ersten Seitenholms **4** bündig anliegen. In gleicher Weise ist der zweite Endbereich **15** der Spannrolle **8** ebenfalls mit zwei gegenüberliegenden Abflachungen **16** mit jeweils dem Absatz **17** ausgebildet, welche an Innenflächen **5a** des zweiten Seitenholms **5** bündig anliegen. Wie aus Fig. 2 ersichtlich, ist der Endbereich **14** der Spannrolle **8** aufgrund der Abflachungen **16** in Richtung eines Doppelpfeils P zum Spannen bzw. Entspannen des Transportgurts **10** innerhalb des ersten Seitenholms **4** verschiebbar. Gleichermaßen ist auch der Endbereich **15** der Spannrolle **8** innerhalb des zweiten Seitenholms **5** verschiebbar.

[0021] Die ersten und zweiten Klemmelemente **12** und **13** (Fig. 3) weisen einen Bundbereich **20** bzw. **21** auf, welcher beim hier dargestellten eingeschraubten Zustand an einer Stirnseite **18** bzw. **19** der Spannrolle **8** anliegt. Wie aus Fig. 3 ferner ersichtlich, klemmen die eingeschraubten ersten und zweiten Klemmelemente **12** und **13** die ersten und zweiten Seitenholme **4** und **5** zwischen ihrem Bundbereich **20** bzw. **21** und dem jeweiligen Absatz **17** der Endbereiche **14**, **15** ein und fixieren dadurch die Spannrolle **8**.

[0022] Wie aus Fig. 2 weiter ersichtlich, weist die Transportgurteinheit **3** zudem eine erste Verstelleinrichtung **22** mit einer Gewindespindel **24** auf, die im ersten Seitenholm **4** angeordnet ist. Mittels einer am ersten Seitenholm **4** abgestützten bzw. geführten Rändelmutter **26** ist die Gewindespindel **24** in Richtungen des Doppelpfeils P werkzeuglos und rein manuell verstellbar. Durch entsprechendes Drehen der Rändelmutter **26** und Verschieben der am Endbereich **14** der Spannrolle **8** anliegenden Gewindespindel **24** ist eine Feineinstellung bzw. exakte Win-

kelausrichtung des auf der Seite des ersten Seitenholms **4** angeordneten Endbereichs **14** der Spannrolle **8** möglich. Es sei angemerkt, dass auf der gegenüberliegenden Seite im zweiten Seitenholm **5** eine identisch ausgebildete zweite Versteileinrichtung mit einer Gewindespindel mit einer Rädelmutter zur Feineinstellung und Winkelausrichtung des Endbereichs **15** der Spannrolle **8** angeordnet ist, welche in der Darstellung von Fig. 2 nicht sichtbar ist. Somit kann eine beidseitige exakte Einstellung und Ausrichtung der Spannrolle **8** nach einem Transportgurtwechsel werkzeuglos vorgenommen werden.

[0023] Fig. 4 zeigt eine perspektivische Darstellung der Fördereinrichtung **1** mit einem Gestell **2**, auf dem die oben beschriebene Transportgurteinrichtung **3** und zwei benachbart hintereinander angeordnete Transportgurteinrichtungen **3.1** und **3.2** gleicher Bauart befestigt sind. Zu besseren Übersichtlichkeit sind in Fig. 4 nur bei der Transportgurteinrichtung **3** die wesentlichen sichtbaren Bauteile mit Bezugszeichen gekennzeichnet. Wie aus Fig. 4 ersichtlich, ist der erste Seitenholm **4** der Transportgurteinrichtung **3** mittels zweier Fixiervorrichtungen **30** mit je einem dritten Klemmelement **32** am Gestell **2** befestigt. Obwohl in Fig. 4 nicht sichtbar, ist der gegenüberliegende zweite Seitenholm **5** der Transportgurteinrichtung **3** mittels zweier identischer Fixiervorrichtungen und Klemmelemente gleichermaßen am Gestell **2** befestigt.

[0024] In Fig. 5 ist der Aufbau der Fixiervorrichtung **30** perspektivisch dargestellt. Die Fixiervorrichtung **30** umfasst eine Passschraube **34** mit einer Flügelmutter **35**. Die Passschraube **34** ist mit dem Seitenholm **4** fest verbunden und wird in einem Langlochbereich **37** einer Aufnahme **36** geführt und mit der Flügelmutter **35** fixiert. Die Aufnahme **36** weist hierbei den Langlochbereich **37** auf, der eine werkzeuglose und rein manuelle Justierung zwischen dem Gestell **2** und dem Seitenholm **4** in Längsrichtung der Transportgurteinheit **3** ermöglicht.

[0025] Wie aus Fig. 4 weiter ersichtlich, ist ein erster Seitenholm **4.1** der Transportgurteinheit **3.1** mittels zweier Fixiervorrichtungen **40** mit je einem vierten Klemmelement **45** am Gestell **2** befestigt, von denen eine in Fig. 6 detailliert dargestellt ist. Hierbei sei angemerkt, dass ein gegenüber angeordneter zweiter Seitenholm **5.1** der Transporteinrichtung **3.1** mittels identischen hier nicht sichtbaren Fixiervorrichtungen am Gestell **2** befestigt ist.

[0026] Die in Fig. 6 gezeigte alternative Ausführungsform der Fixiervorrichtung **40** weist einen Ankerstift **43** mit einem Querstück **44** auf, welcher an einer Aufnahme **46** des Gestells **2** befestigt ist. In das Querstück **44** ist eine Flügelschraube **45** mit einer Spitze **47** eingeschraubt, welche den Ankerstift **43** samt Aufnahme **46** an einem ersten Seitenholm **4.1** fixiert.

[0027] Die Fixiervorrichtungen **30** und/oder **40** können ferner auch zur Befestigung von in Fig. 4 dargestellten Führungsholmen **48** der Transportgurteinrichtung **3.2** Verwendung finden, die an deren Seitenholmen beidseitig befestigt sind.

[0028] Aufgrund der bei der erfindungsgemäßen Fördereinrichtung als Flügelmuttern oder Schnellverschlusshebel ausgebildeten Klemmelemente **12**, **13** und Fixierungsvorrichtungen **30**, **40** wird sowohl der Transportgurtwechsel der Transportgurteinheit als auch die Befestigung einer oder mehrerer Transportgurteinheiten an einem gemeinsamen Gestell **2** durchgehend werkzeuglos und in wesentlich kürzerer Zeit ermöglicht. Zudem werden dadurch die hygienischen Eigenschaften erheblich verbessert und die Reinigung der gesamten Maschinenanordnung wesentlich erleichtert.

Patentansprüche

1. Fördereinrichtung, umfassend:
– ein Gestell (**2**), und eine Transportgurteinheit (**3**), wobei die Transportgurteinheit (**3**) aufweist:
– einen ersten Seitenholm (**4**) und einen zweiten Seitenholm (**5**),
– eine Antriebsrolle (**6**), die im ersten Seitenholm (**4**) und im zweiten Seitenholm (**5**) fest gelagert ist,
– eine Spannrolle (**8**), die im ersten Seitenholm (**4**) und im zweiten Seitenholm (**5**) verstellbar gelagert ist,
– einen geschlossenen Transportgurt (**10**), der um die Antriebsrolle (**6**) und die Spannrolle (**8**) herum angeordnet ist, und
– eine Klemmvorrichtung (**11**) mit einem ersten Klemmelement (**12**) und einem zweiten Klemmelement (**13**), welche an der Spannrolle (**8**) angeordnet ist,
– wobei die Spannrolle (**8**) mittels des ersten Klemmelements (**12**) und des zweiten Klemmelements (**13**) an den Seitenholmen (**4**, **5**) werkzeuglos einstellbar und fixierbar ist.

2. Fördereinrichtung nach Anspruch 1, dadurch gekennzeichnet, dass das erste Klemmelement (**12**) in einen ersten Endbereich (**14**) der Spannrolle (**8**) und das zweite Klemmelement (**13**) in einen zweiten Endbereich (**15**) der Spannrolle (**8**) werkzeuglos einschraubbar ist.

3. Fördereinrichtung nach Anspruch 1 oder 2, dadurch gekennzeichnet, dass das erste Klemmelement (**12**) und das zweite Klemmelement (**13**) als Flügelmutter oder als Schnellverschlusshebel ausgebildet sind.

4. Fördereinrichtung nach einem der Ansprüche 2 oder 3, dadurch gekennzeichnet, dass die ersten und zweiten Endbereiche (**14**, **15**) der Spannrolle (**8**)

jeweils zwei einander gegenüberliegende Abflachungen (**16**) mit jeweils einem Absatz (**17**) aufweisen.

5. Fördereinrichtung nach Anspruch 4, dadurch gekennzeichnet, dass die ersten und zweiten Klemmelemente (**12**, **13**) einen jeweils einer Stirnseite (**18**, **19**) der Spannrolle (**8**) zugewandten Bundbereich (**20**, **21**) aufweisen und die ersten und zweiten Seitenholme (**4**, **5**) zwischen dem Bundbereich (**20**, **21**) und dem Absatz (**17**) der Endbereiche (**14**, **15**) klemmen.

6. Fördereinrichtung nach einem der vorhergehenden Ansprüche, ferner umfassend eine erste und zweite Verstelleinrichtung (**22**) mit jeweils einer Gewindespindel (**24**) mit einer Rändelmutter (**26**) zur werkzeuglosen Verstellung des ersten und des zweiten Endbereichs (**14**, **15**) der Spannrolle (**8**) in Längsrichtung der Transportgurteinheit (**3**), wobei die Versteileinrichtung (**22**) im ersten und zweiten Seitenholm (**4**, **5**) angeordnet ist.

7. Fördereinrichtung nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, dass die Transportgurteinheit (**3**) werkzeuglos mit dem Gestell (**2**) verbindbar und lösbar ist.

8. Fördereinrichtung nach Anspruch 7, dadurch gekennzeichnet, dass am ersten und zweiten Seitenholm (**4**, **5**) Fixiervorrichtungen (**30**) vorgesehen sind, welche mittels einem dritten und vierten Klemmelement (**32**) mit dem Gestell (**2**) werkzeuglos verbindbar sind.

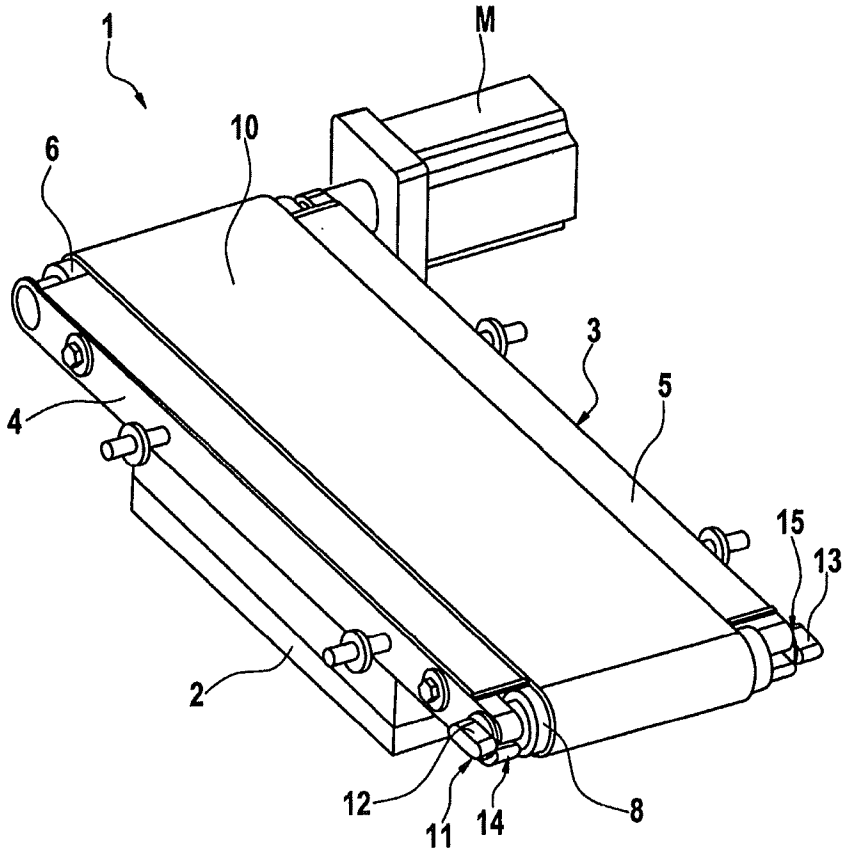
9. Fördereinrichtung nach Anspruch 8, dadurch gekennzeichnet, dass die Fixiervorrichtung (**30**) eine Passschraube (**34**) mit einer Flügelmutter (**35**) umfasst, welche in einer Aufnahme (**36**) des Gestells (**2**) werkzeuglos fixierbar und lösbar ist.

10. Fördereinrichtung nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, dass am Gestell (**2**) mehrere Transportgurteinheiten (**3**) platzierbar sind.

Es folgen 6 Blatt Zeichnungen

Anhängende Zeichnungen

Fig. 1



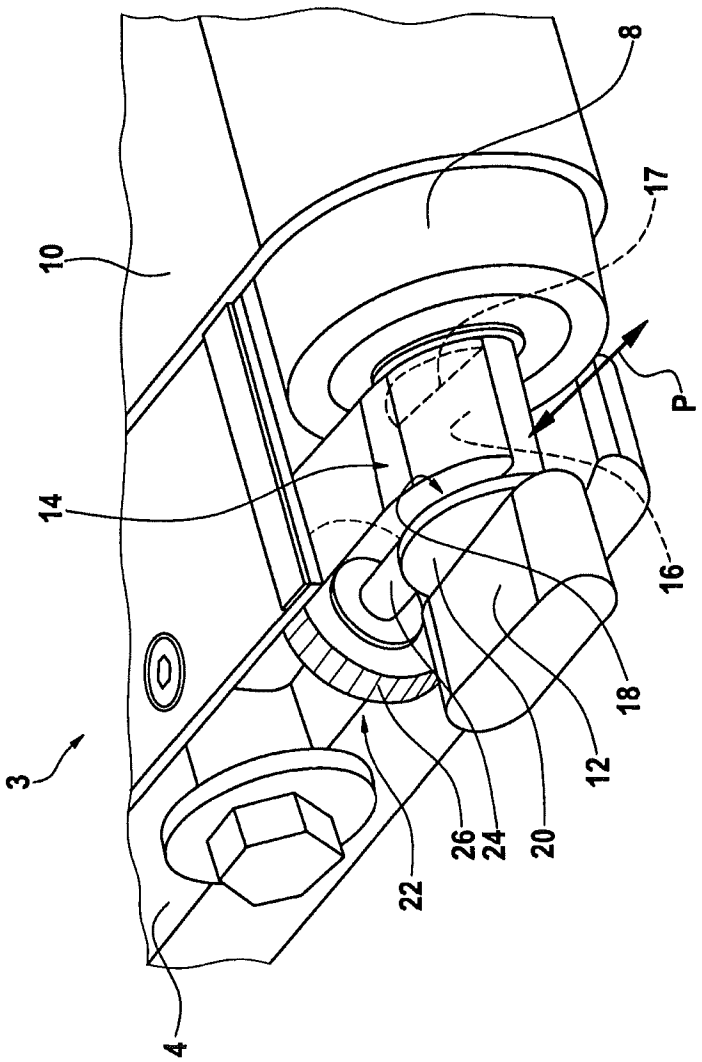


Fig. 2

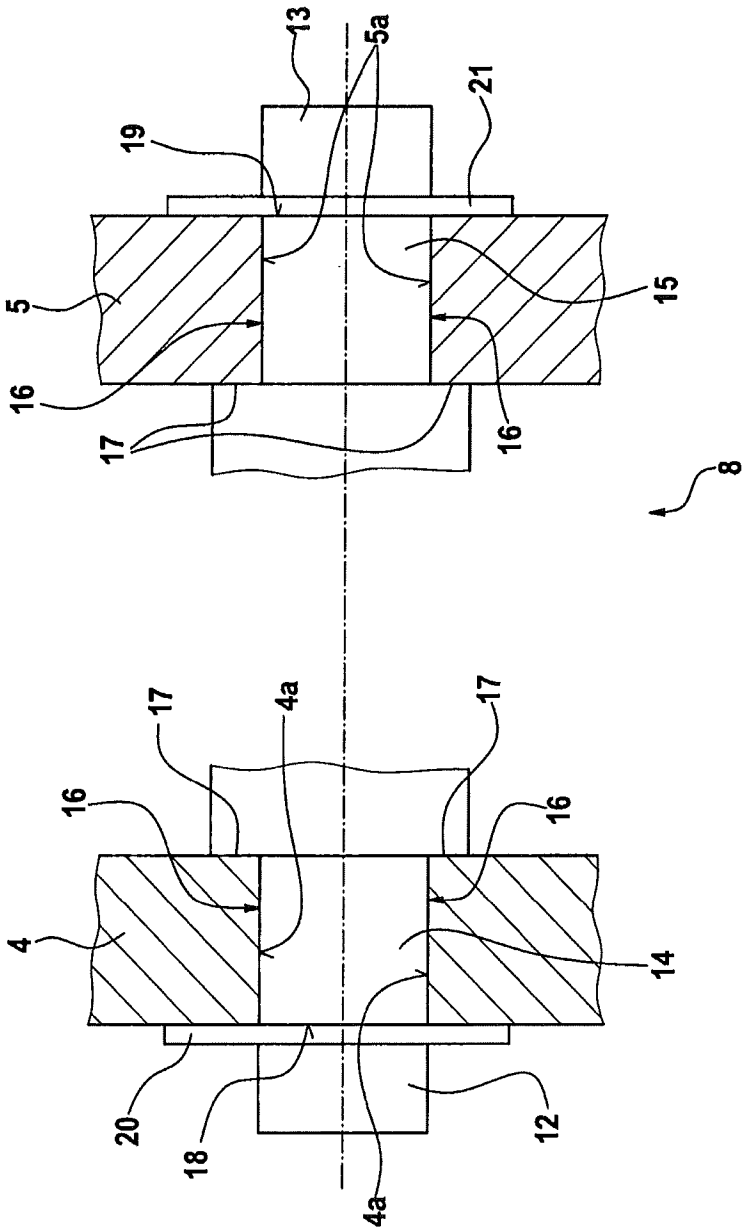


Fig. 3

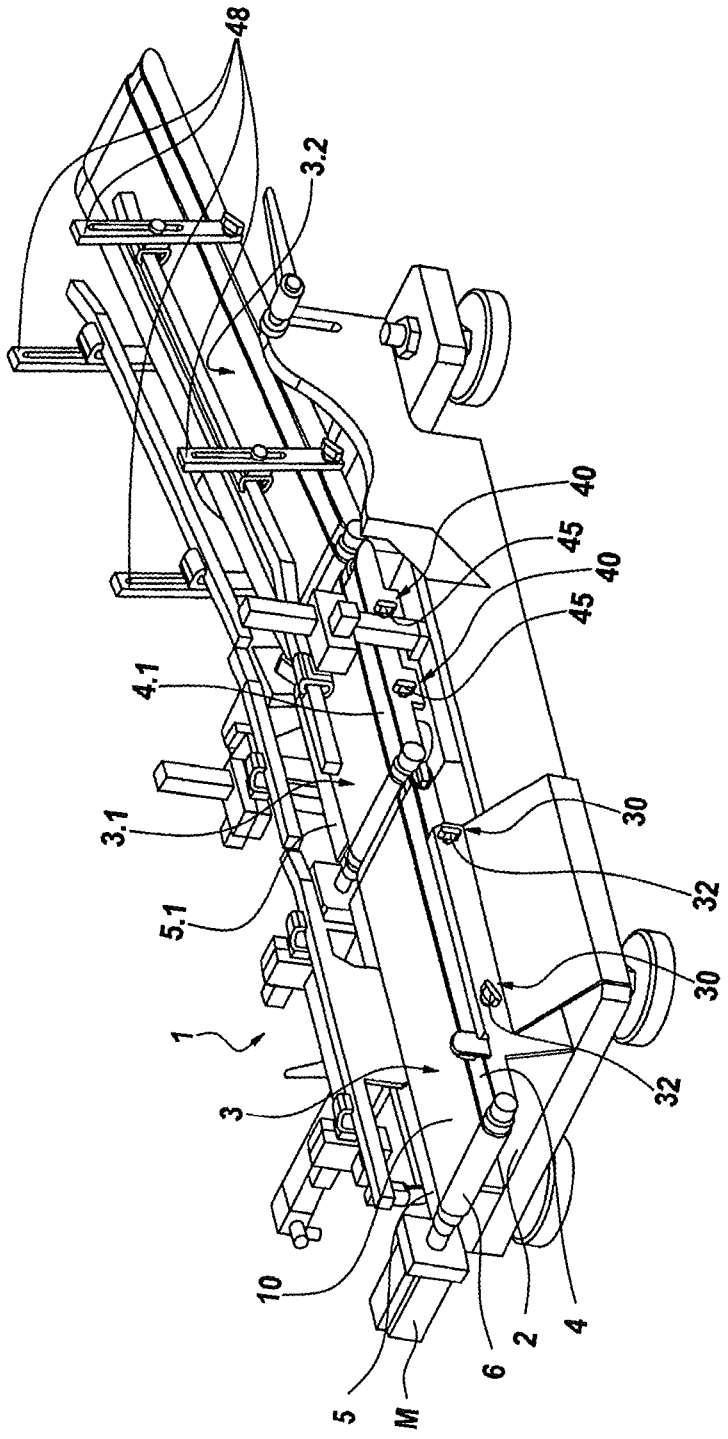


Fig. 4

Fig. 5

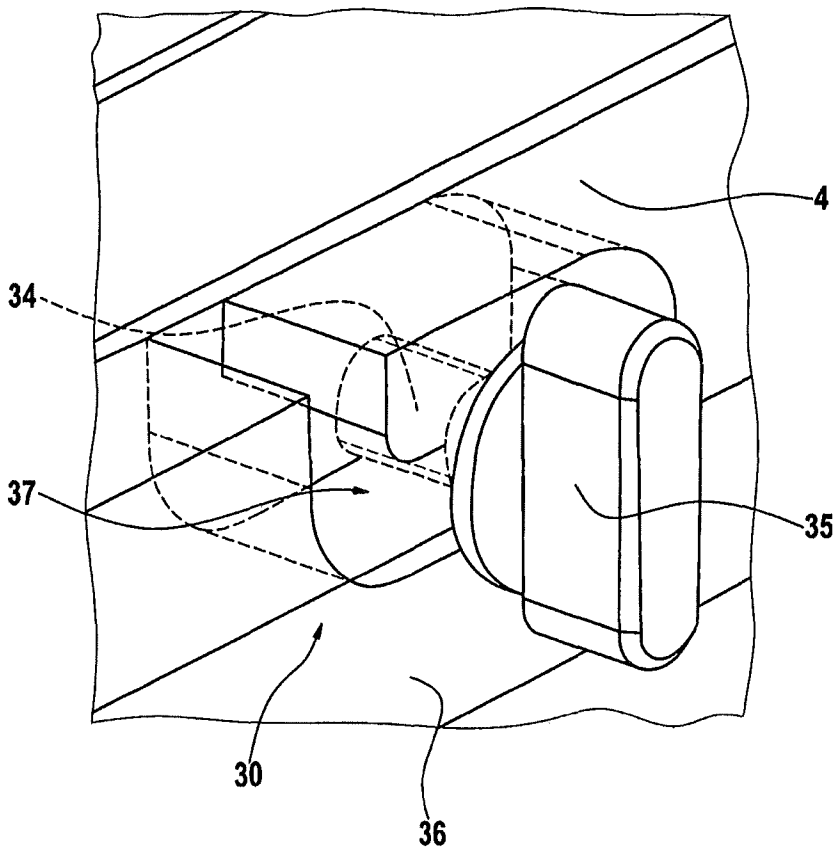
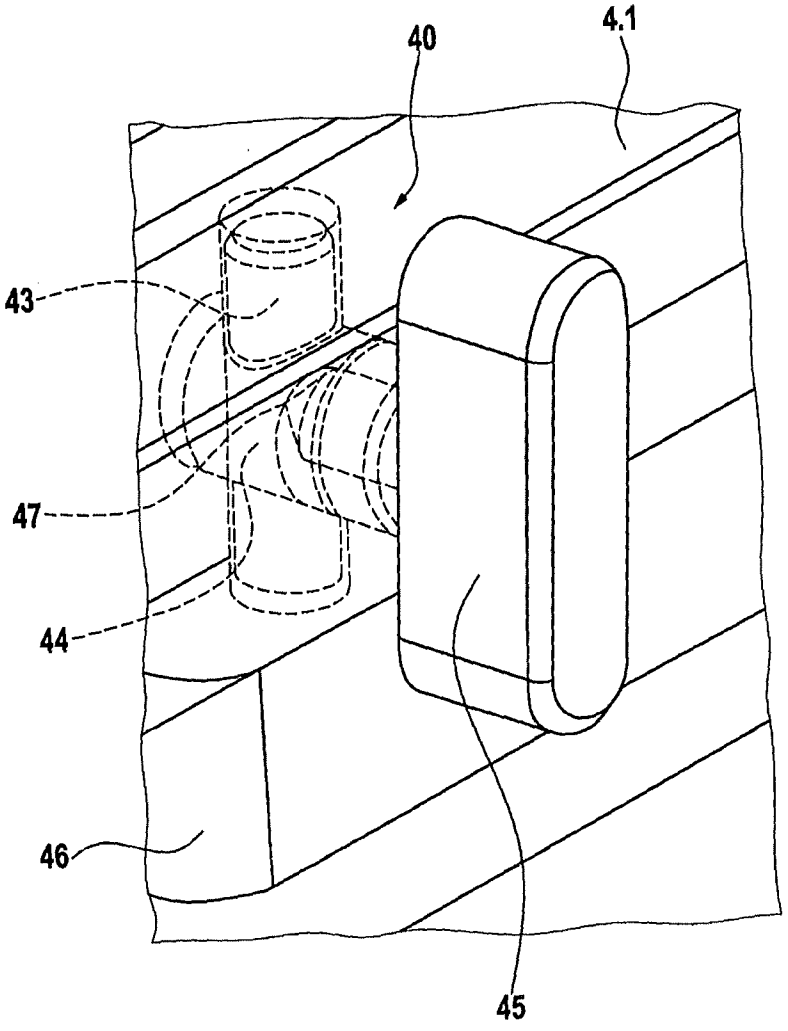


Fig. 6



Espacenet

Bibliographic data: DE102008024314 (A1) — 2009-11-26

Conveyor belt has belt body, at which two guide rollers are held, and endless belt is guided through guide rollers, where guide rollers have fine adjustment with adjusting screw

No documents available for this priority number.

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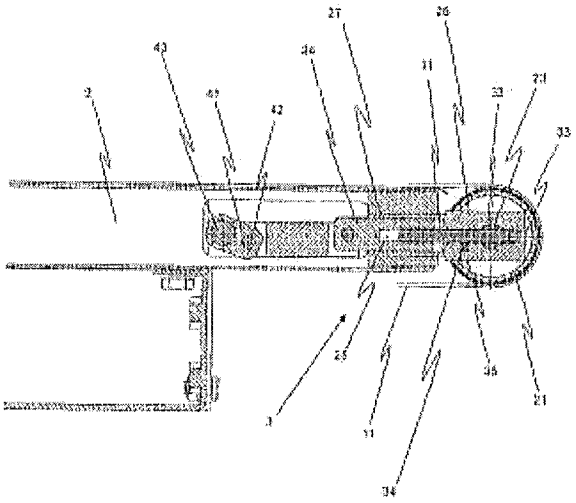
Classification: - international: ***B65G23/44***
- cooperative: **B65G15/62**; **B65G23/44**

Application number: DE20081024314 20080520

Priority number(s): DE20081024314 20080520

Abstract of DE102008024314 (A1)

The conveyor belt (1) has a belt body (2), at which two guide rollers (21,22) are held. An endless belt is guided through the guide rollers. One of guide rollers has a fine adjustment with an adjusting screw for justifying the endless belt tensioning. The axis of the guide roller has a transversely running recess, through which the adjusting screw runs.



Last updated: 11.12.2013 Worldwide Database 5.8.15; 93p

(19) Bundesrepublik Deutschland
Deutsches Patent- und Markenamt

(10) **DE 10 2008 024 314 A1** 2009.11.26

(12) # Offenlegungsschrift

(21) Aktenzeichen: **10 2008 024 314.0**
(22) Anmeldetag: **20.05.2008**
(43) Offenlegungstag: **26.11.2009**

(51) Int Cl.[8]: ***B65G 23/44*** (2006.01)

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(56) Für die Beurteilung der Patentfähigkeit in Betracht zu ziehende Druckschriften:

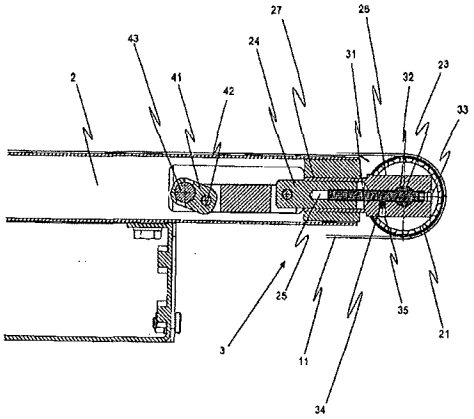
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Die folgenden Angaben sind den vom Anmelder eingereichten Unterlagen entnommen

Rechercheantrag gemäß § 43 Abs. 1 Satz 1 PatG ist gestellt.

(54) Bezeichnung: **Förderband**

(57) Zusammenfassung: Die Erfindung betrifft ein Förderband mit einem Bandkörper (2), der zwei Umlenkwalzen aufweist, über die ein Endlosband geführt ist. Zumindest eine der Umlenkwalzen (21) weist eine Feineinstellung (3) mit einer Stellschraube (31) zur Justierung der Endlosbandspannung auf. Um einen konstruktiv einfachen Aufbau zu erreichen und den notwendigen Reinigungsaufwand gering zu halten ist vorgesehen, dass die Umlenkwalzen über Achsen drehbar gelagert sind, wobei der Abstand von Achse zu Bandkörper einstellbar ist, indem die Achse (23) einer Umlenkwalze eine quer verlaufende Aussparung aufweist, durch die Stellschraube (31) zur Justierung der Endlosbandspannung geführt ist. Somit wird die Stellschraube innen liegend angeordnet und gegen Verschmutzung geschützt.



Beschreibung

[0001] Die Erfindung betrifft ein Förderband mit einem Bandkörper gemäß den Merkmalen des Oberbegriffs des Anspruchs 1.

[0002] In der Praxis ist es bei Förderanlagen oftmals erforderlich, einen Bandkörper mit einer justierbaren Bandspannung zu verwenden.

[0003] In der US 5,030,173 ist ein solcher Bandkörper gezeigt, der eine Justierung der Bandspannung ermöglicht. Es wird der Abstand einer Umlenkrolle zu einem Bandkörper mittels einer Justierschraube und einer Kontermutter eingestellt. Die Justierschraube ist außen an dem Bandkörper angebracht, und verstellt eine Halterung, die ein Lager der Umlenkrolle haltert.

[0004] Aus der GB 2041315 A ist ein weiterer Bandkörper eines Förderbandes bekannt, der eine Justierung der Bandspannung ermöglicht. Eine Umlenkwalze ist hier in einem Lenkschlitz geführt, der am Bandkörper angeformt ist. Mittels dreier Winkelbleche, die über eine Einstellschraube verbunden sind, wird der Abstand der Umlenkwalze zum Bandkörper eingestellt.

[0005] Diese bekannten Lösungen weisen eine Vielzahl von mechanischen Bauteilen auf, die jeweils außen an dem Bandkörper angebracht sind. Diese Bauteile bilden Vorsprünge am Bandkörper aus, die relativ schmutzanfällig und schwer zu reinigen sind.

[0006] Der Erfindung liegt die Aufgabe zugrunde, ein Förderband zu schaffen, das konstruktiv einfach aufgebaut ist, einen geringen Wartungsaufwand benötigt und in kurzer Zeit zu reinigen ist.

[0007] Diese Aufgabe wird erfindungsgemäß durch ein Förderband mit den Merkmalen des Anspruchs 1 gelöst.

[0008] Ein Förderband weist einen Bandkörper auf, an dem jeweils zwei auf einer Achse drehbar gelagerte Umlenkwalzen gehaltert sind. Über die Umlenkwalzen wird ein Endlosband umlaufend geführt. Eine Einstellung der Bandspannung des Endlosbandes erfolgt mittels einer Feineinstellung, die eine Stellschraube zur Justierung der Endlosbandspannung umfasst. Die Umlenkwalzen sind an dem Bandkörper mittels Achsen gelagert. Zumindest eine Achse einer Umlenkwalze weist eine quer verlaufende Aussparung aus, durch die die Stellschraube hindurch greift. Vorzugsweise nimmt die Aussparung den Kopf der Stellschraube auf. Somit bildet die Achse ein Widerlager für die Stellschraube. Diese lässt sich durch die Aussparung hindurch mittels eines Werkzeugs, wie z. B. einem Schraubendreher oder einem Innensechskantschlüssel, verstellen. Das hat den Vorteil, dass sich die Anzahl der notwendigen Bauteile für die Feineinstellung der Bandspannung reduziert und zudem die Bauteile geschützt im Inneren der Achse der Umlenkwalze und/oder des Bandkörpers angeordnet sind. Dadurch sind diese mechanisch geschützt angeordnet, und können von außen keine Verschmutzung annehmen.

[0009] Es ist vorgesehen, dass die Achse massiv ausgeführt ist, und die Aussparung in der Achse – z. B. als Bohrung – quer zur Achse verlaufend angeordnet ist. Die Achse selbst ist feststehend ausgeführt und an dem Bandkörper gelagert. Die Umlenkwalze ist auf der Achse drehbar gehaltert, und wird z. B. über ein Gleitlager oder ein Kugellager gelagert. Der Durchmesser der Achse bzw. die Größe der Aussparung ist so bemessen, dass in der Achse eine ausreichende Wandstärke verbleibt um die notwendige Stabilität zur Halterung der Umlenkwalze sicherzustellen. Indem die Stellschraube durch die Aussparung in der Achse der Umlenkwalze hindurch greift, sichert die Stellschraube die Achse zugleich gegen axiales Verschieben. Durch Drehen der Stellschraube wird der Abstand zwischen der Umlenkwalze und dem Bandkörper eingestellt, und dadurch die Bandspannung des Endlosbandes justiert.

[0010] Es kann vorgesehen sein, dass die Achse der Umlenkwalze zwei beabstandete, parallel zueinander verlaufende Aussparungen aufweist. Jeweils in einem endseitigen Bereich der Umlenkwalze, also zu beiden Seiten des Endlosbandes ist eine solche Aussparung angeordnet. Durch die Aussparungen verläuft jeweils eine Stellschraube. Mit dieser Anordnung ist es möglich, die Bandspannung des Endlosbandes absolut einzustellen, in dem z. B. beide Stellschrauben gemeinsam verstellt werden. Ebenso ist es möglich, eine eventuelle Seitenabweichung des Endlosbandes zu justieren, in dem nur jeweils eine Stellschraube auf einer Seite der Umlenkwalze justiert wird.

[0011] In der Praxis ist es ausreichend, wenn eine Umlenkwalze des Bandkörpers eine Feineinstellung zur Justierung der Endlosspannung aufweist und die andere Umlenkwalze mit festem Abstand ausgeführt ist. Es sind jedoch auch Anwendungen denkbar, bei denen beide Umlenkwalzen eine solche Feineinstellung aufweisen.

[0012] In einer Ausführung ist vorgesehen, dass eine Umlenkwalze eine Feineinstellung mit einer Stellschraube zur Justierung der Endlosbandspannung aufweist, und die andere Umlenkwalze über einen Motor angetrieben ist, um das Endlosband in Förderrichtung anzutreiben.

[0013] Es kann vorgesehen sein, dass die Stellschraube in einer Gewindehülse geführt ist, die in der quer verlaufenden Aussparung in der Achse der Um-

lenkwalze angeordnet ist. Diese Gewindehülse kann eine Führung oder ein Gewinde für die Stellschraube aufweisen und kann der mechanischen Verstärkung der Achse dienen. Insbesondere kann die Gewindehülse fest mit der Achse verbunden, insbesondere verpresst oder verklebt sein.

[0014] Es ist vorgesehen, dass ein Ende der Stellschraube in ein an einem Stellbolzen angeordnetes Sackloch eingreift, wobei der Stellbolzen seinerseits fest mit dem Bandkörper verbunden ist. Die Stellschraube stützt sich somit an dem Stellbolzen und damit mittelbar am Bandkörper ab. Der Abstand der Umlenkwalze zu dem Stellbolzen bzw. zu dem Bandkörper kann über ein Gewinde eingestellt werden, wobei das Gewinde in dem Stellbolzen bzw. dem Sackloch und/oder in der Gewindehülse angeordnet sein kann.

[0015] In einer Ausführung ist vorgesehen, dass die Achse ein Lagergehäuse aufweist, und dieses die Achse in Höhe der Aussparung umschließt. Das Lagergehäuse nimmt in seinem Innern die Stellschraube vollständig auf. Das Lagergehäuse kann rund oder quaderförmig ausgebildet sein und schützt die Stellschraube zusätzlich gegen störende Einflüsse von außen, insbesondere gegen Verschmutzung. Es ist insbesondere vorgesehen, dass das Lagergehäuse geschlossen ausgebildet ist, so dass die Feineinstellung der Endlosbandspannung gut gegen Verschmutzung gesichert ist.

[0016] Es kann vorgesehen sein, dass das Lagergehäuse ein Gewinde aufweist, in dem die Stellschraube geführt ist. Insbesondere kann das Gewinde im Lagergehäuse zusätzlich oder alternativ zu einer innerhalb der Aussparung der Achse angeordneten Gewindehülse vorgesehen sein.

[0017] Zur Einstellung über einen relativ großen Verstellbereich kann das Lagergehäuse verschiebbar an dem Bandkörper gelagert sein, vorzugsweise indem eine Wand des Lagergehäuses in eine Führung des Stellbolzens eingreift. Vorzugsweise weist der Stellbolzen als Führung eine Bohrung auf, deren Innendurchmesser auf den Außendurchmesser des Lagergehäuses abgestimmt ist, so dass das Lagergehäuse passgenau in die Bohrung eingreift und dort axial verschiebbar gehalten ist. Alternativ kann in einer Ausführung zur Lagerung des Lagergehäuses in dem Stellbolzen als Führung ein Schlitz vorgesehen sein, in den eine Wand des Lagergehäuses eingreift, so dass dieses linear verschiebbar an den Stellbolzen gelagert ist.

[0018] Eine weitere Reduktion von Bauteilen ergibt sich, wenn das Lagergehäuse in seinem Inneren eine Aufnahme für die Achse aufweist um diese zu halten. Die Aufnahme kann z. B. als passgenaue Hülse ausgebildet sein, die mit der Wand des Lagergehäuses verbunden, bzw. an die Wand angeformt ist, und in die die Achse eingesteckt wird. Somit verbindet das Lagergehäuse die Achse mit dem Bandkörper. Insbesondere kann das Lagergehäuse ein seitliches Ende der Achse umschließen und diese vor Verschmutzung schützen.

[0019] Um eine besonders gute Abdichtung des Lagergehäuses vorzusehen, kann vorgesehen sein, dass die Außenkontur der Lagerführung geschlossen ist und das Lagergehäuse in axialer Verlängerung der Stellschraube eine von einem Blindstopfen verschlossene Ausnehmung aufweist.

[0020] In einer komfortablen Ausführung kann vorgesehen sein, dass die Feineinstellung zur Justierung der Endlosbandspannung eine Schnellspanneinrichtung aufweist, indem der Abstand zwischen der Umlenkwalze und dem Bandkörper mittel eines Spannhebels zwischen einer ausgefahrenen Betriebsstellung und einer eingefahrenen Montagestellung verstellbar ist. Die Schnellspanneinrichtung ist insbesondere so ausgebildet, dass sich die Justierung der Bandspannung durch das Lösen des Spannhebels nicht ändert. So ist es z. B. möglich, dass durch Lösen des Hebels der Schnellspanneinrichtung das Band in axialer Richtung der Umlenkwalzen von dem Bandkörper abgezogen und durch ein neues Band ersetzt wird. Durch Schließen des Spannhebels stellt man sofort die erforderliche Bandspannung wieder her.

[0021] Es ist insbesondere vorgesehen, dass der Spannhebel ein Excenter oder ein Nocken aufweist, der über ein Gestänge, einen Bolzen oder einen Hebel mit dem Stellbolzen verbunden ist und diesen gegen axiales Verschieben sichert. Der Stellbolzen ist in einer Führung an dem Bandkörper verschiebbar gehaltert, und wird durch den Spannhebel bzw. den Hebel fixiert. Über den Excenter oder den Nocken wird beim Drehen des Spannhebels der Hebel, oder der Bolzen oder das Gestänge linear verschoben und nimmt dabei den Stellbolzen mit. Beim Überführen des Spannhebels von der eingefahrenen Montagestellung in die ausgefahrene Betriebsstellung erfolgt ein Spannen des Endlosbandes, so dass dieses als Feder wirkt. Dabei ist vorgesehen, dass der Nocken auf den Spannhebel so orientiert ist, dass er einen überdrehbaren Totpunkt aufweist. Dadurch wird erreicht, dass der Spannhebel in der Betriebsstellung über die Spannung des Endlosbandes gesichert ist.

[0022] Um die Spannung des Endlosbandes auf Dauer sicher zu stellen, ist vorgesehen, dass die Lagerführung eine Gewindebohrung aufweist, die quer zu der Stellschraube verläuft und eine Klemmschraube zum Sichern der Stellschraube aufweist. Durch Anziehen der Klemmschraube wird die Stellschraube fixiert, so dass diese sich nicht selbsttätig verstellen kann.

[0023] Für eine besonders gute Abdichtung gegen Umwelteinflüsse, insbesondere Verschmutzung ist vorgesehen, dass die Klemmschraube von einem innerhalb der Gewindebohrung angeordneten Schutzstift abgedeckt ist, der die Gewindebohrung nach Außen hin abdichtet. Um eine Beschädigung der Stellschraube zu verhindern kann die Klemmschraube ein im Vergleich zu der Stellschraube weiches Material, z. B. einen Kunststoff oder ein Weichmetall wie Aluminium oder Kupfer aufweisen.

[0024] Eine Anwendung des erfindungsgemäßen Förderbandes ist z. B. in Stückgutförderanlagen möglich, die bei der Lebensmittelherstellung, in der Medizin oder in der Reinraumtechnik eingesetzt werden. Allgemein kann das erfindungsgemäße Förderband überall Verwendung finden, wo hohe Anforderungen an Hygiene und/oder Reinheit gestellt werden und zugleich eine einfache Wartung ermöglicht werden soll.

[0025] Weitere Ausführungsbeispiele der Erfindung sind in den Figuren dargestellt und in der dazugehörigen Figurenbeschreibung beschrieben.

[0026] Es zeigen:

[0027] Fig. 1: Ein Förderband mit einem Bandkörper.

[0028] Fig. 2: Eine Seitenansicht des Förderbandes.

[0029] Fig. 3: Eine vergrößerte Schnittdarstellung des Bandkörpers im Bereich der Umlenkwalze.

[0030] In Fig. 1 ist ein Förderband **1** dargestellt. Das Förderband **1** umfasst einen Bandkörper **2**, an dessen Enden zwei Umlenkwalzen **21** und **22** drehbar gelagert sind. Über die Umlenkwalzen und den Bandkörper ist ein Endlosband geführt, welches in der Fig. 1 der Übersichtlichkeit halber nicht dargestellt ist. Der Bandkörper **2** kann über seitlich angebrachte Halterungen in einem Rahmen befestigt werden, wobei vorgesehen sein kann, dass in dem Rahmen mehrere solcher Bandkörper **2** hintereinander angeordnet sind, um eine größere Förderstrecke für das Förderband **1** zu bilden. Der Bandkörper **2** weist eine ebene Oberfläche auf, über die das obere Trum des Endlosbandes geführt ist. Die in Förderrichtung gesehen zueinander beabstandet angeordneten Umlenkwalzen **21** und **22** sind jeweils über eine Achse **23** an dem Bandkörper **2** befestigt. Diese Achse **23** ist jeweils feststehend ausgebildet, und zu beiden Seiten in einem Lagergehäuse **26** aufgenommen bzw. gehaltert.

[0031] Der Bandkörper **2** weist einen an der Seite des Bandkörpers angeordneten Spannhebel **4** auf, über den eine Justierung des Abstandes der Umlenkwalze **21** zu dem Bandkörper **2** erfolgt. Durch Umlegen des Spannhebels **4** wird der Abstand so variiert, dass die Umlenkwalze **21** von einer Montagestellung mit geringem Abstand zwischen Bandkörper und Umlenkwalze **21** hin zu einer Betriebsstellung mit vergrößertem Abstand zwischen Umlenkwalze **21** und Bandkörper **2** überführt werden kann. In der Montagestellung ist das Endlosband entspannt und kann einfach seitlich, d. h. quer zur Förderrichtung von dem Bandkörper **2** abgezogen bzw. auf den Bandkörper **2** aufgezogen werden.

[0032] In der Fig. 2 ist der Bandkörper **2** des Förderbandes **1** in einer Seitendarstellung gezeigt.

[0033] In der Fig. 3 ist eine Schnittdarstellung des Bereichs des Spannhebels **4** und der Umlenkwalze **21** aus Fig. 2 dargestellt. Der Spannhebel **4** ist um seine Achse **43** drehbar gelagert, und weist einen Excenter **41** auf. Der Excenter **41** wirkt über einen Hebel **42** mit dem Stellbolzen **24** zusammen, der in dem Bandkörper **2** linear verschiebbar gelagert ist. Über den Hebel **42** ist der Stellbolzen **24** fixiert, so dass dieser sich bei arretiertem Spannhebel **4** nicht bewegen kann. Der Stellbolzen **24** weist ein Sackloch **25** mit einem Gewinde auf, in dem eine Stellschraube **31** geführt ist. Zudem weist der Stellbolzen **24** eine Bohrung auf, die für das Lagergehäuse **26** als Führung dient. Das Lagergehäuse **26** weist einen zylindrischen Wandabschnitt auf, dessen Außendurchmesser auf die Bohrung abgestimmt ist, so dass der zylindrische Wandabschnitt **27** des Lagergehäuses **26** linear verschiebbar gehaltert ist.

[0034] Das Lagergehäuse **26** weist eine Aussparung auf, in der die Achse **23** der Umlenkwalze **21** gehaltert ist. Somit ist die Achse **23** über das Lagergehäuse **26** an den Bandkörper **2** befestigt. Weiter weist das Lagergehäuse ein Gewinde auf, welches eine Stellschraube **31** führt. In Verlängerung des Gewindes ist innerhalb der Achse **23** ist eine Querbohrung **32** angeordnet, die die Stellschraube **31** führt.

[0035] Über die Stellschraube **31** wird der Abstand der Achse **23** zu dem Bandkörper **2** eingestellt. Dazu weist das Lagergehäuse **26** eine Aussparung auf, die in axialer Verlängerung der Stellschraube **31** angeordnet, und durch einen Blindstopfen **33** verschlossen ist. Nach Entfernen des Blindstopfens **33** kann unter Zuhilfenahme eines passenden Werkzeuges, wie z. B. einem Schraubendreher oder einem Inbusschlüssel, die Stellschraube **31** zum Justieren des Abstandes gedreht werden.

[0036] Über das Gewinde des Lagergehäuses **26** bzw. das in dem Stellbolzen **24** angeordnete Gewinde wird so bei der Drehung der Stellschraube **31** der Abstand zwischen der Achse **23** und dem Bandkörper **2** verstellt. Da die zweite Umlenkwalze **22** in ihrem Abstand zum Bandkörper **2** fix angeordnet ist,

kann dadurch die Bandspannung des über die Umlenkwalzen **22** bzw. **21** geführten Endlosbandes **11** eingestellt werden.

[0037] Es ist vorgesehen, dass die beiden Gewinde in dem Lagergehäuse **26** und in dem Stellbolzen **24** unterschiedliche Drehrichtung aufweisen. So ist in dem Stellbolzen **24** ein Rechtsgewinde und in dem Lagergehäuse **26** ein Linksgewinde vorgesehen, oder umgekehrt.

[0038] In einer alternativen Ausgestaltung können die Gewinde in dem Lagergehäuse und dem Stellbolzen gleiche Drehrichtung aufweisen und die Stellschraube **31** weist einen ersten Gewindeabschnitt und einen zweiten Gewindeabschnitt mit jeweils unterschiedlicher Drehrichtung auf. Der erste Gewindeabschnitt greift in den Stellbolzen **24** ein und der zweite Gewindeabschnitt greift in das Lagergehäuse **26** ein. Beim Drehen der Stellschraube wird so erreicht, dass sich das Lagergehäuse **26** und der Stellbolzen **24** gegenläufig zueinander bewegen.

[0039] Das Lagergehäuse **26** weist an seiner Unterseite eine Gewindebohrung auf, in der eine Klemmschraube **34** geführt ist. Über die Klemmschraube **34** kann die Stellschraube **31** verklemmt und somit gegen unbeabsichtigtes Verdrehen gesichert werden. Um das Lagergehäuse **26** abzudichten ist vorgesehen, dass die Klemmschraube **34** von einem Sicherungsstift **35** abgedeckt ist, so dass das Lagergehäuse **26** keine Vorsprünge oder Vertiefungen aufweist, in die sich Verschmutzungen einnisten könnten.

ZITATE ENTHALTEN IN DER BESCHREIBUNG

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Zitierte Patentliteratur

- US 5030173 **[0003]**
- GB 2041315 A **[0004]**

Patentansprüche

1. Förderband mit einem Bandkörper (**2**) an dem zwei jeweils auf einer Achse (**23**) drehbar gelagerte Umlenkwalzen (**21**, **22**), über die ein Endlosband (**11**) geführt ist, gehaltert sind, wobei zumindest eine der Umlenkwalzen (**21**) eine Feineinstellung (**3**) mit einer Stellschraube (**31**) zur Justierung der Endlosbandspannung aufweist, **dadurch gekennzeichnet**, dass die Achse (**23**) der Umlenkwalze (**21**) eine quer verlaufende Aussparung aufweist, durch die die Stellschraube (**31**) hindurch verläuft.

2. Förderband nach Anspruch 1, dadurch gekennzeichnet, dass ein Ende der Stellschraube (**31**) in ein an einem Stellbolzen (**24**) angeordnetes Sackloch (**25**) eingreift und der Stellbolzen mit dem Bandkörper (**2**) verbunden ist.

3. Förderband nach einem der Ansprüche 1 oder 2, dadurch gekennzeichnet, dass die Achse (**23**) ein Lagergehäuse (**26**) aufweist, das die Achse auf Höhe der Aussparung umschließt und im Inneren die Stellschraube (**31**) vollständig aufnimmt.

4. Förderband nach einem der Ansprüche 1 bis 3, dadurch gekennzeichnet, dass sowohl das Lagergehäuse (**26**) als auch der Stellbolzen (**24**) jeweils ein Gewinde aufweisen, in dem die Stellschraube **31** geführt ist.

5. Förderband nach Anspruch 4, dadurch gekennzeichnet, dass das Gewinde des Lagergehäuses (**26**) eine andere Drehrichtung aufweist, als das Gewinde des Stellbolzens (**24**).

6. Förderband nach Anspruch 4 oder 5, dadurch gekennzeichnet, dass die Stellschraube **31** zwei Gewindeabschnitte aufweist, die unterschiedliche Drehrichtung aufweisen.

7. Förderband nach einem der Ansprüche 3 bis 6, dadurch gekennzeichnet, dass das Lagergehäuse (**26**) verschiebbar an dem Bandkörper (**2**) gelagert ist, vorzugsweise dass eine Wand (**27**) des Lagergehäuses in eine Führung des Stellbolzens (**24**) eingreift.

8. Förderband nach einem der Ansprüche 3 bis 7, dadurch gekennzeichnet, dass die Außenkontur des Lagergehäuses (**26**) geschlossen ist und das Lagergehäuse in axialer Verlängerung der Stellschraube (**31**) eine von einem Blindstopfen (**33**) verschlossene Öffnung aufweist.

9. Förderband nach einem der Ansprüche 1 bis 8 dadurch gekennzeichnet, dass die Stellschraube (**31**) in einer Hülse (**32**) geführt ist, die in der quer verlaufenden Aussparung in der Achse (**23**) der Umlenkwalze (**21**) angeordnet ist und vorzugsweise ein Gewinde aufweist oder die Stellschraube drehbar lagert.

10. Förderband nach einem der Ansprüche 1 bis 9, dadurch gekennzeichnet, dass der Abstand zwischen der Umlenkwalze (**21**) und dem Bandkörper (**2**) mittels eines Spannhebels (**4**) zwischen einer ausgefahrenen Betriebsstellung und einer eingefahrenen Montagestellung verstellbar ist.

11. Förderband nach Anspruch 10, dadurch gekennzeichnet, dass der Spannhebel (**4**) einen Nocken (**41**) aufweist, der über einen Hebel (**42**) mit dem Stellbolzen (**24**) verbunden ist, wobei der Nocken (**41**) auf dem Spannhebel (**4**) so orientiert ist, dass der Nocken (**41**) beim Drehen des Spannhebels (**4**) einen Totpunkt überwindet.

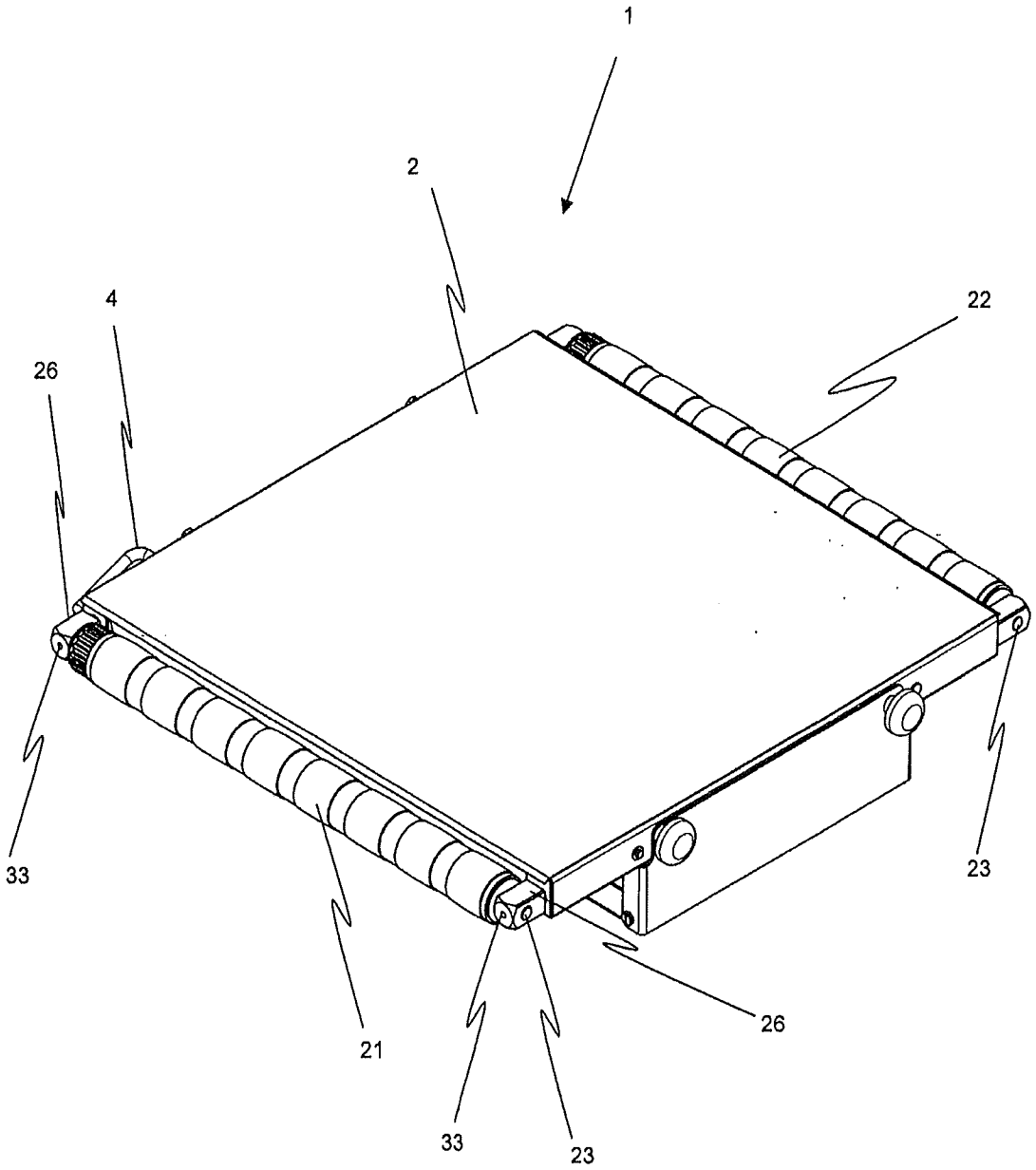
12. Förderband nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, dass das Lagergehäuse (**26**) eine Gewindebohrung aufweist, die quer zu der Stellschraube (**31**) verläuft und eine Klemmschraube (**34**) zum Sichern der Stellschraube führt.

13. Förderband nach Anspruch 12, dadurch gekennzeichnet, dass die Klemmschraube (**34**) von einem innerhalb der Gewindebohrung angeordneten Schutzstift (**35**) abgedeckt ist.

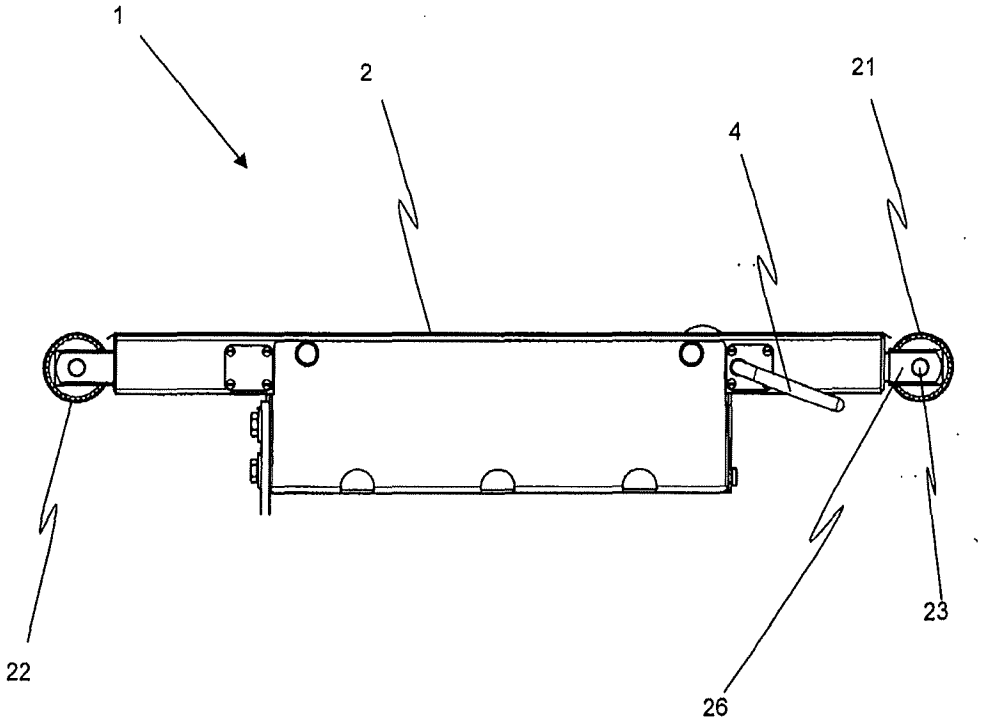
Es folgen 3 Blatt Zeichnungen

Anhängende Zeichnungen

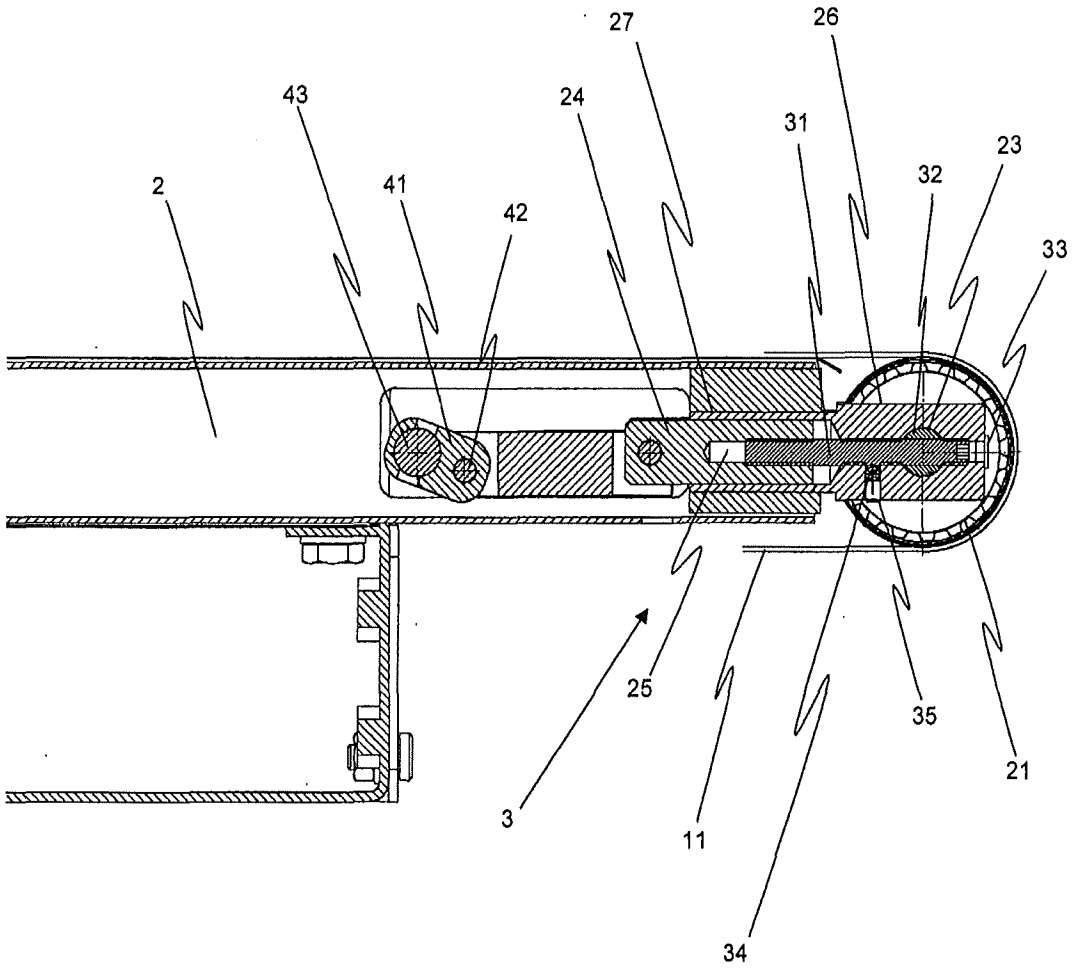
Figur 1



Figur 2



Figur 3



(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 584 580 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
12.10.2005 Bulletin 2005/41

(51) Int Cl.[7]: **B65G 15/00**, B65G 21/06

(21) Application number: **05251189.6**

(22) Date of filing: **28.02.2005**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU MC NL PL PT RO SE SI SK TR
Designated Extension States:
AL BA HR LV MK YU

(30) Priority: **01.03.2004 GB 0404526**

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(54) Method and device for mounting and removing an endless conveyor belt

(57) Conveying apparatus (10) wherein elements comprising the apparatus are of modular construction and are adapted to facilitate disassembly and reassembly of the apparatus as required to facilitate access to the conveyor assembly, particularly the belt (34), to enable removal and replacement of the belt quickly and without the need for on-site vulcanisation thereby significantly reducing the down time of the apparatus.

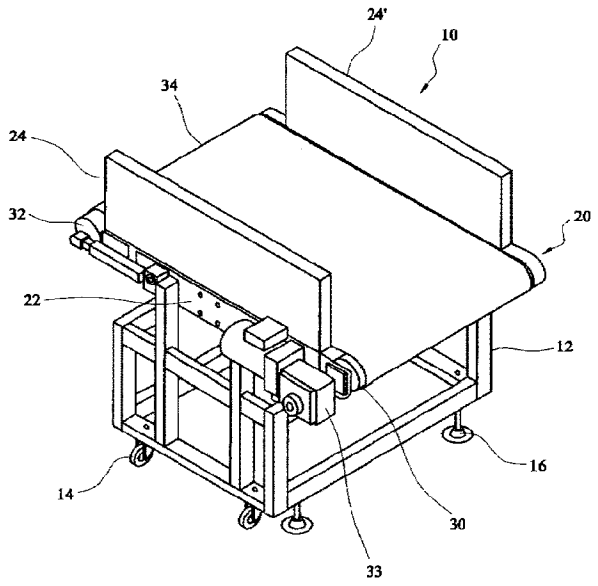


FIG. 1

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Description

[0001] This invention relates to a method and apparatus for conveying articles such luggage in an airport environment. However, the invention is equally applicable to the conveyance of letters and parcels, containers, trays, recyclable material and a bulk raw vegetable crop.

[0002] Conveying apparatus is frequently used for the movement of bulk items and in applications where heavy duty and often constant use is required. The principle of operation is that a belt is turned by a drive roller inside the belt and the articles such as luggage transverses the top strand of the belt and travels as the belt travels. It is important that such apparatus be as reliable as possible and "down time" when the conveyor is out of action due to difficulties with the belt, such as replacing it, is reduced to a minimum as in circumstances where the articles being transported is luggage, say at an airport, this would cause considerable disruption.

[0003] Although various conveyors have been developed, they suffer from the disadvantage that is a difficult and time consuming job to carry out maintenance, particularly the repair or replacement of the belt. Accordingly, we have identified the need for improvements in this respect or generally.

[0004] According to the invention there is provided conveying apparatus which provides improvements with regard to repair and maintenance to reduce the amount of downtime required.

[0005] In an embodiment of the invention there is provided conveying apparatus wherein elements comprising the apparatus are of modular construction and are adapted to facilitate disassembly and reassembly of the apparatus as required to facilitate access to the conveyor assembly.

[0006] The apparatus comprises a support frame assembly, typically constructed from steel or a similar suitable material. The frame is provided with heavy duty castors and self-levelling adjustable feet. The provision of castors ensures that the conveyor is highly manoeuvrable. The support frame assembly carries a conveyor frame assembly around which a conveyor belt runs.

[0007] The conveyor frame assembly is secured to the support frame by support means. These include support means located at either side of the frame and which may be adapted to be modular being removable and replaceable as required. The removal of these support means facilitates access to the conveyor frame assembly.

[0008] The conveyor frame assembly comprises side members between which is located a strengthening flat. The side members are angled such that a portion of the side member is substantially vertical and a portion is substantially horizontal. The strengthening flat is secured to the horizontally extending portions of the side members such that it extends between them. Beneath the strengthening flat the conveyor frame assembly is provided with cross members which extend between and are secured to the substantially vertical portions of the side members. These provide the conveyor frame assembly with additional strength.

[0009] Side panels are provided which drop into apertures which are formed on the conveyor frame assembly to combat bounce in use and to retain articles on the conveyor preventing them from sliding off the belt. These panels are modular, being designed to be removed and replaced as necessary.

[0010] At one end of the conveyor frame assembly there is provided a drive roller with a tail roller being provided at the other end. The drive roller is motorised using a suitable drive motor, however this could be replaced by an internally motorised drum. A belt is located over the conveyor frame assembly and the drive and tail rollers such that the rollers are inside the loop formed by the belt. The belt is driven by the drive rollers as a result of friction contact between the roller and the underside of the belt. The drive roller may also be crowned to help retain the belt in the required working position. In addition, the drive roller and tail roller are wider than the belt. This assists to maintain correct tracking of the belt.

[0011] Attached to the side members of the conveyor frame assembly are a plurality, generally four, of mounting means for two snub rollers which are located behind the drive and tail rollers and on the outside of the conveyor belt. The snub rollers are provided with a lug or projection at either end which is received in a corresponding notch formed in a mounting plate to retain them in the required position relative to the drive and tail rollers and the conveyor belt. The tracking of the conveyor belt is affected by the snub rollers acting on the return side of the conveyor belt. The snub rollers also act to retain the conveyor belt in the required position. The mounting means for the snub rollers and the construction of the rollers enable them to be removed and replaced as required by hand without the need for specialised tools. Furthermore, the design of the mounting means enables the snub rollers to be replaced without the need for extensive adjustment or re-calibration. Belt tracking adjustment means are also provided which can adjust snub rollers to take account of the angle of drive if required. The conveyor frame assembly is also provided with a sliding bed which supports the belt in operation.

[0012] The position of the tail roller relative to the conveyor frame assembly can be altered to either bring it closer to the frame or move it further away. The position of the tail roller can be altered in this way to either increase' or decrease the tension applied to the conveyor belt. The movement of the tail roller is facilitated by having the tail roller mounted on retractable brackets that are driven by a hand wheel or a winding handle through a reduction gear box/cross helical gear box which screws the roller mounts in or out depending on the direction of the handle rotation and causes the supports on which the tail roller is mounted to move within a shaft secured to the inside of the substantially upright portion

of side member. As the roller is caused to move either closer to or further away from the conveyor frame assembly, the sliding bed is also caused to follow this movement such that the area of support for the conveyor when in use is also adjusted.

[0013] In the event the belt becomes damaged during use, the operator can access the belt from the side of a machine, generally the side which does not carry the motor. The side panel can be removed and the tail roller is retracted. Once retracted the slack in the belt allows the snub rollers to be removed from their mounting bracket. Once the snub rollers are removed the belt will hang down. The support means between the support frame and the conveyor frame assembly on that same side are then removed. On removal of these support means, the conveyor frame assembly is supported by the frame from one side only being held in a cantilever position. When the conveyor is hanging from the cantilever support the belt can then be pulled off through the open side.

[0014] In an embodiment of the invention there is also provided a method of accessing conveying apparatus to facilitate removal of the belt.

[0015] The method comprises the step of removing a side panel from the conveyor frame assembly, the further step of retracting the tail roller, the still further step of removing the snub rollers thereby enabling the belt to hang down, the step of removing the support means between the support frame and the conveyor frame assembly on that same side such that the conveyor frame assembly is supported by the frame from one side only being held in a cantilever position and the step of pulling the belt through the open side.

[0016] Refitting is the reverse of removal, and the tracking may be checked and adjusted as necessary when the new belt is fitted.

[0017] By creating a conveyor system which has a modular capacity, which may be accessed from the side for maintenance, thereby enabling the conveyor frame assembly to be retained in a cantilevered attitude, this enables a conveyor apparatus to be maintained very quickly and in particular permits the fast and easy changing and replacing of a belt which can be achieved without the need to split a belt to remove it or re-join a belt once fitted. This reduced the down time of the conveyor thereby reducing attendant comsttercial losses. In addition, the invention avoids expensive on-site vulcanisation often associated with the conveyor industry today.

[0018] An embodiment of the invention will now be described, by way of example only, with reference to the following illustrative figures in which:

Figure 1 is a perspective view of the conveyor apparatus from above and one side;

Figure 2 is a perspective view of the conveyor apparatus from below and the other side;

Figure 3 is a perspective view of the support frame assembly of the conveyor apparatus;

Figure 4 is a perspective view of the strengthening flat of the conveyor apparatus;

Figure 5 is a perspective view of part of the conveyor frame assembly from below;

Figure 6 is a perspective view of part of the conveyor frame assembly from below showing the rollers;

Figure 7 is a perspective view of part of the conveyor frame assembly;

Figure 8 is a perspective detailed view of part of the conveyor apparatus;

Figure 9 is a perspective view of part of the conveyor apparatus after disassembly showing removal of the belt

[0019] As can be seen in Figures 1, 2 and 3 conveyor apparatus 10 comprises a support frame assembly 12. The frame is provided with heavy duty castors 14 and self levelling adjustable feet 16. The frame has upwardly extending support means 18 which have formed with a bracket 19 at one end which is used to secure the support means 18 to the frame 12 together with suitable fixing means such as bolts. At the other end, the support means 18 are secured to the conveyor frame assembly 20. Said support means are removable and replaceable as required. The conveyor frame assembly 20 has two side members 22 and 22' which run on either side. The side members are angled such a portion of the side portion is substantially horizontal and a portion is substantially vertical. The horizontal portion is formed with apertures into which are received side panels 24, 24'. These are then bolted into position but can be removed and replaced as required. Located between the side members is a strengthening flat 26 as shown in Figure 4 which is secured to the horizontally extending portions of the side members 22 22'. Beneath the strengthening flat 26, the conveyor frame assembly 20 is provided with further strengthening means in the form of cross members 28 as can be seen in Figure 5.

[0020] As shown in Figures 1, 2 and 6 a drive roller 30 is located at one end of the conveyor frame assembly 20 and a tail roller 32 at the other end. The drive roller 30 is driven by a motor 33 typically although not exclusively being helical bevel, 1.1Kw, 102rpm 3 phase, 50 Hz being shaft mounted with shrink disc fitting and a quick power supply via a Hartling connection. A belt 34, which is joined at the end to form a continuous loop, is located around the conveyor frame assembly 20 and rollers 30,32 such that the rollers 30,32 are located inside the loop. The belt 34 may be formed from flame retardant PVC or similar material. The belt 34 is driven

by the drive roller 30 as a result of friction contact between the roller 30 and the belt 34.

[0021] As can be seen in Figure 6 snub rollers 36 36=are provided which are close to the drive and tail rollers, 30,32. These are retained in the required position by mounting plates 38 secured to the side members 22, 22= and act on the return side of the belt 34. The snub rollers 36, 36= act to maintain the position of the belt 34 and affect the tracking of the belt 34. The belt 34 is supported in use by a sliding bed 40 as shown in Figure 7.

[0022] The position of the tail roller 30 relative to the conveyor frame assembly 20 can be altered to either bring it closer to the frame 20 or move it further away. The position of the tail roller 30 can be altered in this way to either increase or decrease the tension applied to the conveyor belt 34. The movement of the tail roller 30 is facilitated by having the tail roller 30 mounted on retractable brackets 42 that are driven by a hand wheel or a winding handle 44 as shown in Figure 8 through a reduction gear box/cross helical gear box which screws the roller mounts in or out depending on the direction of the handle rotation. As the roller 30 is caused to move either closer to or further away from the conveyor frame assembly 20, the sliding bed 44 is also caused to follow this movement such that the area of support for the belt, when in use, is also adjusted.

[0023] In the event the belt 34 becomes damaged during use, the operator can access the belt 34 from the side of the conveyor 10, generally the side which does not carry the motor. The retaining bolts holding the modular side panel 22 in position are loosened and the side panel 22 is removed. The tail roller 30 is then retracted which serves to de-tension and slacken the belt. Once retracted the slack in the belt allows the snub rollers to be removed from their mounting bracket. Once the snub rollers are removed the belt will hang down.

[0024] The support means 18 between the support frame 10 and the conveyor frame assembly 20 on that same side are then removed. On removal of these support means 18, the conveyor frame assembly 20 is supported by the frame 10 from one side only being held in a cantilever position. When the conveyor frame assembly 20 is hanging from the cantilever support the belt 34 can then be pulled off through the open side as shown in Figure 9.

Claims

1. Conveying apparatus wherein elements comprising the apparatus are of modular construction and are adapted to facilitate disassembly and reassembly of the apparatus as required.

2. Conveying apparatus according to claim 1 wherein said disassembly and reassembly of the apparatus is partial to facilitate access as required.

3. Conveying apparatus according to claim 2 wherein a conveyor frame assembly is secured to and supported by a support frame assembly.

4. Conveying apparatus according to claim 3 wherein said conveyor frame assembly is secured to said support frame assembly by support means which are removably replaceable.

5. , Conveying apparatus according to claim 3 wherein said support frame is adapted to support said conveyor frame assembly from one side thereby retaining said conveyor frame assembly in a cantilevered attitude.

6. Conveying apparatus according to claim 4 or claim 5 wherein said support frame is adapted to support said conveyor frame assembly from one side after removal of said support means thereby retaining said conveyor frame assembly in a cantilevered attitude.

7. Conveying apparatus according to any of the previous claims wherein said conveyor frame assembly comprises side panels, a drive roller, a tail roller, snub rollers, a strengthening flat and a belt.

8. Conveying apparatus according to claim 7 wherein said side panels are removably replaceable.

9. Conveying apparatus according to claim 7 wherein said snub rollers are removably replaceable.

10. Conveying apparatus according to claim 7 wherein the position of said tail roller may be changed relative to the drive roller.

11. Conveying apparatus according to claim 10 wherein changing the position of the tail roller relative to the drive roller facilitates tensioning and de-tensioning of the belt.

12. Conveying apparatus according to claim 11 wherein said belt may be removed without the need for cutting by pulling it off through the open side created by retaining the conveyor frame assembly in a cantilevered attitude.

13. A method of removing a belt from conveying apparatus comprising the steps of providing conveying apparatus, said apparatus being of modular construction, the further step of removal of the modular elements to facilitate access to the belt and the step of removing the belt.

14. A method of removing a belt from conveying apparatus comprising the step of removing a side panel from the conveyor frame assembly, the further step

of retracting the tail roller, the still further step of removing the snub rollers thereby enabling the belt to hang down, the step of removing the support means between the support frame and the conveyor frame assembly on that same side such that the conveyor frame assembly is supported by the frame from one side only being held in a cantilever position and the step of pulling the belt through the open side.

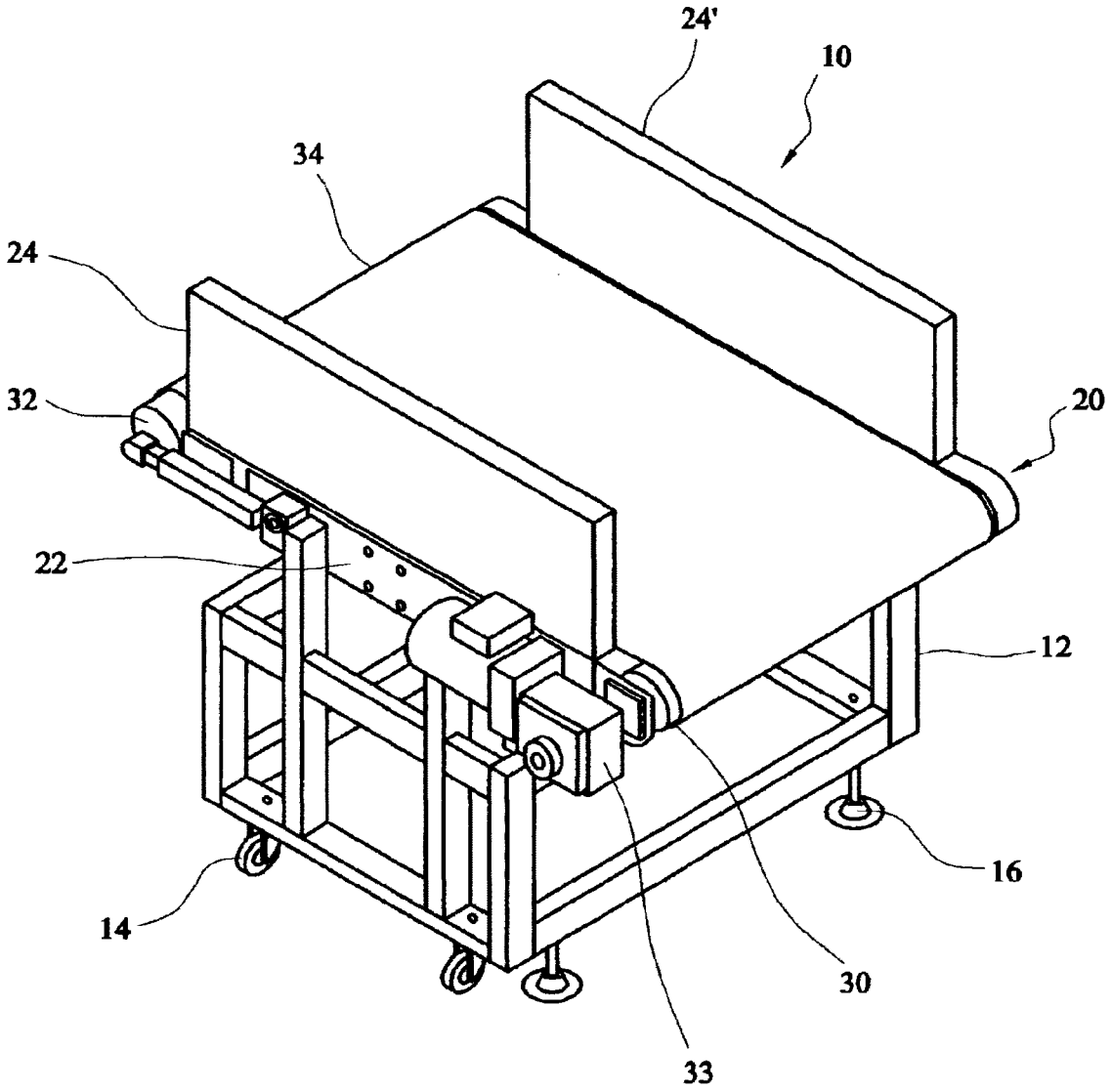


FIG. 1

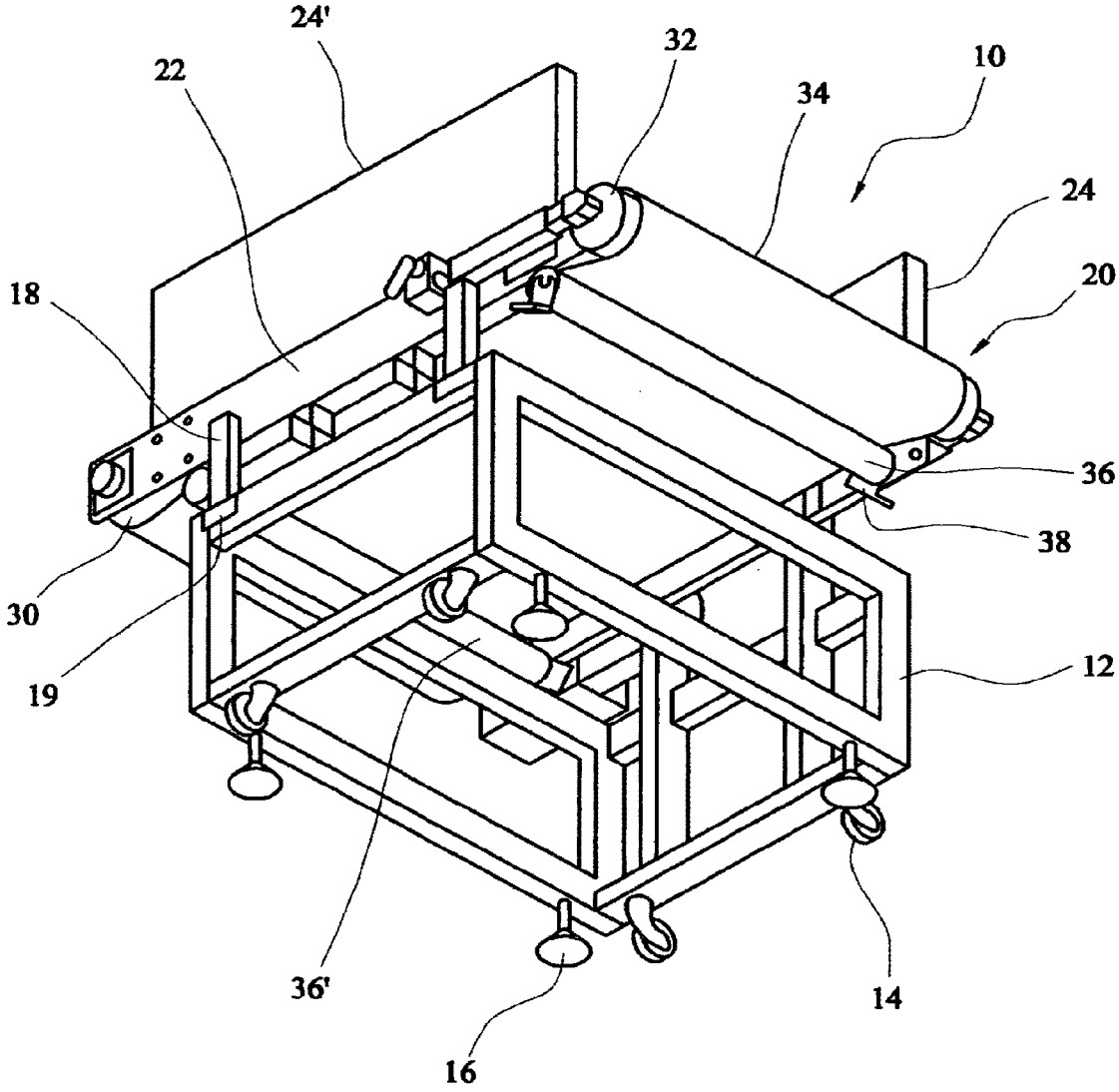


FIG. 2

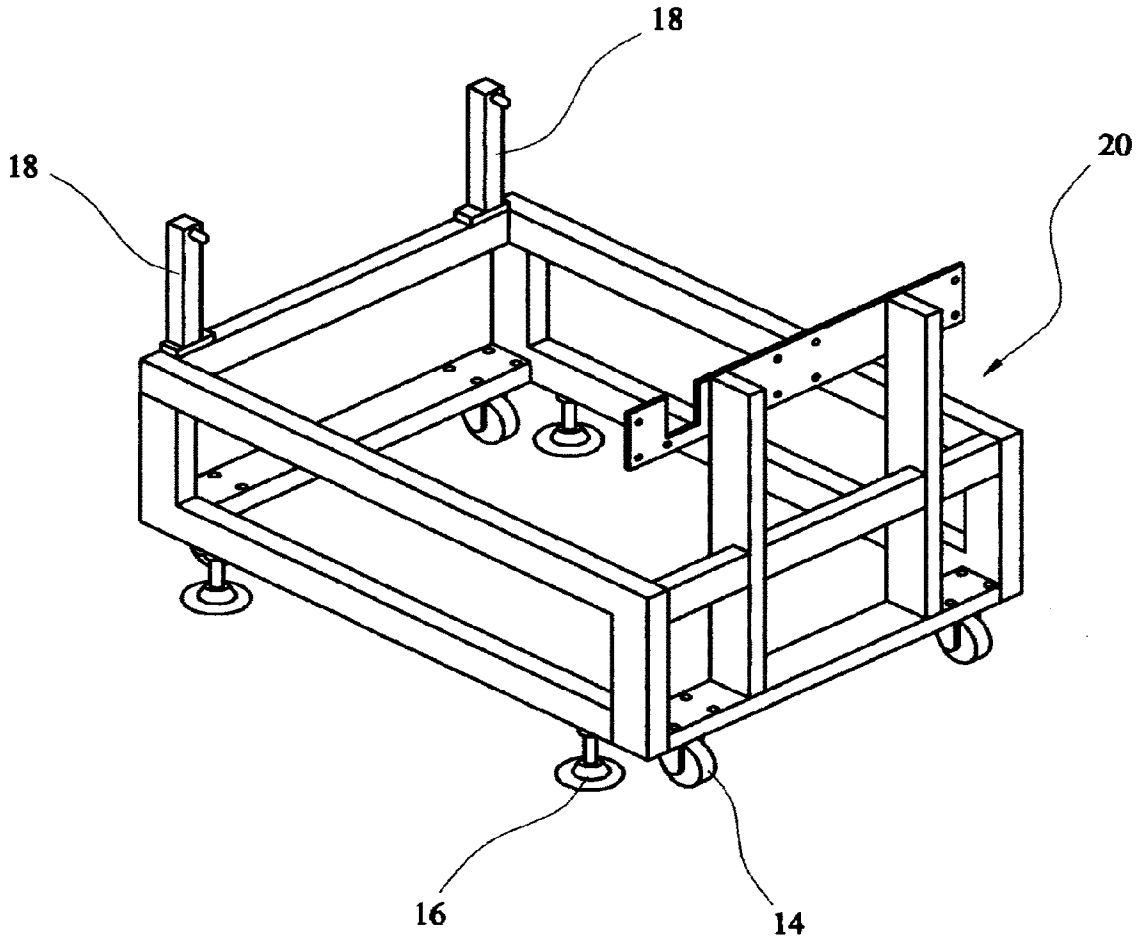


FIG. 3

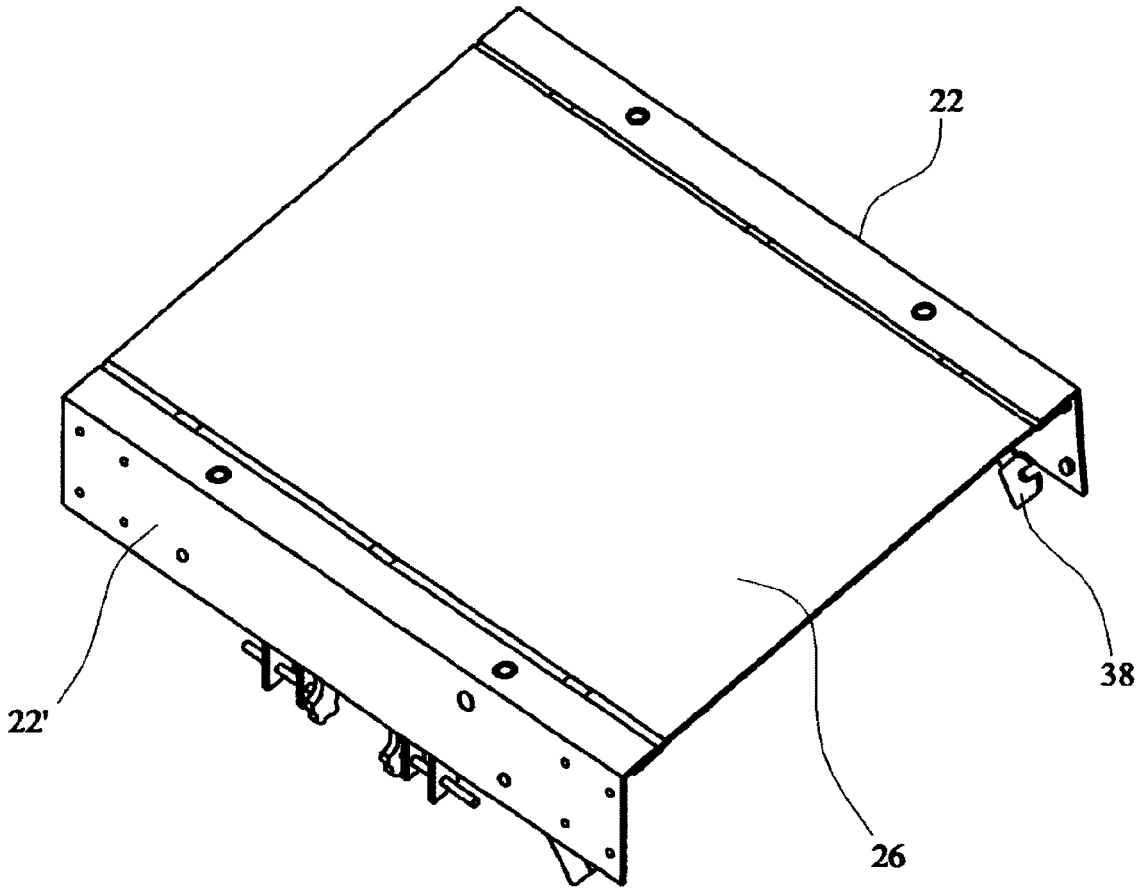


FIG. 4

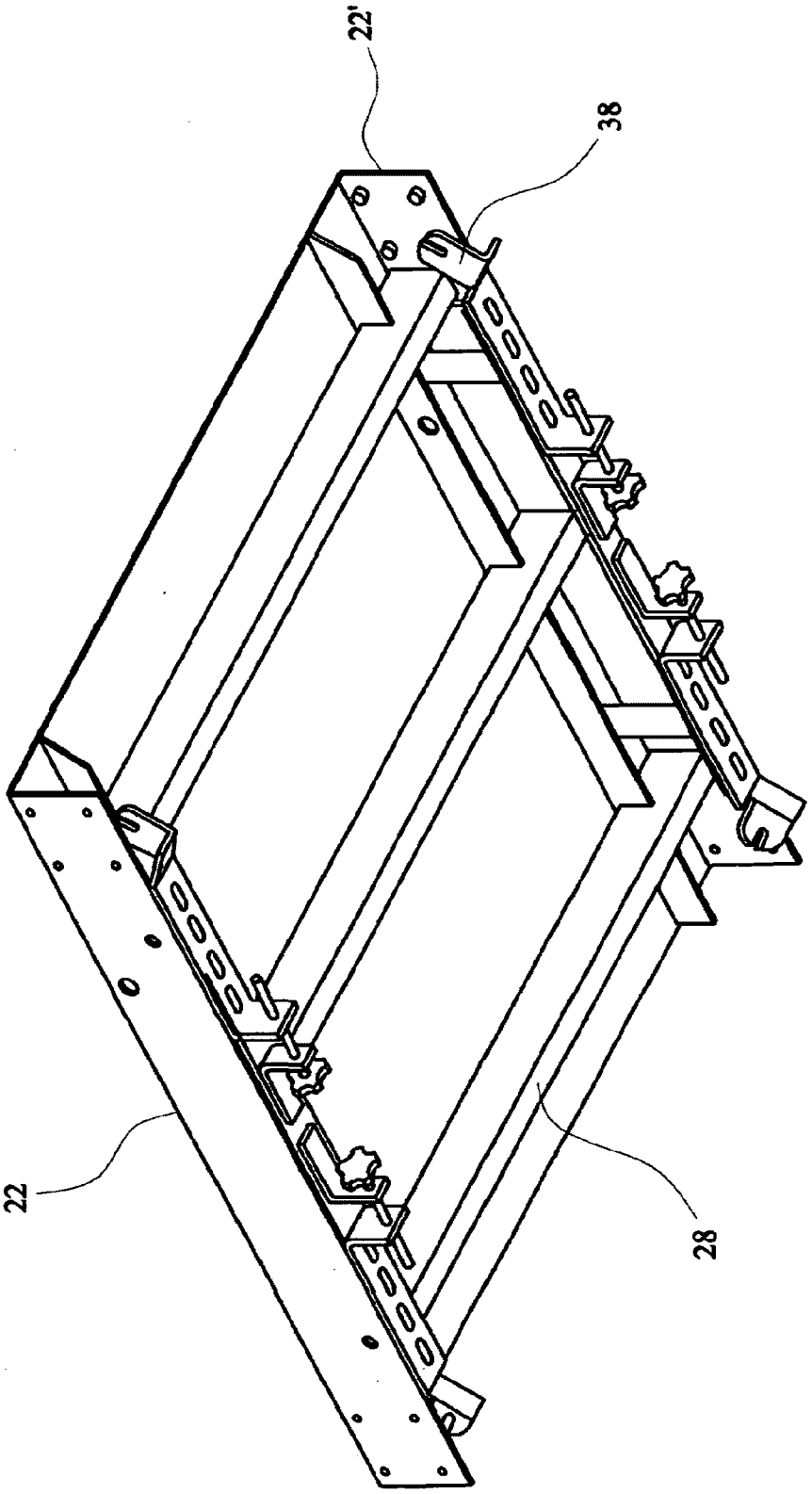


FIG. 5

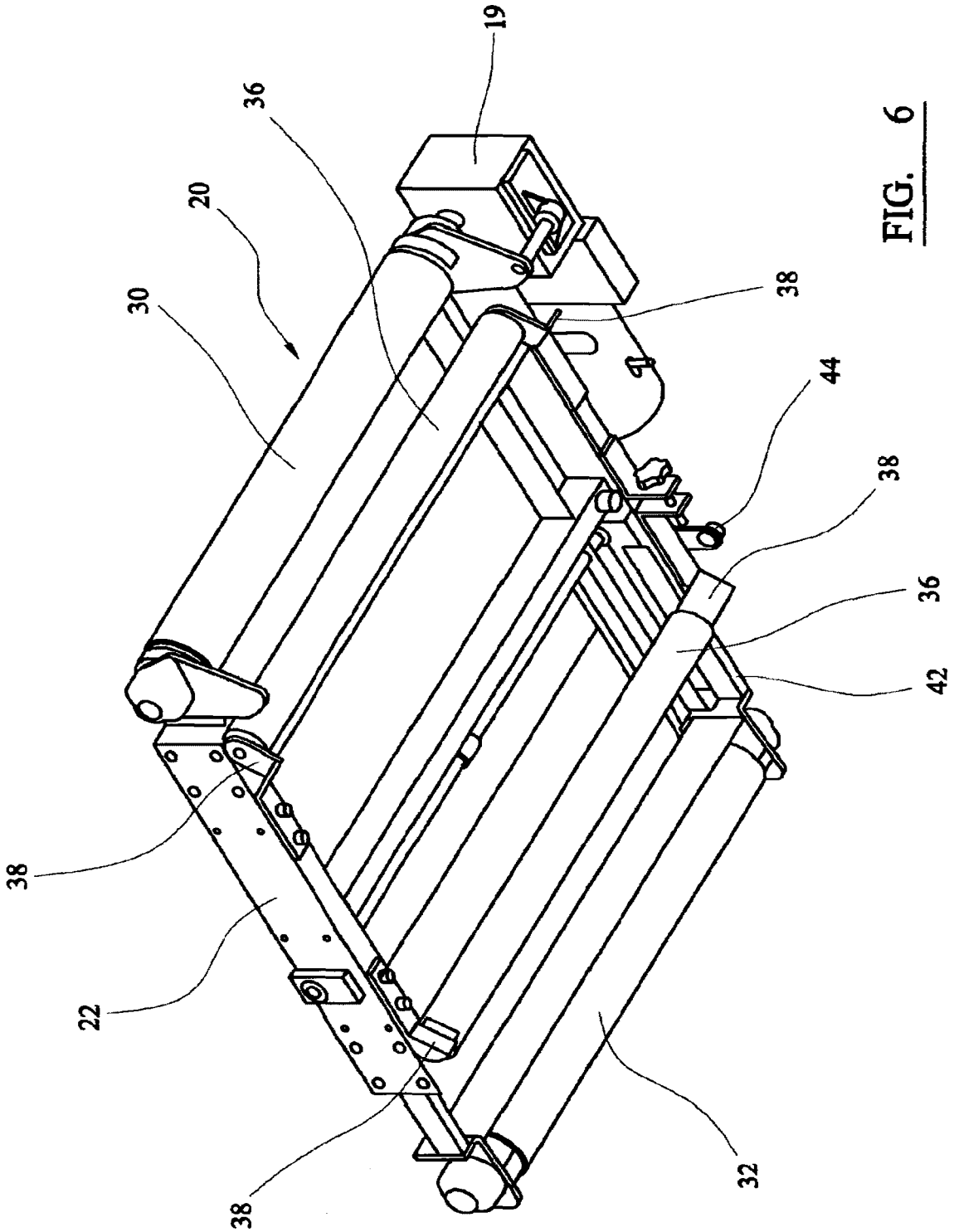


FIG. 6

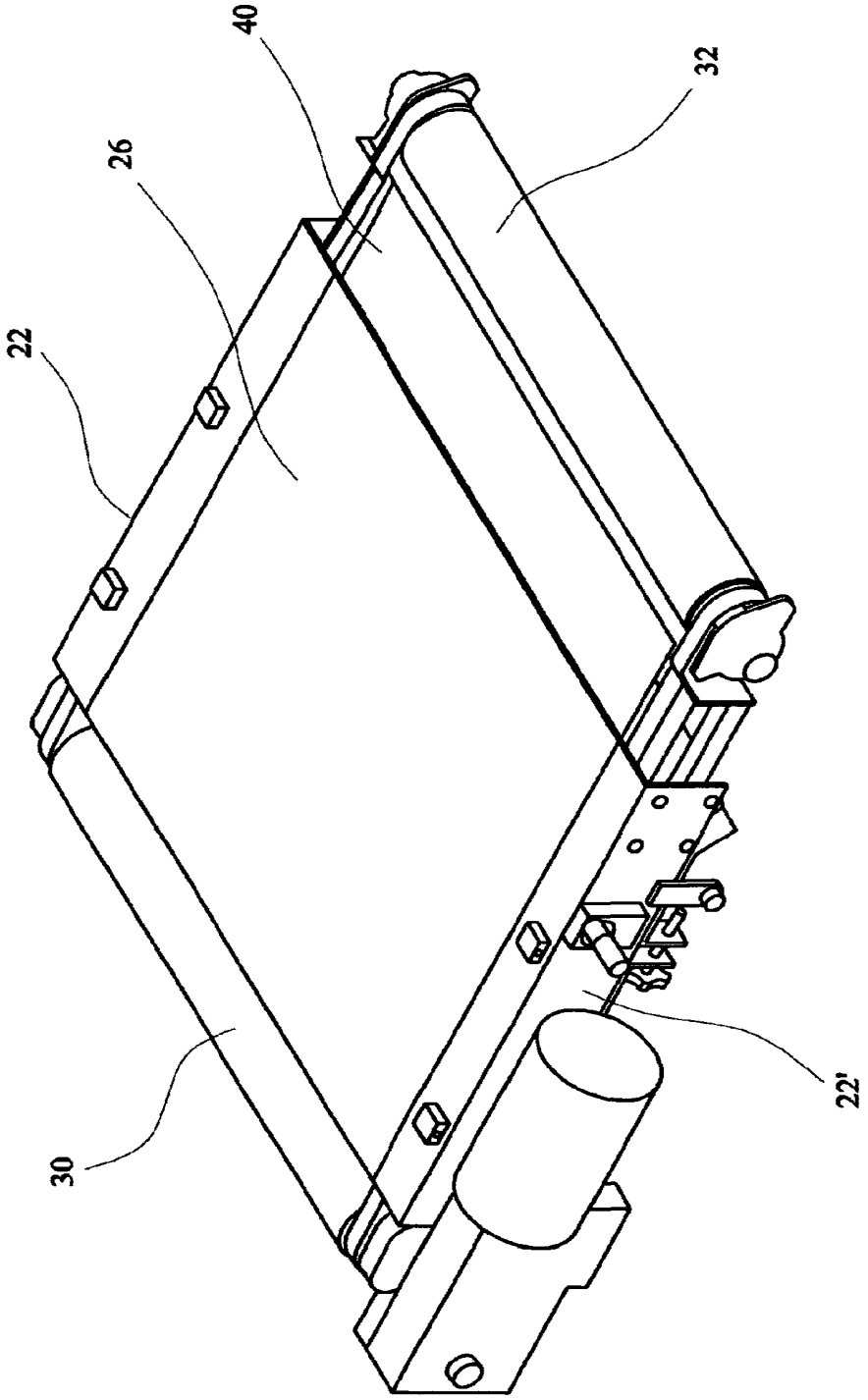


FIG. 7

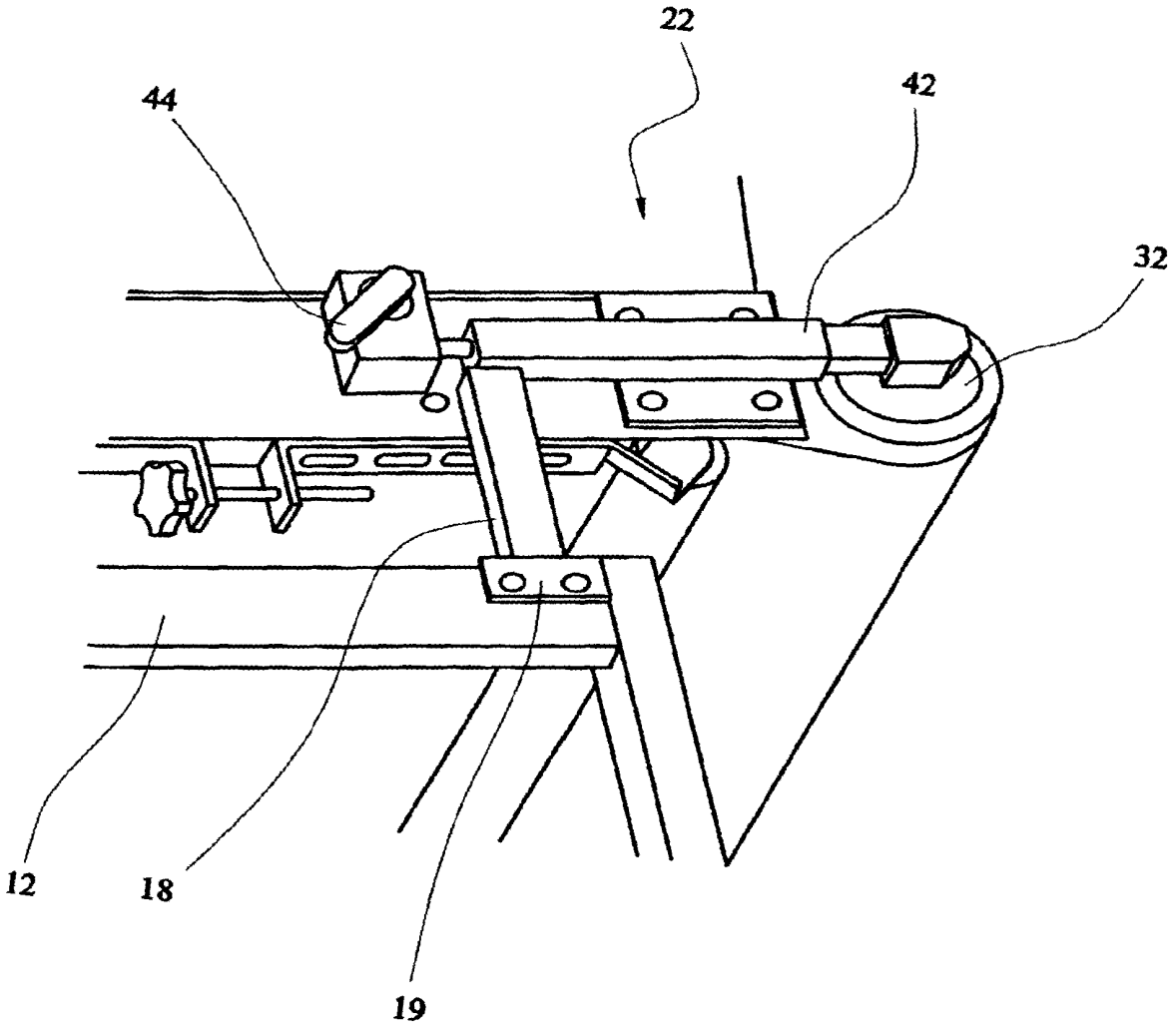


FIG. 8

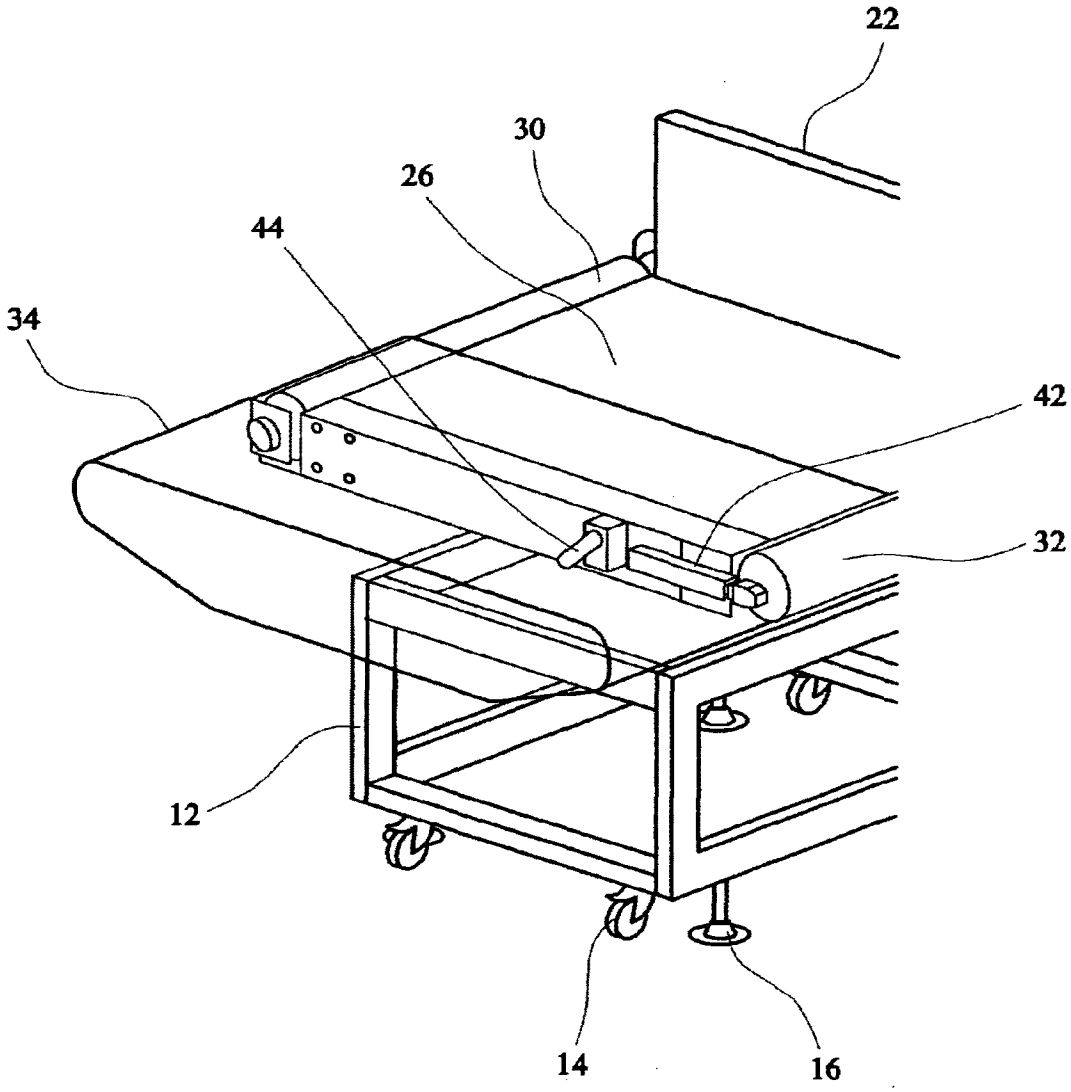


FIG. 9

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 05 25 1189

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X Y	GB 2 017 619 A (HOWE RICHARDSON SCALE CO LTD) 10 October 1979 (1979-10-10) * page 1, line 1 - line 47 * * page 1, line 69 - page 2, line 94 * * figures 1-8 * -----	1-6,8-14 7	B65G15/00 B65G21/06
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Y	WO 00/44651 A (MANCHESTER, DOUG) 3 August 2000 (2000-08-03) * page 8, line 1 - line 9 * * figures 1-3 * -----	7	

TECHNICAL FIELDS SEARCHED (Int.Cl.7)

B65G

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	14 June 2005	Papatheofrastou, M

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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A : technological background
C : non-written disclosure
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T : theory or principle underlying the invention
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 05 25 1189

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14-06-2005

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 816 092 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
08.08.2007 Bulletin 2007/32

(51) Int Cl.:
B65G 47/31 *(2006.01)* ***B65G 15/10*** *(2006.01)*

(21) Application number: **07075077.3**

(22) Date of filing: **30.01.2007**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC NL PL PT RO SE SI SK TR
Designated Extension States:
AL BA HR MK YU

(30) Priority: **07.02.2006 NL 1031094**

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(54) Conveyor system

(57) The present invention provides a conveyor system (1) for influencing the spacing between successive products during transport thereof in a direction of transport between a charge end (2) and a discharge end (4), comprising a number of end-to-end conveying modules (10), a main frame (3), to which the conveying modules are connected, each conveying module comprising a frame (11) and a number of parallel endless conveyor belts (15) which are passed over pulleys (16,17) provided at the front side (12) and the rear side (14) of the conveying module in question, which pulleys are rotatable with respect to the frame, as well as drive means (29,30) comprising a motor (30) for driving all the conveyor belts of the module, said conveyor system further comprising control means for individually controlling the drive means of each conveying module, as well as a method for maintaining a conveying module that forms part of such a conveyor system.

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Description

[0001] The present invention relates to a conveyor system for influencing the spacing between successive products during transport thereof in a direction of transport between a charge end and a discharge end.

[0002] US patent US 5,070,995 discloses a conveyor system which makes it possible to influence the spacing between successive objects during transport thereof in a direction of transport between a charge end and a discharge end. Said conveyor system comprises five successive conveying modules each comprising two pulleys, one of which is driven by an individually controllable driving motor, over which two pulleys an endless conveyor belt is passed, which conveyor belt extends the full width of the conveying module. Randomly spaced objects being supplied upstream of the conveyor system by a supply conveyor can be spaced a desired (constant) distance apart upstream of the conveyor system by suitably controlling the various driving motors of the respective conveying modules. The conveying modules are relatively short in length, in the sense that, judging from the schematic figure 1 of the aforesaid US patent, said length is in any case even shorter than the width of the conveyor belts. With such conveyor belts exhibiting a relatively small length-width ratio there is a risk that the conveyor belt will not run true on the pulleys and consequently tends to move off the pulleys in lateral direction. This risk occurs in particular upon acceleration or deceleration of the conveyor belts or when the conveyor belts are subjected to varying loads. It is precisely these conditions that occur with the conveyor system according to US 5,070,995. Another important drawback of the conveyor system according to US 5,070,995 is the fact that if a conveyor belt should fall out of action, which may occur in particular if the belt should break, the entire conveyor system cannot be used until said conveyor belt has been exchanged, which, depending on the construction of the conveying modules that is not described in detail in US 5,070,995, may take up a considerable amount of time. With certain applications such a temporary failure of the conveyor belt, and consequently of the conveyor system as a whole, is unacceptable.

[0003] The object of the present invention is in the first place to provide a conveyor system of the kind referred to in the introduction which provides a solution or at least an improvement as regards the problems as described above regarding the true running of the conveyor belts. In order to accomplish that object, the conveyor system according to the invention comprises a number of end-to-end conveying modules, a main frame, to which the conveying modules are connected, each conveying module comprising a frame and a number of parallel endless conveyor belts which are passed over pulleys provided at the front side and the rear side of the conveying module in question, which pulleys are rotatable with respect to the frame, as well as drive means comprising a motor for driving all the conveyor belts of the module, which conveyor system further comprises control means for individually controlling the drive means of each conveying module. A major advantage of using a number of side-by-side endless conveyor belts instead of one single, wide endless conveyor belt is that the length-width ratio of the conveyor belts is increased in such a manner that the behaviour of the individual conveyor belts as regards the true running thereof is significantly improved. A very important additional advantage is the fact that if one of the conveyor belts should break, the conveyor system as a whole can nevertheless continue to function, assuming that the objects to be processed have a width greater than the spacing between conveyor belts positioned adjacent to each other. Repairing or exchanging the conveyor belt in question can take place at a suitable later point in time, when the conveyor system is not required to function.

[0004] From a viewpoint of preventive or corrective maintenance it is preferable if the conveyor system according to the invention comprises guide means for guiding at least conveying modules that are positioned between other conveying modules in a horizontal direction transversely to the direction of transport. In this way a conveying module can readily be made available to one side for maintenance without there being a need to use the floor space that is present under the conveying modules, which is usually taken up by cable ducts, which makes it difficult or even impossible to use a hand truck or the like onto which a conveying module can be lowered after being detached from the main frame.

[0005] Although it is possible within the framework of the present invention that the guide means comprise guides which are rigidly connected to the main frame, it is preferable if the guide means comprise guides mounted to each conveying module for guiding an adjacent conveying module. This makes it possible to use a very simple construction for the main frame, in spite of the possibility to move individual intermediate conveying modules transversely to the direction of transport.

[0006] As regards the most downstream and/or the most upstream conveying module, which cannot be regarded as conveying modules positioned between other conveying modules, of course, on the sides of which legs of the main frame will generally be mounted in practice, which legs interfere with the guiding of the most downstream and/or the most upstream conveying module in lateral direction from their active position, it is advantageous if the most downstream and/or the most upstream conveying module is (are) pivotable about a horizontal pivot axis that extends transversely to the direction of transport. Said pivotability makes it possible to use smaller dimensions for the most downstream and/or the most upstream conveying module, so that it will nevertheless be possible to guide the most downstream and/or the most upstream conveying module sideways past a leg of the main frame and thus pass the leg in question.

[0007] The most downstream and/or the most upstream conveying module preferably engage(s) an adja-

cent conveying module upon pivoting, so that few if any adaptations of the main frame are required for realising the aforesaid pivotability. The most downstream and/or the most upstream conveying module pivots about the point of engagement with the adjacent conveying module in question, as it were, and can be moved sideways, being suspended from said conveying module, in a manner comparable to the manner in which the intermediate conveying modules are moved.

[0008] In particular in order to enable a sufficient degree of pivoting, it is preferable if the conveying modules are at least substantially triangular in shape when seen in side view.

[0009] The use of a number of parallel conveyor belts for each conveying module presents this problem that each of said conveyor belts must be maintained at the correct tension in use. Naturally it is possible, also within the scope of the present invention, to provide separate tensioning means for each of said conveyor belts for this purpose. The drawback of such an embodiment, however, is that the conveying modules will become relatively complex in that case on account of all the features that are required for individually tensioning the parallel conveyor belts. It is quite preferable within this framework if a tensioning roller is provided for each conveyor belt of each conveying module, which tensioning roller abuts against the associated conveyor belt over part of its circumference, wherein the tensioning rollers of each conveying module are pivotable about a pivot axis with respect to a tensioning frame that is kept under tension with respect to the frame, and wherein the tensioning rollers are of a springy type, so that at least the part of the circumference of the tensioning rollers that abuts against the associated conveyor belts can spring inwards and outwards under the influence of the tensile force in the associated conveyor belt. An important advantage that is obtained in this manner is the fact that relatively simple features suffice for maintaining the parallel conveyor belts at the correct tension. The pivot axes for each tensioning roller need not necessarily be coaxial, although this may be preferable according to a preferred embodiment yet to be discussed. It should be realised within the framework of the present preferred embodiment that even if the parallel conveyor belts would have the same length upon installation of the conveyor system, said length will change in practice due to be elongation of the conveyor belts, partly in dependence on the loads to which the individual parallel conveyor belts are subjected in use.

[0010] With regard to the above preferred embodiment, the present invention further recognises that this principle can be used not only in a conveyor system for influencing the spacing between successive objects during transport thereof in a direction of transport between a charge end and a discharge end, but in general also in a conveyor system for transferring objects during transport thereof in a direction of transport between a supply conveyor and a discharge conveyor, which conveyors extend at an angle ranging between 0° and 90° relative to each other. According to the present invention, such a conveyor comprises a conveying module with a frame and a number of parallel endless conveyor belts which are passed over pulleys provided at ends of the conveying modules, which pulleys are rotatable with respect to the frame, wherein individual pulleys are provided for each conveyor belt at various longitudinal positions of the conveying module, at least at the discharge end, as well drive means for driving the conveyor belts, wherein a tensioning roller is provided for each conveyor belt, which tensioning rollers abut against the respective associated conveyor belts over part of their circumference, wherein said tensioning rollers can pivot about a pivot axis with respect to a tensioning frame that is kept under tension with respect to the frame, and wherein the tensioning rollers are of a springy type, so that at least the part of the circumference of the tensioning rollers that abuts against the associated conveyor belts can spring inwards and outwards in radial direction with respect to the associated axes of rotation under the influence of the tensile force in the associated conveyor belt. The invention makes it possible to use a simpler construction for such conveyor systems than for prior art conveyor systems having the same functionality.

[0011] Preferably, the tensioning rollers abut against the associated conveyor belts below the central axes of the pulleys.

[0012] Alternatively, a pulley itself may function as a tensioning roller, so that the conveying module can have relatively limited overall height as the endless conveyor belt in that case only needs to comprise a forward portion (in the direction of transport) and a parallel return portion a short distance below said forward portion. In such a preferred embodiment, the other pulley would be used for driving the parallel conveyor belts.

[0013] A very advantageous preferred embodiment is characterized in that the tensioning rollers of each conveying module are formed by longitudinal portions of an at least originally common tensioning roller having a length such that it extends over at least two adjacent conveyor belts and preferably over all the adjacent conveyor belts of the associated conveying module. The fact is that such tensioning rollers can be produced at relatively low cost because there is no need for every conveyor belt to have its own tensioning roller to be provided on the common axis of rotation.

[0014] In order to prevent adjacent tensioning rollers from influencing each other by springing inwards and outwards, it is advantageous if the common tensioning roller between the longitudinal portions has a reduced diameter.

[0015] As regards the use of springy type tensioning rollers according to the above-described preferred embodiments, it generally applies that it is furthermore preferable if one common axis of rotation forms the axis of rotation of all the tensioning rollers, so that one and the same, common axis of rotation element can be used for

all the tensioning rollers of a conveying module.

[0016] The present invention furthermore relates to a method of maintaining a conveying module having a broken conveyor belt positioned between other conveyor belts, which conveying module forms part of a system according to the invention comprising a number of conveying modules as described above, which method comprises the steps of:

- removing the broken conveyor belt, if it is still present,
- moving at least one conveyor belt one position over the pulleys to the original position of the broken conveyor belt, in such a manner that an empty position where no conveyor belt is present is created on the outer side of the module.

In this way it is readily possible to fill the position of a broken conveyor belt with an adjacent conveyor belt, insofar as this should be necessary, by moving adjacent conveyor belts towards the original position of the broken conveyor belt. An empty position is (temporarily) created on one side of the conveying module in that case, which is less objectionable than an empty position between the outer conveyor belts of a conveying module. Said empty position may be filled with a new conveyor belt at a later point in time, for example when sufficient time is available.

[0017] More specifically, it is preferable in that case if the method comprises the steps of:

- clearing at least one transverse side of the conveying module,
- moving all the conveyor belts between the cleared transverse side and the original position of the removed conveyor belts one position over the pulleys in the direction of the original position of the removed conveyor belt,
- adding a conveyor belt over the pulleys on the cleared transverse side from said cleared transverse side.

Said clearing of the transverse side of the conveying module can take place in a very suitable manner by moving the conveying module sideways, making use of the guide means as already explained above in the description of certain preferred embodiments of the conveyor system according to the invention.

[0018] As an alternative solution to the problem regarding the true running of a conveyor belt over pulleys as described in the introduction, the present invention also relates to a conveyor system for influencing the spacing between successive objects during transport thereof in a direction of transport between a charge end and a discharge end, comprising a number of end-to-end conveying modules, a main frame, to which the conveying modules are connected, each conveying module comprising a frame and at least one endless conveyor belt passed over pulleys at the front side and the rear side of the conveying module in question, which pulleys are rotatable with respect to the frame, as well as drive means with a motor for driving the conveyor belt(s) of the module, said conveyor system further comprising control means for individually controlling the drive means of each conveying module, wherein said at least one conveyor belt is provided with inwardly extending grooves and wherein at least one of said pulleys is circumferentially provided with ribs that fall into said grooves, or wherein at least one of said pulleys is circumferentially provided with grooves and said at least one conveyor belt is provided with inwardly extending ribs that fall into said grooves. Providing said at least one conveyor belt with said grooves or ribs and providing at least one of said pulleys with said ribs or grooves, respectively, achieves that the conveyor belt is retained in lateral direction, as it were, so as to improve the true running of the conveyor belt.

[0019] It has become apparent that a favourable effect on the behaviour of the of the conveyor belt as regards the true running thereof is obtained in particular if said grooves and ribs extend in a direction perpendicular to the direction of transport, which advantageously imparts rigidity to the conveyor belt(s) in a direction transversely to the direction of transport, which has an additional favourable effect on the true running thereof.

[0020] The invention will be explained in more detail hereinafter by means of a description of a number of embodiments of the present invention, in which reference is made to the following figures:

Figure 1 shows a conveyor system according to the invention, which functions as a transfer conveyor between a supply conveyor and a discharge conveyor;
Figure 2 shows the conveyor system of figure 1;
Figure 3 shows a conveying module that forms part of the conveyor system of figures 1 and 2;
Figures 4a and 4b show in side elevation two successive situations during use and during (temporary) (partial) removal, respectively, of an intermediate conveying module;
Figures 5a and 5b show in side elevation two successive situations during use and during (temporary) (partial) removal, respectively, of a conveying module positioned at an end of the conveyor system;
Figure 6 shows a part of the conveyor system during (partial) removal of an intermediate conveying module as well as a conveying module positioned at an end of the conveyor system;
Figure 7 is a view of the conveying module of figure 3 with partially cutaway conveyor belts;
Figure 8 shows tensioning features for a conveying module as shown in figure 3;
Figures 9a and 9b show two successive situations during repair of an intermediate conveyor belt of a conveying module;
Figure 10 shows alternative features for tensioning the conveyor belts of a conveying module;
Figure 11 shows a tensioning frame for a conveying

module fitted with a tensioning roller;
Figure 12 shows a tensioning frame identical to the tensioning frame of figure 11, in which different tensioning rollers are used;
Figure 13 shows the tensioning frame of figure 11, in which a common tensioning roller is used;
Figure 14 shows a conveyor system according to the invention at a position where a supply conveyor joins a main conveyor at a non-perpendicular angle;
Figure 15 shows a conveying module with a partially cutaway conveyor belt; and
Figure 16 shows a conveying module that forms part of a conveyor system according to the invention.

[0021] Figure 1 shows a conveyor system 1 comprising a supply conveyor 2, a transfer conveyor 3 according to the invention and a discharge conveyor 4, which are positioned end-to-end with respect to one another. The transfer conveyor 3 is capable of influencing the spacing between parcels 5 being supplied to the transfer conveyor 3 by the supply conveyor 2, i.e. enlarge or reduce said spacing so that the products 5 will in any case arrive on the discharge conveyor 4 with a specified spacing between them. Said minimum spacing is required in order to enable automated sorting means (not shown) to sort the parcels 5 sideways onto one of the sorting conveyor is 6a, 6b, 6c, 6d. Such sorting means may for example consist of a pusher on the side of the discharge conveyor remote from the sorting conveyors 6a-6d, or of shoes forming part of the discharge conveyor 4, which can move along slats which extend transversely to the direction of transport and which form part of the discharge conveyor 4 as described in European patent application EP 602 694. The transfer conveyor functions not only to ensure that the spacing between products 5 on the discharge conveyor 4 in any case is larger than a predetermined minimum required spacing, but also to ensure that said value is as close to the minimum required value as possible with a view to utilising the sorting capacity on the discharge conveyor 4 as optimally as possible.

[0022] Figure 2 is a more detailed view of the intermediate conveyor 3 in isolated position. The intermediate conveyor 3 comprises a main frame substantially consisting of four legs on the corners of the frame, two opposed longitudinal girders 8, which each interconnect two legs 7 on one longitudinal side of the main frame, and two cross girders 9, which each interconnect two legs 7 at the ends of the intermediate conveyor 3 at the bottom side thereof. In the present example, the intermediate conveyor 3 furthermore comprises eight conveying modules 10, of which the conveying module 10' that is positioned between other conveying modules 10 has been extended sideways in part in a manner yet to be described in more detail.

[0023] Figure 3 shows an intermediate conveying module 10. Each conveying module 10 comprises a frame consisting of a folded steel plate 11 (see figure 8) having a vertical front side 12, a substantially horizontal upper side 13 and a vertical rear side 14. Each conveying module 10 furthermore comprises a number of parallel endless conveyor belts 15 (twenty in this case). Each conveyor belt 15 is passed over a common cylindrical pulley 16 at the front side of the associated conveyor module 10, which pulley has a length equal to the width of all the endless conveyor belts 15, and over individual pulleys 17 at the rear side, which pulleys have a width substantially equal to that of the associated conveyor belts 15. With reference furthermore to figure 8, the individual pulleys 17 are barrel-shaped, as it were, with a slightly convex outer surface that is to have a positive effect on the true running of each conveyor 15 on the associated pulley 17.

[0024] The pulleys 17 are individually supported at the ends of a support member 18 that has a substantially square, hollow cross-section over the larger part of its length, viz. with the exception of that part of the length of the support member 18 where the pulley 17 is provided. Each support member 18 extends into a correspondingly shaped recess 19 in a tensioning frame 20 with the front part thereof. As a result, the support member 18 can only move in the directions indicated by the double arrow 21 with respect to the tensioning frame 20. A compression spring 22 acts between vertical stop walls that extend transversely to the direction of transport to bound the cavity in the support member as well as in the recess 19, which compression spring functions to maintain the required tension in the conveyor belt 15 that is passed over the pulley 17.

[0025] The tensioning frame 20 is at both ends provided with a horizontal guide strip 23 that extends laterally outwards, which strip falls within a guide groove 24, which has a length greater than that of the guide strip 23 and which is provided with a constructional member 25, which, seen in transverse direction, is mounted to the frame 11 at both ends of the parallel conveyor belt 15. A bore 26 is present in the part of the constructional member 25 that is positioned at the front side, within which bore a shaft member for the common pulley 16 can rotate. To that end, a gear 27 is provided coaxial with the common pulley 16 at the outer side of the constructional member 25, which gear 27 is rigidly connected to the shaft member in question for joint rotation. An endless toothed belt 29 is passed over the gear 27 and over the gear 28. The gear 28 is driven by an electric motor 30, which is mounted to the inner side of the vertical mounting plate 31, which is in turn mounted to the frame 11. The toothed belt 29 is correctly tensioned by means of a tensioning roller 32, which presses against the outer side of the toothed belt 29 and which is rotatably supported in one end of the right-angled arm 33, which can pivot about a pivot axis 34 with respect to the frame 11. The pivot axis 34 extends in the longitudinal direction of the conveying module 10 (i.e. transversely to the direction of transport for the transfer conveyor 3) in the corner of the right-angled shape of the arm 33. An adjusting screw 35 is provided for pivoting the right-angled arm 33 about the

pivot axis 34, thereby increasing or decreasing the tension of the toothed belt 29, which adjusting screw engages the end of the right-angled arm 33 that is positioned opposite the tensioning roller 32. The (at least substantially) horizontal part of the right-angled arm 33 that is shown in figure 3 extends within a housing 36 which is rigidly connected to the frame 11 and in which the right-angled arm 36 is mounted to enable pivoting thereof about the pivot axis 34.

[0026] In an alternative embodiment it is conceivable that the tensioning frame forms part of the frame 19 or is at least rigidly connected thereto, or that only the transverse stop walls within the recesses 19 on the side of the support member 19 remote from the pulleys 19 are movable together with the wedge element 41.

[0027] The electric motors 30 of each conveying module 10 are individually controlled by control means (not shown), for example on the basis of measurements by means of a light screen or a camera, for example, of the spacing between parcels 5 on the supply conveyor 2 and/or on the transfer conveyor 3 itself. As a result, the individual parcels 5 can move according to an individual velocity profile on the transverse conveyor 3, thus making it possible to change the spacing between the parcels 5 and to present parcels 5 to the discharge conveyor 4 with a desired spacing between them.

[0028] An important advantage of the transfer conveyor 3 as described so far is the fact that a number of parallel conveyor belts 15 are used rather than a single, wide conveyor belt as in the prior art. The first advantage that is achieved in this manner is that the behaviour of the individual conveyor belts as regards the true running thereof is much more favourable because of the relatively great length-width ratio of the endless conveyor belt 15. A further important advantage that is achieved is that in the unhoped-for event that the operation of one of the endless conveyor belts 15 is halted, for example because the belt has broken, this does not automatically mean that the operation of the entire conveying module 10 and thus of the transfer conveyor 3 is halted, which might lead to considerable consequential damage.

[0029] At the front side, the tensioning frame 20 is provided with a wedge element 41 at two longitudinal positions (also refer to figure 7), which wedge element mates with a counter wedge element 42. The counter wedge element 42 engages around the upper side and the bottom side of the associated wedge element 41 and can be laterally reciprocated with respect to the frame 11, or more specifically with respect to the tensioning frame 20, in the directions indicated by the double arrow 43. The counter wedge element 42 is to that end provided with internal screw thread at the front side thereof, which screw thread mates with the external screw thread 44 on the tensioning shaft 45, the ends of which are supported in the frame via construction members 25, at the rear side of bores 26 thereof. To rotate the tensioning shaft 45 in the directions indicated by the double arrow 46, the construction member 25 that is shown in figure 8 is externally provided with a hexagonal engagement portion 47.

[0030] When the counter wedge element 42 is moved to the right, seen in figure 8, the tensioning frame 20 is urged away from the tensioning shaft 45 on account of the interaction between the counter wedge element 42 and the wedge element 41, as a result of which the tensioning rollers 17 will press against the inner side of the conveyor belt 15 with increased force so as to tension said conveyor belts. Also the compression springs 22 will be loaded for pressure in that case. On the other hand, when the counter wedge element 42 is moved to the left, seen in figure 8, space will be cleared for the tensioning frame 20 to move in the direction of the tensioning shaft 45, which takes place under the influence of the compression springs 22 as long as there is tension on the conveyor belts 15 and which can be effected manually by pushing the tensioning frame 20 forward (seen in the direction of transport) when there is no tension on the conveyor belts 15, or by spring means (not shown) acting between the tensioning frame 20 and the frame 11, which spring means tend to push the tensioning frame forward. Such spring means may be provided in the rear side of guide grooves 24 and press against the end faces 46 of the guide strips 23.

[0031] The manner in which individual conveying modules 10 can be detached from the remaining part of the transfer conveyor 3, for example for carrying out maintenance work, will now be explained with reference in particular to figures 4a-6. In the first place it is important in this connection to know that in the position of use the ends of the conveying modules 10 are mounted to the underside of the longitudinal girders 8 by means of bolts 51 that engage in screwed holes 52 of the two housings 36 at the ends of each conveying module 10. Furthermore it is important to note that each conveying module 10 positioned between other conveying modules 10 is provided, both at the front side 12 and at the rear side 14, with a U-shaped section 53, 54, whose open sides are directed to the front and to the rear, respectively. The rear section 53 is connected to the frame 11 at a slightly higher position than the front section 54, the difference in height amounting to half the height of the sections 53, 54. The dimensions of each conveying module 10, the spacing between conveying modules and the length of the legs of the sections 53 and 54 have been selected such that the upper leg of a front section 54 is positioned between the legs of the rear section 53 of a conveying module positioned upstream thereof, without said legs making contact with each other in the position of use, whilst (logically) the upper leg of the front section 54 extends between the two legs of the rear section 53 of a downstream conveying module 10.

[0032] Unscrewing the bolt 51 (figure 4b) will lead to the conveying module in question moving downwards as indicated by the arrows 55, as a result of which the legs of the section 53 will be supported on the legs of the section 54 of the upstream conveying module 10, whilst

the upper leg of the front section 54 will be supported on the lower leg of the section 53 of the downstream conveying module 10. The legs of the sections 53, 54 of the adjacent conveying modules 10 on which the aforesaid legs of the sections 53, 54 of the conveying module in question will be supported can subsequently function to guide the movement in the lateral direction of the conveying module in 10 under the longitudinal girder 8, as shown for one conveying module 10' in figure 2. If desired, the conveying module 10' can thus be removed in its entirety and be exchanged for another conveying module. Alternatively it is also readily possible to arrange for the conveying module 10' to have a free end on the side of the conveying module 10 remote from the electric motor 30 for the purpose of mounting a conveyor belt 15, which will be discussed in more detail yet with reference to figures 9a and 9b.

[0033] It is not possible for at least two reasons to remove the conveying modules 10 that are positioned at the front side and the rear side of the transfer conveyor 3 in the same manner as the intermediate conveying modules 10 as explained with reference to figures 4a and 4b. In the first place, a leg 8 physically stands in the way. Furthermore, there is only one conveying module adjacent to the conveying modules 10 in question, so that said conveying modules cannot be supported on an adjacent conveying module 10 at the respective end of the transfer conveyor 3.

[0034] Figure 5a shows the most downstream conveying module 10 of the transfer conveyor 3. This conveying module 10, too, is provided with a rear section 56 at the rear side 12, although said section 56 is provided at a lower position than the rear sections 53 of the intermediate conveying modules 10, and in such a manner that the upper leg rather than the lower leg of the rear section 56 extends between the legs of the front section 54 of the conveying module 10 positioned upstream thereof. In addition to that, the most downstream conveying module is provided with a U-shaped section 57 at the front side 14 thereof, with this difference that the open side of said U-shaped section 57 is directed upwards, as a result of which the U-shaped section 57 takes up less space, seen in the direction of transport.

[0035] As with the intermediate conveying modules 10, the associated bolts 51 are unscrewed for removing the most downstream conveying module and 10, as a result of which the upper leg of the rear section 56 of the most downstream conveying module 10 will be supported at the rear side on the lower leg of the section 54 of the conveying module 10 positioned upstream thereof. The two legs in question, like all the other legs of the other sections 53, 54, 56, 57 for that matter, are hook-shaped at their ends, causing the legs in question to interlock and form a hinge, as it were, about which the most downstream conveying module 10 can pivot downwards in the direction indicated by the arrow 59 until the moment when the back of the front section 57 of the most downstream conveying module 10 abuts against the cross girder 9, which functions as a fixed guide. As figure 5b shows, the most downstream conveying module 10 just extends on the inner side of the leg 8 in that pivoted position, as a result of which the most downstream conveying module 10 can be moved over the front section 54 of the upstream conveying module 10 and the fixed guide 9, perpendicular to the plane of drawing. In order to enable the most downstream conveying module 10 to pivot to a sufficient degree in the direction indicated by the arrow 59, it is important that the conveying modules 10 are triangular in shape, seen in perpendicular a view, which triangular shape is defined in particular by the shape of the mounting plate 31, which has a triangular shape with the vertex facing downwards.

[0036] Figure 6 shows by way of illustration the transfer conveyor 3 in the condition in which the most upstream conveying module 10 has been (temporarily) pivoted downwards in a manner comparable to the manner as described for the most downstream conveying module 10 with reference to figures 5a and 5b, whilst an intermediate conveying module 10' is shown to be extended.

[0037] Figures 9a and 9b show how it is possible in a relatively simple manner to exchange a (broken intermediate) conveyor belt 15 (which has already been removed in figure 9a) at the location indicated at 61, in which connection it is noted that failure of the conveyor belt 15 need not necessarily lead to failure of the entire conveying module 10 and thus of the entire transfer conveyor 3, so that it is possible to carry out such an exchange at a suitable point in time, when the transfer conveyor 3 is not required to function. The tension on the conveyor belts 15 is released (figure 9a) by suitably turning the tensioning shaft 45 as explained in the foregoing, in particular with reference to figure 8. In this way it becomes possible to move the conveyor belts 15 that are positioned at the end of the open position 61 remote from the electric motor 30 in figure 9a in the direction of the free position 61 as indicated by the arrows 62, thus creating a free position for a conveyor belt 15 at the end remote from the electric motor 30 (figure 9b). To add a new conveyor belt 15 at the location of the free position, it is important that a free end is created at the conveying module 10. The conveying module is to that end extended sideways, as explained with reference to figures 4a - 5b, for example. Thus a possibility is created to fit a new conveyor belt 15 and subsequently, in random order, return the conveying module to its operative position and tension the conveyors belts 15 again by suitably turning the tensioning shaft 45.

[0038] Figure 10 shows the principle of an alternative embodiment for a conveying module 71. The conveying module 71 comprises a number of parallel endless conveyor belts 72, which are passed, in the form of a triangle, over two common pulleys 73, 74 positioned at the same vertical level, and a tube motor 75 positioned under the common pulleys 73, 74, centrally between said pulleys. A tensioning unit 76 is provided for each conveyor belt 72. Each tensioning unit 76 has a tensioning roller 77

that presses against the outer side of the associated conveyor belt 72 at a position between the common pulley 74 and the tube motor 75. Each tensioning unit 76 further comprises a fixed arm 78 that is fixedly connected to the frame (module) of the conveying module 71 and two pivoting arms 79 capable of reciprocating pivoting movement about the pivot axis 80 in the direction indicated by the arrow 81, between which the tensioning roller 77 is rotatably mounted. The pivoting arms 79 are interconnected by means of a rod 82 above the pivot axis 80 and below the tensioning roller 77. A tension spring 83 is operative between the end of the fixed arm 78 remote from the pivot axis and the rod 82, which tension spring 83 tends to press the tensioning roller 77 against the outer side of the associated conveyor belt 72.

[0039] The tensioning units 76 are disposed side by side. To release the conveyor belts 72, it is preferable if the adjacent tensioning units 76 are mounted to a separate tensioning frame, which can be detached from the frame of the conveying module 71 for moving the tensioning roller 77 and the conveyor belts 72 apart.

[0040] Figure 11 shows a tensioning frame 91 that can function as an alternative to the tensioning frame 20 in figure 8. Insofar as applicable, like parts are indicated by the same numerals. A pulley 92 is provided for each of the parallel conveyor belts 15 (only one pulley being shown in figure 11), which pulley is mounted, being rotatable about its central axis 96, between two rearwardly extending legs of a U-shaped section 93, the web of which U-shaped is mounted to the rear side 94 of the tensioning frame 91, which is to that end provided with screwed holes 95.

[0041] The pulleys 92, which may be produced by means of injection-moulding, for example, each comprise an inner ring 97 and an outer ring 98, which are both made of a relatively hard material, for example a metal. The outer ring 98 has a slightly convex surface so as to make it easier for the associated conveyor belt 15 to run true. The inner ring 97 and the outer ring 98 are interconnected via leaf springs 99 made of a plastic material or a metal, for example. The leaf springs 99 extend substantially tangentially from the inner ring 97 and join the inner side of the outer ring 98 at an angle of approximately 45°. In unloaded condition, the central axis of the outer ring 98 coincides with the central axis 96 of the inner ring 97. In loaded condition, however, the outer ring 98 will move in the direction indicated by the arrow 100 with respect to the central axis 96 under the influence of the tensile force in the associated conveyor belt 15, against the spring action of the leaf springs 99, which will deform, of course, and thus enable movement of the outer ring 98. The important advantage that is achieved in this manner is the fact that a much simpler construction can be used for the tensioning frame 91 than for the tensioning frame 20 according to figure 8, for example, and that furthermore fewer separate additional features are required in order to ensure the required tensile force in the various conveyor belts 15.

[0042] A similar advantage applies with regard to the pulleys 110, 120 in figure 12. The pulleys 110, 120 each have an inner ring 111, 121 and an outer ring 112, 122. The space between the respective inner rings 111, 121 and outer rings 112, 122 is filled with a foam-like material 113, 123, for example polyurethane. Because of its nature, the foam-like core 113, 123 can deform under the influence of external forces being exerted on the outer ring 112, 122, as a result of which the central axis of the outer ring 112, 122 will be shifted with respect to the central axis of the inner ring 111, 121 in the direction of the force being exerted thereon. Air chambers 114, 124 are provided in the foam-like core 113, 123 to make it easier for said core to deform.

[0043] Figure 13 shows a further alternative for using the pulleys 92, 110 and/or 120 according to figures 11 and 12. In figure 13 one common pulley 130 having a common axis of rotation is used instead of a number of individual pulleys. Said common pulley 130 comprises a single shaft member 131 extending the full length of the tensioning frame 91, around which a cylindrical foam core 132 is provided, which is fixedly connected to the shaft member 131. A hard shell 133 has furthermore been provided over the entire length of the common pulley 130 at the time of the original manufacture thereof. The diameter of the common pulley 130 is reduced at regular intervals, viz. at positions between the eventual power will conveyor belts 15. To that end not only parts of the shell 133 have been removed, but also parts of the cylindrical foam core 132, as indicated at 134. By locally reducing the diameter at regular intervals, parts that can function more or less as individual pulleys are formed between the reduced areas, in the sense that local inward springing of a part of the shell 133 will not result in inward springing of an adjacent part of the shell 133 for an adjacent conveyor belt 15 as well. This also depends on the nature of the material of the cylindrical foam core 132, of course, and on the degree to which the diameter has been reduced at the location indicated at 134. It is even conceivable in that connection that material is only removed from the shell 133 and not from the cylindrical foam core 132 when the diameter is being locally reduced. Alternatively it is conceivable within the framework of the present invention to provide the shell 133 only at discrete positions, so that the shell 133 need not be removed at a later stage.

[0044] Figure 14 shows a conveyor system in which advantageous use can be made of conveying rollers as explained with reference to figures 11 and 12. The conveyor system 141 comprises a supply conveyor 142 having a direction of transport 143 and a discharge conveyor 144 having a direction of transport 145. The direction of transport 143 extends at an angle β of approximately 45° with respect to the discharge conveyor 144, with a transfer conveyor 146 being provided in the transition area between the supply conveyor 142 and the discharge conveyor 144. A specialist term for such a transfer conveyor 146 is "junction". The transfer conveyor 146 is at least substantially triangular in shape, seen in top plan view,

so as to enable the transfer conveyor 146 to join the end side of the supply conveyor 142 on the one hand and the longitudinal side of the discharge conveyor 144 on the other hand.

[0045] The transfer conveyor 146 comprises a number of endless conveyor belts 147 extending in the direction of transport 143, which are each passed over a common pulley 148 on the side of the supply conveyor 142 and over individual pulleys 149 on the side of the discharge conveyor 144. Because of the triangular shape of the transfer conveyor 146, the individual conveyor belts 147 each have their own individual length, which length is different from that of the other conveyor belts 147. The individual pulleys 149 are mounted between two legs of a U-shaped section 150 in such a manner as to be rotatable about their central axes, which U-shaped section 150 is provided with a tensioning arm 151 at the end thereof, via which arm 151 the position of said section can be adjusted by means of an adjusting screw 151. When a conveyor belt 147 is to be rendered tensionless, for example for carrying out maintenance work, the tensioning arm 151 can be moved in the direction of the supply conveyor 142. The pulley 149 can have a configuration identical to that of the pulley 92 or of the pulley 120, in any case having a hard outer ring/shell and a springy core, so that the outer ring/shell can spring inwards in the direction of the supply conveyor 142, with the central axis of the outer ring/shell being shifted with respect to the original position when the pulley 149 is not loaded. An important constructional advantage that is achieved in this manner is that no additional spring means are required in the transfer conveyor 146 for ensuring the required tensile force in the conveyor belt 147.

[0046] Figures 15 and 16 show two conveying modules 150, 170, which can function as alternatives to the conveying module 10, as explained in the foregoing in particular with reference to figure 3. Like parts will be indicated by the same numerals. One relatively wide conveyor belt 151, 171 is used with the conveying modules 150, 170 instead of a number of parallel, relatively narrow conveyor belts 15, which conveyor belts 151, 171 are passed over a front pulleys 152, 172, respectively, and rear pulleys 153, 173, respectively.

[0047] In order to obtain an improved behaviour as regards the true running of the relatively short, wide conveyor belts 151, 171, grooves 154, 174 are formed in the pulleys 152, 153 and 172, 173, into which inwardly extending ribs 155, 175 of the associated conveyor belts 151, 171 extend. Because of the engagement between the grooves 154, 174 and the ribs 155, 175, the associated conveyor belts 151, 171 do not exhibit any tendency, or at least to a significantly reduced extent, to move sideways off the associated pulleys 152, 153 and 172, 173, in spite of their relatively short length. Thus they exhibit an improved behaviour as regards the true running thereof. The difference between the conveying module 150 and the conveying module 170 is that the grooves 154 and the ribs 155 of the conveying module 150 extend transversely to the direction of transport, whilst the grooves 174 and the ribs 175 of the conveying module 170, on the other hand, extend parallel to the direction of transport.

Claims

1. A conveyor system for influencing the spacing between successive products during transport thereof in a direction of transport between a charge end and a discharge end, comprising a number of end-to-end conveying modules, a main frame, to which the conveying modules are connected, each conveying module comprising a frame and a number of parallel endless conveyor belts which are passed over pulleys provided at the front side and the rear side of the conveying module in question, which pulleys are rotatable with respect to the frame, as well as drive means comprising a motor for driving all the conveyor belts of the module, said conveyor system further comprising control means for individually controlling the drive means of each conveying module.

2. A conveyor system according to claim 1, **characterized by** guide means for guiding at least conveying modules that are positioned between other conveying modules in horizontal direction transversely to the direction of transport.

3. A conveyor system according to claim 2, **characterized in that** the guide means comprise guides mounted to each conveying module for guiding an adjacent conveying module.

4. A conveyor system according to any one of the preceding claims, **characterized in that** the most downstream and/or the most upstream conveying module is (are) pivotable about a horizontal pivot axis that extends transversely to the direction of transport.

5. A conveyor system according to claim 4, **characterized in that** the most downstream and/or the most upstream conveying module engage(s) an adjacent conveying module upon pivoting.

6. A conveyor system according to any one of the preceding claims, **characterized in that** the conveying modules are at least substantially triangular in shape when seen in side view.

7. A conveyor system according to any one of the preceding claims, **characterized in that** a tensioning roller is provided for each conveyor belt of each conveying module, which tensioning roller abuts against the associated conveyor belt over part of its circumference, wherein the tensioning rollers of each con-

veying module are pivotable about a pivot axis with respect to a tensioning frame that is kept under tension with respect to the frame, and wherein the tensioning rollers are of a springy type, so that at least the part of the circumference of the tensioning rollers that abuts against the associated conveyor belts can spring inwards and outwards under the influence of the tensile force in the associated conveyor belt.

8. A conveyor system for transferring objects during transport thereof in a direction of transport between a supply conveyor and a discharge conveyor, which conveyors extend at an angle ranging between 0° and 90° relative to each other, comprising a conveying module with a frame and a number of parallel endless conveyor belts which are passed over pulleys provided at ends of the conveying modules, which pulleys are rotatable with respect to the frame, wherein individual pulleys are provided for each conveyor belt at various longitudinal positions of the conveying module, at least at the discharge end, as well drive means for driving the conveyor belts, wherein a tensioning roller is provided for each conveyor belt, which tensioning rollers abut against the respective associated conveyor belts over part of their circumference, wherein said tensioning rollers can pivot about a pivot axis with respect to a tensioning frame that is kept under tension with respect to the frame, and wherein the tensioning rollers are of a springy type, so that at least the part of the circumference of the tensioning rollers that abuts against the associated conveyor belts can spring inwards and outwards in radial direction with respect to the associated axes of rotation under the influence of the tensile force in the associated conveyor belt.

9. A conveyor system according to claim 7 or 8, **characterized in that** the tensioning rollers abut against the associated conveyor belts below the central axes of the pulleys.

10. A conveyor system according to claim 7 or 8, **characterized in that** the tensioning rollers are made up of a pulley.

11. A conveyor system according to claim 7, 8, 9 or 10, **characterized in that** the tensioning rollers of each conveying module are formed by longitudinal portions of an at least originally common tensioning roller having a length such that it extends over at least two adjacent conveyor belts and preferably over all the adjacent conveyor belts of the associated conveying module.

12. A conveyor system according to claim 11, **characterized in that** the common tensioning roller between the longitudinal portions has a reduced diameter.

13. A conveyor system according to any one of the claims 7-12, **characterized in that** one common axis of rotation forms the axis of rotation of all the tensioning rollers.

14. A method of maintaining a conveying module having a broken conveyor belt positioned between other conveyor belts, which conveying module forms part of a system according to claim 1 or a dependent claim thereof, which method comprises the steps of:

- removing the broken conveyor belt, if it is still present,
- moving at least one conveyor belt one position over the pulleys to the original position of the broken conveyor belt, in such a manner that an empty position where no conveyor belt is present is created on the outer side of the module.

15. A method according to claim 14, **characterized by** the steps of

- clearing at least one transverse side of the conveying module,
- moving all the conveyor belts between the cleared transverse side and the original position of the removed conveyor belts one position over the pulleys in the direction of the original position of the removed conveyor belt,
- adding a conveyor belt over the pulleys on the cleared transverse side from said cleared transverse side.

16. A conveyor system for influencing the spacing between successive objects during transport thereof in a direction of transport between a charge end and a discharge end, comprising a number of end-to-end conveying modules, a main frame, to which the conveying modules are connected, each conveying module comprising a frame and at least one endless conveyor belt passed over pulleys at the front side and the rear side of the conveying module in question, which pulleys are rotatable with respect to the frame, as well as drive means with a motor for driving the conveyor belt(s) of the module, said conveyor system further comprising control means for individually controlling the drive means of each conveying module, wherein said at least one conveyor belt is provided with inwardly extending grooves and wherein at least one of said pulleys is circumferentially provided with ribs that fall into said grooves, or wherein at least one of said pulleys is circumferentially provided with grooves and said at least one conveyor belt is provided with inwardly extending ribs that fall into said grooves.

17. A conveyor system according to claim 16, **charac-**

terized in that said grooves and said ribs extend perpendicularly to the direction of transport.

18. A conveyor system according to claim 16 or 17, **characterized by** the characterising features of any one of the claims 2-6.

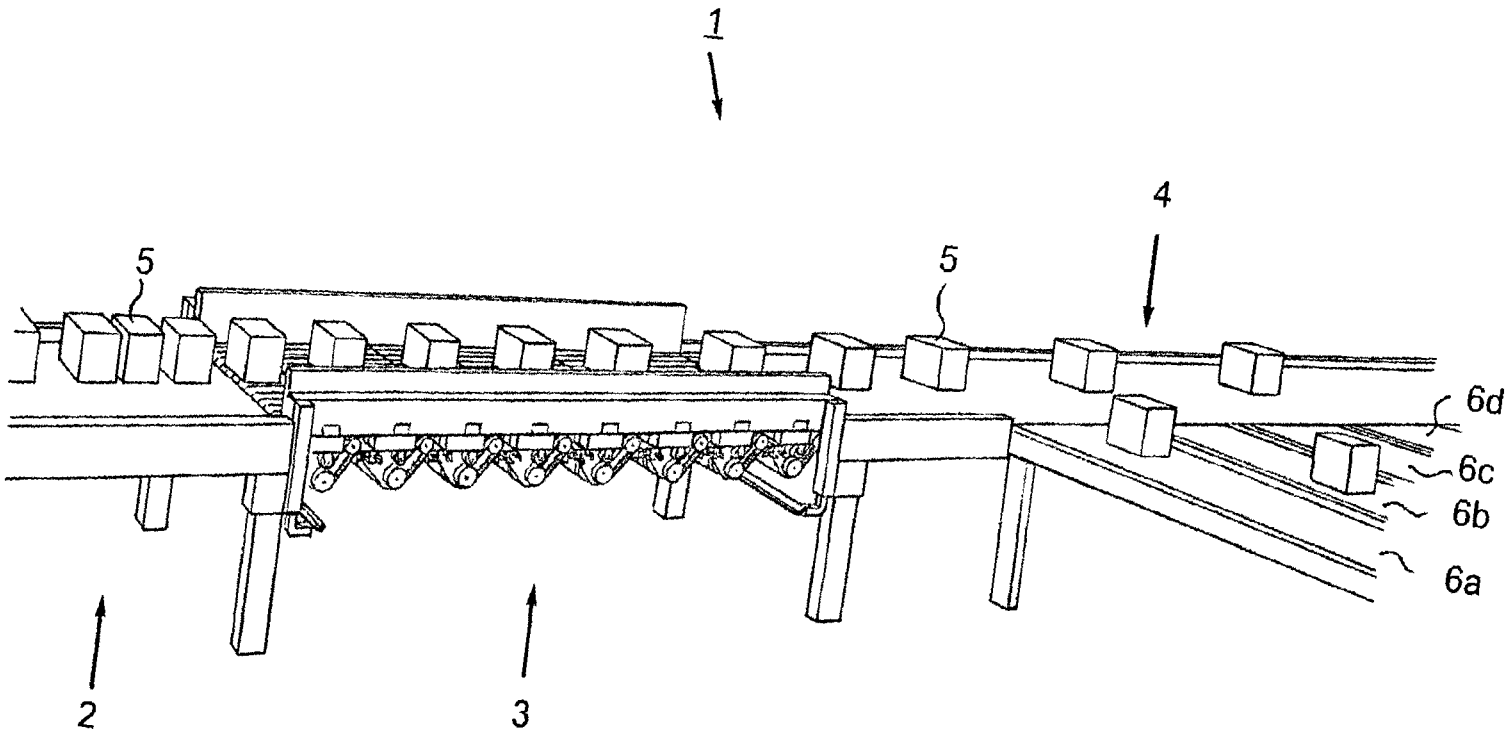


Fig. 1

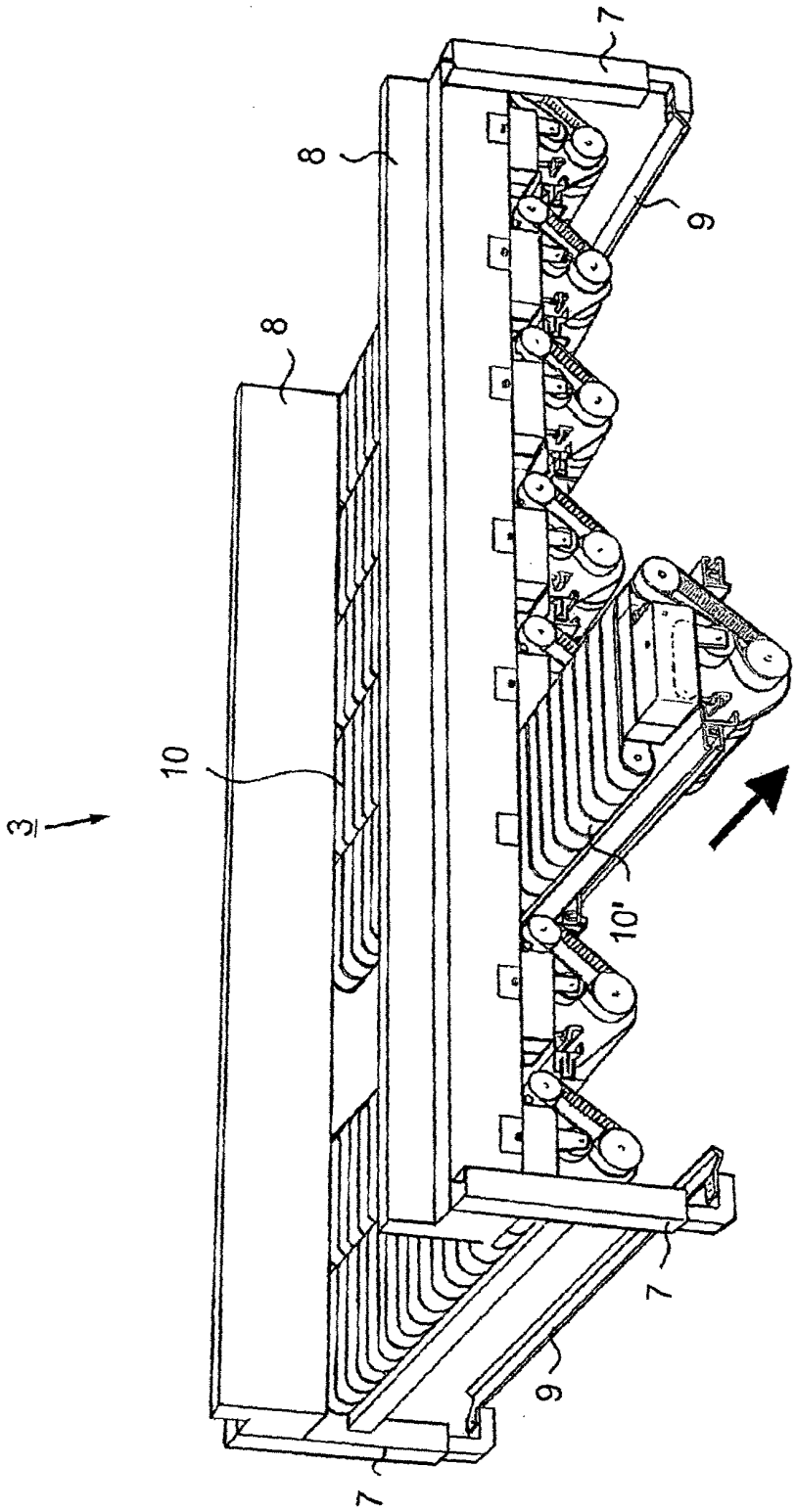


Fig. 2

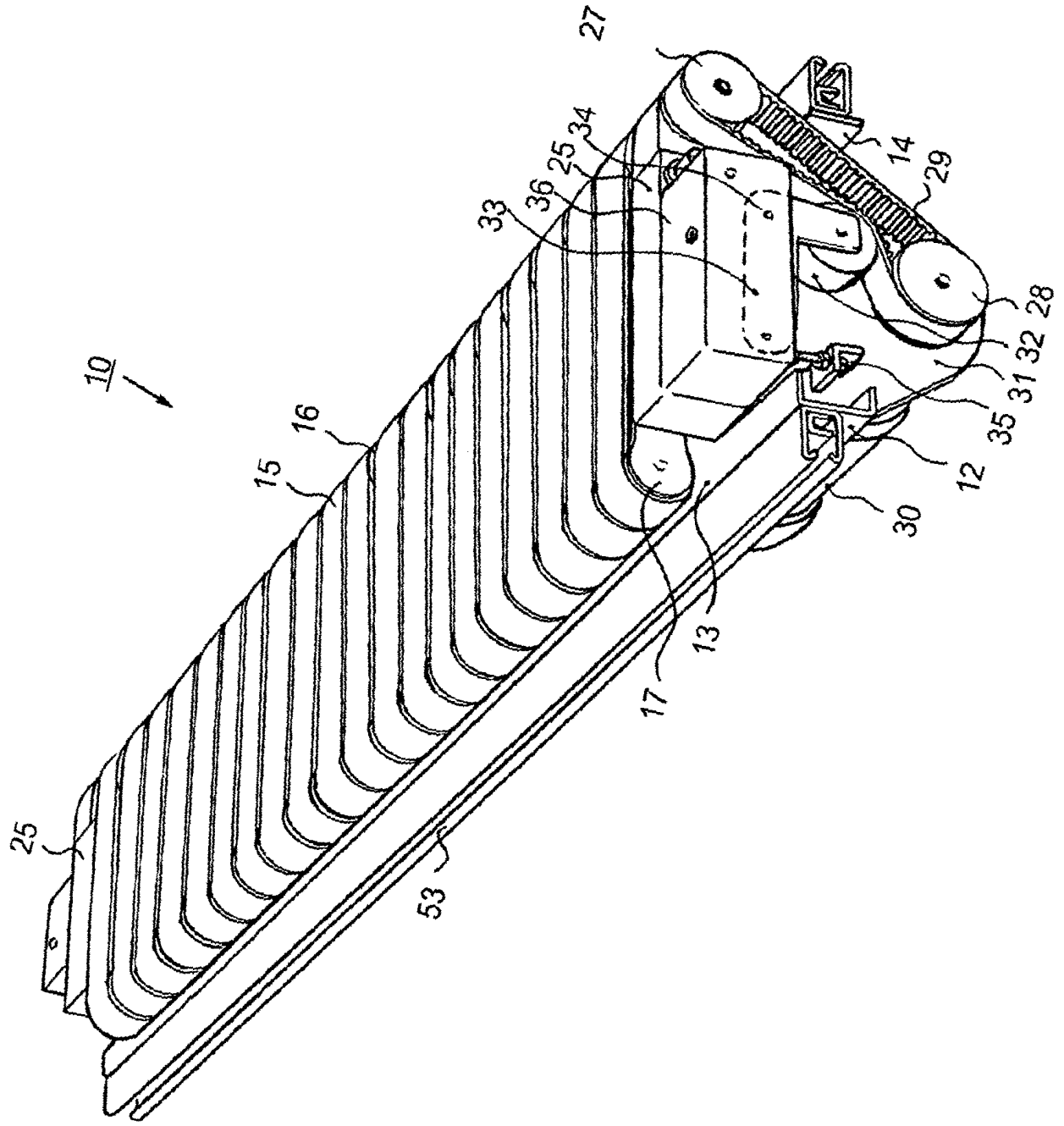


Fig. 3

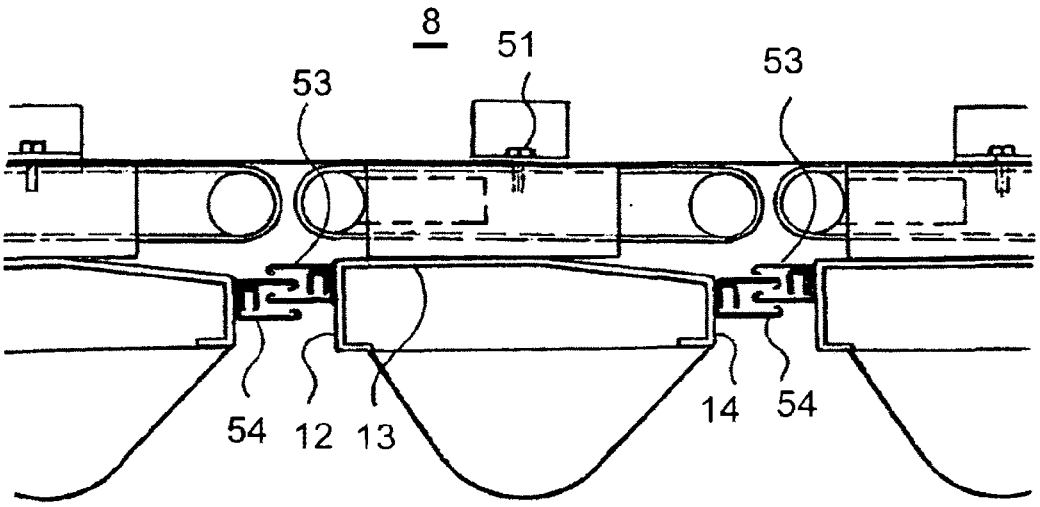


Fig. 4a

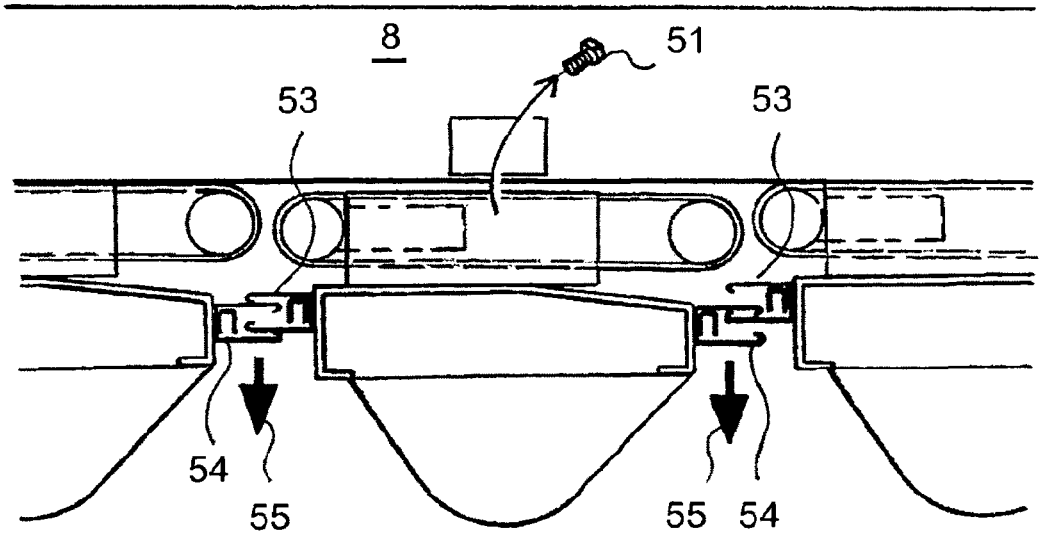


Fig. 4b

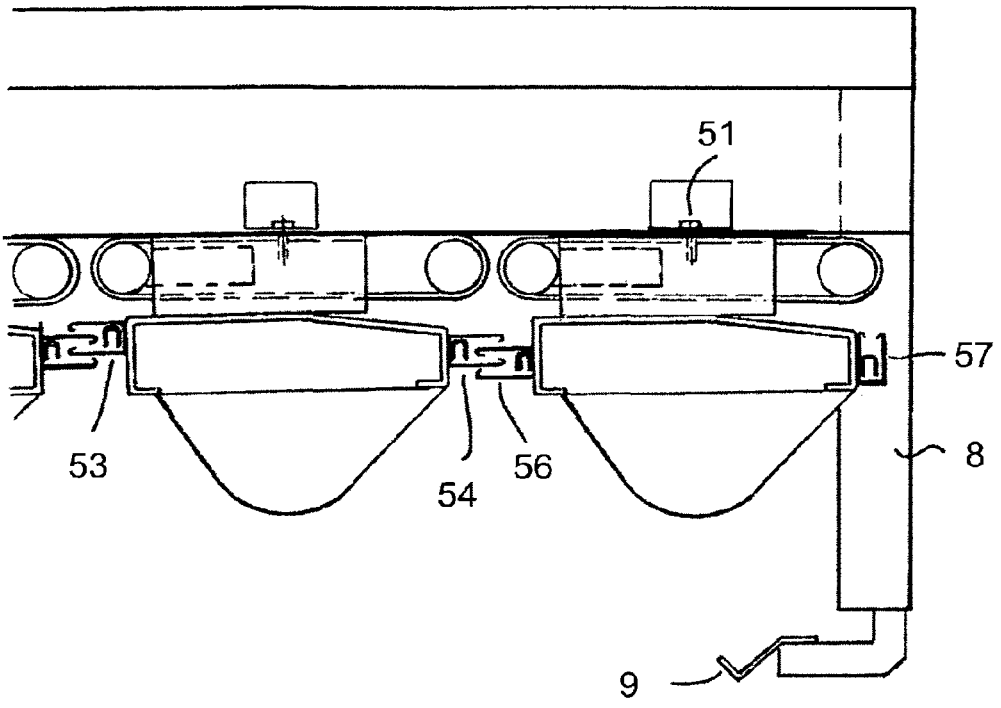


Fig. 5a

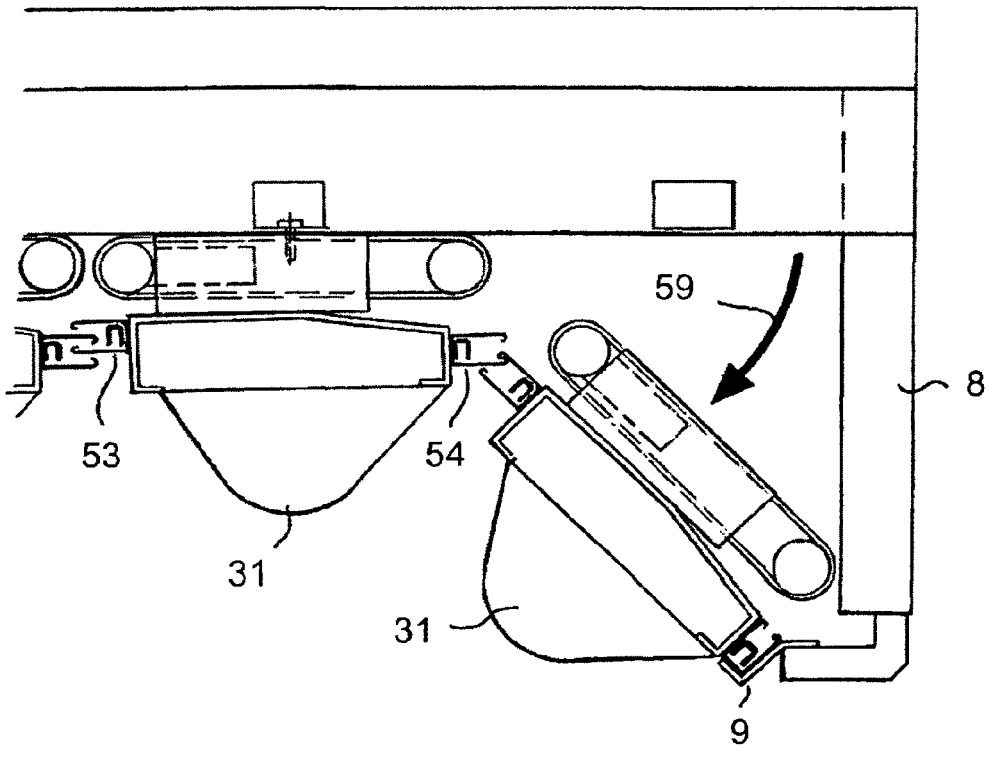
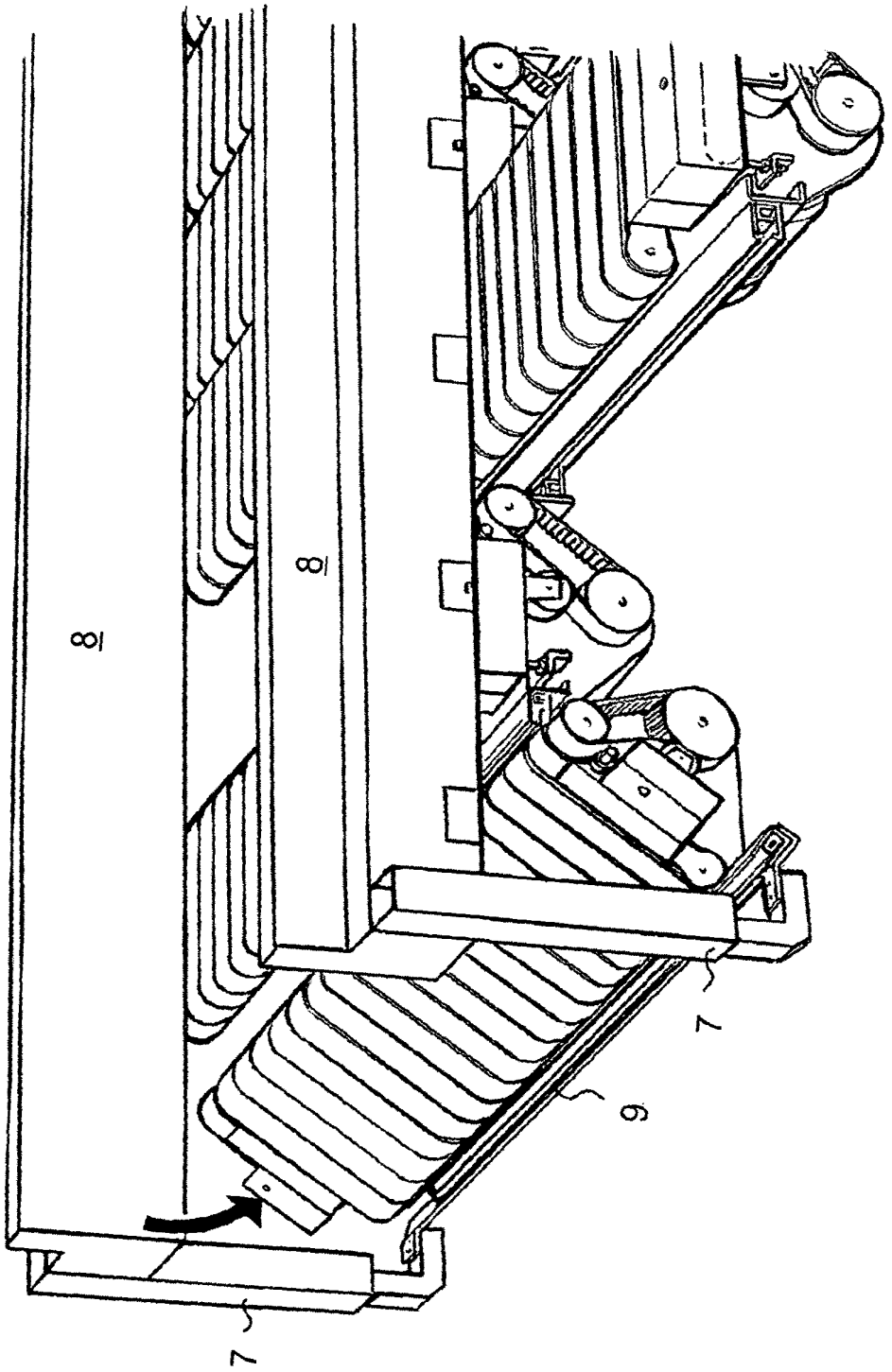


Fig. 5b

Fig. 6



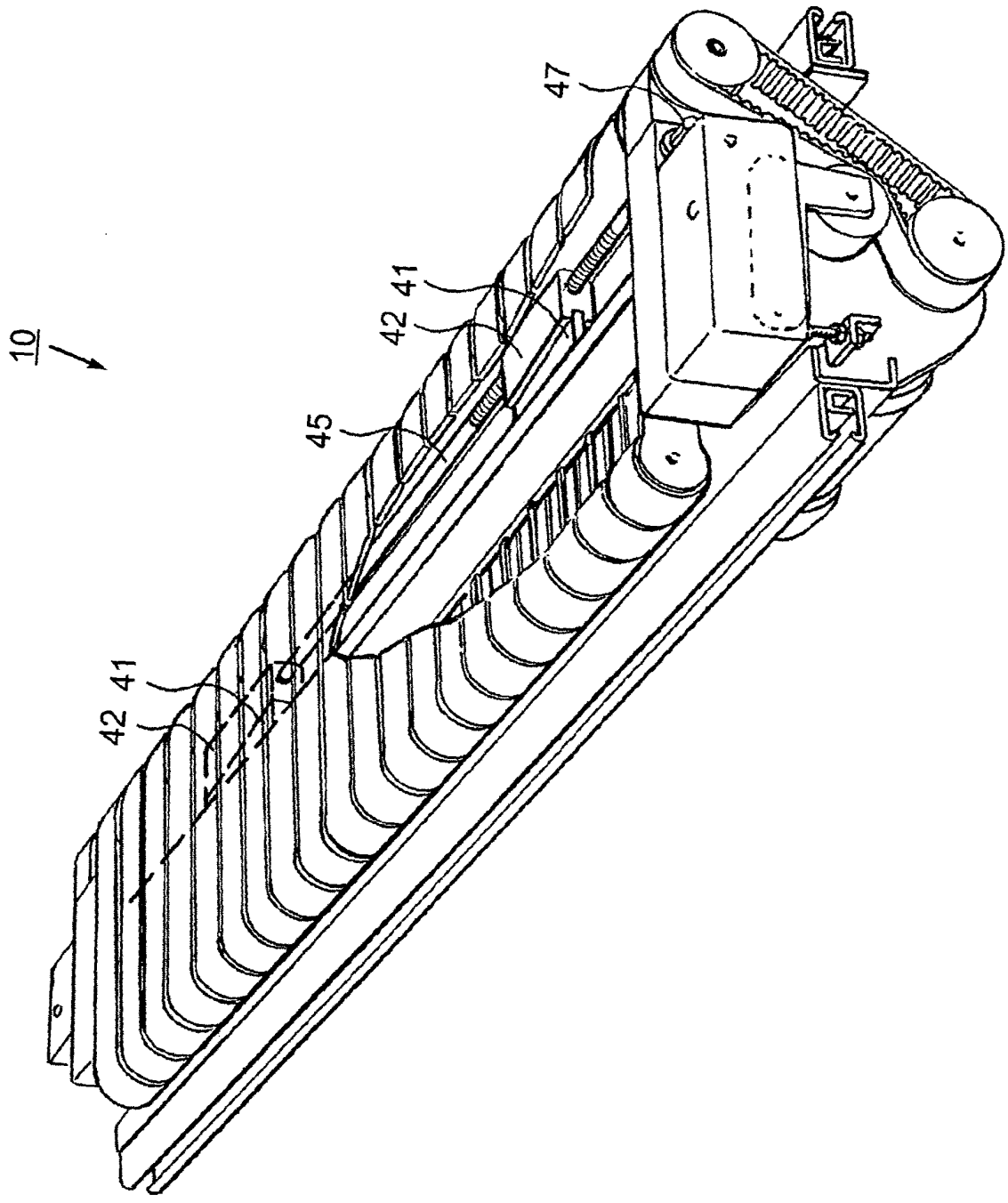


Fig. 7

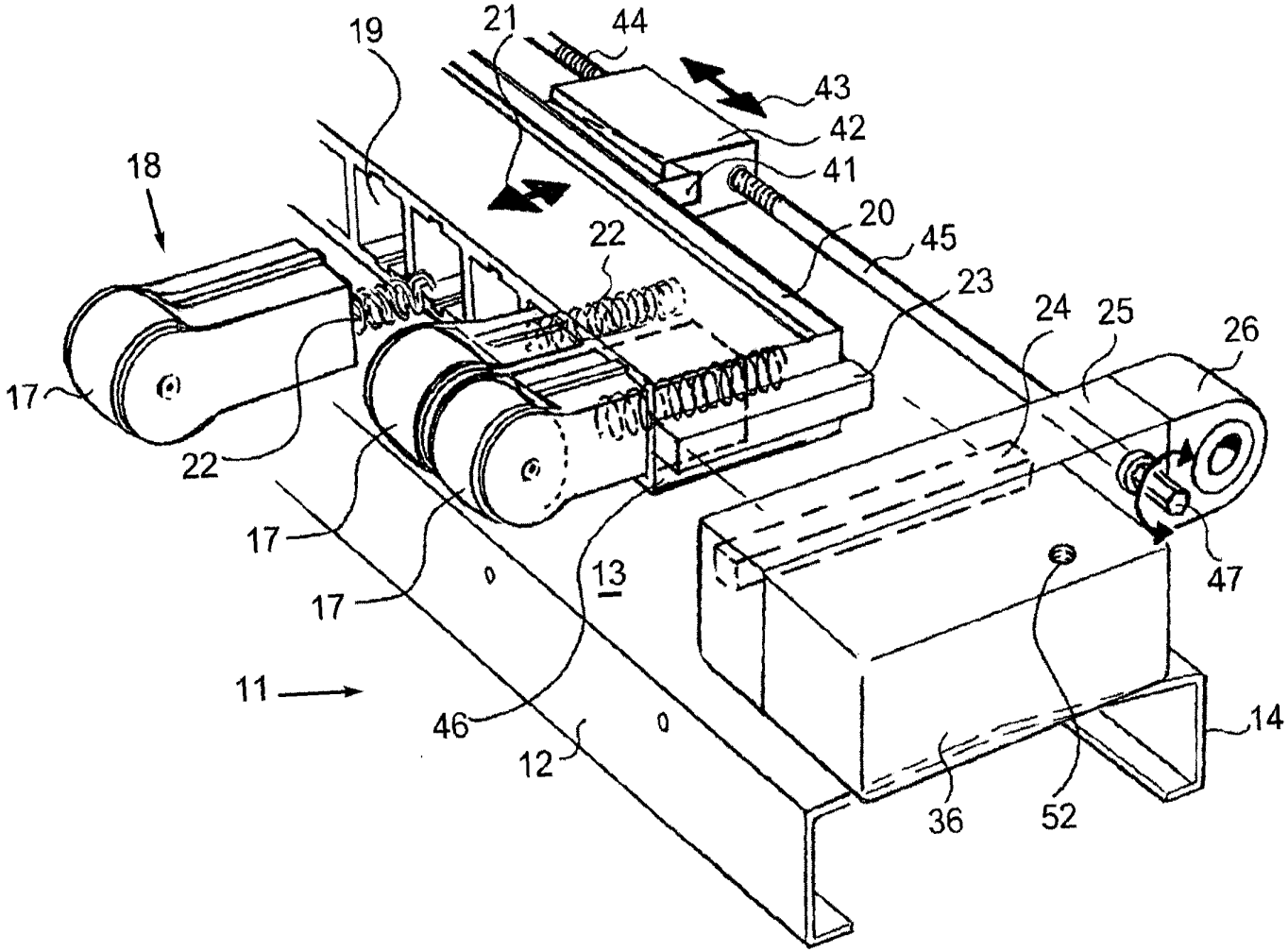

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Fig. 8

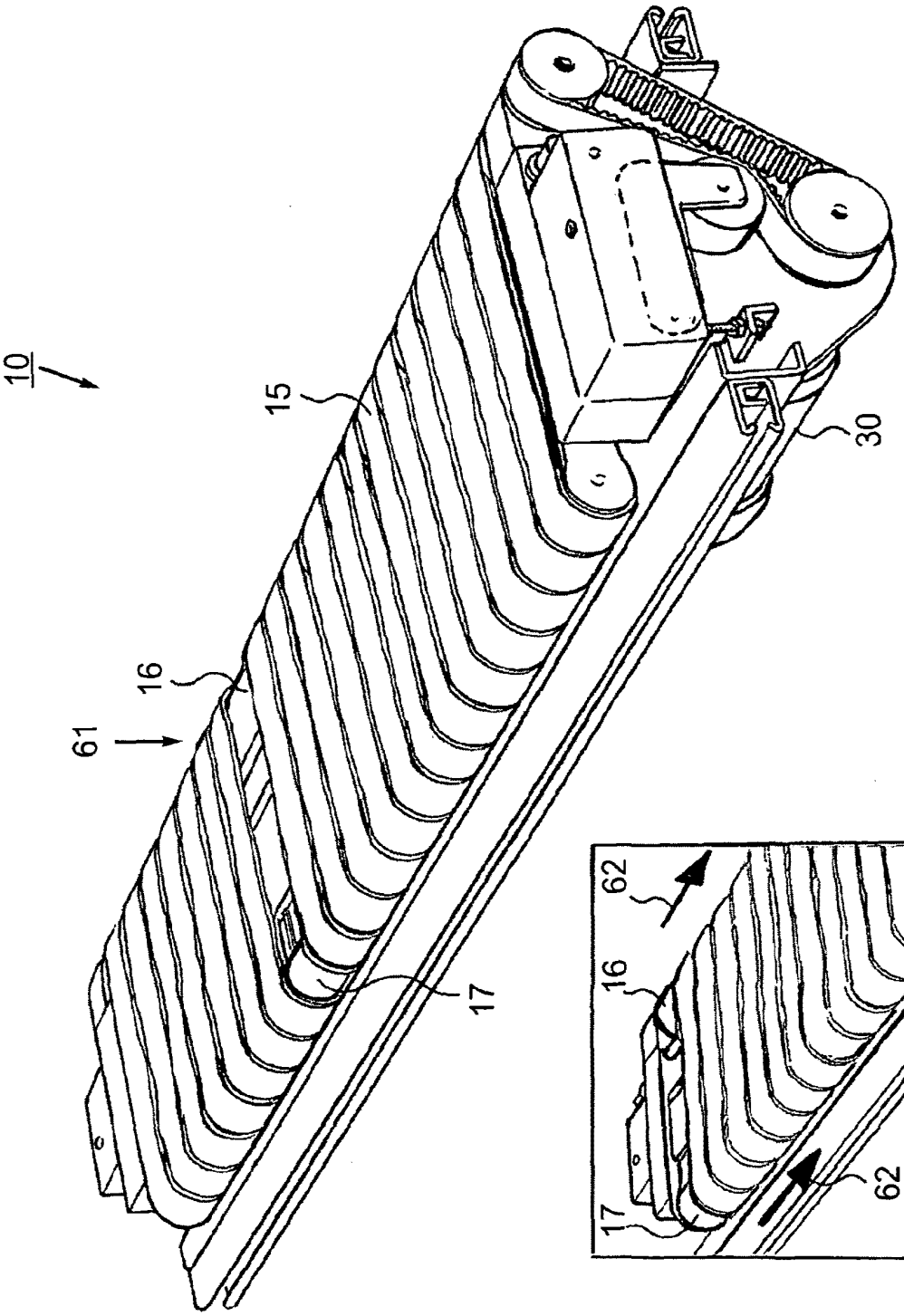


Fig. 9a

Fig. 9b

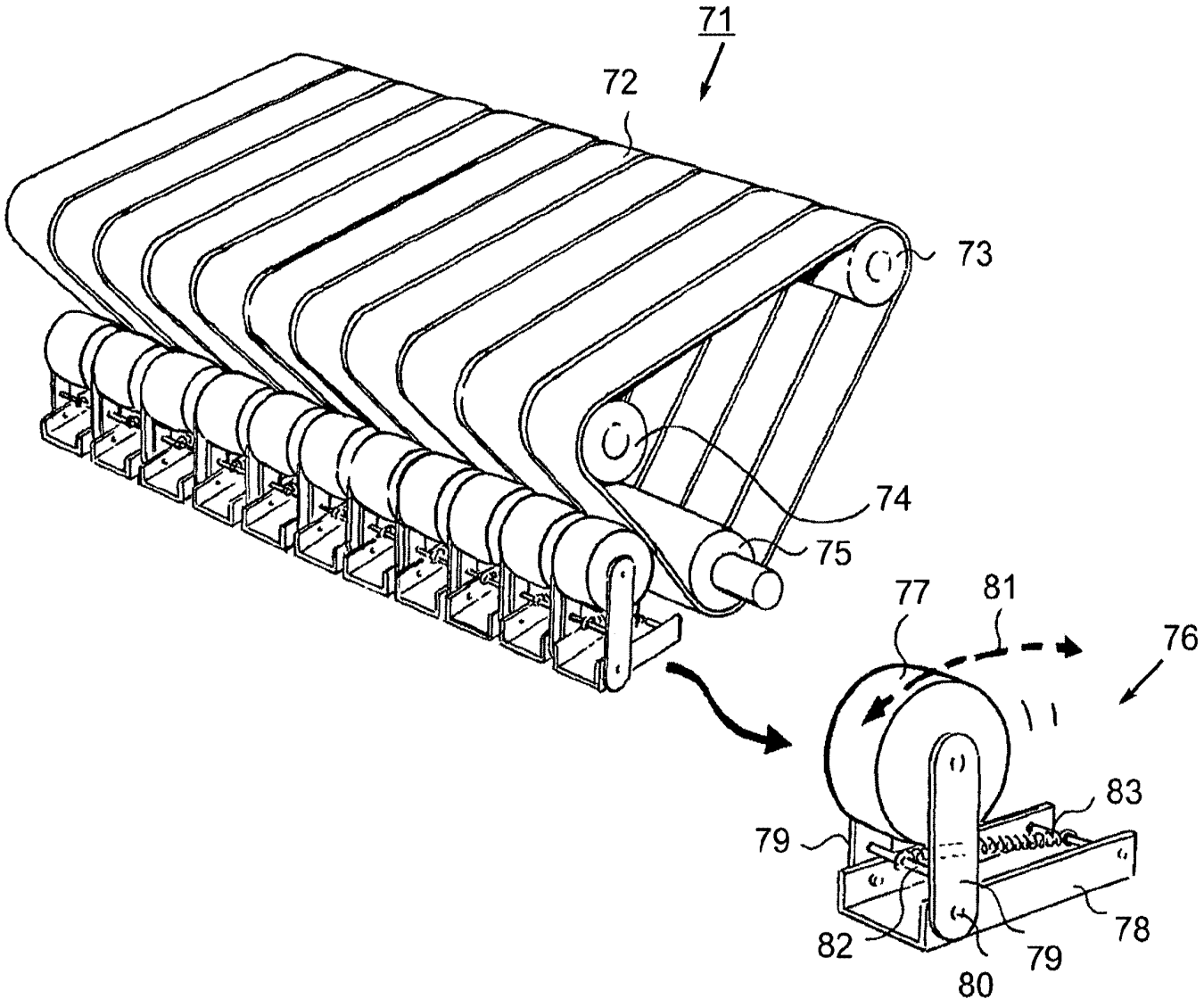


Fig. 10

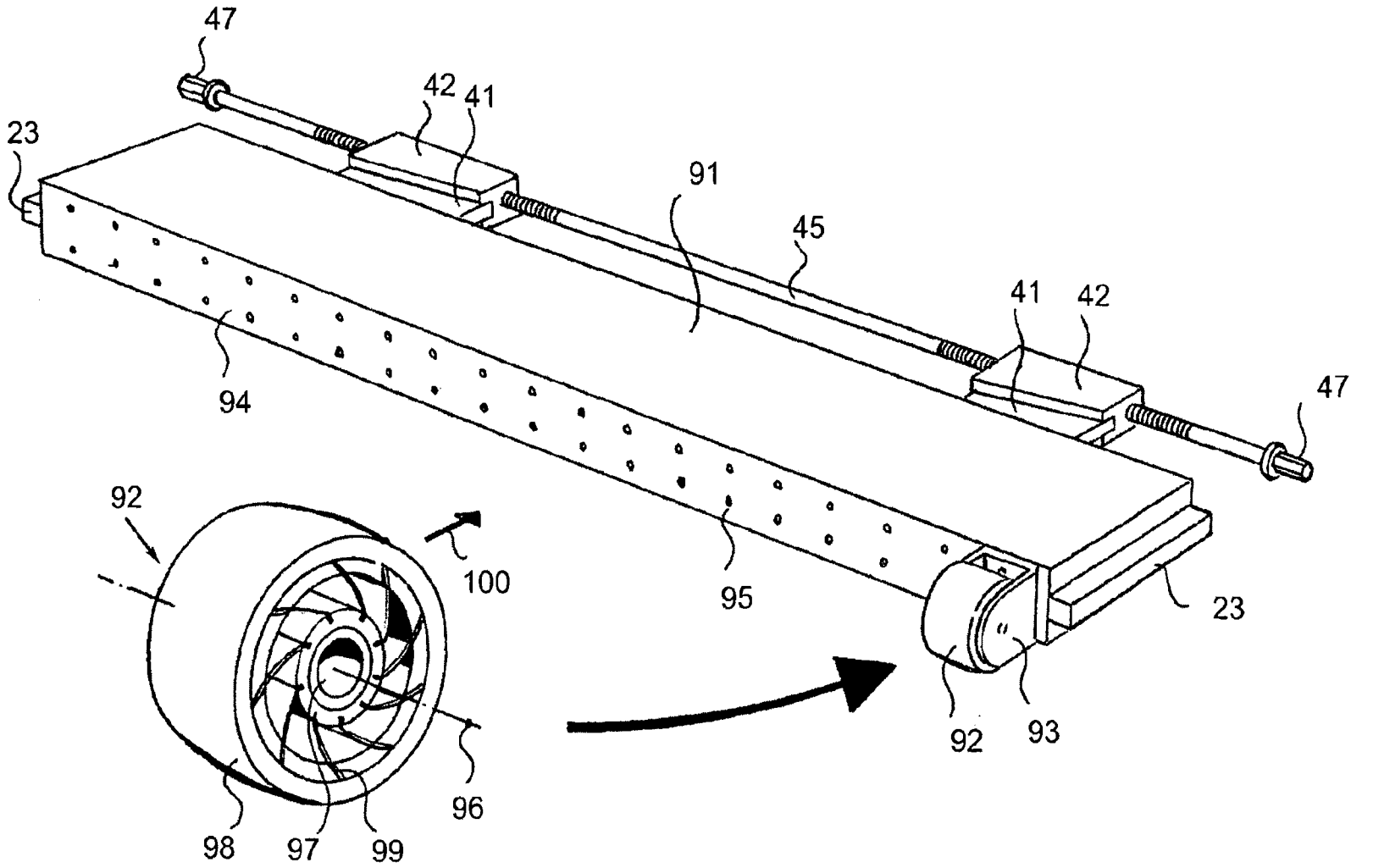


Fig. 11

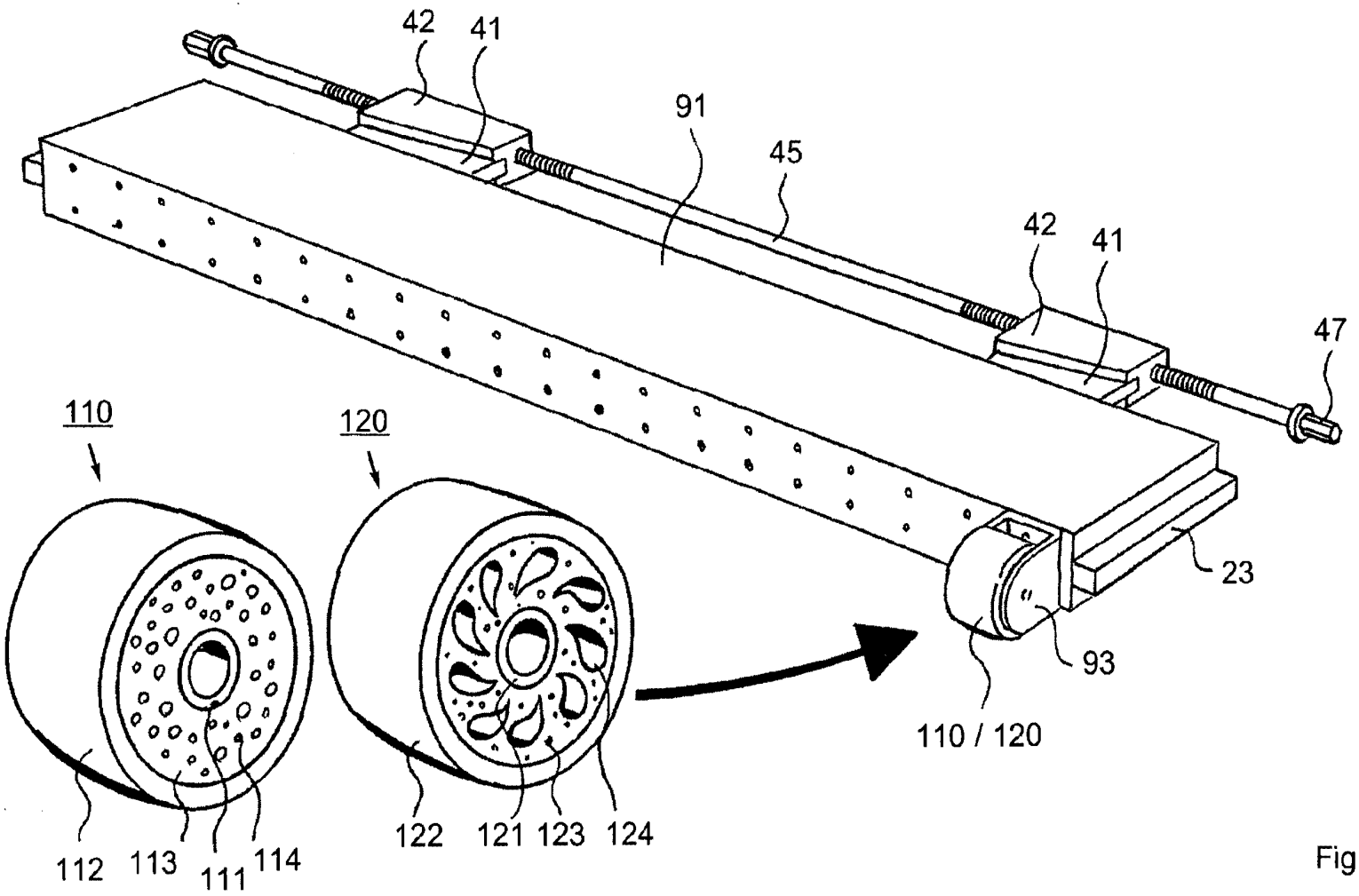

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Fig. 12

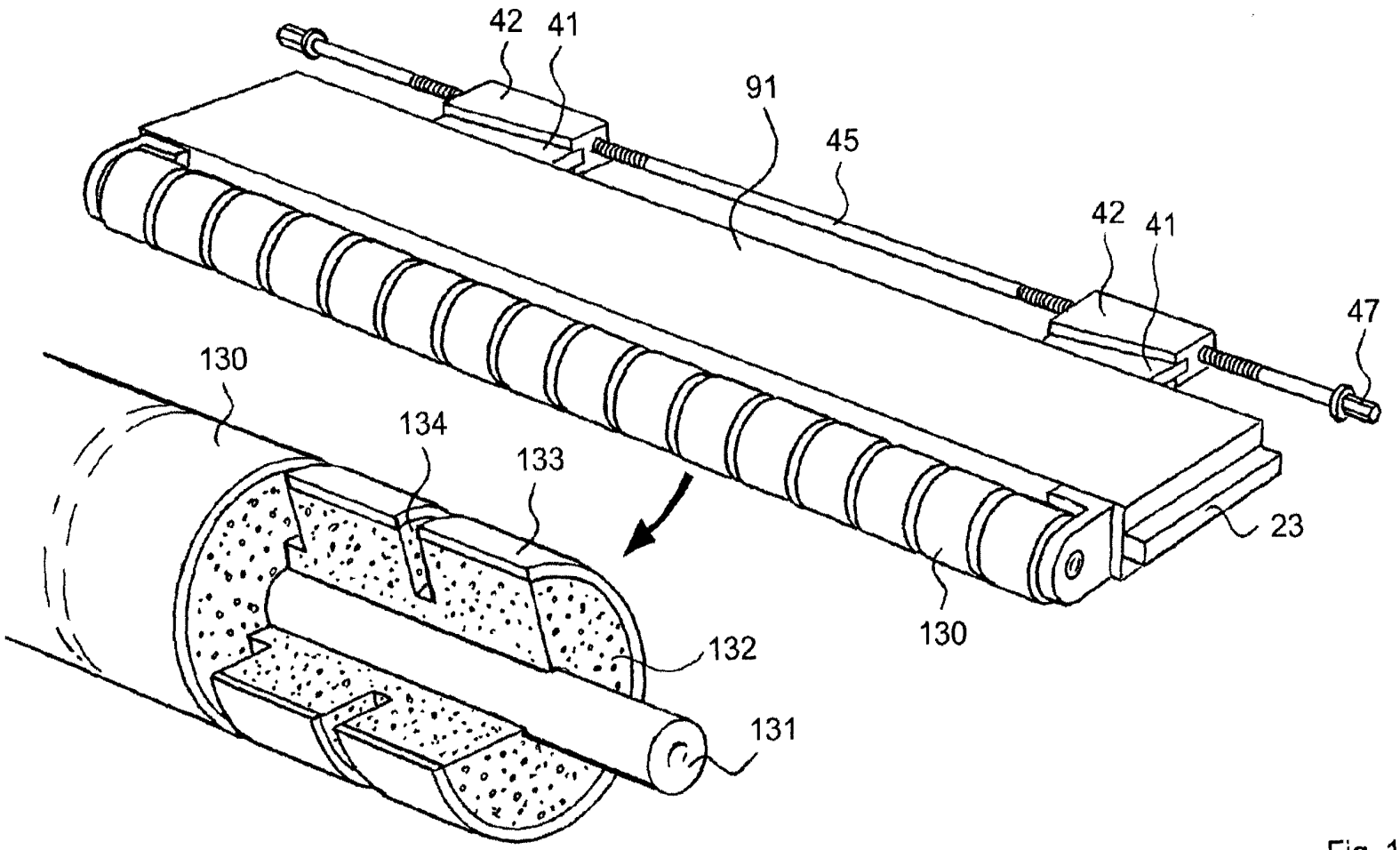


Fig. 13

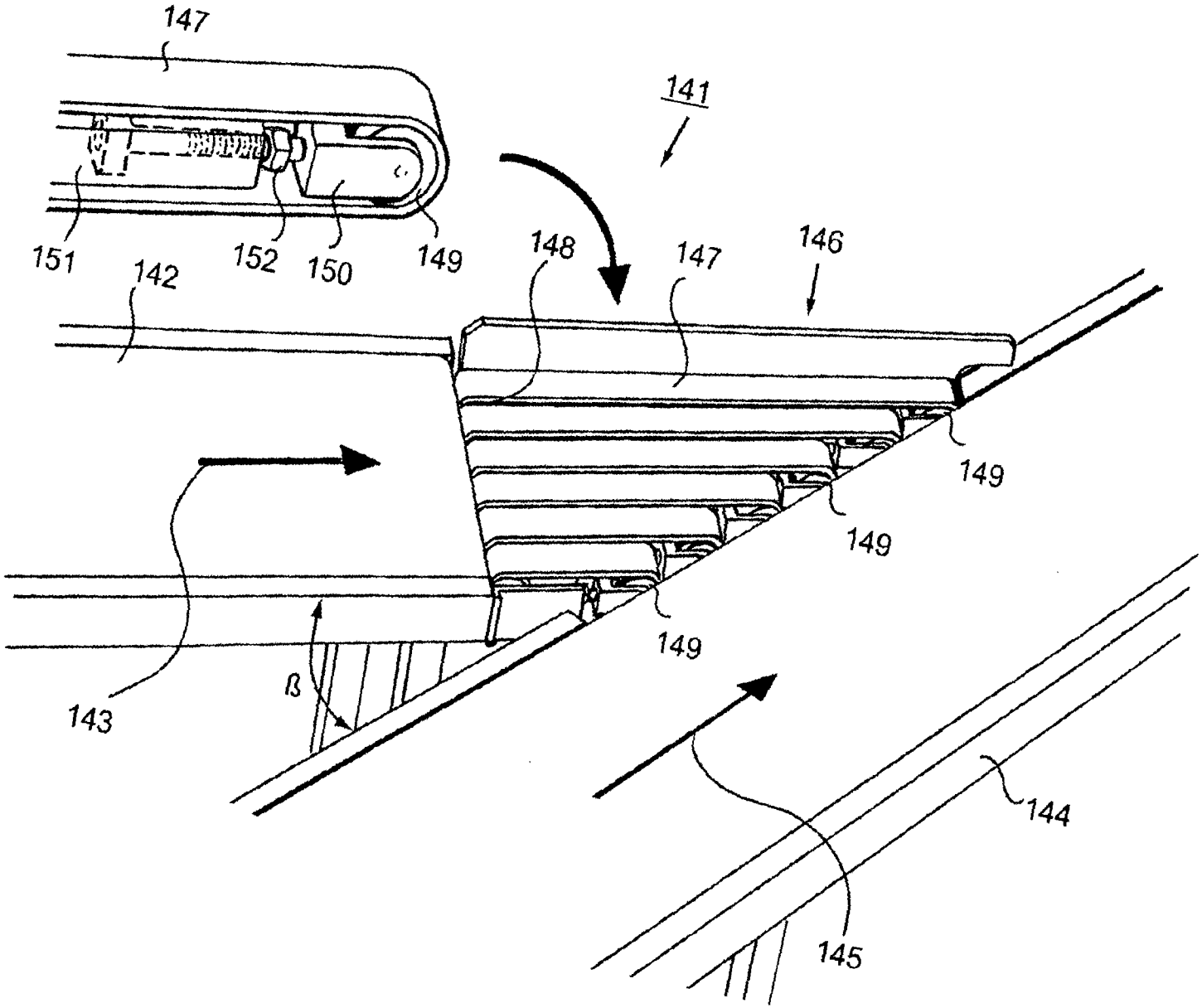


Fig. 14

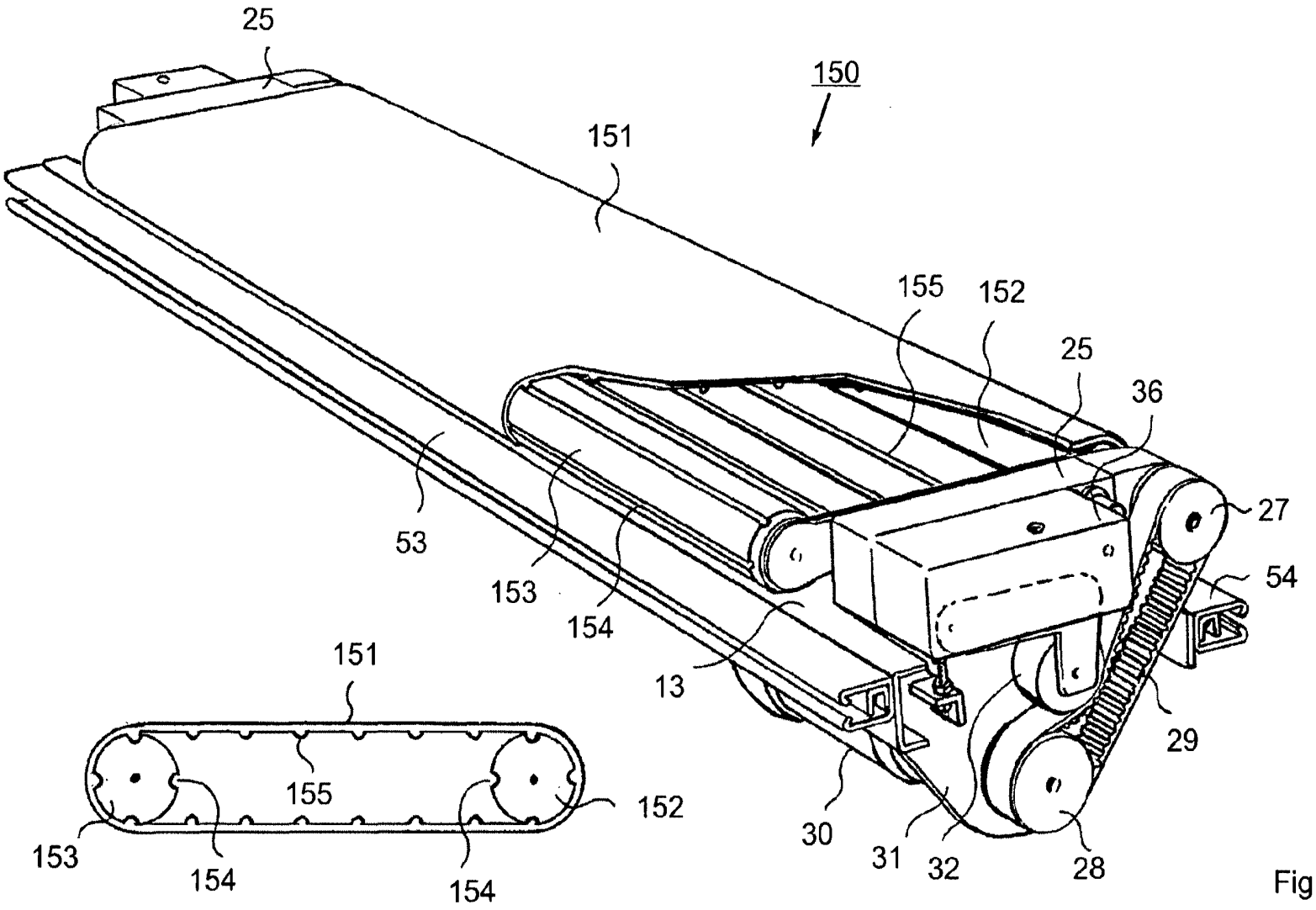

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Fig. 15

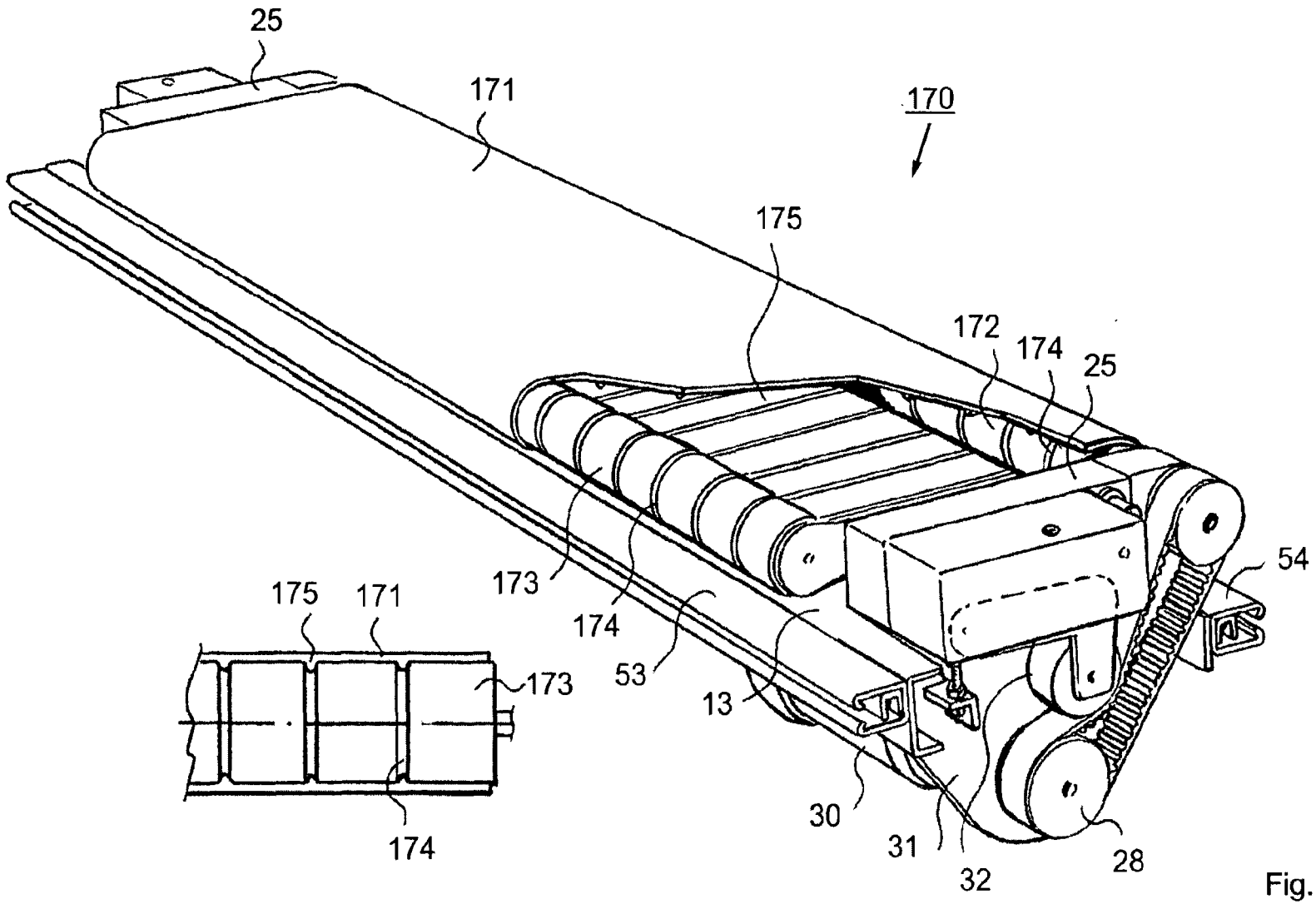

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Fig. 16

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 07 07 5077

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X Y A	EP 0 818 406 A1 (ALSTHOM CGE ALCATEL [FR] CIT ALCATEL [FR]) 14 January 1998 (1998-01-14) * page 3, line 42 - page 4, line 27; claims; figures *	1,2 16-18 14	INV. B65G47/31 B65G15/10
X	US 2004/104100 A1 (SCHIESSER RICARDO N [US] ET AL) 3 June 2004 (2004-06-03) * page 3, column 1, line 13 - page 4, column 2, line 14; figures *	1,2,6-10	
Y	EP 1 607 349 A (R N MACHB B V [NL]) 21 December 2005 (2005-12-21) * abstract; figures *	16-18	
A	EP 1 584 580 A (HERBERT R J ENG LTD [GB]) 12 October 2005 (2005-10-12) * column 4, line 23 - column 5, line 46; figures *	1,6,7,9, 11,14	
A	US 3 122 935 A (ROY W. MORLING) 3 March 1964 (1964-03-03) * claims; figures *	1,12,16	TECHNICAL FIELDS SEARCHED (IPC) B65G

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	27 April 2007	PAPATHEOFRASTOU, M

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)



European Patent Office

Application Number
EP 07 07 5077

CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing more than ten claims.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid, namely claim(s):

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

☒ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

☐ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

European Patent Office

LACK OF UNITY OF INVENTION
SHEET B

Application Number
EP 07 07 5077

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1-7,9-18

A conveyor system for influencing the spacing between successive products during transport comprising modules with multiple endless belts.

---

2. claims: 8-13

A conveyor system for transferring objets comprising a conveying module with endless belts and a tensioning roller for each conveyor belt.

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 07 07 5077

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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27-04-2007

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REFERENCES CITED IN THE DESCRIPTION

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- EP 602694 A **[0021]**

(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 877 328 B1

(12) **FASCICULE DE BREVET EUROPEEN**

(45) Date de publication et mention de la délivrance du brevet:
05.11.2008 Bulletin 2008/45

(21) Numéro de dépôt: **06726149.5**

(22) Date de dépôt: **30.03.2006**

(51) Int Cl.:
B65G 15/24 *(2006.01)*

(86) Numéro de dépôt international:
PCT/FR2006/000686

(87) Numéro de publication internationale:
WO 2006/103348 (05.10.2006 Gazette 2006/40)

(54) **DISPOSITIF DE CONVOYAGE DE CHARGES ISOLEES**

VORRICHTUNG ZUR BEFÖRDERUNG VON ISOLIERTEN LASTEN

DEVICE FOR CONVEYING ISOLATED LOADS

(84) Etats contractants désignés:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC NL PL PT RO SE SI SK TR

(30) Priorité: **30.03.2005 FR 0503079**

(43) Date de publication de la demande:
16.01.2008 Bulletin 2008/03

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(74) Mandataire: **Jeannet, Olivier**
Cabinet Jeannet
40 rue Raulin
69007 Lyon (FR)

(56) Documents cités:
US-A- 1 603 634
US-A- 5 096 045
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- **PATENT ABSTRACTS OF JAPAN vol. 006, no. 232 (M-172), 18 novembre 1982 (1982-11-18) & JP 57 131609 A (NISSAN JIDOSHA KK), 14 août 1982 (1982-08-14)**

Il est rappelé que: Dans un délai de neuf mois à compter de la publication de la mention de la délivrance du brevet européen au Bulletin européen des brevets, toute personne peut faire opposition à ce brevet auprès de l'Office européen des brevets, conformément au règlement d'exécution. L'opposition n'est réputée formée qu'après le paiement de la taxe d'opposition. (Art. 99(1) Convention sur le brevet européen).

EP 1 877 328 B1

Description

[0001] La présente invention concerne un dispositif de convoyage de charges isolées comprenant un ensemble de modules de convoyage, portables et articulés entre eux de sorte à former un chemin multidirectionnel pour le transport et l'accumulation de charges isolées (voir par exemple le document US-A-5662209).

[0002] Il concerne le domaine industriel de la fabrication de matériel pour la manutention continue (mécanisée) de charges isolées (colis, bacs, cartons, fardeaux ou tout autres types de charges unitaires). Il est destiné à équiper toutes installations de traitement de flux de marchandises (entrepôts, centres de tri, usines, centres logistiques, gare de fret, etc.).

[0003] Actuellement, les équipements utilisés pour le convoyage de flux dans de telles installations sont des appareils dédiés à une fonction, dimensionnés pour convenir à une forme de circuit (exemple : une partie droite n'est pas configurable en une partie courbe, une partie plane ne peut pas accepter d'inflexion, etc.).

[0004] La conception de ces appareils a été épurée au maximum pour réduire les coûts, et ce au détriment de leur polyvalence.

[0005] Il existe des tapis transporteurs droits, des tapis transporteurs courbes, d'autres éléments élévateurs, d'autres éléments qui sont descendeurs, etc. et leur ossature mécanique ne leur permet pas intrinsèquement de changer de fonction.

[0006] Généralement, l'industriel ou le logisticien qui investi dans l'acquisition d'un circuit de manutention automatisé doit en modifier la forme à court ou moyen terme, car l'application d'origine évolue très vite. Des tronçons de convoyeurs doivent alors être modifiés pour être réutilisés dans une configuration différente, ce qui entraîne des coûts supplémentaires et des problèmes techniques potentiels ainsi que des délais de mise en oeuvre. Bien souvent, de nouveaux équipements doivent être acquis pour compléter les équipements réutilisés.

[0007] Si un nouveau besoin de manutention soudain et/ou éphémère survient, les utilisateurs devront s'en accommoder avec les moyens dont ils disposent; ce qui se traduit généralement par une manutention manuelle ou avec des moyens inadaptés, impliquant une baisse importante de la productivité et une dégradation des conditions de travail.

[0008] Ce phénomène est devenu moins acceptable depuis quelques temps, où plusieurs nouveaux facteurs sont apparus :

- les contraintes marketing des entreprises utilisatrices impliquent une plus grande variété de conditionnement des produits (promotions commerciales, nombreux et différents formats d'emballage, changement fréquents des conditionnements...) ;
- les fonctions logistiques (réception, stockage, préparation de commande, expédition) mais également d'emballage et de fabrication (co-packing, co-manufacturing) sont de plus en plus sous-traitées par les entreprises utilisatrices à des fournisseurs de prestations extérieures. Ces derniers doivent donc parfois traiter des flux de marchandises pour plusieurs clients utilisateurs différents. Les équipements de manutention continue doivent, dans ce cas également, pouvoir traiter des produits de dimensions très variées ;
- la durée de vie des produits et des réseaux de distribution diminue, ce qui impose une modification fréquente des structures logistiques ;
- la diminution des stocks entraîne une tension des flux : il est opportun de pouvoir ajouter ou déplacer très rapidement des équipements de manutention permettant de faciliter, d'accélérer ou de rendre moins pénibles le traitement des flux.

[0009] Ceci entraîne une demande des utilisateurs en moyens de manutention mécanisés universels et flexibles.

[0010] D'où l'intérêt de cumuler différentes fonctions avec un même équipement :

- être configurable en parties droites ET courbes ET/OU inclinées
- transporter ET accumuler,
- s'adapter à des hauteurs de travail très variables,

et de compléter ces nouvelles exigences par :

- un déploiement rapide lorsqu'un besoin spécifique se présente,
- une facilité réelle de mise en oeuvre,
- une mise en oeuvre directe par l'utilisateur sans recours à des prestations spécialisée (montage mécanique, câblage électrique, automatisme,...), généralement sous-traitées.

[0011] Le dispositif selon la présente invention a pour objectif de remédier à cet état de choses.

[0012] Selon un aspect de l'invention, chacun des modules de convoyage se compose d'un châssis, d'un convoyeur de manutention continue, de moyens et de réglage en hauteur et en inclinaison, et de moyens et de liaison mécanique et électrique permettant une liaison entre les différents modules de manière à former un cheminement pouvant faire suivre aux charges transportées des trajectoires droites et/ou courbe avec des inclinaisons réglables.

[0013] Selon un autre aspect de l'invention, le dispositif de convoyage de charges isolées comprend un chariot de support des modules de convoyage et/ou d'alimentation électrique de ceux-ci.

[0014] Selon un autre aspect de l'invention, chaque module de convoyage est équipé d'un moyen de transfert entre modules des charges à transporter suivant une trajectoire courbe.

[0015] Selon un autre aspect de l'invention, chaque

module de convoyage est équipé d'un moyen (5, 7) de guidage des charges à transporter.

[0016] Selon un autre aspect de l'invention, le moyen de réglage en hauteur et en inclinaison est réalisé au moyen d'un système de bipieds télescopiques et escamotables, comportant chacun un moyen de blocage angulaire et en hauteur dudit bipied.

[0017] Selon un autre aspect de l'invention, le moyen de blocage angulaire et en hauteur de chaque bipied est réalisé grâce à la combinaison, d'une part, d'une poignée excentrique, de quatre bagues dentées, d'un tirant horizontal, agencés de façon à bloquer angulairement les bipieds par rapport au châssis, et, d'autre part, de deux cônes de commandes, de deux tirants verticaux, de quatre montants verticaux et, de deux ressorts annulaires, agencés de façon à bloquer le mouvement de réglage en hauteur des bipieds.

[0018] Selon un autre aspect de l'invention, le moyen de réglage supplémentaire en hauteur et en inclinaison est du type à simple ciseau.

[0019] Selon un autre aspect de l'invention, le moyen permettant une liaison mécanique entre les différents modules comprend des moyens à allongement télescopique et à liaison à rotule, agencés de façon à pouvoir former entre les modules de convoyage un angle variable sur plusieurs plans.

[0020] Selon un autre aspect de l'invention, les moyens à allongement télescopique sont ajustables sans outil, par une rotation de 90° de la rotule ou de la chape autour de leurs axes.

[0021] Selon un autre aspect de l'invention, le moyen de transfert entre modules des charges à transporter comprend un rouleau conique, motorisé grâce à un contre galet en appui sur la partie tournante du convoyeur, ledit rouleau conique étant mis en oeuvre de façon à faire suivre aux produits à transporter une trajectoire courbe et étant monté sur un support télescopique permettant de s'adapter aux différentes longueurs d'entrefer induites par la configuration de l'installation : partie droite vers autre partie droite, partie droite vers partie courbe, partie courbe vers partie courbe.

[0022] Selon un autre aspect de l'invention, le moyen de guidage des charges à transporter comprend des rives de guidage, constituées d'un tube déformable en matière plastique ou autre, fixé sur un support mécanique ou magnétique, et agencé de façon à éviter aux produits transportés de tomber à terre.

[0023] Selon un autre aspect de l'invention, les moyens et de liaison mécanique et électrique sont montés sur des convoyeurs de manière à pouvoir retransmettre les signaux d'informations ainsi que la puissance électrique nécessaire à la connexion d'un autre module de convoyage situé après un convoyeur classique, de façon à pouvoir insérer des convoyeurs classiques au sein d'un circuit constitué de modules de convoyage objets de la présente invention.

[0024] Selon un autre aspect de l'invention, chaque module de convoyage est conçu pour être portable et se mettre en place sans outil, par une personne seule.

[0025] Le dispositif selon l'invention permet entre autres choses de mettre en oeuvre rapidement, facilement et directement par l'utilisateur, un ensemble de modules de convoyage motorisés et portables, permettant de transporter et/ou d'accumuler un flux de charges isolées, en formant, selon le cheminement choisi, des parties soit droites, soit courbes, soit montantes, soit horizontales, soit descendantes, ou une combinaison de ces dernières.

[0026] Le raccordement mécanique et électrique des différents modules de convoyage s'effectue rapidement et sans outil. L'ensemble des actions nécessaires pour configurer ou re-configurer le réseau de convoyeurs portables est réalisable par une seule personne, homme comme femme.

[0027] La légèreté et la facilité d'emploi de chacun des modules de convoyage permettent à l'utilisateur d'employer l'équipement sans retenue et aussi fréquemment que possible, ce qui, d'une part augmente la productivité quotidienne des centres de production et, d'autre part diminue la fatigue liée à la manutention manuelle et ponctuelle des charges unitaires.

[0028] Par ailleurs, l'objet de la présente invention peut couvrir un large champ d'applications, contrairement aux convoyeurs connus jusqu'à ce jour. Avec le même dispositif, la possibilité est donnée de modifier instantanément la forme d'un réseau de convoyage en cas de panne de machine de production par exemple, de rajouter soudainement un poste de travail, de charger et décharger des véhicules roulants (camions, wagons, ...), de transporter des flux à un étage supérieur ou inférieur (plateforme, sous-sol,...),... Bien d'autres applications sont possibles.

[0029] Le dispositif objet de l'invention peut également donner un caractère évolutif et configurable à tous les réseaux de convoyage. Il est en effet possible de modifier profondément le cheminement du réseau de convoyage sans recours à des prestataires spécialisés (monteurs mécaniciens, câbleurs électriques, informaticiens,...), ce qui n'est pas le cas avec les convoyeurs de technologie existante.

[0030] Les modules de convoyage peuvent se connecter mécaniquement et électriquement à des convoyeurs de technologie traditionnelle qui doivent être équipés d'interfaces compatibles. Le convoyeur traditionnel sert alors de transmetteur de puissance électrique et de signaux de commande au module de convoyage suivant. L'intérêt est de pouvoir mixer sur un circuit de convoyage les tronçons destinés à ne pas évoluer structurellement (utilisant des convoyeurs de technologie traditionnelle) et ceux qui sont amenés à de fréquents changements (utilisant des modules de convoyage objet de la présente invention).

[0031] L'utilisation de l'objet de l'invention peut donc être généralisée à un grand nombre d'applications de convoyage de charges isolées.

[0032] Un jeu de cellules photoélectriques et de cartes

électroniques de commande, embarquées sur le convoyeur, peut permettre au système un fonctionnement d'accumulation sans pression, c'est-à-dire que les différents convoyeurs sont commandés selon l'état d'occupation du convoyeur suivant. Grâce à ce type de fonctionnement, les différentes charges isolées ne rentrent pas en contact les unes des autres, évitant ainsi les risques de dégradation ou de chute à terre. Cette fonction peut être occultée pour un convoyage classique (sans accumulation) par simple reconfiguration des cavaliers de la carte de commande.

[0033] Un chariot de support et d'alimentation électrique complète le dispositif objet de l'invention. L'alimentation électrique équipant le chariot est amovible et peut être amenée seule à proximité de l'un des quelconques convoyeurs portables lorsque des contraintes d'encombrement ne permettent pas l'accès du chariot.

[0034] En outre, le chariot d'alimentation permet le stockage optimisé de 1 à 20 modules de convoyage lorsque ces derniers ne sont pas utilisés (figure 3) ainsi que leur transport jusqu'au lieu d'utilisation.

[0035] Le cheminement de l'énergie électrique 24Vcc s'effectue de convoyeur en convoyeur grâce à une connexion électrique à chaque extrémité des modules de convoyage.

[0036] Dans des applications particulières en extérieur, les modules de convoyage peuvent s'empiler dans un véhicule roulant pour être transportés jusqu'au point de chargement ou déchargement du véhicule. L'alimentation électrique basse tension nécessaire aux modules de convoyage peut alors être fournie par la batterie du véhicule roulant.

Description technique

Terminologie :

[0037] Dans tout ce qui suit, le terme "module de convoyage" désigne un module complet comprenant différents sous-ensembles comme le châssis (1), le convoyeur (36) ...

[0038] Le terme "convoyeur" sera utilisé pour désigner le sous-ensemble du "module de convoyage" exclusivement consacré à la fonction de convoyage.

[0039] Sur les dessins annexés, donnés à titre d'exemple non limitatif d'une des formes de réalisation de l'objet de l'invention

- la figure 1 représente une vue en perspective du dispositif selon la présente invention permettant de réaliser différentes formes de circuit de convoyage. Les modules de convoyage (3) sont représentés stockés sur le chariot 14 (repère I), en position d'attente d'utilisation (repère II), et en position dépliée d'utilisation (repère III) ;
- la figure 2 représente une vue en perspective - ainsi que trois vues en deux dimensions - d'une première forme de réalisation du dispositif selon la présente invention, représentant un module de convoyage (3) ;
- la figure 3 représente une vue de coté schématique du chariot d'alimentation électrique ;
- les figures 4 et 5 représentent une des formes de réalisation du dispositif de liaison mécanique entre deux convoyeurs portables. La figure 4 est une vue de dessous de deux modules de convoyage (3). Le détail A montre la liaison mécanique grâce au système rotule et chape.
  La figure 5 montre plus précisément ce dispositif isolé : le détail C montre le système de télescopie, identique pour le système male (rotule 42) et femelle (chape 43). Les détails D et E représentent une vue agrandie de la rotule (42) et de la chape (43) ;
- les figures 6 et 7 représentent une des formes de réalisation de support mécanique ou magnétique de rive de guidage ;
- la figure 8 représente une des formes de réalisation du dispositif à rouleau conique 6 de transfert des charges isolées entre deux convoyeurs portables ;
- la figure 9 représente une des formes de réalisation du système de blocage en rotation des pieds télescopiques ;
- la figure 10 est une vue en coupe partielle du bipieds télescopique (coté poignée) ;
- la figure 11 est une vue en coupe partielle du bipieds télescopique (coté opposé à la poignée) ;
- la figure 12 est une vue en coupe partielle du système de blocage en hauteur des bipieds télescopiques ;
- la figure 13 représente une des formes de réalisation d'un module de convoyage à rouleaux motorisés.

[0040] Le dispositif de convoyage de charges isolées selon la présente invention (figures 1 à 13) est constitué d'un ensemble de modules de convoyage (3) et d'un chariot (14) de support et d'alimentation électrique, ledit dispositif étant destiné à équiper toutes installations de traitement de flux de marchandises (entrepôts, centres de tri, usines, centres logistiques, gare de fret, etc.).

[0041] Chacun des modules de convoyage (3) se compose d'un châssis (1), d'un convoyeur de manutention continue, de moyens (18) et (2) de réglage en hauteur et en inclinaison, de moyens (8) et (13) de liaison mécanique et électrique de façon à permettre une liaison démontable entre les différents modules de sorte à former un cheminement pouvant faire suivre aux charges transportées des trajectoires droites et/ou courbes avec des inclinaisons réglables permettant ainsi le changement d'altitude, d'un moyen (6) de transfert de la charge à transporter entre les modules de convoyage et d'un moyen (5, 7) de guidage de la charge à transporter

[0042] Le réglage en hauteur et en inclinaison de chaque module de convoyage (3) sera de préférence réalisé au moyen d'un système de bipieds télescopiques escamotables (18).

[0043] Les deux bipieds télescopiques (18) peuvent

être escamotés complètement (en position horizontale, ils sont complètement intégrés dans le châssis (1)), ou, grâce à un mouvement de rotation permis par le déblocage de la poignée excentrique (19), être orientés verticalement ou dans une position angulaire intermédiaire entre la position horizontale et verticale.

[0044] L'arrêt en rotation des bipieds (18) est effectué grâce à des bagues dentées (20) qui sont maintenues en prise par la poignée (19) (figures 9, 10 et 11): le mouvement de rotation de la poignée (19) est transformé en mouvement de translation par la forme excentrique de ladite poignée (19) et transmis au tirant horizontal (24). Les cônes de commande (23), fixés sur le tirant horizontal (24), transmettent ce mouvement aux tirants verticaux (27). Le matériau utilisé pour les cônes de commande (23) présente une bonne résistance au frottement (POM, PA,...) de façon à permettre le glissement de l'extrémité des tirants verticaux sur les cônes de commandes (23) lors de la rotation des bipieds (18).

[0045] La longueur de chacun des deux bipieds (18) (agissant directement sur la hauteur du module de convoyage (3)) est réglable grâce à un dispositif de glissière tubulaire : les montants verticaux males (41) coulissent dans les montants verticaux femelles (Figure 11 et 12). Le blocage en position est effectué par le coincement d'un ressort annulaire (29) entre le guide ressort conique (31) et le montant vertical femelle (30) (figure 12). Lors de l'ouverture de la poignée (19), le tirant vertical (27) descend et décoince le ressort (29), libérant ainsi le mouvement de télescopie de la glissière (30, 41). De la sorte, l'ouverture de la poignée (19) provoque simultanément le déblocage du bipied (18) en rotation et en télescopie.

[0046] Inversement, sa fermeture maintient le bipied (18) dans une position angulaire et une hauteur donnée.

[0047] L'action directe sur les deux poignées (19) permet de régler la hauteur et l'inclinaison du convoyeur portable, sans outil.

[0048] L'angle d'inclinaison maximum permis par la différence de hauteur des bipieds (18) est de 20° et la hauteur maximum de la surface de transport des charges peut être de 1200 mm par rapport au sol.

[0049] Ce dispositif peut être complété par un système d'élévation (2) qui permet d'augmenter la course de réglage en hauteur et en inclinaison par élévation du convoyeur par rapport au châssis (1). Le système d'élévation (2) est de préférence du type à simple ciseau (figure 2). De la sorte, l'angle maximum d'inclinaison peut être de 25° et l'élévation supplémentaire en hauteur d'environ 300 mm. De la sorte, la hauteur maximum de la surface de transport des charges peut atteindre 1500 mm par rapport au sol.

[0050] Le module de convoyage (3) comporte un moyen de liaison mécanique (8) et un moyen de connexion électrique (13) à chacune de ses extrémités afin de pouvoir se lier mécaniquement et électriquement au module précédent et/ou suivant. De préférence, le moyen de liaison mécanique (8) sera du type télescopique à rotule (figures 4 et 5) de façon à pouvoir former entre les modules de convoyage un angle variable sur plusieurs plans. Ceci est réalisé de façon à permettre à l'ensemble de présenter un cheminement selon une trajectoire multidirectionnelle (droite et/ou courbe, dans des inclinaisons différentes) du flux des produits à transporter (figure 1).

[0051] Le dispositif de liaison mécanique (8) est constitué d'une partie male, la rotule (42) (figure 5, détail D) et d'une partie femelle, la chape (43) (figure 5, détail E).

[0052] Chacune de ces parties est télescopique de façon à s'adapter aux différents intervalles induits par la configuration de l'installation : partie droite vers autre partie droite, partie droite vers sur partie courbe, partie courbe vers partie courbe.

[0053] Le réglage de la télescopie s'effectue par une rotation de 90° de la chape (43) ou de la rotule (42) autour de son axe (figure 5, détail C). Un ressort de torsion peut être utilisé pour le retour en position initiale. Le maintien en position de la rotule et la chape est effectué grâce à un tourillon du commerce (figure 5, détail E).

[0054] De préférence, le moyen de liaison électrique sera un connecteur électrique du commerce, assurant la transmission des signaux de commande (photocellule et informations de commande) et de l'alimentation de puissance (24Vcc). Ce connecteur peut se situer sous le dispositif télescopique (8) de sorte à concentrer sur une même zone l'intervention de l'utilisateur effectuant la liaison de deux modules.

[0055] Le châssis (1) est de préférence conçu pour permettre aux modules de convoyage (3) de s'empiler les uns sur les autres lorsqu'ils ne sont plus utilisés (figure 1).

[0056] Le convoyeur de manutention continue est de technologie connue : à rouleaux commandés par rouleaux moteurs, par tapis à mailles plastiques ou par bande transporteuse en matière plastique ou caoutchouc.

[0057] Dans le cas du convoyeur à rouleaux commandés (figure 13), ce dernier est de préférence constitué par une ossature (32), d'un ensemble de rouleaux libres (11) à gorges, commandés par des rouleaux à moteur électrique intégrés (17) (communément appelé "rouleaux moteurs"), et ceci par l'intermédiaire de courroies rondes en polyuréthane disposées en relais entre les rouleaux.

[0058] Le moyen de transfert (6) de la charge à transporter entre modules peut être du type rouleau conique. L'effet de la conicité du rouleau permet le transport des charges suivant une trajectoire courbe. Quelle que soit la technologie de convoyage retenue, chacun des modules de convoyage peut être muni d'un tel rouleau conique motorisé (6) à chacune de ses extrémités de façon à faire suivre aux produits à transporter une trajectoire courbe.

[0059] Ce rouleau conique (6) est motorisé par la bande transporteuse du convoyeur au moyen d'un contre galet (22) (figure 8). Chaque rouleau conique (6) est monté sur un support télescopique permettant de s'adapter aux différentes longueurs d'entrefers induites par la con-

figuration de l'installation, partie droite vers autre partie droite, partie droite vers partie courbe, partie courbe vers partie courbe.

[0060] Par ailleurs, des rouleaux cylindriques motorisés peuvent être montés en lieu et place des rouleaux coniques lorsque l'utilisateur désire augmenter sensiblement la longueur du module de convoyage concerné.

[0061] Le moyen de guidage (7) de la charge à transporter est de préférence du type rives de guidage, constituées d'un tube déformable en matière plastique ou autre, qui est fixé sur un support (5) (figure 7), réalisé de façon à éviter aux produits transportés de tomber à terre.

[0062] Ce dispositif de rive de guidage (7) se monte sur les différents convoyeurs motorisés (36) par fixation mécanique et/ou magnétique (5) et assure ainsi une continuité de guidage sur tout le cheminement de convoyage, selon toutes trajectoires multidirectionnelles (figure 7 et 8).

[0063] Les modules de convoyage peuvent être munis de roues blocables qui permettent un déplacement au sol facile et rapide. Ces roues se montent en extrémité des bipieds (18). Des sabots optionnels peuvent se monter autour de ces roues pour permettre le passage d'escaliers ou de changements de niveaux.

[0064] Un jeu de cellules photoélectriques (10) et de cartes électroniques de commande (21), embarqué sur le convoyeur (figure 2), peut permettre au système un fonctionnement d'accumulation sans pression.

[0065] Le chariot d'alimentation (14) (figure 3) comprend l'alimentation électrique (15) pouvant se connecter à n'importe quel module de convoyage (3), ainsi que de dispositifs permettant le support des différents accessoires des convoyeurs, soit au minimum :

- rives de guidage (7) à l'emplacement 33
- rouleaux coniques (6) à l'emplacement 39
- rouleaux cylindriques pour transfert droit à l'emplacement 34
- support de rives (5) et pièces de rechange de première urgence à l'emplacement 38
- ... .

[0066] Des roues (40) peuvent permettre un déplacement roulant du chariot (14). Les emplacements 37 peuvent être utilisés pour la reprise par chariot de type élévateur ou transpalette.

Exemple de mise en oeuvre

[0067] Les modalités de mise en oeuvre du dispositif objet de la présente invention sont les suivantes : l'utilisateur prélève un à un les modules de convoyage du chariot d'alimentation (si ce dernier est utilisé, ce qui n'est pas obligatoire) et les dispose sur le sol à sa convenance.

[0068] Il procède aux réglages de hauteur et d'inclinaison (grâce aux deux poignées (19)) ou de trajectoire courbe en montant les rouleaux coniques de transfert (6).

[0069] Il connecte ensuite mécaniquement et électriquement entre eux les différents convoyeurs portables grâce au dispositifs (8) et (13).

[0070] Puis, il relie l'alimentation électrique (du chariot (14) ou déportée) à n'importe quel module de convoyage.

[0071] Enfin, il connecte le chariot au réseau électrique et appuie sur le bouton de mise en marche de l'alimentation électrique : les convoyeurs se mettent alors en fonctionnement selon la configuration du mode de fonctionnement de la carte de commande (21).

[0072] Le système peut fonctionner suivant plusieurs modes de fonctionnements différents :

- un mode de marche en accumulation sans pression,
- un mode de marche en transport simple.

[0073] Le changement des modes de fonctionnement peut se faire très simplement grâce à l'ajustement de cavaliers sur la carte de commande (21) de chaque module de convoyage.

[0074] La mise en oeuvre des divers éléments constitutifs donne à l'objet de la présente invention un maximum d'effets utiles qui n'avaient jamais été, à ce jour, obtenus par des dispositifs existants.

[0075] Il va de soi que l'invention n'est pas limitée à la forme de réalisation décrite ci-dessus à titre d'exemple mais qu'elle s'étend à toutes les formes de réalisations couvertes par les revendications ci-annexées.

Revendications

1. Dispositif de convoyage de charges isolées comprenant un ensemble de modules de convoyage (3), **caractérisé en ce que** chacun des modules de convoyage (3) se compose d'un châssis (1), d'un convoyeur de manutention continue, de moyens (18) et (2) de réglage en hauteur et en inclinaison, et de moyens (8) et (13) de liaison mécanique et électrique permettant une liaison entre les différents modules de convoyaye (3) de manière à former un cheminement pouvant faire suivre aux charges transportées des trajectoires droites et/ou courbe avec des inclinaisons réglables.

2. Dispositif de convoyage de charges isolées selon la revendication 1, **caractérisé en ce qu'**il comprend un chariot (14) de support des modules de convoyage (3) et/ou d'alimentation électrique de ceux-ci.

3. Dispositif de convoyage de charges isolées selon la revendication 1 ou la revendication 2, **caractérisé en ce que** chaque module de convoyage (3) est équipé d'un moyen (6) de transfert entre modules des charges à transporter suivant une trajectoire courbe.

4. Dispositif de convoyage de charges isolées selon l'une des revendications 1 à 3, **caractérisé en ce**

que chaque module de convoyage (3) est équipé d'un moyen (5, 7) de guidage des charges à transporter.

5. Dispositif de convoyage de charges isolées selon l'une des revendications 1 à 4, **caractérisé en ce que** le moyen de réglage en hauteur et en inclinaison est réalisé au moyen d'un système de bipieds (18) télescopiques et escamotables, comportant chacun un moyen de blocage angulaire et en hauteur dudit bipied (18).

6. Dispositif de convoyage de charges isolées selon la revendication 5 **caractérisé en ce que** le moyen de blocage angulaire et en hauteur de chaque bipied (18) est réalisé grâce à la combinaison, d'une part, d'une poignée excentrique (19), de quatre bagues dentées (20), d'un tirant horizontal (24), agencés de façon à bloquer angulairement les bipieds (18) par rapport au châssis (1), et, d'autre part, de deux cônes de commandes (23), de deux tirants verticaux (27), de quatre montants verticaux (30) et (41), de deux ressorts annulaires (29), agencés de façon à bloquer le mouvement de réglage en hauteur des bipieds (18).

7. Dispositif de convoyage de charges isolées selon l'une des revendications 1 à 6 **caractérisé en ce que** le moyen (2) de réglage supplémentaire en hauteur et en inclinaison est du type à simple ciseau.

8. Dispositif de convoyage de charges isolées selon l'une des revendications 1 à 7, **caractérisé en ce que** le moyen (8) permettant une liaison mécanique entre les différents modules de convoyage (3) comprend des moyens à allongement télescopique et à liaison à rotule, agencés de façon à pouvoir former entre les modules de convoyage un angle variable sur plusieurs plans.

9. Dispositif de convoyage de charges isolées selon la revendication 8 **caractérisé en ce que** les moyens à allongement télescopique sont ajustables sans outil, par une rotation de 90° de la rotule (42) ou de la chape (43) autour de leurs axes.

10. Dispositif de convoyage de charges isolées selon l'une des revendications 3 à 9, **caractérisé en ce que** le moyen (6) de transfert entre modules des charges à transporter comprend un rouleau conique (6), motorisé grâce à un contre galet (22) en appui sur la partie tournante du convoyeur, ledit rouleau conique (6) étant mis en oeuvre de façon à faire suivre aux produits à transporter une trajectoire courbe et étant monté sur un support télescopique permettant de s'adapter aux différentes longueurs d'entrefer induites par la configuration de l'installation : partie droite vers autre partie droite, partie droite vers partie courbe, partie courbe vers partie courbe.

11. Dispositif de convoyage de charges isolées selon l'une des revendications 4 à 10, **caractérisé en ce que** le moyen (7) de guidage des charges à transporter comprend des rives de guidage, constituées d'un tube déformable en matière plastique ou autre, fixé sur un support (5) mécanique ou magnétique, et agencé de façon à éviter aux produits transportés de tomber à terre.

12. Dispositif de convoyage de charges isolées selon l'une quelconque des revendications précédentes, **caractérisé en ce que** les moyens (8) et (13) de liaison mécanique et électrique sont montés sur des convoyeurs de manière à pouvoir retransmettre les signaux d'informations ainsi que la puissance électrique nécessaire à la connexion d'un autre module de convoyage (3) situé après un convoyeur classique, de façon à pouvoir insérer des convoyeurs classiques au sein d'un circuit constitué de modules de convoyage (3) objets de la présente invention.

13. Dispositif de convoyage de charges isolées selon l'une quelconque des revendications précédentes, **caractérisé en ce que** chaque module de convoyage (3) est conçu pour être portable et se mettre en place sans outil, par une personne seule.

Claims

1. Device for conveying isolated loads comprising an assembly of conveying modules (3), **characterized in that** each of the conveying modules (3) is made up of a frame (1), a continuous handling conveyor, height and inclination adjusting means (18) and (2), and mechanical and electrical linking means (8) and (13) enabling the different conveying modules (3), to be linked so as to form a route capable of causing the transported loads to follow straight and/or curved trajectories with adjustable inclination.

2. Device for conveying isolated loads according to claim 1, **characterized in that** it comprises a support carriage (14) for the conveying modules (3) and/or electrical power for these modules (3).

3. Device for conveying isolated loads according to claim 1 or claim 2, **characterized in that** each conveying module (3) is provided with transfer means (6) between modules for transported loads following a curved trajectory.

4. Device for conveying isolated loads according to one of claims 1 to 3, **characterized in that** each conveying module (3) is provided with guide means (5, 7) for the transported loads.

5. Device for conveying isolated loads according to one of claims 1 to 4, **characterized in that** the height and inclination adjusting means are produced through a system of telescopic and retractable bipods (18), each comprising angular blocking means (18) at the top of said bipod.

6. Device for conveying isolated loads according to claim 5, **characterized in that** the angular blocking means at the top of each bipod (18) are produced through the combination, on one hand, of an eccentric handle (19), four toothed rings (20), a horizontal tie rod (24), all positioned so as to angularly block the bipods (18) relative to the frame (1), and, on the other hand, of two control cones (23), two vertical tie rods (27), four vertical posts (30) and (41), two ring springs (29), positioned so as to block the height adjusting movement of the bipods (18).

7. Device for conveying isolated loads according to one of claims 1 to 6 **characterized in that** the additional height and inclination adjusting means (2) are of the simple shear type.

8. Device for conveying isolated loads according to one of claims 1 to 7, **characterized in that** the means (8) enabling a mechanical link between the different conveying modules (3), comprises telescopic expansion means with a ball link, positioned so as to be able to form a conveyor angle between the modules which is variable on several planes.

9. Device for conveying isolated loads according to claim 8, **characterized in that** the telescopic expansion means are adjustable without tools, by a 90° rotation of the ball joint (42) or of the yoke (43) around their axes.

10. Device for conveying isolated loads according to one of claims 3 to 9, **characterized in that** the means (6) for transferring transported loads between modules comprise a tapered roller (6), motorized thanks to a counter-roller (22) bearing on the rotating part of the conveyor, said tapered roller (6) being implemented so as to cause the transported products to follow a curved trajectory and being assembled on a telescopic support allowing adaptation to the different gap lengths caused by the configuration of the installation: straight part towards another straight part, straight part towards curved part, curved part towards curved part.

11. Device for conveying isolated loads according to one of claims 4 to 10, **characterized in that** the means (7) for guiding the transported loads comprise guide edges, made up of a malleable tube in plastic or another material, fixed on a mechanical or magnetic support (5), and positioned so as to prevent the transported products from falling on the ground.

12. Device for conveying isolated loads according to any of the preceding claims, **characterized in that** the mechanical and electrical linking means (8) and (13) are mounted on conveyors so as to be able to retransmit information signals as well as the electrical power needed for the connection to another conveyor module (3) located after a traditional conveyor, so as to be able to insert traditional conveyors within a circuit made up of conveying modules (3) according to the present invention.

13. Device for conveying isolated loads according to any of the preceding claims, **characterized in that** each conveying module (3) is designed to be portable and to be set up without tools, by only one person.

Patentansprüche

1. Vorrichtung zum Befördern einzelner Lasten, umfassend eine Anordnung von Beförderungsmodulen (3), **dadurch gekennzeichnet, dass** jedes der Beförderungsmodule (3) aus einem Rahmen (1), einem durchgehenden Verladeförderer, Mitteln (18) und (2) zum Einstellen der Höhe und Neigung und Mitteln (8) und (13) zum mechanischen und elektrischen Verbinden, die eine Verbindung zwischen den verschiedenen Beförderungsmodulen (3) ermöglichen, besteht, um eine Wegführung zu bilden, welche die transportierten Lasten dazu bringen kann, gerade und/oder gebogene Bahnen mit einstellbaren Neigungen zu verfolgen.

2. Vorrichtung zum Befördern einzelner Lasten nach Anspruch 1, **dadurch gekennzeichnet, dass** sie einen Wagen (14) zum Tragen der Beförderungsmodule (3) und/oder um diese mit Strom zu versorgen umfasst.

3. Vorrichtung zum Befördern einzelner Lasten nach Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** jedes Beförderungsmodul (3) mit einem Mittel (6) versehen ist, um die zu transportierenden Lasten zwischen den Modulen entlang einer gebogenen Bahn zu übertragen.

4. Vorrichtung zum Befördern einzelner Lasten nach einem der Ansprüche 1 bis 3, **dadurch gekennzeichnet, dass** jedes Beförderungsmodul (3) mit einem Mittel (5, 7) zum Führen der zu transportierenden Lasten versehen ist.

5. Vorrichtung zum Befördern einzelner Lasten nach einem der Ansprüche 1 bis 4, **dadurch gekennzeichnet, dass** das Mittel zum Einstellen der Höhe und Neigung mittels eines Systems aus ausziehba-

ren und einklappbaren Zweibeinen (18) ausgebildet ist, die jeweils ein Mittel umfassen, um das Zweibein (18) in Winkel und Höhe zu blockieren.

6. Vorrichtung zum Befördern einzelner Lasten nach Anspruch 5, **dadurch gekennzeichnet, dass** das Mittel, um jedes Zweibein (18) in Winkel und Höhe zu blockieren, durch die Kombination einerseits aus einem exzentrischen Griff (19), vier Zahnringen (20), einer waagerechten Zugstange (24), die angeordnet sind, um die Zweibeine (18) im Verhältnis zum Rahmen (1) zu blokkieren, und andererseits aus zwei Steuerkegeln (23), zwei senkrechten Zugstangen (27), vier senkrechten Ständern (30) und (41), zwei ringförmigen Federn (29), die angeordnet sind, um die Bewegung zur Höheneinstellung der Zweibeine (18) zu blockieren, ausgebildet ist.

7. Vorrichtung zum Befördern einzelner Lasten nach einem der Ansprüche 1 bis 6, **dadurch gekennzeichnet, dass** das Mittel (2) zum weiteren Einstellen der Höhe und Neigung von der Art einer einfachen Schere ist.

8. Vorrichtung zum Befördern einzelner Lasten nach einem der Ansprüche 1 bis 7, **dadurch gekennzeichnet, dass** das Mittel (8), das eine mechanische Verbindung zwischen den verschiedenen Beförderungsmodulen (3) ermöglicht, Mittel mit ausziehbarer Verlängerung und mit Kugelgelenkverbindung umfasst, die angeordnet sind, um zwischen den Beförderungsmodulen einen auf mehreren Ebenen variablen Winkel zu bilden.

9. Vorrichtung zum Befördern einzelner Lasten nach Anspruch 8, **dadurch gekennzeichnet, dass** die Mittel mit ausziehbarer Verlängerung ohne Hilfsmittel durch eine Drehung von 90° des Kugelgelenks (42) oder des Gabelkopfs (43) um ihre Achsen verstellbar sind.

10. Vorrichtung zum Befördern einzelner Lasten nach einem der Ansprüche 3 bis 9, **dadurch gekennzeichnet, dass** das Mittel (6) zum Übertragen der zu transportierenden Lasten zwischen den Modulen eine konische Rolle (6) umfasst, die über eine kleine Gegenrolle (22), die sich auf den drehenden Teil des Förderers abstützt, motorisiert ist, wobei die konische Rolle (6) eingesetzt wird, um die zu transportierenden Produkte dazu zu bringen, eine gebogene Bahn zu verfolgen, und dabei auf einem ausziehbaren Halter angebracht ist, der es ermöglicht, sich den verschiedenen Zwischenraumlängen anzupassen, die durch die Konfiguration der Einrichtung herbeigeführt werden: gerader Teil zu anderem geradem Teil, gerader Teil zu gebogenem Teil, gebogener Teil zu gebogenem Teil.

11. Vorrichtung zum Befördern einzelner Lasten nach einem der Ansprüche 4 bis 10, **dadurch gekennzeichnet, dass** das Mittel (7) zum Führen der zu transportierenden Lasten Führungsleisten umfasst, die aus einer verformbaren Plastikröhre oder dergleichen bestehen, die auf einem mechanischen oder magnetischen Halter (5) befestigt ist und angeordnet ist, um zu vermeiden, dass die transportierten Produkte auf den Boden fallen.

12. Vorrichtung zum Befördern einzelner Lasten nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Mittel (8) und (13) zum mechanischen und elektrischen Verbinden an den Förderern angeordnet sind, um die Informationssignale sowie die notwendige elektrische Leistung für den Anschluss eines anderen Beförderungsmoduls (3), das sich nach einem herkömmlichen Förderer befindet, weiterleiten zu können, um herkömmliche Förderer innerhalb eines Kreislaufs aus Beförderungsmodulen (3) der vorliegenden Erfindung einfügen zu können.

13. Vorrichtung zum Befördern einzelner Lasten nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** jedes Beförderungsmodul (3) ausgelegt ist, um tragbar zu sein und ohne Hilfsmittel von einer einzigen Person eingesetzt werden zu können.

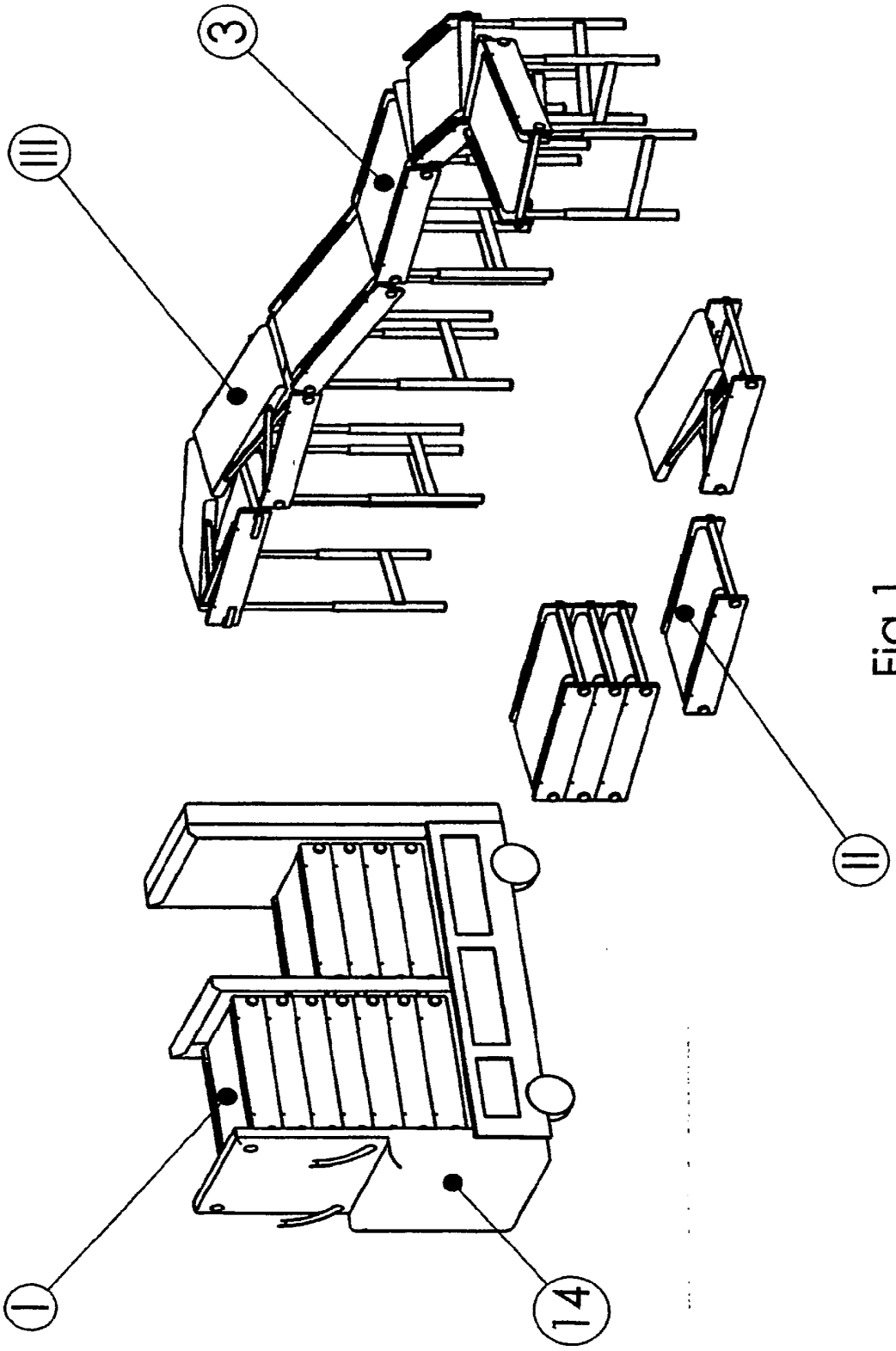


Fig.1

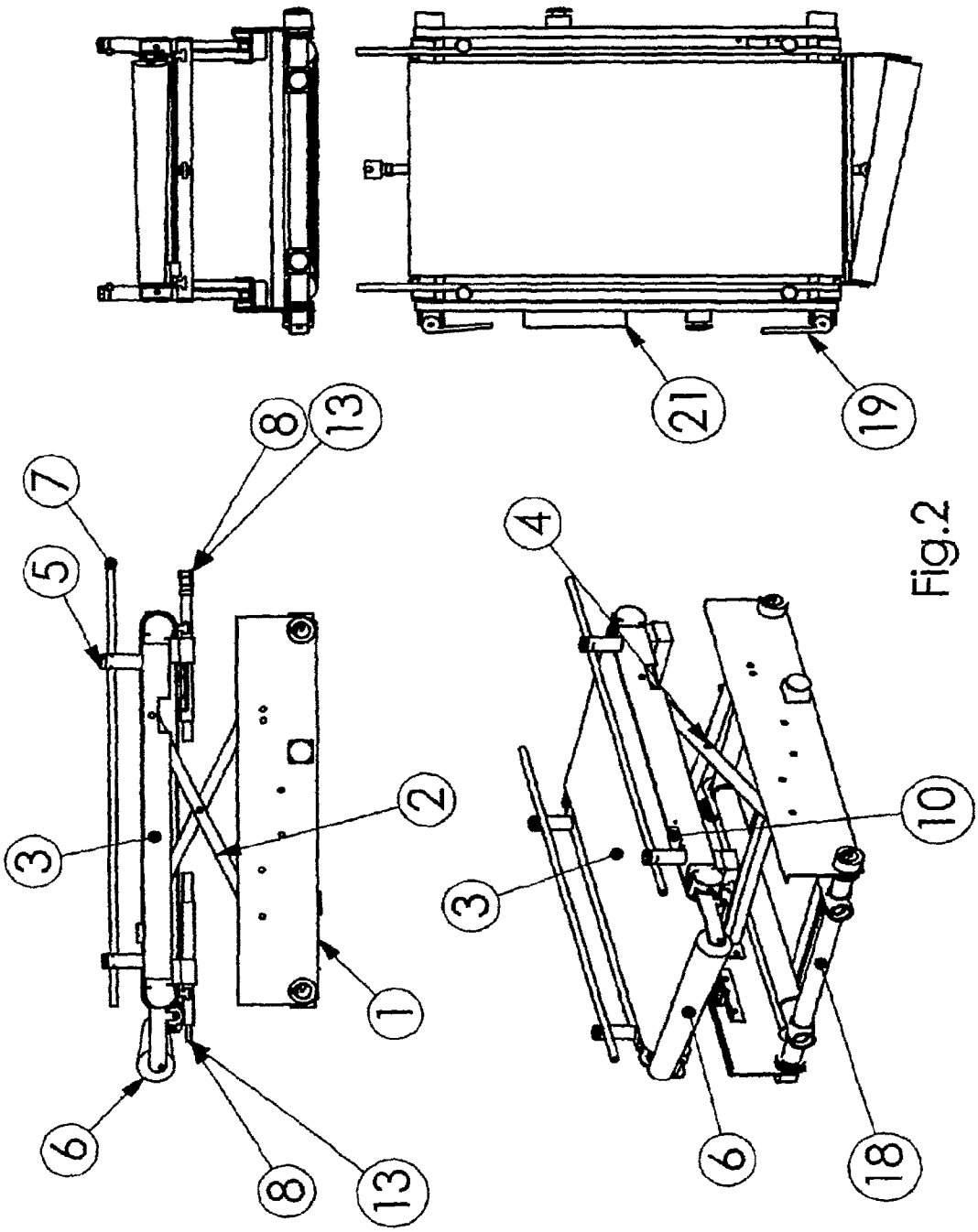


Fig.2

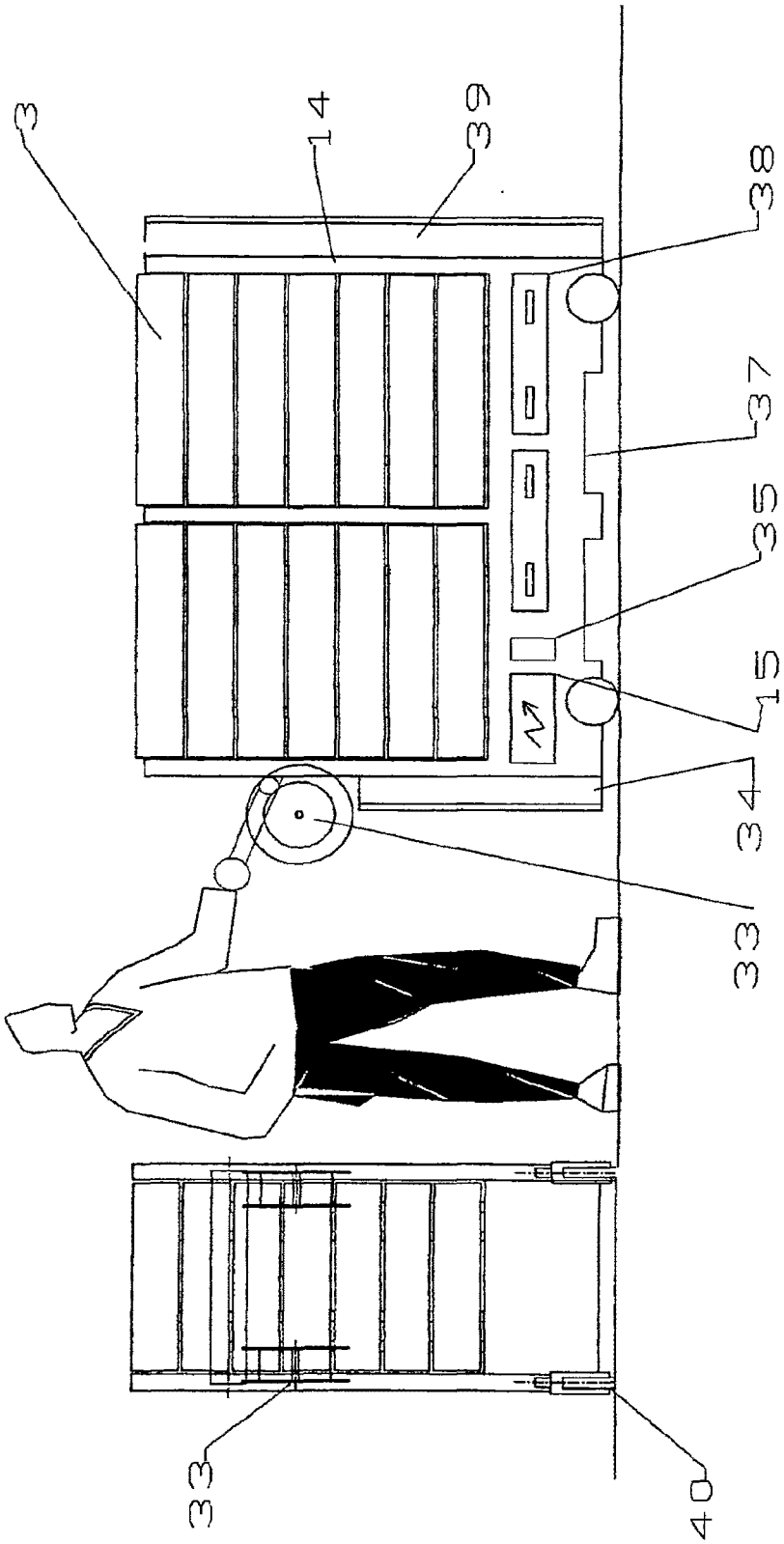


Fig.3

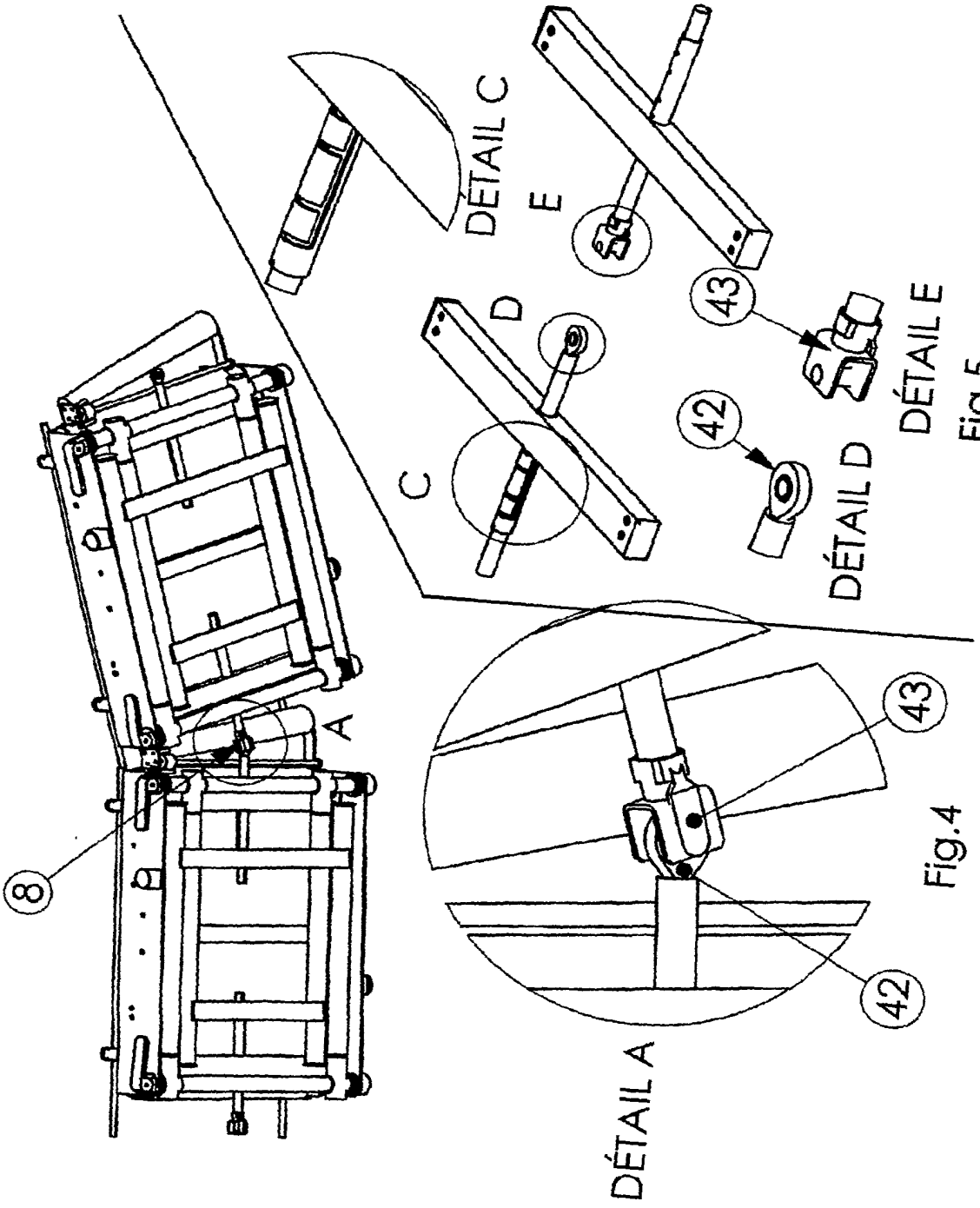


Fig.4

Fig.5

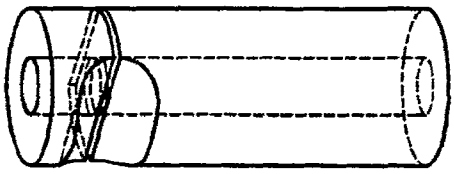
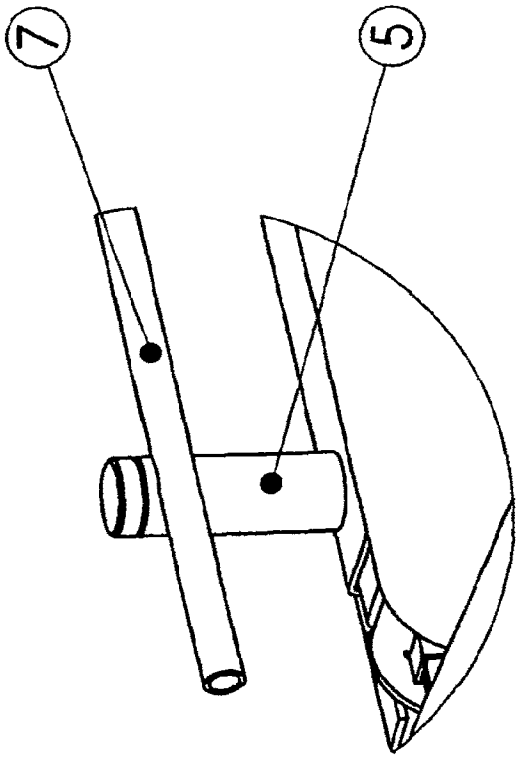


Fig.7



DÉTAIL A

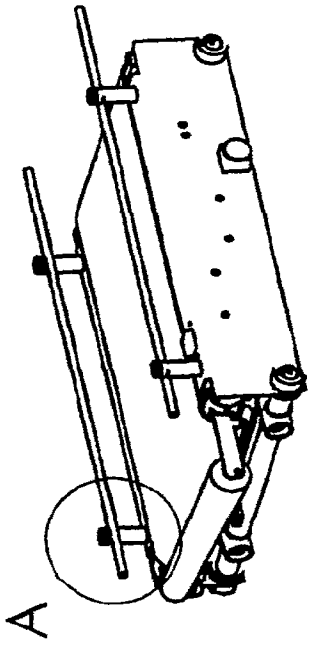
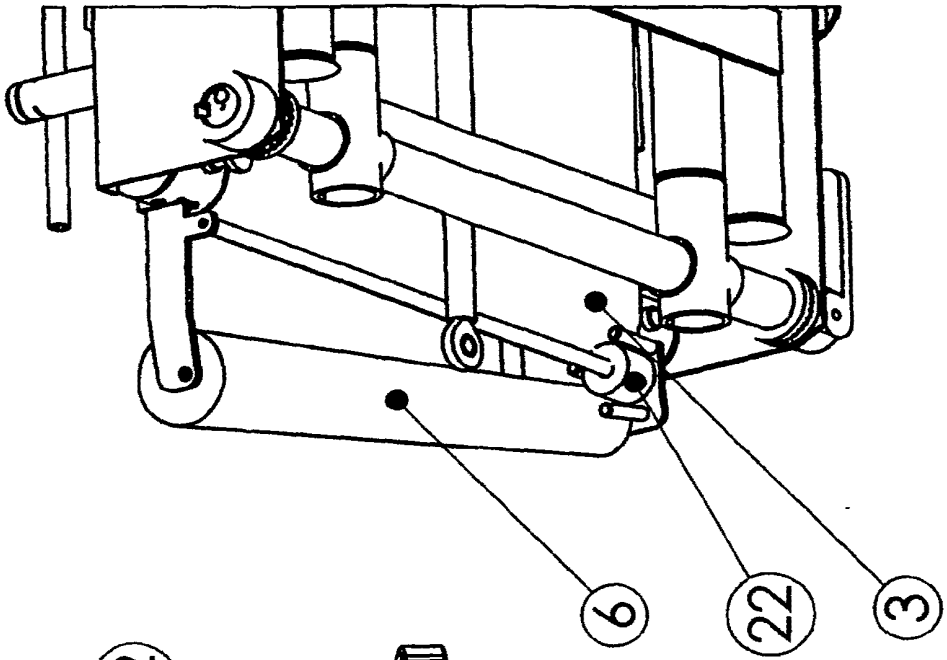


Fig.6



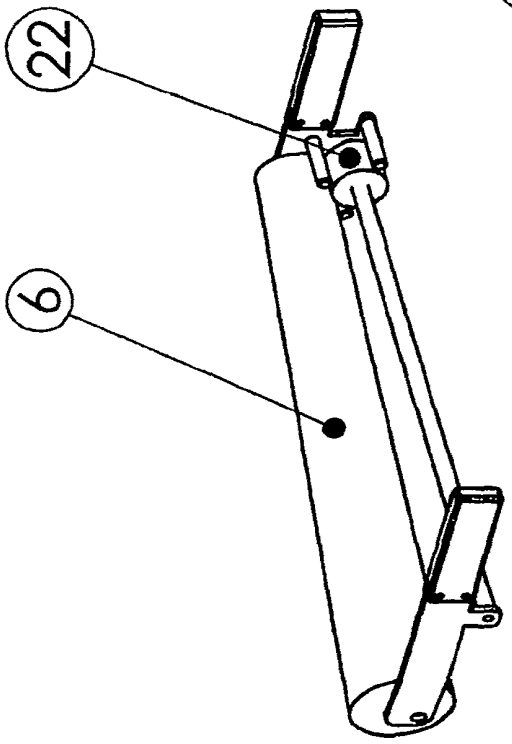


Fig.8

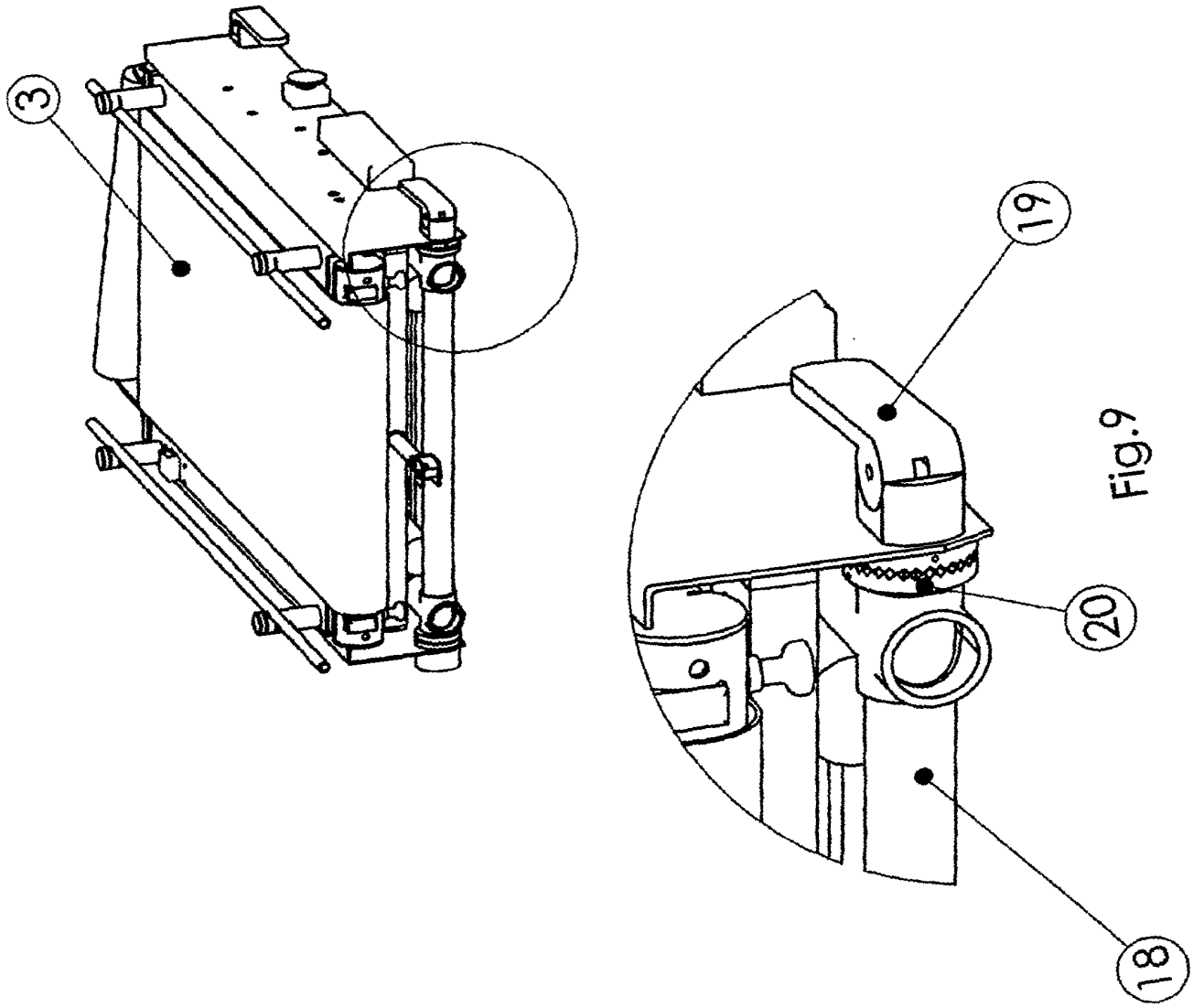


Fig.9

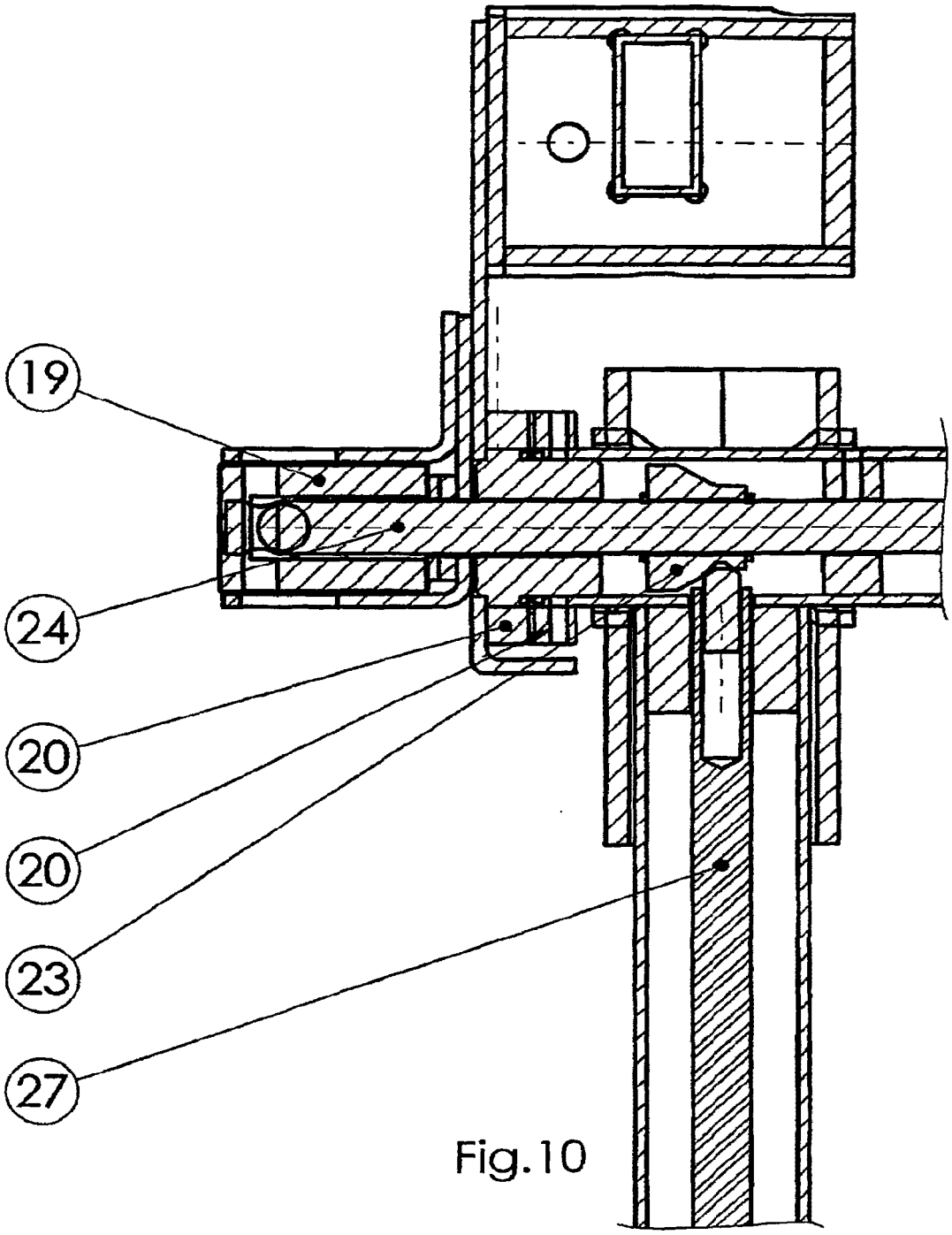


Fig.10

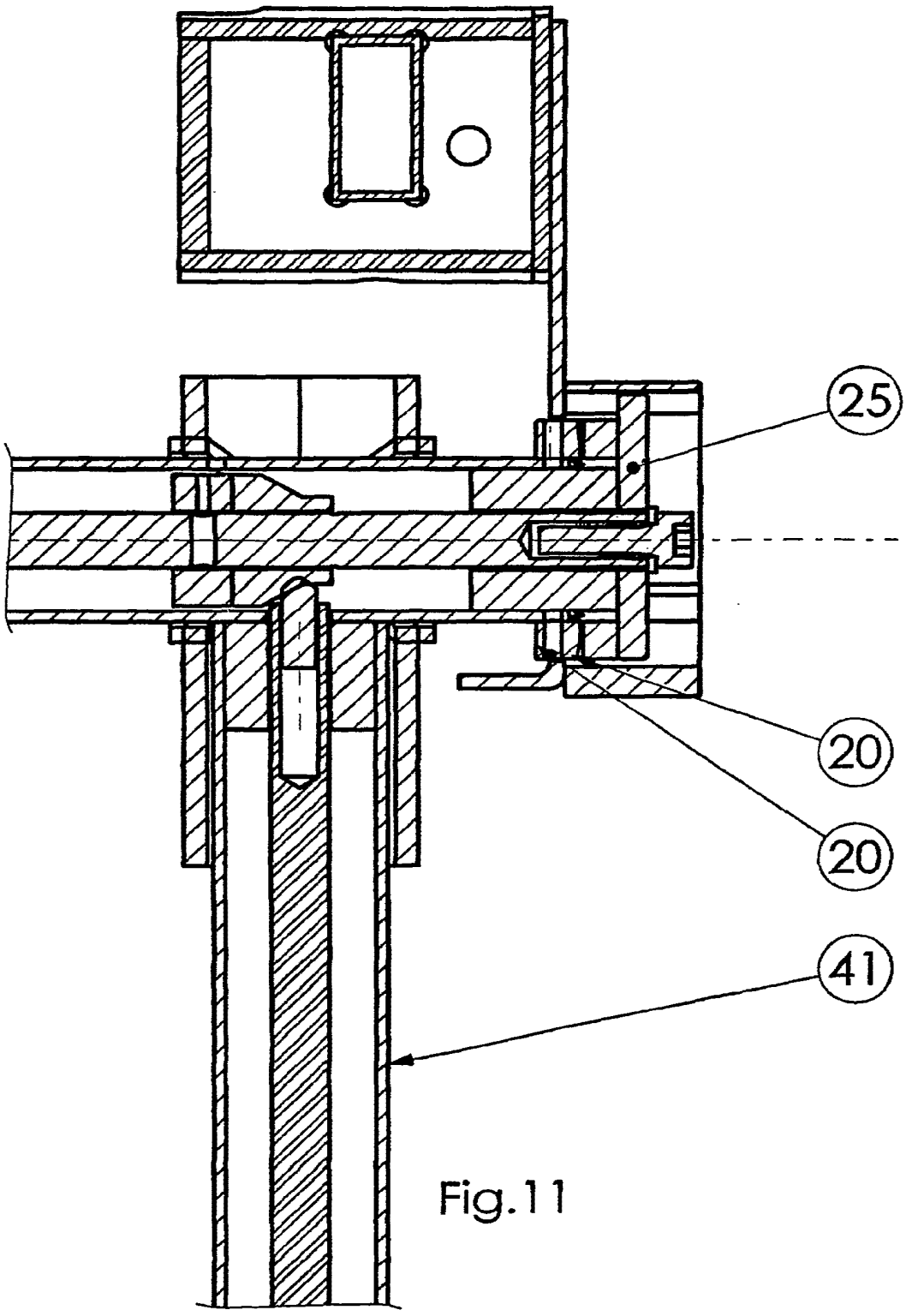


Fig.11

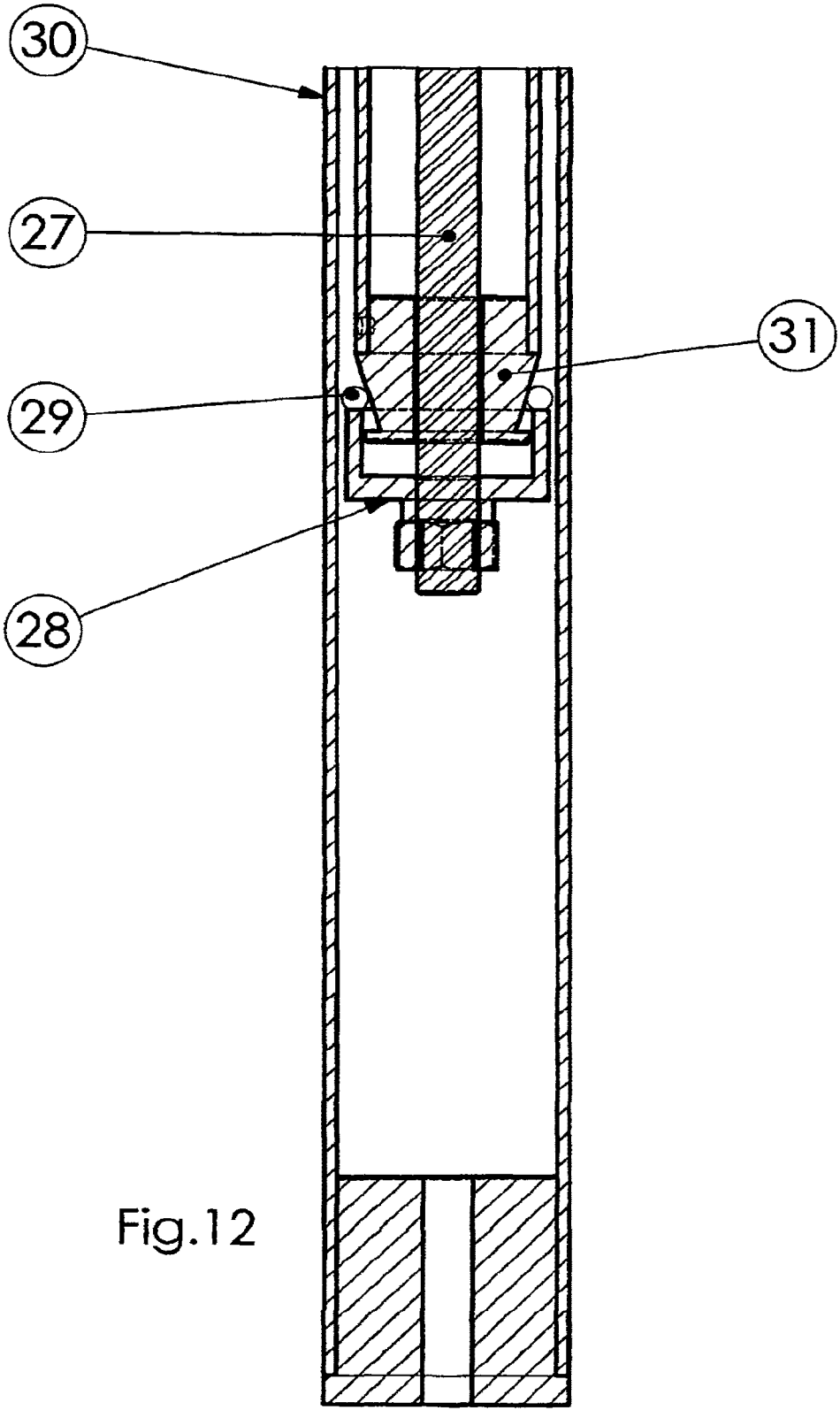


Fig.12

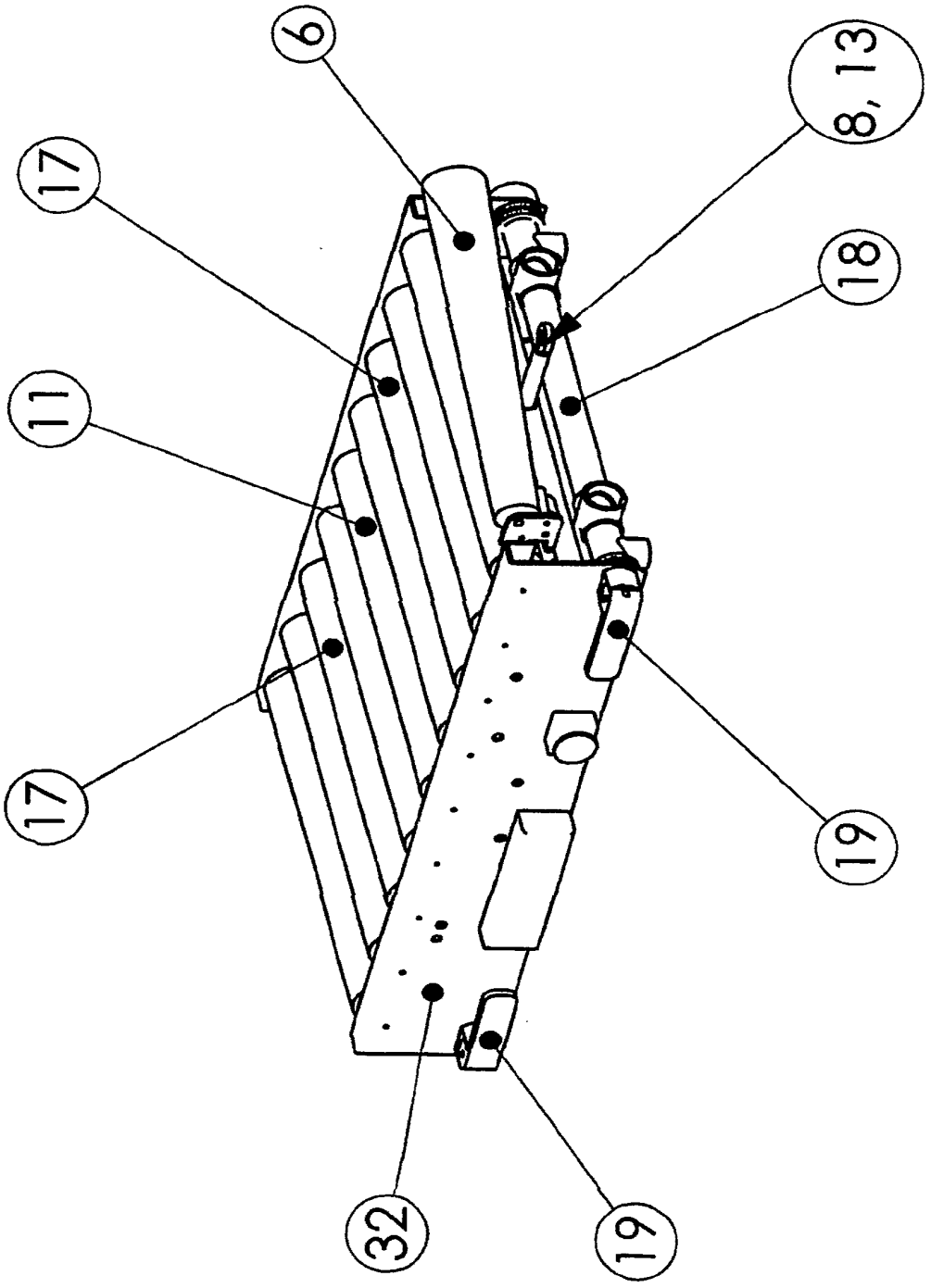


Fig.13

RÉFÉRENCES CITÉES DANS LA DESCRIPTION

Cette liste de références citées par le demandeur vise uniquement à aider le lecteur et ne fait pas partie du document de brevet européen. Même si le plus grand soin a été accordé à sa conception, des erreurs ou des omissions ne peuvent être exclues et l'OEB décline toute responsabilité à cet égard.

Documents brevets cités dans la description

- US 5662209 A **[0001]**

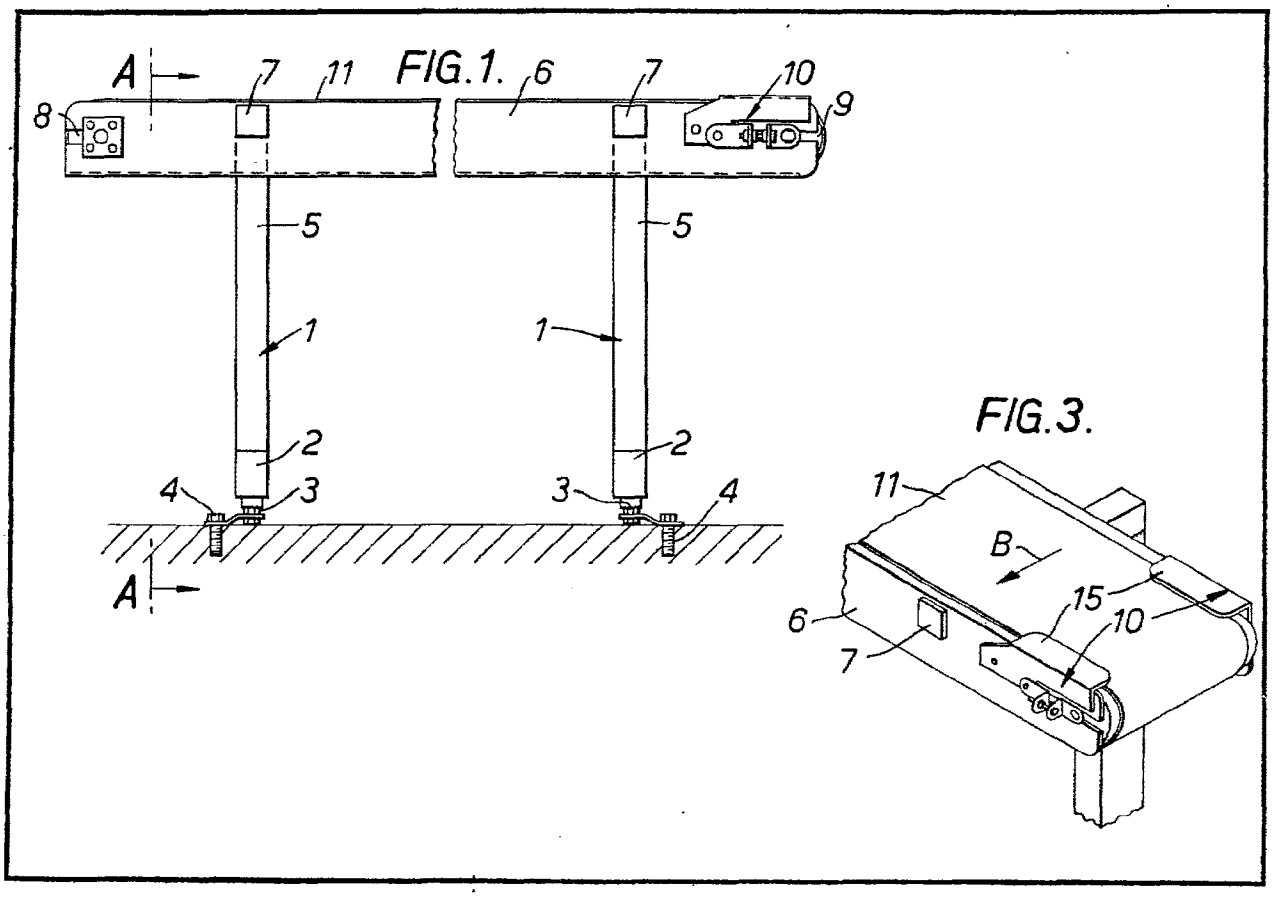
(12) UK Patent Application (19) GB (11) 2 041 315 A

(21) Application No 8003082
(22) Date of filing 30 Jan 1980
(30) Priority data
(31) 79/04527
(32) 8 Feb 1979
(33) United Kingdom (GB)
(43) Application published
10 Sep 1980
(51) INT CL³
B65G 21/00
(52) Domestic classification
B8A LD LK R8 S26
(56) Documents cited
GB 2017619A
GB 1491573
GB 1313687
GB 679951
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GB 590008
(58) Field of search
B8A
(71) Applicant
Cope Whelon & Company Limited, Vastern House, 57 Vastern Road, Reading, Berkshire

(72) Inventor
Cecil John Cope
(74) Agent
Jensen & Son

(54) **An Endless Belt Conveyor Unit**

(57) A conveyor unit for use, particularly, in food processing has a pair of spaced supports 5 carrying a frame 6. An endless conveyor belt 11 is supported by two rollers 8, 9 rotatably mounted in the frame 6. The frame 6 is secured by one side only to the supports 5 so as to be cantilevered horizontally to thereby have a free unsupported side. One of the rollers 9 is mounted on the frame through tensioning means 10 to enable the tension in the belt to be adjusted. When the tensioning means is slackened the conveyor belt can be removed and replaced from the unsupported side without having to be cut or joined. Alternative forms of tensioning means are provided.



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FIG. 1.

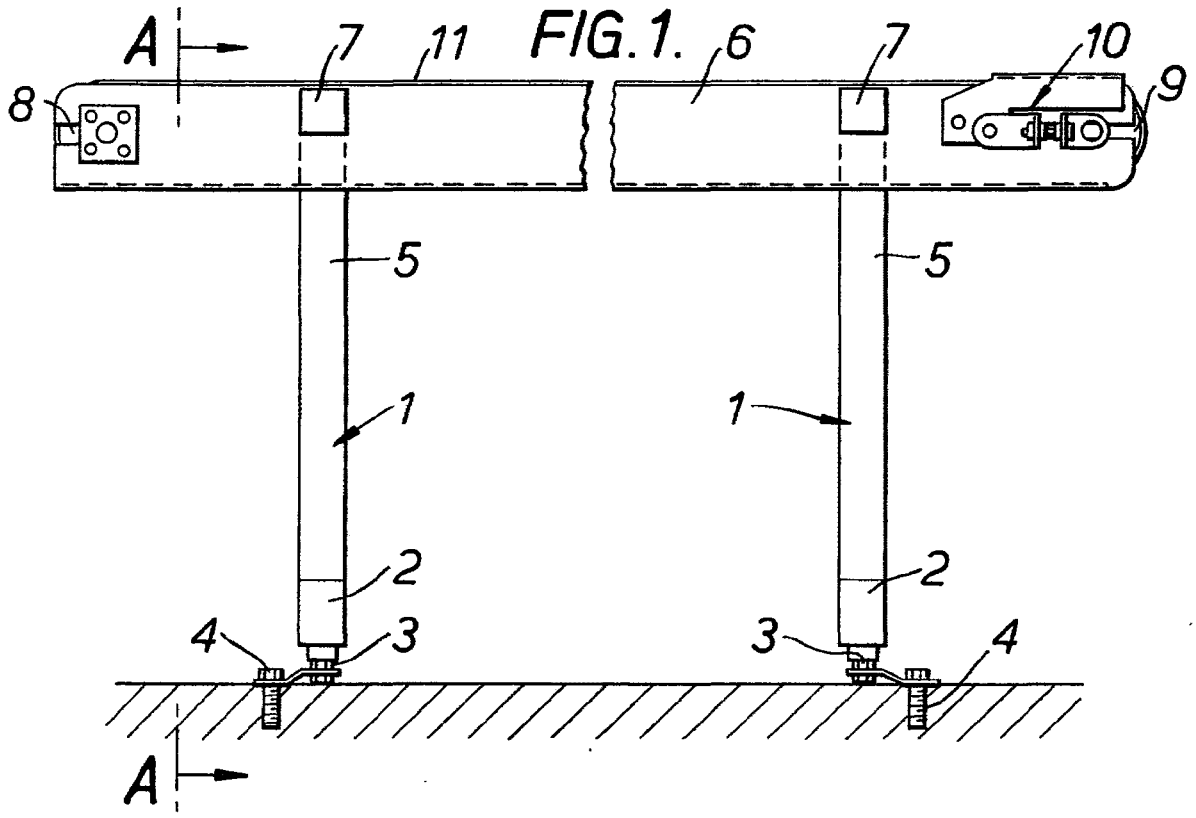


FIG. 2.

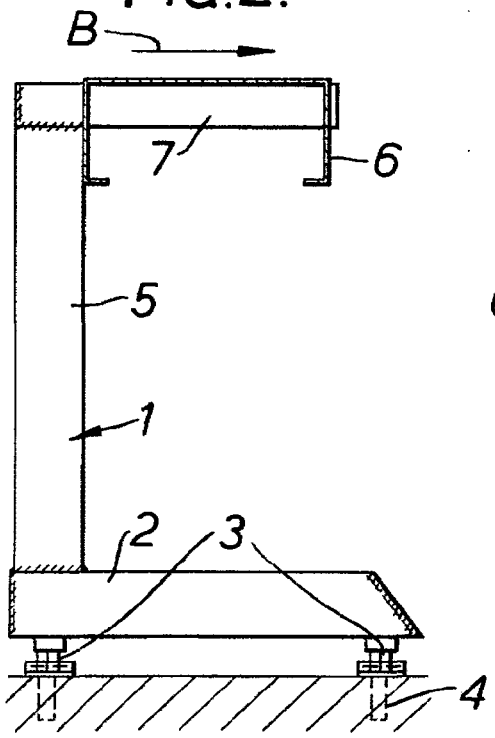
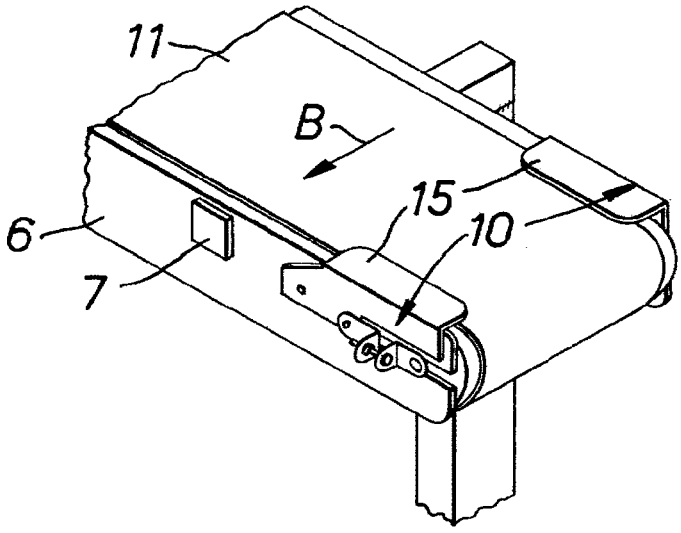


FIG. 3.



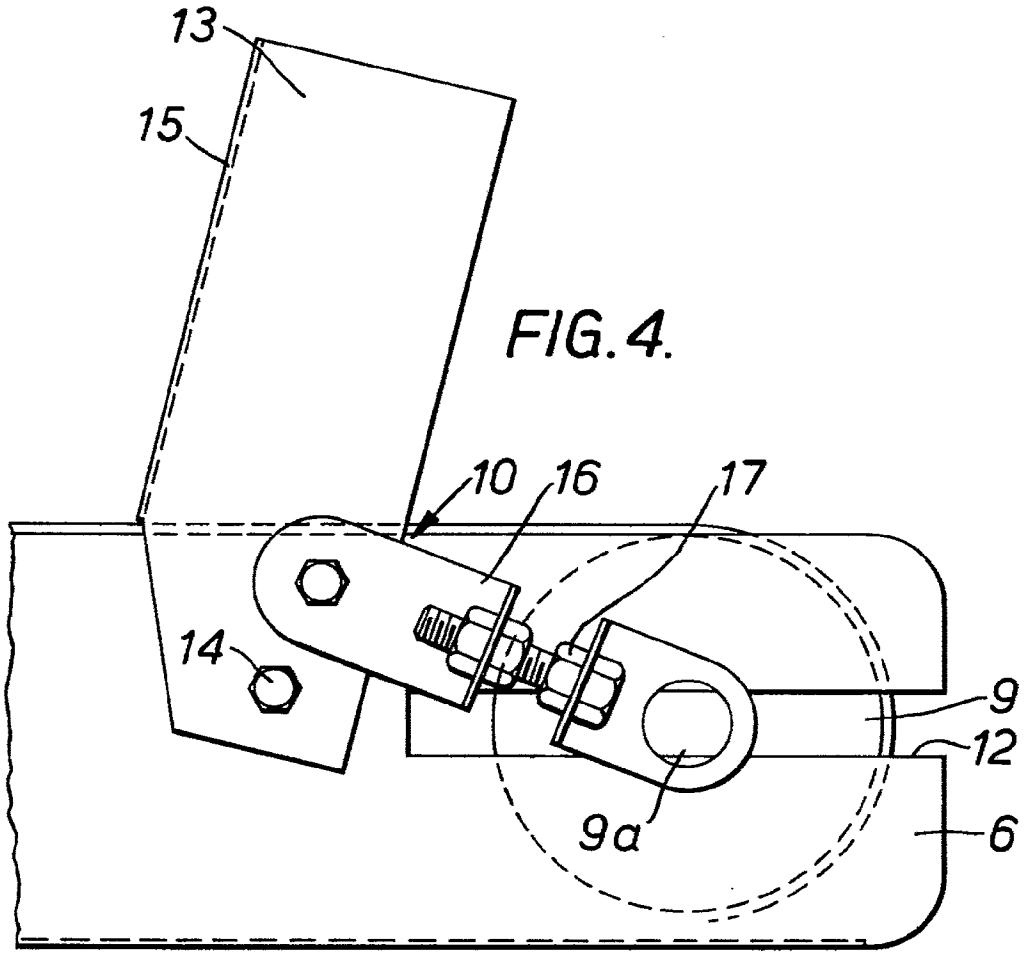
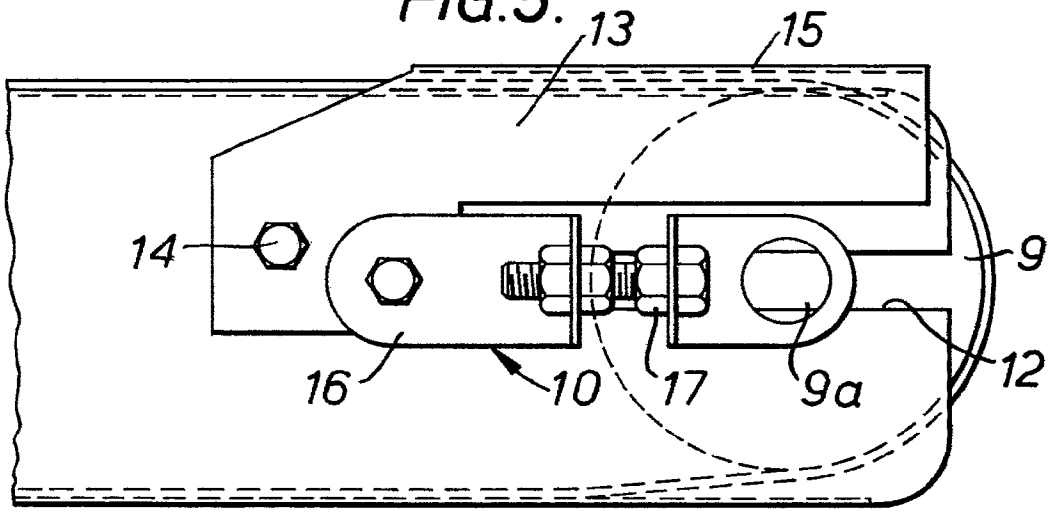


FIG.4.

FIG.5.



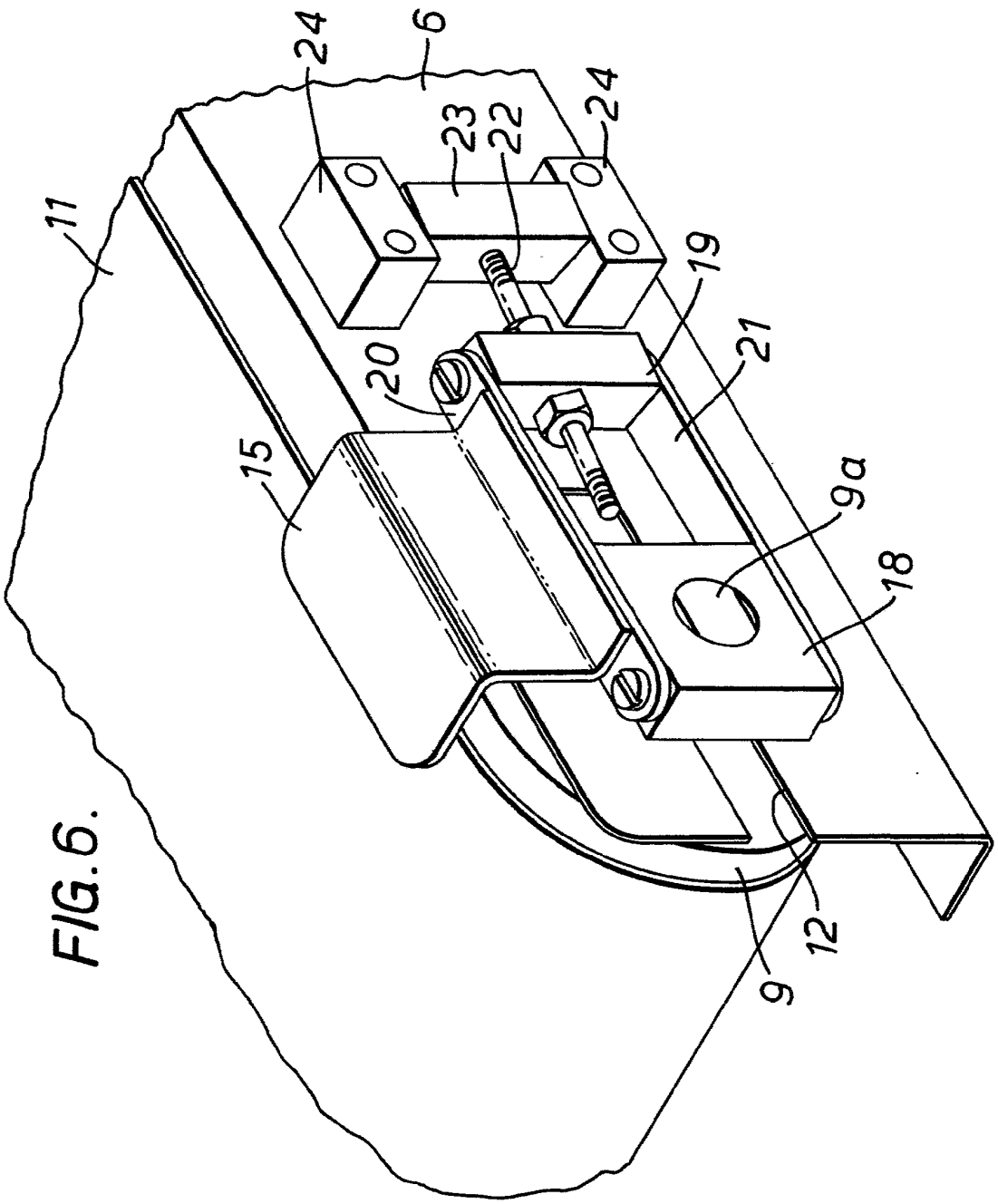
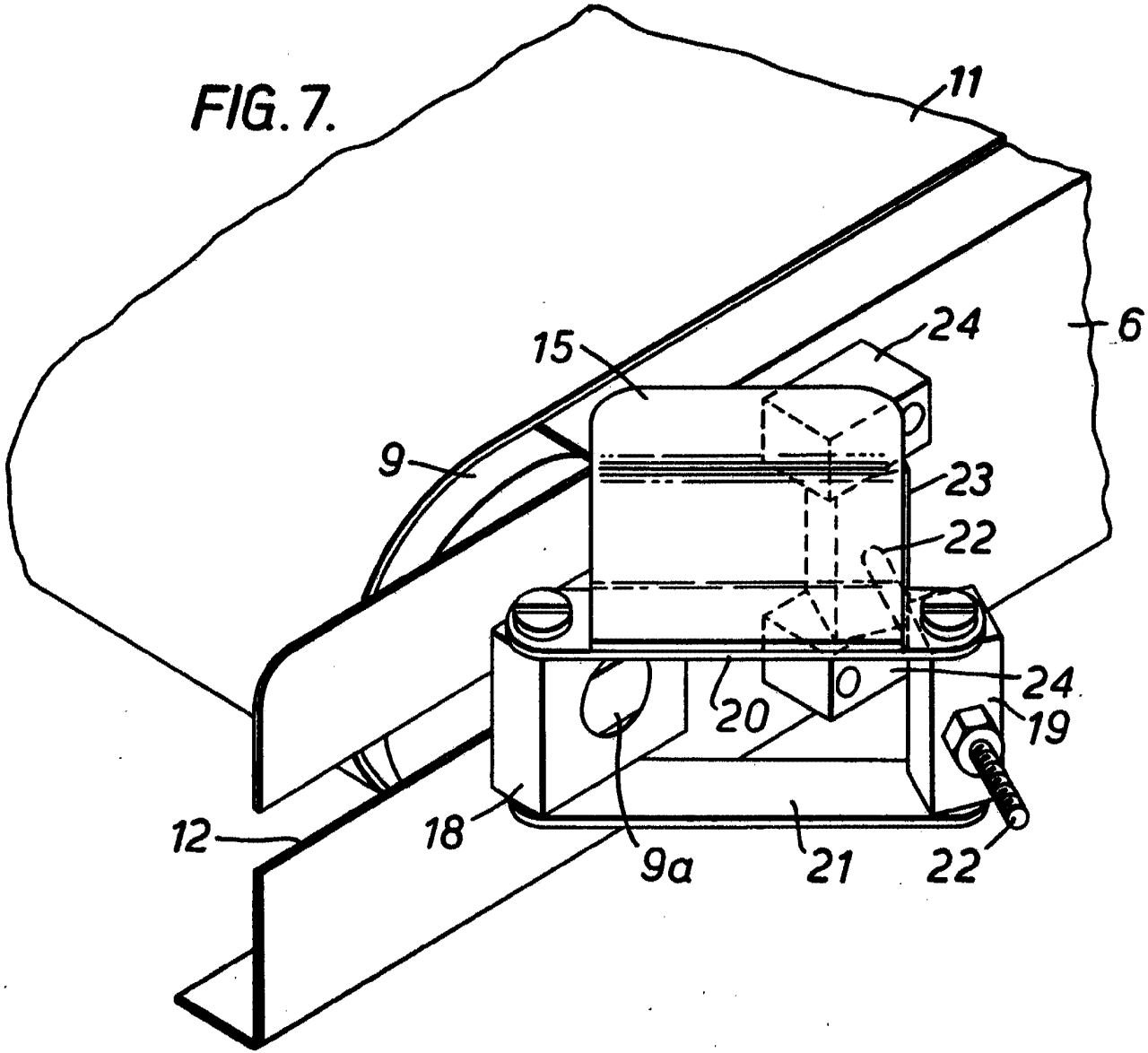


FIG.6.

FIG. 7.



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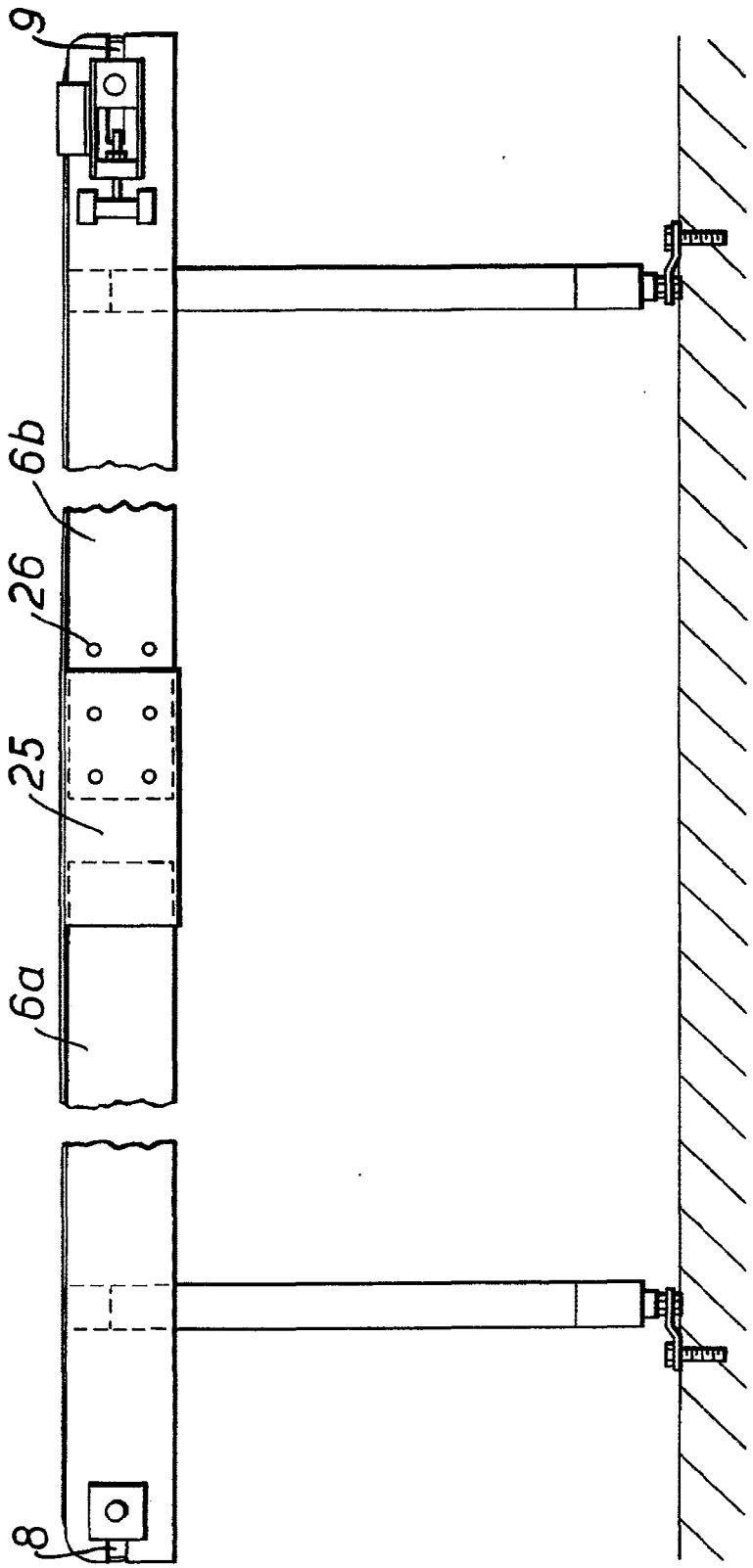


FIG.8.

SPECIFICATION

A Conveyor Unit

This invention relates to a conveyor unit having an endless conveyor belt which is particularly, but not exclusively, suitable for use in the food processing industry.

In the food processing industry wide use is made of endless belt conveyors for transporting food, such as chicken carcasses, or trays containing food, from one processing station to the next. Cleanliness is an essential requirement and the machinery and conveyor must be cleaned and sterilised regularly. In order to remove for cleaning purposes, an endless conveyor belt from one type of known conveyor it is necessary to cut the belt. After the belt has been cleaned and sterilised it is placed back on the conveyor and the cut ends are heat sealed together to remake the endless conveyor belt. It has also been known to use belts which are joined together by fastening means which can be unfastened to enable the belt to be removed from the conveyor. Such fastening means, however, have the disadvantage that they are not completely smooth and hence form dirt or germ traps which are much more difficult to clean and sterilise.

The present invention seeks to provide a conveyor unit in which an endless belt can be removed for cleaning purposes without being cut, and replaced after cleaning without difficulty.

According to the present invention there is provided an endless belt conveyor unit including support means to which is secured an elongate conveyor comprising an endless belt mounted on at least two rollers in spaced parallel relationship, the conveyor being secured, by one side only, to the support means and extending horizontally therefrom in the form of a cantilever so that the opposite side of said conveyor to said one side is unsupported, tensioning means being provided for tensioning the belt, the arrangement being such that when the tensioning means is slackened, the conveyor belt can be removed and replaced from said opposite side without having to be cut or joined.

Preferably, the support means comprises a pair of spaced substantially L-shaped support members having a substantially horizontal base mounted on adjustable feet, and having a vertical arm to the top of which one side of the conveyor is secured.

In a preferred embodiment the conveyor is mounted in a frame secured to said support members, the belt being supported on two rollers rotatably mounted in said frame. Preferably, in this form, one of the rollers is driven by a motor and the other roller is secured to the frame through the tensioning means so that the position of the roller relative to the frame is adjustable.

Embodiments of the invention will now be described by way of example with reference to the accompanying drawings, in which:—

Figure 1 shows a side-view of an endless belt conveyor unit,

Figure 2 shows an end view in the direction A—A of Figure 1,

Figure 3 shows a perspective view of part of the conveyor unit,

Figure 4 shows a side view to a greater scale, of the tensioning means with the conveyor belt slackened,

Figure 5 shows a view similar to Figure 4 but with the tensioning means tensioning the conveyor belt,

Figure 6 shows a perspective view of an alternative embodiment of the tensioning means,

Figure 7 shows the embodiment of Figure 6 with the conveyor belt slackened off, and

Figure 8 shows a conveyor unit having means for adjusting the spacing between conveyor rollers.

Referring firstly to Figures 1 and 2 there is shown an endless belt conveyor unit intended for use in the food processing industry and comprising a unit for transferring items from a first station to a second station. The unit includes a pair of spaced L-shaped support members 1 which are arranged in parallel and are substantially identical. Each support has a base 2 which is mounted on adjustable feet 3. In the installed condition the feet 3 may be secured to the ground by bolts 4 as shown in Figure 1. A conveyor support leg 5 extends vertically from one end of each of the base members 2.

A conveyor supporting frame 6 is secured to the upper ends of the legs 5, the framework extending beyond the legs as shown in Figure 1. To secure the framework 6 to the legs a horizontal arm 7 extends, as a cantilever, from the top of each leg 5 to which the arms 7 are welded. The frame 6 is secured to the arms 7. At one end of the frame 6 there is rotatably mounted a motor-driven conveyor drum or roller 8 whilst at the other end there is rotatably mounted a further roller 9, parallel to the driven roller 8. The position of the roller 9 is adjustable relative to the frame 6 and hence the roller 8 by means of a tensioning device 10. The tensioning device will now be described in greater detail with reference to Figures 3, 4 and 5. An endless conveyor belt 11 extends round both of the rollers 8 and 9.

As shown particularly in Figure 4, the roller 9 is mounted in a slot 12 in the frame 6, the slot 12 extending towards the other roller 8 so that the position of the roller 9 relative to the slot determines the degree of slackness imparted to the conveyor belt 11. The position of the drum 9 in the slot is determined by the tensioning means 10. The tensioning means 10 is provided on both sides of the conveyor roller 9 as shown in Figure 3 although for the sake of simplicity only one side will be described. Each tensioning means has a first lever 13 secured to the frame 6 so as to be pivotable about an axis 14. The lever 13 has a web 15 extending perpendicularly to the main face of the web so as to overlie the edge of the conveyor belt to form a guard when the tensioning means is in the position of tensioning

the belt, that is in the normal operation position. This position is shown in Figure 5.

The axle 9*a* of the roller 9 is connected to the lever 13 by a link 16 which is pivotably mounted to the axle 9*a* and also to the lever 13 at a point thereon spaced from the axis 14. The link 16 includes a screw threaded device 17 for adjusting the length thereof. It will be understood that the final position of the roller 9 relative to the frame 6, which position determines the tension in the conveyor belt, can be adjusted by varying the length of the link 16.

In operation, when it is desired to remove the conveyor belt for cleaning or replacement, the tensioning means is slackened by moving the lever 13 to the position shown in Figure 4. The conveyor belt can then be removed from the unit without being cut in any way by moving it in the direction of the arrow B shown in Figure 2 and 3. After the belt has been cleaned and sterilised it can be repositioned on the machine in the same manner without being cut and rejoined. When the belt has been replaced the tensioning device is moved to the position shown in Figure 5 to tension the belt. Thus, by having spare clean belts available a clean belt can be placed on the conveyor unit in a matter of seconds in contrast to the known arrangements in which the belt had to be cut and subsequently fastened by means of a fastening device or by heat sealing, both of which methods have the disadvantages discussed earlier.

Referring now to Figure 6, there is shown an alternative embodiment of tensioning means. As in the previous embodiment, the tensioning means provided on both sides of the conveyor belt although only one side is shown and described. In this embodiment each end of the axle 9*a* is mounted in a block 18 forming part of a quick release mechanism. The block 18 is connected to a further block 19 through an upper link and a lower link 20, 21 respectively which are pivotally secured adjacent their ends to the blocks so as to be pivotable about a common vertical axis on each block. A belt guard 15 is secured to the upper link 20 so as to over-lie the edge of the conveyor belt 11 when the tensioning device is tensioning the belt 11.

The block 19 is connected through a link 22 to a further block 23 which is itself pivotally mounted so as to be pivotable about a vertical axis in mountings 24 secured to the frame 6 of the conveyor unit.

The link 22 consists of a screw-threaded shaft rotatable relative to the block 19 and secured thereto by means of lock units 25. The length of the link 22 is thus adjustable.

In Figure 6 the mechanism is shown in the belt tensioning position. To slacken the belt 11 the centre of the mechanism i.e. in the region of the block 19 is pulled laterally away from the frame 6 to the position shown in Figure 7. A handle may be provided on the block 19 for this purpose. Since the lengths of the links 20, 21 and 22 are fixed this movement causes the block 18, and hence the axle 9*a* and roller 9, to be drawn towards the block 25, whose position relative to the frame 6 is fixed by the mountings 24.

The movement of the link 20 away from the belt also ensures that the belt guard 15 is moved clear of the belt 11. The belt 11 can thus be removed and replaced as described previously.

Referring now to Figure 8 there is shown an alternative form of main frame of the conveyor unit modified to provide a range of adjustment between the conveyor rollers, 8, 9 in addition to that provided by the adjustment on the tensioning device. In this embodiment the frame 6 consists of two parts 6*a*, 6*b* which are joined on each side of the frame by a respective connecting plate member 25. The member 25 is secured by welding for example, to one part 6*a*. The frame part 6*b* has a plurality of spaced bolt holes 26 through selected ones of which the member can be secured to the frame part 6*b* to provide the desired spacing between the rollers 8, 9.

For very long conveyor belts the range of movement for tensioning the belt and providing sufficient slackness to enable the belt to be removed provided by the tensioning means 10 may not be sufficient. In this case, the two frame parts 6*a*, 6*b* may be connected through a quick release mechanism as shown in Figures 6 and 7. Thus, the mountings 24 would be secured to one frame part and the block 18 to the other. Operation of the mechanism in conjunction with the tensioning means controlling the position of the roller 9 provides a greater range of movement for tensioning purposes.

Although as described the conveyor supporting surface is horizontal it will be understood that the conveyor may be inclined to transfer items from one level to another.

It will also be understood that the conveyor unit support could be provided with four or more legs in the form of a table or may be a cabinet or similar box-like support. In this case, the conveyor unit would be in section, in the form of a very shallow C-shape having an upper free arm carrying the frame 6 and hence the conveyor rollers and belt and a lower free arm secured to the top of the table or cabinet.

In certain cases, particularly when conveying heavy loads, excessive bending loadings may be imposed on the cantilever framework. To avoid this easily detachable stays, or supports, could be mounted adjacent the open side of the conveyor unit so that the conveyor frame 6 is supported on both sides of the belt during operation.

Claims

1. An endless belt conveyor unit including support means to which is secured an elongate conveyor comprising an endless conveyor belt mounted on at least two rollers in spaced parallel relationship, the conveyor being secured, by one elongate side only, to the support means and extending therefrom in the form of a cantilever so that the opposite elongate side of the said conveyor is unsupported and the belt load-

supporting surface is substantially horizontal, tensioning means being provided for tensioning the belt, the arrangement being such that when the tensioning means is slackened, the conveyor belt can be removed and replaced from said opposite side without having to be cut and/or disconnected or joined.

2. A conveyor unit as claimed in claim 1 wherein the support means comprises a pair of spaced substantially L-shaped support members, each having a substantially horizontal base mounted on adjustable feet and a vertical arm to which said one elongate side of the conveyor is secured.

3. A conveyor unit as claimed in claim 1 or 2 wherein the conveyor is mounted in a frame secured to said support members, the belt being supported on at least two rollers rotatably mounted in said frame.

4. A conveyor unit as claimed in claim 3 wherein one of said rollers is adapted to be driven by a motor and is mounted in a fixed location on the frame and the other roller is movably mounted on the frame, its position thereon being determined by the tensioning means so that the distance between the rollers is adjustable.

5. A conveyor unit as claimed in claim 4 wherein the tensioning means includes a lever pivotally mounted on said frame so as to be pivotable between a belt-release position and a belt-tensioning position, and a link pivotally connected at one of its ends to said other roller and at its other end to the lever at a point spaced from the pivotal axis of the lever, the arrangement being such that pivotal movement of the lever is transmitted through said link to move said other roller relative to the positionally fixed roller to thereby vary the distance between the rollers.

6. A conveyor unit as claimed in claim 5 wherein the length of said link is adjustable to enable the tension in the belt to be varied.

7. A conveyor unit as claimed in claim 5 or 6 wherein when the lever is in the belt tensioning position, the tension in the belt acts through said link on the lever so as to maintain the lever in said belt-tensioning position.

8. A conveyor unit as claimed in any one of claims 5, 6 or 7 wherein the lever includes a web which, when the lever is in the belt tensioning position, overlies the edge of the belt to form a belt guard.

9. A conveyor unit as claimed in any one of claims 5 to 8 wherein a tensioning means is provided on each axial end of said other roller.

10. A conveyor unit as claimed in claim 4 wherein the tensioning means includes a link one end of which is pivotally mounted on mountings secured to said frame so as to be pivotable about a vertical axis between a belt release position and a belt tensioning position, the other end of the link being connected to a centre block connected through pivotal connections to a mounting block, the said other roller being carried by the mounting block, the mounting block and said other roller being movable relative to the frame towards and away from said mountings by movement of the centre block laterally away from the belt.

11. A conveyor unit as claimed in claim 10 wherein the length of said link is adjustable to enable the tension in the belt to be varied.

12. An endless conveyor belt unit substantially as described herein with reference to, and as illustrated in, the accompanying drawings.

Printed for Her Majesty's Stationery Office by the Courier Press, Leamington Spa, 1980. Published by the Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.

(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 2 239 108 A2

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
13.10.2010 Bulletin 2010/41

(51) Int Cl.:
B26D 1/143 *(2006.01)* *B26D 7/00* *(2006.01)*

(21) Application number: **10006877.4**

(22) Date of filing: **22.10.2008**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MT NL NO PL PT RO SE SI SK TR
Designated Extension States:
AL BA MK RS

(30) Priority: **22.10.2007 US 999961 P**
23.10.2007 US 202 P
21.10.2008 US 255661

(62) Document number(s) of the earlier application(s) in accordance with Art. 76 EPC:
08876638.1 / 2 212 067

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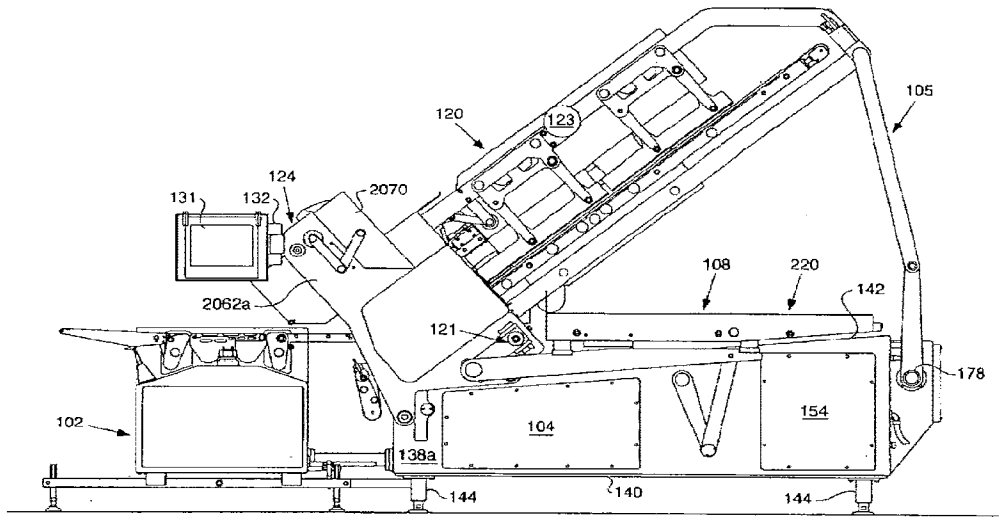
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Remarks:
This application was filed on 02-07-2010 as a divisional application to the application mentioned under INID code 62.

(54) A food article slicing machine having a slicing blade retraction mechanism

(57) A high speed slicing apparatus and a weighing and classifying conveyor combination that provides plural advantages in productivity by enhancing portion control and yield, food hygiene by implementing an automated cleanup position, etc., and operation by employing a laser food article end detection system. The invention provides a mechanism and method for slicing multiple food articles, independent of feed rate, and the ability to weigh each product group from each food article to achieve optimal weight control and yield of each food article.

FIG. 1



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Description

BACKGROUND OF THE INVENTION

[0001] Many different kinds of food articles or food products, such as food slabs, food bellies, or food loaves are produced in a wide variety of shapes and sizes. There are meat loaves made from various meats, including ham, pork, beef, lamb, turkey, and fish. The meat in the food loaf may be in large pieces or may be thoroughly comminuted. These meat loaves come in different shapes (round, square, rectangular, oval, etc.) and in different lengths up to six feet (183 cm) or even longer. The cross-sectional sizes of the loaves are quite different; the maximum transverse dimension may be as small as 1.5 inches (4 cm) or as large as ten inches (25.4 cm). Loaves of cheese or other foods come in the same great ranges as to composition, shape, length, and transverse size.

[0002] Typically the food loaves are sliced, the slices are grouped in accordance with a particular weight requirement, and the groups of slices are packaged and sold at retail. The number of slices in a group may vary, depending on the size and consistency of the food article and the desire of the producer, the wholesaler, or the retailer. For some products, neatly aligned stacked slice groups are preferred. For others, the slices are shingled or folded so that a purchaser can see a part of every slice through a transparent package.

[0003] Food articlescan be sliced on high speed slicing machines such as disclosed in U.S. Patents 5,628,237 or 5,974,925 or as commercially available as the FX180® slicer available from Formax, Inc. of Mokena, Illinois, USA.

[0004] The FX180® machine can be configured as an automatically loaded, continuous feed machine, or an automatically loaded, back-clamp or gripper type machine.

[0005] For an automatically loaded, continuous feed machine, side-by-side upper and lower conveyor pairs drive food articles into the cutting plane. A gate is located in front of the conveyors. The initial food articles are loaded with leading ends abutting the gate. The gate is lowered and the food articles proceed into the conveyors. When the initial food articles are sliced to the extent that the trailing ends of the food articles clear the gate, the gate is raised and new food articles are loaded in the feed paths, held back by the gate. Shortly thereafter the gate is lowered and new food articles slide down to where lead ends of the new food articles abut trailing ends of the initial food articles being sliced. The new food articles are driven into the cutting plane trailing the initial food articles. Food articles are sequentially and continuously loaded in this manner, lead end-to-trailing end, in abutting contact with the preceding food articles.

[0006] U.S. Patent 5,628,237 and European patent EP 0 713 753 describe a back-clamp or gripper type slicing machine. According to this type of slicing machine, two food articles are loaded onto a lift tray and the lift tray is raised to a ready-to-sweep position. Two loaf grippers are retracted after the previous food articles are sliced. During retraction of the loaf grippers, loaf-to-slicing blade gate doors are closed and ends of the previous food articles are dropped through a loaf end door. After the grippers have reached the retracted position or "home position" remote from the slicing blade, a loaf sweep mechanism is activated, moving the food articles laterally together into the slicing position. A spacing mechanism moves down and spaces the food articles apart. The grippers then advance after it has been determined that the loaf sweep mechanism has moved the food articles to the slicing position. The grippers have onboard sensing mechanisms that are triggered by contact with the food articles. After sensing and gripping the food articles, the food articles are retracted slightly, and the loaf-to-slicing blade gate doors are opened and the food articles are advanced to the slicing plane of the slicing blade. The loaf sweep mechanism retracts and the loaf lift tray lowers, ready for the next reload cycle. According to this design, in practice, the reload cycle is accomplished in about eight seconds. In a high volume slicing operation, reload cycle time can be a significant limitation to optimum production efficiency.

[0007] In either configuration the FX180® slicing machine has achieved great commercial success. However, the present inventors have recognized that it would be desirable to slice up to four food articles or more with independent feeding and weighing capabilities, with hygienic and operational enhancements.

SUMMARY OF THE INVENTION

[0008] The invention provides a mechanism and method for slicing multiple food articles with independency of feed rate and the ability to weigh each product group from each food article respectively to achieve optimal weight control and yield of each food article.

[0009] The present invention provides a high speed slicing apparatus and a weighing and classifying conveyor combination that provides plural advantages in productivity, food hygiene, and operation.

[0010] The combination provides food hygiene advantages by use of unibody construction with minimal penetrations, double sealed door closures, self draining angled surfaces, the use of hygienic, round, sealed adjustable legs, the use of an automatic debris or scrap removal conveyor, a hygienic configuration of a food article lift and sweep mechanism. Further, the combination provides an automated cleanup position wherein, the elevated food article feed mechanism can be collapsed to a more convenience plane or maintenance position, the weighing and classifying conveyor is oriented at a distance from the slicing apparatus for ease of cleanup and maintenance, and the blade cover is automatically lifted to a cleanup position. The weighing and classifying conveyor includes way conveyor belts that are separable from their respective drive motors for ease of cleaning

and maintenance. Additionally, all product contact conveyor belts throughout the combination are easily removable.

[0011] The combination provides for enhanced portion control and yield. A food article feed mechanism ensures accurate feeding by the use of servo driven and controlled feed belts and grippers. The slicing mechanism includes up to four independent drives for slicing four or more food articles simultaneously. An enhanced food article gate swing is withdrawn, not laterally but longitudinally toward the knife blade to ease the food articles toward the slicing plane.

[0012] Operationally, food article grippers are provided which minimize the longitudinal length of remainder ends of sliced food articles. In this regard, food article sensors have been removed from the grippers and a laser food article end detection system is employed which allows for a more compact, smaller-bite gripper.

[0013] A mechanism is provided to retract the slicing blade from the slicing plane during the dwell between sliced groups to prevent scrap generation. Further, a mechanism is provided to both dynamically and mechanically brake the slicing blade to a quick stop.

[0014] Laser intrusion detectors are used to shut down systems when an unwanted intrusion by an operator is detected.

[0015] An onboard information carrier system utilizing a RFID target and a read/write head is provided on the slicing blade and the shear support to simplify equipment set up, operation and maintenance.

[0016] An automated, sequenced food article tray loading method and apparatus is provided wherein food articles can be loaded sequentially into the lift tray into designated and separated lanes which automatically sequentially assume a preload condition, and after the food articles are loaded, food article separation is maintained on the lift tray. A food article transfer mechanism or sweep mechanism is provided which receives the food articles on the lift tray in their separated positions and transfers the food articles into the food article feed mechanism while maintaining the separated positions.

[0017] A stack/draft completion feature is possible with the apparatus of the invention wherein incomplete stacks/drafts can be moved from the jump conveyor to the deceleration conveyor and new food article scrap can be off loaded to the scrap or debris conveyor for disposal. The incomplete stacks/drafts can then be reloaded to the jump conveyor for completion of the stacks/drafts.

[0018] Two involute-shaped blade sizes are compatible with the slicing apparatus wherein a quick changeover between blade types is provided.

[0019] The combination of the invention provides multiple configurations to slice, weigh and classifying 1, 2, 3, 4 or more food articles.

[0020] Numerous other advantages and features of the present invention will become readily apparent from the following detailed description of the invention and the embodiments thereof, and from the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021]

Figure 1 is a near side elevational view of a slicing machine and a weighing and classifying conveyor combination of the present invention;

Figure 2 is an elevational view of the combination of figure 1 with some panels removed or made transparent illustrating some underlying components;

Figure 3 is an elevational view of the combination of figure 1 with further panels removed or made transparent and underlying components revealed;

Figure 4 is a rear view of the combination shown in figure 3;

Figure 4A is an elevational view of the combination of figure 1 in a clean-up, non-operational position;

Figure 4B is a fragmentary, elevational, enlarged view of a portion of the slicing machine shown in figure 1;

Figure 5 is a far side elevational view of the combination shown in figure 1;

Figure 6 is a far side perspective view of the combination shown in figure 5;

Figure 7 is a rear view of the combination shown in figure 3;

Figure 8 is an enlarged, fragmentary near side elevational view of food article lift tray and food article positioning systems;

Figure 8A is an enlarged fragmentary sectional view taken generally along line 8A-8A of Figure 9;

Figure 9 is a fragmentary plan view of a food article lift tray;

Figure 10 is a rear view of the food article lift tray shown in figure 9;

Figure 11 is a rear view of the food article lift tray and food article transfer apparatus;

Figure 12 is a fragmentary perspective view of the food article lift tray and food article transfer apparatus;

Figure 12A is an enlarged elevational view of the food article transfer apparatus;

Figure 13 is a plan view of the food article transfer apparatus;

Figure 14 is a plan view of the food article feed apparatus;

Figure 15 is an elevational view of the food article feed apparatus shown in figure 14;

Figure 15A is a sectional view taken generally along line 15A-15A;

Figure 16 is an elevational view of the food article feed apparatus;

Figure 17 is a plan view of a gripper taken from the food article feed apparatus of figure 16;

Figure 17A is a front view of the gripper taken generally along line 17A-17A of figure 17;

Figure 18 is a sectional view taken generally along line 18-18 of figure 17A;
Figure 19 is a fragmentary perspective view of the food article feed apparatus;
Figure 20 is an enlarged sectional view of the attachment of the gripper to the belt;
Figure 21 is a sectional view taken generally along line 20-20 of figure 16;
Figure 22 is a sectional view taken generally along line 22-22 of figure 21;
Figure 23 is a sectional view taken generally along line 23-23 of figure 21;
Figure 24 is a plan view taken along line 24-24 figure 21;
Figure 25 is an elevational view taken generally along line 25-25 of figure 24;
Figure 26 is a fragmentary elevational view of a food article gate mechanism;
Figure 27 is a near side perspective view of the food article gate mechanism and a food article end removal mechanism in a first operative position;
Figure 28 is a near side perspective view of the food article gate mechanism and the food article end removal mechanism in a second operative position;
Figure 29 is a far side perspective view of the food article end removal mechanism;
Figure 30 is a top far side perspective view of the food article end removal mechanism;
Figure 31 is a far side elevation view of the food article gate mechanism and the food article end removal mechanism;
Figure 32 is a sectional view taken generally along line 32-32 of figure 2;
Figure 33 is a sectional view taken generally along line 33-33 of figure 32;
Figure 33A is a sectional view taken generally along line 33A-33A of figure 33;
Figure 34 is a perspective view of a portion of a slicing blade assembly taken from figure 32;
Figure 35 is a sectional view taken generally along line 35-35 of figure 32;
Figure 36 is a sectional view taken generally along line 36-36 of figure 32;
Figure 3 is an enlarged fragmentary far side elevational view of the combination of figure 1 showing underlying components and features;
Figure 38 is an enlarged fragmentary near side elevational view of the combination of figure 1 showing underlying components and features;
Figure 39 is a plan view of mechanical components within the base section of the combination shown in figure 1;
Figure 40 is a bottom perspective view of the lift tray and food article feed apparatus;
Figure 41 is a far side perspective view of a front portion of the combination of figure 1;
Figure 42 is a near side perspective view of a food article positioning apparatus and food article feed elevation adjusting apparatus;
Figure 43 is a near side perspective view of a food article shear support;
Figure 44 is a Front elevational view of the shear support shown in figure 43;
Figure 44A is a front elevational view of a slicing blade with respect to the shear support;
Figure 44B is a sectional view taken generally along line 44B-44B of figure 44A;
Figure 44C is a sectional view of a jump conveyor drive assembly taken generally along line 44C-44C of figure 35;
Figure 45 is a front perspective view of the slicing apparatus with the weighing and classifying conveyor removed;
Figure 46 is a near side perspective view of a front portion of the slicing apparatus with a cover removed to view inside components;
Figure 46A is a near side elevational view of the slicing apparatus showing underlying components;
Figure 47 is a far side of elevational view of the slicing apparatus showing underlying components;
Figure 48 is a front elevational view of the slicing apparatus with the weighing and classifying conveyor removed;
Figure 49 is a enlarged near side perspective view of the slicing apparatus;
Figure 50 is an enlarged near side perspective view of the slicing apparatus and weighing and classifying conveyor;
Figure 51 a is a diagrammatic plan new of a onboard information system according to one aspect of the invention;
Figure 52 is a diagrammatic sectional view of the onboard information system taken generally along line 52-52 of figure 51;
Figure 53 is a far side perspective view of a laser guard system according to another aspect, of the invention;
Figure 54 is a near side perspective view of the laser guard system;
Figure 55 is a near side elevation view of the weighing and classifying conveyor of figure 1 showing underlying components;
Figure 56 is a perspective view of a portion of a weighing conveyor with the conveyor belt and rollers removed;
Figure 57 is a bottom view of a weighing conveyor belt with frame and rollers removed from the weighing conveyor shown in figure 56;
Figure 58 is an enlarged elevational view of a portion of the weighing and classifying conveyor;
Figure 59 is a near side elevation view of the weighing and classifying conveyor shown in a clean-up position;
Figure 60 is a far side elevational view of the weighing and classifying conveyor;
Figure 60A is an end view of the weighing and clas-

sifying conveyor showing underlying components;
Figure 60B is a plan view of the weighing and classifying conveyor;
Figure 61 is a schematic representation of the combination of figure 1 showing a four food article set up;
Figure 62 is a schematic representation of the combination of figure 1 showing a three food article set up;
Figure 63 is a schematic representation of the combination of figure 1 showing a two food article set up;
Figure 64 is a progressive schematic diagram showing the loading of four food articles onto a food article lift tray;
Figure 65 is a schematic plan view showing the weighing and classifying conveyor configured for four lanes of sliced product;
Figure 66 is a schematic plan view showing the weighing and classifying conveyor configured for two lanes of sliced product;
Figure 67 is a schematic plan view showing the weighing and classifying conveyor configured for one lane of sliced product;
Figure 68 is a schematic plan view showing the weighing and classifying conveyor configured for three lanes of sliced product;
Figure 69 (not used)
Figure 70 is a schematic rear end view of the food article lift tray showing the tray configured to hold four square cross section food articles;
Figure 71 is a schematic rear end view of the food article lift tray showing the tray configured to hold four circular cross section food articles;
Figure 72 is a schematic rear end view of the food article lift tray showing the tray configured to hold four large D-shaped food articles;
Figure 73 is a schematic and view of the food article lift tray showing the tray configured to hold for large rectangular cross section food articles;
Figure 74 is a schematic and view of the food article lift tray showing the tray configured to hold two large prone rectangular food articles;
Figure 75 is a schematic elevational view of a round knife blade to be used with the apparatus of the present invention;
Figure 76 is a schematic elevational view of an involute-shaped knife blade for slicing large food articles to be used with the apparatus of the present invention;
Figure 77 is a schematic elevational view of an involute-shaped knife blade for slicing small food articles to be used with the apparatus the present invention;
Figure 78 is a near side elevational view of a laser guard system of the present invention;
Figure 79 is a sectional view taken generally along line 79-79 of figure 78;
Figure 80 is a plan view of a rear portion of the weighing classifying conveyor;
Figure 81 is in elevation view taken generally along line 81-81 of figure 80;
Figure 82 is a plan view of the rear portion of the weighing and classifying conveyor of figure 80 with deceleration conveyor belts removed for clarity; and
Figure 83 is an exploded view of a portion of the deceleration conveyor taken from figure 82.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0022] While this invention is susceptible of embodiment in many different forms, there are shown in the drawings, and will be described herein in detail, specific embodiments thereof with the understanding that the present disclosure is to be considered as an exemplification of the principles of the invention and is not intended to limit the invention to the specific embodiments illustrated.

[0023] U.S. Patent Application No. 60/999,961 filed on October 22, 2007 and U.S. Patent Application No. 61/000,202 filed on October 23, 2007 are both herein incorporated by reference.

[0024] Figures 1-3 illustrate a high speed slicing apparatus 100 and a weighing and classifying conveyor or output conveyor 102 according to a preferred embodiment of the invention. The slicing apparatus 100 includes a base section 104, a collapsible frame 105, an automatic food article loading apparatus 108 that receives food articles 110 to-be-sliced, a food article feed apparatus 120, a food article feed elevation adjusting apparatus 121, a food article end removal apparatus 122 (Figure 27), a laser safety guard system 123, a slicing head apparatus 124, and a slice receiving apparatus 130. The slicing apparatus also includes a computer display touch screen 131 that is pivotally mounted on and supported by a support 132.

[0025] The apparatus 100 can also include an onboard information carrier system 135 (Figures 51, 52) that allows Installed parts to be tagged with an information read and write data carrier that can communicate control or maintenance or other information to machine control.

Base Section

[0026] The base section 104 includes a compartment 136 having side walls 138a, 138b, a bottom wall 140, and an inclined top wall 142. The apparatus 100 is supported on four adjustable feet 144. The compartment 136 has a tapered side profile from back to front wherein the top wall 142 slants down from back to front. The slanted orientation of the top wall 142 ensures water drainage off the top of the compartment 136.

[0027] The adjustable feet 144 are shown in figure 4B. The feet include a cylinder 144a that is bolted to the bottom wall 140. The cylinder 144a includes an internal threaded bore 144b that receives a threaded portion 144f of a shaft 144c that is mounted on a foot base 144d. The

shaft 144c includes a smooth portion 144g of below the threaded portion 144f. The smooth portion 144g is sealed to the cylinder 144a by an o-ring 144h carried inside the cylinder144a. This design prevents threads from being exposed which can collect particles and spray water from clean up.

[0028] The compartment 136 includes near side doors 152,154, far side doors 156, 158 (figure 5), and a rear door 162 that permit access into the compartment or to modules normally within the compartment 136. The compartment 136 typically affords an enclosure for a computer, motor control equipment, a low voltage supply, and a high voltage supply and other mechanisms as described below. The compartment may also include a pneumatic supply or a hydraulic supply, or both (not shown).

[0029] Base section 104 also includes a debris or scrap conveyor 170 that can be operated to slowly circulate at all rimes to remove food pieces or other debris that would otherwise collect on top of the top wall 142, and delivers the debris to a collector bucket 173 located below an output end 170a of the conveyor 170.

[0030] The debris conveyor 170 is shown in Figures 45 and 47-50. The debris conveyor includes a belt 163 that circulates around a rear idle roller 164a, a front tensioning roller 164b and a drum motor roller 164c. The belt circulates against a front idle roller 164d. The rollers 164b and 164c are supported by side plates 165a, 165b. The side plates 165a, 165b are fixed to support shafts 166a, 166b which are attached in cantilever fashion to a far side of the machine by a triangular base plate 167 that is fastened to end nuts 2066a, 2066b of the tubular shafts 2067a, 2067b described below. The cantilever mounting allows for the belt to be removed off the rollers at a near side of the machine for cleaning.

[0031] Each of the rollers 164a, 164b, 164d are rotatably carried on a pair of bearings 168 that have a block shaped outer contour 168a with a recessed square block shaped region 168b. The square block shaped region 168b of each bearing 168 is configured to tightly fit within a respective support bracket 169a, 169b, 169c to removably support the respective roller. The outer contour 168a captures the respective support bracket 169a, 169b, 169c by sandwiching both sides of the respective bracket 169a, 169b, 169c. The support brackets 169a are J-shaped hangers located on the far side and near side of the machine. The support brackets 169b, 169b are U-shaped brackets mounted to the side plate 165a at the far side of the machine and to the front of the compartment 136 at a near side of the machine. The support brackets 169c, 169c are formed as part of the side plates 165a, 165b and are open upward.

[0032] A tensioning shaft 171 extends across the conveyor 170 below the roller 164b. The shaft 171 is connected to cams 171 a, 171b at positions adjacent to and outside of the side plates 165a, 165b. At a near side of the machine a handle 171h is fixed to the shaft 171. The cams 171 a, 171 b ride against bottoms 168c of the rectangular block shaped contours 168a of the bearings 168. Each cam 171 a, 171 b has a substantially flat portion 171c on its cam surface that underlies the bottoms 168c to lock the roller 164b in an elevated position to tension the belt 173.

[0033] To tension the belt 163, the handle 171h is turned from the pointing down position shown in Fig. 46A to the pointing up position shown in Fig 46A, i.e., turned clockwise.

Collapsible Frame and Elevated Housings

[0034] The base section 104 supports the collapsible frame 105 as shown in Figs. 1-4A. The collapsible frame 105 includes a foldable support mechanism 174 that supports a food article feed mechanism frame 190.

[0035] The foldable support mechanism 174 includes a servomotor 175 that drives a gear reducer 176 having a drive shaft 178 that extends out of the gear reducer 176 at opposite ends. The drive shaft 178 is fixed to parallel levers 180a, 180b which swing out with a turning of the drive shaft 178. The levers 180a, 180b are pivotally connected to parallel support columns 182a, 182b via an axle joint 184. The columns 182a, 182b are pivotally connected to the frame 190 which pivotally supports the food article feed apparatus 120 on an axle 192.

[0036] The food article feed mechanism frame 190 also supports a sweep mechanism housing 194, a feed conveyor drive housing 196, and a end disposal housing 198, all on the far side of the apparatus, shown in figures 5 and 6. The frame also supports the laser safety guard system 123.

[0037] For cleaning and maintenance purposes, the collapsible frame 105 is collapsed down by actuating the servomotor 175 and gear reducer 176 to rotate the levers 180a, 180b, which draws down the columns 182a, 182b as the frame 190 rotates on the axle 192. The frame 190, and all equipment supported thereby, is lowered for more convenient maintenance and cleaning as illustrated in Figure 4A. In some cases this eliminates the need for ladders or platforms when servicing the slicing apparatus 100.

Automatic Food Article Loading Appararus

[0038] As illustrated in figure 7-9, the automatic food article loading apparatus 108 includes a lift tray assembly 220, a lift tray positioning apparatus 228 and a food article lateral transfer apparatus 236. The lift tray assembly 220 receives food articles to-be-sliced. The tray positioning apparatus 228 pivots the tray assembly 220 to be laterally adjacent to, and parallel with, the food article feed apparatus 120. The food article lateral transfer apparatus 236 moves the food articles from the lift tray assembly 220 onto the food article feed apparatus 120.

Lift Tray Positioning Apparatus

[0039] Figures 7, 9 and 10 illustrate the food article lift tray assembly 220 includes a frame 290 that supports four movable food article support plates 302, 304, 306, 308.

[0040] As illustrated in figure 8, the frame 290 is connected by a rear connection 330 and a front connection 332 to a lever 336. The lever 336 is pivotally connected to a height adjustment bar 340 at a pivot connection 342. A servomotor 350 drives a gear reducer 351 that has an output shaft 352 that is fixed to a crank arm 360. The crank arm 360 is pivotally connected to a lift arm 362 at a pivot connection 364. The lift arm 362 is pivotally connected to the lever 336 at a pivot connection 366.

[0041] When the servomotor 350 turns the crank arm 360 via the gear reducer 351, the crank arm 360 is turned counterclockwise in Fig. 8 and the lift arm 362 is elevated to pivot the lever 336 about the pivot connection 342. This pivots and elevated the rear end of the frame 290 and the food article lift tray assembly 220.

Lift Tray Assembly

[0042] As illustrated in figs. 9 and 10, the support plates 302, 304 are separated by a divider 312. The support plates 304, 306 are separated by a divider 314. The support plates 306,308 are separated by a divider 316. The dividers 312, 314, 316 are fixed with respect to the frame 290. The support plates 302, 304, 306, 308 are movable in a perpendicular direction "P" to a length direction of the frame 290 (Fig. 8). When the frame 290 is horizontally oriented, direction "P" is substantially vertical.

[0043] Each food article support plate 302, 304, 306, 308 is supported by a selective lift mechanism 326 described in Figs. 8, 9 and 40. Figure 8 discloses the selective lift mechanism 326 for the support plate 302 with the understanding that the selective lift mechanism 326 for each of the food article support plates 302, 304, 306, 308 is identical.

[0044] The support plate 302 is fastened to two parallel lift bars 370, 372. Three swing levers 380, 382, 384 are pivotally connected to transverse shafts 388, 400, 402 of the frame 290, at base ends 380a, 382a, 384a of the swing levers 380, 382, 384, respectively. Distal ends 380b, 382b, 384b of the swing levers 380, 382, 384, respectively, are pivotally connected to the two parallel lift bars 370, 372. A pneumatic cylinder 416 is pivotally connected at a first end 416a to a transverse strut 420 of the frame 290. The cylinder 416, particularly the cylinder rod 426, is pivotally connected at a second end 416b to the distal end 382b of the swing lever 382.

[0045] Each support plate is provided with an optical sensor or other proximity sensor 302s, 304s, 306s, 308s that is signal-connected to machine control. As illustrated in Figures 8A, the sensors 302s, 304s, 306s, 308s beam tight and receive reflected light through a hole 302f in the respective support plate. The proximity sensors 302s, 304s, 306s, 308s are configured to sense when a food article is loaded onto the respective support plate 302, 304, 306, 308.

[0046] Each support plate is also provided with fore and aft stationary hooks 302g, 302k that engage pins 302p spanning between the lift bars 370, 372 and which hooks are open facing forwardly, and a movable latch 302m that engages a pin 302p between the lift bars 370, 372. The latch 302m has a hook that is open rearward and can be disengaged by a finger pushed down through a hole 302t in the respective support plate, and the support plate then moved rearwardly, to the rights in figures 8A and 9, disengaging the hooks 302g, 302k to allow the support plate to be withdrawn from the lift tray for cleaning.

[0047] In operation, when the cylinder 416 is actuated pneumatically to elongate, i.e., the rod 426 is moved to the right in figure 8, the swing levers 380, 382, 384 will swing clockwise about their base ends 380a, 382a, 384a. The swing lever 382 will swing from direct force by the cylinder 416 and the swing levers 380, 384 will swing from the force from the parallel lift bars 370, 372 on the distal ends 380b, 384b, of the swing levers 380, 384.

[0048] Referring to Figure 10, when the cylinders are elongated, the support plates 302, 304, 306, 308 are elevated from a lowered position indicated as 302a, 304a, 306a, 308a to an elevated position indicated as 302b, 304b, 306b, 308b. The plates initially are all elevated. The innermost plate 308 is lowered first to receive a food article of the. Once the proximity sensor 308s senses a food article is present, the next plate 306 is lowered to receive the next food article. Once a food article is loaded onto the plate 306 and its presence is sensed by the sensor 306s, the next plate 304 is lowered. Once a food article is sensed on the plate 304, the plate 302 is lowered. This sequence is demonstrated in Figure 64. In the case where less than four food articles are to be loaded onto the food article tray, machine control can change the sequencing and response to signals from the switches 302s, 304s, 306s, 308s.

[0049] Once the tray is loaded and lifted, the food articles 110 will be moved from the lowered position indicated at 110a wherein the food articles are guided in lateral position by the guides 312, 314, 316, to a raised position indicated as 110b, wherein the support plates 302, 304, 306, 308 are elevated to be flush with a top of the guides 312, 314, 316.

Food Article Lateral Transfer Apparatus

[0050] The food article lateral transfer apparatus 236 is illustrated in figures 10-13. The apparatus 236 includes front and rear transfer sweeps 452, 454 (figure 12). The front and rear transfer sweeps are identically configured so only the front transfer sweep 452 will be described in detail.

[0051] The food article feed apparatus frame 190 includes an upper frame 520 and a lower frame 522. The

upper frame comprises two parallel rails 534, 536, four tubular braces 539, 541, 542, 544 and two L- shaped frame extensions 548, 550 that are laterally spaced from the near side rail 534. The frame extension 548 is fixed to ends of the tubular braces 539, 541, and the frame extension 550 is fixed to ends of the tubular braces 542, 544. The lower frame 522 comprises parallel straight rails 522a, 522b and two transverse struts 523a, 523b which connect the two straight rails 522a, 522b. At a front end of the food article feed mechanism frame 190, the rails 534, 536, 522a, 522b are fastened to a thick support plate 551 that is bolted to the axle 192.

[0052] The front sweep 452 comprises two vertical frames 556, 558 that are substantially mirror image identical. Each frame 556, 558 comprises front journals 560a, 560b and rear journals 562a, 562b that slide laterally on tubular braces 539, 541, respectively. A multi-lane spacer 570 is arranged below the frames 526, 558. The multi-lane spacer 570 comprises side plates 572, 574 and intermediate rectangular-shaped tubular spacers 576, 578, 580. The side plates 572, 574 and tubular spacers 576, 578, 580 are connected together by front and rear struts 582, 584, respectively that connect raised portions of each of the plates 572, 574 and spacers 576, 578, 580. The struts 582, 584 hold the plates 572, 574 and spacers 576, 578, 580 in a vertical, spaced-apart and parallel orientation. The relative positioning of the plates 572, 574 and spacers 576, 578, 580 define the desired spacing of four food articles to be carried on the food article feed apparatus to be sliced simultaneously by the slicing head apparatus.

[0053] The multi-lane spacer 570 is hung from the frames 55C, 558 by links 584, 580, 588, 590. The front links 584, 588 are pivotally connected to the respective frames 556, 558 and pivotally connected to the side plates 572, 574 of the multi-lane spacer 570. The rear links 586, 590 are pivotally connected to the side plates 572, 574 and connected to slide bearings 600, 602 that each slidably receives a square cross section drive rod 606 in a fashion such that turning of the square cross section drive rod 606 causes a turning of the rear links 586, 590. Turning of the rear links 586, 590 forcibly swings the rear links 586,590, which swings the multi-lane spacer 570 rearward and upward. The square cross section drive rod 606 slides through the slide bearings 600, 602 during lateral sliding of the sweep 452. The square cross section drive rod 606 has a round end that is journaled for rotation in a bearing 610 carried by the frame extension 550.

[0054] Figure 11 illustrates the sweep 452 in two positions. In a first position marked 452a, the sweep is above four food articles 110 that are positioned on the support plates 302, 304, 306, 308, with the support plates in a raised position flush with the dividers 312, 314, 316. From this position, the sweep 452 is moved to the right by a sweep transfer device 630 shown in figure 13. The multi-lane spacer 470 is positioned to be above the conveyor 530. The top surface of the conveyor 530 is flush with the top surface of the support plates 302, 304, 306, 308 so a smooth sliding transfer is enabled. The sweep 452 moves laterally with the journals 560a, 560b; 562a, 562b sliding along the tubular braces 539, 541.

[0055] Figure 13 illustrates the transfer device 630 comprises a servomotor 636 that turns the operating mechanism of a screw drive 638 via a belt 642. The screw drive 638 is mounted within a tubular cover 540. A hollow rod 646 is fixed on an end thereof to the frame 556 and penetrates the cover 540. The rod 646 has internal threads, such as provided by a threaded nut or screw Mower welded to the rod, and the screw drive 638 has an internal rod (not shown) with external threads which engage the internal threads. Thus, turning of the rod of the screw drive 638 in a pre-defined direction moves the nut along the rod and either extends or retracts the rod 646 from or into the cover 540.

[0056] To reload the conveyor 530 with four new food articles 110, the multi-lane spacer 470 must be raised so as not to interfere with the food articles being sliced on the conveyor 530, and then moved outward (to the left in figure 11). To raise the multi-lane spacer 470, the square cross section rod 606 is turned, to swing the links 586, 590. A turning mechanism 720 is shown in figure 13 associated with identical sweep 454, with the understanding that an identical mechanism 720 would be used for the sweep 452. The turning mechanism 720 includes a linear actuator servomotor 726 pivotally fastened at a base end 726a to the frame 520 and having an extendable rod 730 pivotally connected to a lever 736. At an opposite end the lever 736 is connected to the square cross section rod 606. The rod 730 is connected to the lever 736 at a location eccentric to a centerline of the square cross section rod 606. The servomotor 726 turns an internal threaded rod or like device to extend or retract the rod 730 and thus turn the lever 736 and the square cross section rod 606 in either direction, clockwise or counterclockwise about an axis of the rod 606. Thus, when the rod 730 is extended, the rod 606 is turned counterclockwise (as viewed in figure 12) and the multi-lane spacer 470 is raised.

[0057] The servomotor 636 then turns the screw drive 638 to extend the rod 646 to move the sweep 452 to the left position shown in figure 11 bur raised above the lift tray 220. The linear actuator servomotor 726 then retracts the rod 730 to reverse rotate the square cross section rod 606 to tower the multi-lane spacer 470 to the position indicated as 452a in figure 11. At this position, four new food articles 110 can be raised by the supports 302, 3204, 306, 308 to take the four lane positions between the side plates 570, 574 and the spacers 576, 578, 580.

[0058] As the food articles 110 are transferred from the support plates 302, 304, 306, 308 a sensor 770 determines a location of the end 110d of each food article 110. According to the preferred embodiment, the sensor 770 comprises a laser distance sensor that uses a beam 770a to determine the distance between the sensor 770

and the back end 110d of each food article as the food articles pass by during transfer. This distance is recorded in the machine control and associated with each food article 110, particularly, associated with the food article 110 and the lane to be occupied by each food article during slicing. The machine control has instructions for calculating a length of each food article based on the distance value provided the sensor.

Food Article Feed Apparatus

[0059] The lower conveyor 530 of the food article feed apparatus 120 is shown in figure 14. The conveyor 530 includes four independently driven endless conveyor belts 802, 804, 806, 808. Each belt 802, 804, 806, 808 is identically driven so only the drive for the belt 802 will be described. A machine control "C" (fig. 51) has instructions for ending machine slicing of all food articles on the food article feed apparatus when the shortest food article is sliced to a minimum length. The minimum length may be predefined, may be a food article length below which the machine can no longer slice a food article, or may be a food article length below which continued slicing will produce unacceptable scrap slices cause by slicing a food article end.

[0060] The belt 802 is wrapped around a toothed front drive roller or pulley 812 and a back idler roller or pulley 816. The belt 802 preferably has teeth that engage teeth of the two rollers 812, 816. Each drive roller 812 includes a toothed outer diameter 812a and a toothed, recessed diameter 812b. An endless drive belt 820 having a smaller width than the belt 802 wraps around the recessed diameter 812b. As shown in Figure 15A, the smaller endless drive belt 820 operates within the larger operating path of the larger endless conveyor belt 802. The drive belt 820 also wraps around a drive roller 824 that is fixed to a drive shaft 828. The drive shaft 828 extends transversely to the belt 802 and is journaled for rotation within a bearing 830 mounted to a near side frame member 836.

[0061] The drive shaft 828 penetrates a far side frame member 838 and extends to a bearing 843, coupled to a gear reducer 842 mounted to a support frame 854. The gear reducer 842 is coupled to a servomotor 850 that is mounted to the support frame 854. The drive belt 820 circulates within the perimeter defined by the endless belt 802.

[0062] The servomotor 850 drives the drive shaft 828 which turns the roller 824 which circulates the belt 820 which rotates the roller 812 which circulates the belt 802.

[0063] A shown in figures 14, 15, 15A, 19 and 20 the belt 802 is supported along its length by flat rails 860, 862 which underlie lateral edges of the belt 802. The rails 860, 862 (as well as rails for the belts 804, 806, 808) are supported by struts 870, 872,874 and 876 which connect the near frame member 836 to the far frame member 838.

[0064] Each idler roller 816 is provided with a pneumatic belt tension adjustment mechanism 882 that is braced from a transverse bar 886 that is fastened between the frame members 836, 838. The pneumatic belt tensioning adjustment mechanism 882 has an internal piston which is acted upon by pneumatic air pressure to exert a constant force on tension rods 882a which exert a force on frame 883 of each idler roller 816 outwardly away from the transverse bar 886 to maintain tension on the belts.

[0065] Figure 15-20 illustrate a gripper 894 used in cooperation with the belt 802. The gripper 894 is mounted to a top run of the belt 802 and is translated along the food article path by the belt 802. The gripper 894 is clamped to a belt joint block 896 by a screw 89 7. The block 896 comprises an upper member 899 and a lower member 900 that include teeth 899a, 900a on members 899, 900 that engage the upper and lower teeth of the belt 802 once the members 899, 900 are clamped together to splice the free ends 802e, 802f of the belt 802. For clamping, fasteners 902, 904 are provided which are inserted from below the member 900 through plain holes in the member 900 and tightly threaded into threaded holes 902a, 904a in the member 899.

[0066] The gripper 894 travels from the retracted home position shown in figures 16 and 19, to the advanced, forward position, shown in figures 15 and 20. The lower member 900 is sized to slide between a lateral clearance 906 located between rails 860, 862 (figure 14).

[0067] The gripper 894 is pneumatically actuated via pressurized air hoses 912, 913 (figure 16). The air hoses 912, 913 are coupled to include free hanging supply loops 914, 915 that includes a dead weight pulley 916 to prevent inadvertent tangling of the hoses with other equipment. Tube guides can also be provided on the back of the frame member 190 to guide the air hoses vertically to prevent tangling of the hoses with other equipment.

[0068] The gripper 894 includes an air cylinder 926 having a piston 930 therein. Air connectors 932, 936 communicate air to/from opposite sides of the piston to control movement of the piston in either direction. A shown in figure 18, movement of a piston rod 938 connected to the piston 930 moves an annular rack 942 that is engaged to four pinion gears 944 of four claws 946. Movement of the annular rack 942 away from the cylinder 926 opens the claws 946, and movement of the annular rack 942 toward the cylinder 926 closes claws 946.

Upper Conveyor

[0069] As illustrated in Figure 21, at a front end of the food article feed apparatus 120, above the lower feed conveyor 530 are four upper feed conveyors 992, 994, 996, 998 having endless belts 1002, 1004, 1006, 1008, respectively. The endless belts 1002, 1004, 1006, 1008 are independently driven and are directly opposed to the lower conveyor belts 802, 804, 806, 808, respectively. The respective belt pairs, such as the upper belt 1002 and the lower belt 802 are circulated in opposite directions to drive a food article clamped there between into the slicing plane.

[0070] The near side upper conveyors 992, 994 are configured in a mirror image fashion, across a longitudinal vertical center plane of the food article feed apparatus 120, to the far side two conveyors 996, 998 so that only the near side two conveyors 992, 994 need be described.

[0071] Figure 21 shows the conveyor 992 has a drive roller 1010 having a central hub 1012 with a center bore 1014. The drive roller 1010 has tubular stub axles 1016, 1018 extending from opposite ends of the central hub 1012. The tubular stub axles 1016, 1018 are journaled for rotation by bearings 1020, 1022 that are fastened to carrier blocks 1023a.

[0072] The conveyor 994 includes a drive roller 1038 having a central hub 1042 with a bore 1044. The drive roller 1038 has tubular stub axles 1046 and 1048 extending from opposite ends of the central hub 1042. The tubular stub axles 1046, 1040 are journaled by bearings 1050,1052 respectively that are attached to carrier blocks 1023b.

[0073] A motor housing 1054, including a baseplate 1054b and a cover 1054a, is mounted to an end of an upper conveyor support bar 1056. The base plate 1054b of each side of the machine is fastened to a linear actuator, such as a pneumatic cylinder 1055a and 1055b respectively. The cylinders 1055a, 1055b are connected together by the support bar 1056. Each cylinder slides on a fixed vertical rod 1057a, 1057b respectively. Thus, controlled air to the cylinders 1055a, 1055b can be used to uniformly raise or lower the near side housing 1054 and the far side housing 1054 uniformly.

[0074] A spindle 1060 extends through the motor housing 1054, through a sleeve 1064, through a coupling 1065, through the tubular stub axle 1016, through the central bore 1014, through the tubular stub axle 1018, through the tubular stub axle 1046, and partly into the bore 1044. The spindle 1060 has a hexagonal cross-section base region 1070, a round cross-section intermediate region 1072, and a hexagonal cross-section distal region 1074. The hexagonal cross-section base region 1070 is locked for rotation with a surrounding sleeve 1071 to rotate therewith.

[0075] The intermediate region 1072 is sized to pass through the sleeve 1064, through the tubular stub axle 1016, through the central bore 1014, and through the tubular stub axle 1018 to be freely rotatable therein. The distal region 1014 is configured to closely fit into a hexagonal shaped central channel 1078 of the tubular stub axle 1046 to be rotationally fixed with the tubular stub axle 1046 and the drive roller 1038.

[0076] The sleeve 1064 includes a hexagonal perimeter end 1064a that engages a hexagonal opening 1065a of the coupling1065. The coupling 1065 includes an opposite hexagonal opening 1065a that engages a hexagonal perimeter end 1016a of the tubular stub axle 1016. The coupling 1065 couples the sleeve 1064 and the stub axle 1016 for mutual rotation such that the sleeve 1064 and the drive roller 1010 are locked for rotation together, i.e., turning of the sleeve 1064 turns the drive roller 1010.

[0077] Within the motor housing 1054 are two servomotors 1090, 1092 mounted to the housing by fasteners. The servomotors each have a vertically oriented output shaft 1096 that rotates about a vertical axis connected to a worm gear 1098 that is enmesh with and drives a drive gear 1100 that rotates about a horizontal axis. The drive gear 1100 drives the sleeve 1071 that drives the region 1070 of the spindle to rotate the spindle 1060. Rotation of the spindle 1060 rotates the drive roller 1038 via the hexagonal cross-section distal end region 1074.

[0078] Adjacent to the servomotor 1090 is the servomotor 1092. The servomotor 1092 is configured substantially identically with the servomotor 1090 except the worm gear 1098, as shown in schematic form in Figures 22 and 23, of the servomotor 1092 drives a drive gear 1100 that drives the sleeve 1064 to rotate. The sleeve 1064 rotates independently of the round cross-section region 1072 of the spindle 1060, and drives a stub axle 1016 to rotate, which rotates the drive roller 1010.

[0079] The sleeves 1071 and 1064 are journaled for rotation by bearings 1106, 1108; and 1110, 1112, respectively. The drive gears 1100, 1100 are fastened to the respective sleeve 1071, 1064 using fasteners 1116.

[0080] The housings 1054, via servomotors 1090, 1092, on both sides of the conveyors 992, 994, 996, 998 support the conveyors 992, 994, 996, 998. By using the cylinders 1055a, 1055b to raise and lower the housings 1054, the conveyors can be raised or lowered to match a product size.

[0081] Each conveyor belt 1002, 1004, 1006, 1008 is wrapped around the respective drive roller and a front idle rollers 1134, 1135, 1136, 1137 that is supported by respective side frames 1131, 1132. The front rollers 1134, 1135, 1136, 1137 are vertically movable independently by pivoting of the conveyor about an axis of the respective drive roller.

[0082] Also, as shown in figures 24 and 25, the underside of the support bar 1056 carries pneumatic cylinders 1130, Each pneumatic cylinder 1130 extends a piston rod to press down on side frames 1131, 1132 of each conveyor to pivots down a front end of each conveyor 992, 994, 996, 998 to lightly press down on a top of the product below. The inclination of each conveyor 992, 994, 996, 998 is set by upward pressure from the product and downward pressure from the pneumatic cylinders 1130.

Food Article Gate

[0083] As illustrated in Figure 26, at a front end of the food article feed apparatus 120 a food article gate 1140 is movably positioned to provides a stop for food articles that are loaded onto the conveyor 530. In order to commence slicing of the food articles, the food article gate 1140 must be displaced. Figures 26 and 27 show the gate 1140 in a lowered position marked 1140a. Figures 26 and 28 show the gate 1140 in a raised position marked 1140b. Guide plates 1146a, 1146b are provided fixedly

attached to the frame 190, one on each lateral side of the gate 1140. Each guide plate includes a slot 1148 that has a vertical portion 1148a and a lower, inclined portion 1148b. Two rollers 1150 are connected to a front side of the gate 1140, one sliding within each slot 1148 of the two guide plates 1146a, 1146b respectively. An axle 1154 is journaled at opposite ends by a frame portion 1158 and a back wall 1160 of the sweep mechanism housing 194, using bearings. Two levers 1164a, 1164b are fixedly connected to the axle 1154 such as to swing when the axle 1154 is rotated about its axis. Each lever 1164a, 1164b is pivotally connected to a lug 1166a, 1166b, respectively. The lugs 1166a, 1166b are welded to a backside of the gate 1140.

[0084] Within the sweep mechanism housing 194 a linear actuator such as a pneumatic cylinder 1170 is pivotally connected at a base end 1170a and pivotally connected at a rod end 1170b to a turning lever 1172. The turning lever 1172 is fixedly connected to the axle 1154. Thus, when the pneumatic cylinder 1170 retracts the rod end 1170b toward the cylinder 1170 the turning lever 1172 will be in the position marked 1172b and the gate will be in the elevated position marked 1140b. When the pneumatic cylinder 1170 extends the rod end 1170b away from the cylinder 1170, the turning lever 1172 will be in the position marked 1172a and the gate will be in the lowered position marked 1140a.

[0085] Advantageously, the gate 1140 follows the track 1148 in an outward and upward motion which generally releases the food articles in a forward direction toward the slicing plane for slicing.

Food Article End Disposal

[0086] Figures 10, 11 and 27-31 illustrate the food article end removal apparatus 122. The apparatus 122 comprises a prone U-shaped transport 2000. The transport 2000 is carried by near side bearings 2004 and far side bearings 2006. The bearings 2004, 2006 slide along parallel rails 2008, 2010 that are fixedly supported by the frame 190. The transport 2000 can be moved from a position directly above the conveyor belts 802, 804, 806, 808 as shown in figure 27 to a position extended outside of the far side of the slicing apparatus 100 as shown in figure 28. A servomotor 2016 located within the sweep mechanism housing 194 drives a shaft 2020 in rotation. The shaft turns a drive pulley 2024 which turns a belt 2026 which turns a driven pulley 2028 which drives a further pulley 2030 via a common shaft 2032. A drive belts 2034 is wrapped around the further pulley 2030 and an idler pulley 2036, the idler pulley 2036 being journaled on an idler shaft 2038. A fixing block 2040 fixes a bottom run of the drive belt 2034 to the bearing 2006. Thus, when the servomotor 2016 rotates the shaft 2020, the belt 2026 is circulated by the pulley 2024 which circulates the drive belt 2034 via the pulley 2030 and the transport 2000 is moved by the fixing block 2040.

[0087] Figure 27 shows a movable paddle 2046 which can be inserted into the open cross-sectional space of the transport 2000. The paddle 2046 is connected by an elongated handle 2048 that is pivotally connected to a front lever 2052 and to a rear lever 2056. The front and rear levers 2052, 2056 are pivotally connected to the far side frame member 838 of the food article feed conveyor 530 at bearings 2052a, 2056a respectively. The rear lever 2056 extends below the bearing 2056a and is pivotally connected to a pneumatic cylinder 2064 at a rod end 2064a. The pneumatic cylinder 2064 is pivotally connected to the frame 190 at an opposite end 2064b within the food article feed drive housing 196. Thus, extension of the rod end 2064a away from the cylinder 2064 will retract the paddle 2046 as shown in figure 28, and retraction of the rod end 2064a toward the cylinder 2064 will cause the paddle 2046 to extend into the transport 2000 as shown in figure 27.

[0088] In operation, after the food articles have been sliced completely leaving only ends gripped by the grippers, the grippers 894 are retracted toward the home position of the grippers but are halted temporarily a short distance along the food article path providing a clearance for the transport 2000. The transport 2000 is driven by the servomotor 2016 from an extended-outward position as shown in figures 10 and 28 to the inward position as shown in Figure 27 with the paddle in the position shown in figure 27. Any end portions that are on the transport 200 will be pushed off the transport 200 by the paddle 2046 during travel of the transport 200 onto the conveyor 530. The grippers 894 then would release the ends which will fall or slide by gravity onto the transport 2000. The grippers then continue up the food article feed paths to the gripper home position at the top of the feed mechanism. Before new food articles are loaded onto the feed mechanism 120, the paddle 2046 is withdrawn to the position shown in figure 28 and then the transport 2000 is moved to the position shown in figure 28 carrying the end portions out of the food article feed mechanism and away from the conveyor 530. The process is repeated after new food articles are sliced and grippers and ends proceed up the food article feed paths. The grippers are again halted at a position part way up the feed paths, the paddle is moved to the position shown in Figure 27 and the transport 2000 is moved back onto the conveyor 530. The paddle 2046 displaces the end portions off of the transport 2000 and into a bucket or other disposal mechanism, as the transport moves over the conveyor.

[0089] On a far side of the machine 100, the transport 2000 is covered by a cover and chute arrangement 198 shown in operating position in figures 6 and 10 and pivoted about hinges 198a to be in a raised maintenance position shown in figure 29.

Slicing Head Section

[0090] Figures 2, 3, 5, 6 and 32-37 illustrate components and features of the slicing head section 124. The section 124 includes a housing 2060 having a thick top

wall 2061 (Figure 33), thick side wall 2062a, 2062b, an enclosing front skin 2063a, a top skin 2063b and a bottom wall 2064. The front skin 2063a can include a window 2063c closed by a cover 2063d that provides access to the motor within the housing 2060.

[0091] The side walls 2062a, 2062b are substantially similar. Each sidewall includes an upper window 2065a and a tower window 2065b. The upper windows are closed by covers 2065c. The side walls 2062a, 2062b extend outside of and down below the top wall 142 of the compartment 136 and are fastened through the compartment 136 by tubular braces 2067a, 2067b, 2067c traversing inside the compartment136, welded to the sidewalls 138a, 138b and nuts 2066a, 2066b, 2066c on each side of the compartment tightened onto threaded rods (not visible) that are inserted through the tubular braces 2067a, 2067b, 2067c.

[0092] The thick top wall 2061 and thick side walls 2062a, 2062b form a rigid frame for the slicing head section 124.

[0093] A slicing head cover 2070 is provided to cover the moving slicing blade and openings near to the slicing blade during operation.

[0094] The slicing head cover 2070 is pivotally connected to the side walls 2062a, 2062b by a pair of articulated arms 2071 a, 2071b that are mirror image identical across a longitudinal, vertical center plane of the slicing head section 124. The slicing head cover 2070 is hinged to the top skin 2063b by hinges 2072a, 2072b.

[0095] The slicing head cover 2070 can be pivoted upwardly by the arms 2071a, 2071b moving from a folded state or closed state as shown in Figure 2 to a substantially unfolded state or open state as shown progressively in Figure 3, wherein the slicing head cover moves from position 2070a to 2070b to 2070c.

[0096] Figures 32 and 33 illustrate a mechanism 2072 used to move the arms 2071a, 2071b to raise and lower the slicing head cover 2070. The mechanism comprises a vertically oriented servomotor 2073 having an output shaft 2073a connected to a worm gear 2073b. The worm gear 2073b is enmesh with a hollow follower gear 2074a fixedly mounted on a transverse shaft 2074b. The shaft 2074b extends across the housing 2060 and exits side walls 2062a, 2062b through bearings 2075a, 2075b.

[0097] The shaft 2074b is fixed to pivot levers 2076a, 2076b that are respectively pivotally connected to swing levers 2077a, 2077b of the respective arms 2071a, 2071b. Ends of the swing levers 2077a, 2077b are pivotally connected to the slicing head cover 2070.

[0098] When the servomotor is turned in the select direction to open the slicing head cover 2070, the worm gear 2073b turns about its axis which turns the shaft 2074b about its axis. Turning of the shaft 2074b counterclockwise as viewed in Figure 2 and 3 pivots the lever arms 2076a, 2076b clockwise which thrusts the swing arms 2077a, 2077b upward to lift up the slicing head cover 2070.

[0099] The circle 2080 in figure 32 schematically illustrates the cutting path within a cutting plane 2081 of an involute-shaped blade 2082 (shown in figure 33). A rotary hub 2084 has a fixed toothed annular surface 2084a that is rotated by a toothed belt 2088 that is circulated by a drive pulley 2094 that is driven by a servomotor 2098. The rotary hub 2084 is carried by a stationary hub 2130. The stationary hub 2130 includes a flange 2131 that is fastened to the thick top wall 2061.

[0100] A linear servo actuator 2102 has a trunion mount 2106 that is fastened to the top wall 2061 of the housing 2060. The cylinder has an extendable rod 2110 that is connected to a vertical link 2114 that is pivotally connected at its opposite ends to base ends of parallel pivot bars 2116, 2118. For clarity, the lower pivot bar 2118 is not shown in Figure 33. The pivot bars 2116, 2118 are both pivotally and slidably attached at distal ends about an axis 2121 to opposite sides of a bearing hub 2120 that is arranged for sliding movement only in the axial direction "X" (figure 33), within the stationary hub 2130. The pivot bars 2116, 2118 are also both pivotally attached at an intermediate location about a pivot axis 2128 to a flange 2126 formed on the stationary hub 2130. The pivot axis 2128 is located between the base ends and distal ends of the pivot bars 2116, 2118.

[0101] As shown in Figures 33A and 34, since the stationary hub surrounds the bearing hub 2120, enlarged or oblong holes 2130c are provided through the stationary hub 2130 to allow a pair of pins 2130d, each having a smaller diameter than the respective oblong or enlarged hole 2130c to pass through the stationary hub 2130 on opposite sides, to be fixed to the bearing hub 2120. The oblong or enlarged holes 2130c allow for some clearance for the sliding movement of the bearing hub 2120 with respect to the stationary hub 2130.

[0102] Rectangular sliding lugs 2116t, 2118t are fit within elongated rectangular holes 2116v, 2118v in the pivot bars 2116, 2118. The lugs 2116t, 2118t and holes 2116v, 2118v allow sliding movement of the lugs 2116t, 2118t in the direction "T" during pivoting of the pivot bars 116, 2118. The lugs 2116t, 2118t are rotatably fastened to the pins 2130d and cover with caps 2130f wherein oil or grease can be filled in under the caps.

[0103] The pivot axis 2128 is provided by a pivot pin 2128a, with threaded end holes, that locks the pivot bars 1116, 2118 together by bolt caps 2128b.

[0104] A blade drive shaft 2132 is splined to the rotary hub 2084 by a gear 2136 engaged to a plurality of inner teeth 2140 on the inside of the rotary hub 2084. Thus, the rotary hub 2084 is fixed for rotation with the blade drive shaft 2132. The rotary drive shaft 2132 is journaled for rotation by base tapered roller bearings or thrust bearings 2144 and distal tapered roller bearings or thrust bearings 2148 in order for the rotary drive shaft 2132 to rotate with respect to the non-rotating bearing hub 2120.

[0105] The blade drive shaft 2132 includes a lower counterweight mount 2133 that permits a lower counterweight 2135a to be fastened directly to the blade drive shaft 2132 using fasteners 2134 threaded into threaded

holes provided in the blade drive shaft 2132. Upper counterweight 2135b for balancing the involute-shaped blade 2082 is fastened to the involute-shaped blade 2082 using fasteners 2136.

[0106] When the rod 2110 is extended with respect to the actuator 2102, the pivot bars 2116, 2118 rotate counterclockwise (as viewed in figure 33) about the pivot axis 2128 and thrust the pivot axis 2121 in a direction away from the cutting plane 2081 (down in figure 33). The bearing block 2120 slides within the stationary hub 2130. The cutting blade 2082 becomes offset by a small amount away from the cutting plane 2081.

[0107] When the actuator 2102 reverses the direction of the rod 2110, i.e., the rod is retracted, the pivot bars 2116, 2118 rotate clockwise (as viewed in figure 33) about the pivot axis 2128 and the pivot bars 1116, 2118 thrust the axis 2121 in a direction toward the cutting plane 2081. The bearing block 2120 slides toward the cutting plane 2081 (up in figure 33), and the blade 2082 returns to being coplanar with the cutting plane 2081.

[0108] A disc 2160 is fastened to the rotary hub 2084 with fasteners to rotate therewith. As shown in figures 33A and 34, a pair of disc brakes 2162, 2164 are provided having calipers 2162a, 2164a, respectively. The calipers 2162a, 2164a are fixedly mounted to a mounting bar 2166 and fit over opposite sides of the disc 2160. The mounting bar 2166 is mounted to the stationary hub 2130 by fasteners 2168 and tubular spacers 2170. Each disc brake 2162, 2164 includes movable, opposing friction pads within the calipers 2162a, 2164a (not seen) that face opposite sides of the disc 2160 and are subject to air pressure within the calipers 2162a, 2164a to squeeze the rotating disc 2160 and bring the rotating disc 2160 and the rotary hub 2084, the drive shaft 2132 and the blade 2082 to a rapid and safe stop.

Food Article Feed Elevation Adjusting Apparatus

[0109] It is an advantage of the or present invention that the height of the conveyor 530 at the front and back ends thereof can be precisely set depending on the product size to be cut. Accordingly, a food article feed elevation adjusting apparatus 3000 is provided and illustrated in Figures 37-39. The adjusting apparatus 3000 also includes the foldable support mechanism 174 previously described in the control thereof. The adjusting apparatus 3000 includes a servomotor 3002 that is mounted within the enclosure 136 by a bracket 3006 that is secured to the transverse strut 2067c. The servomotor 3002 includes an output shaft 3005 that drives an output pulley 3008. A toothed belt 3010 surrounds the output pulley 3008 and two adjustment pulleys 3016, 3018. A tension pulley 3020 maintains a constant tension on the belt 3010, and causes the belt to wrap more teeth on each of the adjustment pulleys 3016, 3018. Each adjustment pulley 3016, 3018 is connected to an input shaft 3030a, 3032a of a fine movement screw adjusting cylinder or actuator 3030, 3032, respectively. Thus, when the servomotor 3002 turns, the pulleys 3008, 3016, 3018, 3020 causes fine, precise movement of the output end 3030b, 3032b of the adjusting cylinders 3030, 3032. The adjusting cylinders 3030, 3032 are set at an angle that is substantially perpendicular to the conveying surface of the conveyor 530, as shown in fig. 27, and is substantially parallel to the cutting plane so that any adjusted change in elevation by the adjusting cylinders 3030, 3032, with a corresponding change in elevation of the foldable support mechanism 174 through a controlled movement of a servomotor 175, will not change the angle of slice through food articles carried on the conveyor 530.

[0110] Figure 40 shows the adjusting cylinders 3030, 3032 extending above the top wall 142 of the compartment. The cylinders 3030, 3032 are fixed with respect to the top wall 142 but the output ends 3030b, 3032b can be raised and lowered by the servomotor 3002. The output ends 3030b, 3032b are rotatably connected to the axle 192 by rings 3030c, 3032c that are connected to the output end 3030b, 3032b, and encircle the axle 192 but allow free rotation of the axle 192 within the rings 3030c, 3032c.

[0111] Figure 41 illustrates the axle 192 journaled by a bearing 3040 that is mounted to a slide block 3041 that is slidably carried by the side wall 2062b along a slot 3042 that is elongated along the same angle as the adjustment direction of the cylinders 3030, 3032. Figure 42 shows the axle 192 journaled by a bearing 3046 that is mounted to a slide block 3047 that is slidably carried by the side wall 2062a along a slot 3048 that is elongated along the same angle as the adjustment direction of the cylinders 3030, 3032.

[0112] Also, for adjusting the elevation of the food article lift tray positioning apparatus, the pivot point 342 (Figure 5) is also guided by a bearing 3049 slidable within a slot 3050 in the side wall 2062a (Figure 42 and 50), the slots 3048 and 3050 being parallel in elongation.

Shear Support

[0113] A shear support 3010 is shown in Figures 43 and 44. The shear support guides the food articles being sliced into the slicing plane wherein the rotating slicing blade is arranged to come within a close tolerance of the shear support. The shear support illustrated has four rectangular openings, although any number of openings or size and shape of openings is encompassed by the invention. The present embodiment of the invention could accommodate four or less openings of variable shapes and sizes. The shear support 3060 fits down into a U-shaped frame 3068 that is fastened by upper bracket 3069a and lower bracket 3069b at each side of the frame 3068 to the front plate 551 of the food article feed frame 190 as shown in Figures 44A and 44B.

[0114] The upright members 3070a, 3070b of the frame 3068 have a plurality of plain holes 3072 therethrough. Once the shear support 3060 is set down into the frame 3068 a top cross bar 3076 (shown in Figure

44, not installed in Figure 43) is placed over the shear support between the upright members and bolted to the upright members using a pair of plain holes 3072 aligned across the frame 3068, depending on the height of the shear support 3060, that allow- the top cross bar 3076 to fit down snugly on the shear support 3060, and threaded holes 3078 provided into the cross bar, to complete a rectangular frame that surrounds the shear support on all four sides.

[0115] The shear support 3060 is preferably composed of non-metallic material.

Slice Receiving Apparatus

[0116] The slice delivery apparatus 130 comprises a slice accumulation conveyor or jump conveyor 3064.

[0117] The conveyor 3064 is shown in Figures 37 and 55. The conveyor 3064 is carried on a transverse bar 3100 that is supported at opposite ends by a raising apparatus 3106. The raising apparatus 3106 is shown in Figures 37, 39 and 46. The raising apparatus 3106 comprises a servomotor 3110 that drives a gearbox 3111 that drives a sprocket 3114 that drives a belt (or multiple belt elements) 3118. The belt is wrapped around a driven sprocket 3120 that is fixed on a shaft 3124. The shaft 3124 is journaled by bearings 3126, 3128 and penetrates through the side walls 138a, 138b of the compartment 136 and into vertically arranged rack and pinion assemblies 3130, 3132 located outside the side skins across the compartment 136. The shaft 3124 is fixed to a pinion 3136 within each rack and pinion assembly, wherein the pinion is enmesh with teeth on a vertical rack 3138. When the pinions 3136 are rotated by the shaft 3124 the racks 3138 are raised or lowered an equal amount. The transverse bar 3100 is supported at its opposite ends by one of the racks 3138.

[0118] In operation, as the blade cuts slices from the food articles 110, the slices accumulate on the conveyor 3064 in a straight stack or a shingled drafts or other style presentation as is known. As the stack accumulates the raising mechanism 3106 lowers the conveyor so that each slice falls an equal distance onto the stack. This helps form a neat stack.

[0119] A jump conveyor drive 3141 is shown in figures 32, 33, 35, 36 and 44C. A servomotor 3142 drives a gearbox 3144 that has an output shaft 3146 that drives a pulley 3148. The pulley 3148 drives a belt 3150 that rotates a driven pulleys 3152. The driven pulley 3152 drives an axially aligned gear 3156 that drives a series of counter-rotating, enmeshed gears 3158, 3160, 3162. The last gear 3162 drives an axially arranged gear 3166 that is enmeshed with a counter-rotating gear 3168. The counter-rotating gear 3168 is enmeshing with a final gear 3170 that drives a drive roller 3172 of the conveyor 3064. This arrangement allows relative axial pivoting between the pulley/gear 3152, 3156 and gear pairs 3162, 3166 to adjust the length of the drive 3141 by "folding" the drive to adapt to changing elevations of the jump conveyor 3064.

[0120] Sometime during slicing, food articles are exhausted (completely sliced) when the current accumulated stacks or drafts are only partially completed on the jump conveyor 3064. According to one advantage of the combination of the present invention, the partially completed stacks or drafts are moved from the jump conveyor onto the weighing and classifying conveyor 102 to be held in a standby position on the weighing and classifying conveyor 102. New food articles are loaded onto the machine 100 and initial slicing begins. However, initial slicing produces scrap pieces which must be removed from the salable product. The jump conveyor 3064 collects the scrap pieces and conveys the scrap pieces in a reverse direction to dump the scrap pieces off the back end of the jump conveyor down onto the scrap accumulating conveyor 170 where the pieces are removed with any other scrap on the conveyor. Alternatively, the jump conveyor 3064 can be lowered a small amount using the raising mechanism 3106, and the jump conveyor 3064 conveys the scrap pieces in a forward direction to dump the scrap pieces off the front end of the jump conveyor down onto the scrap accumulating conveyor 170 where the pieces are removed with any other scrap on the conveyor.

[0121] The jump conveyor can also be configured as described in U.S. Serial11/449,574 filed 6/08/2006 herein incorporated by reference.

Onboard Information Carrier System

[0122] As another feature of the invention, the onboard information carrier system 135 can be incorporated into removable parts such as the slicing blade 2082 and the shear support 3060.

[0123] The onboard information carrier system preferably incorporates radio frequency identification technology (RFID). The system can be incorporated into the exemplary embodiment of the present invention or other slicers as well, such as the FX180® slicer available from Formax, Inc. of Mokena, Illinois, USA and slicers described in U.S. Patent 5,628,237 and European patent EP 0 713 753, herein incorporated by reference.

[0124] Figures 51 and 52 illustrate the system 135 comprises a data carrier 4001 embedded into the blade 2082 for storing data from which data can be read and to which data can be written, a read/write head 4006 mounted to the top wall 2061 of the housing 2060 that reads/writes data from/to the data carrier 4001, a controller or interface 4010 located within the housing 2060 or the base compartment 136 (shown schematically) communicating between the read/write head 4006 and machine control C. The data carriers are passive in that they do not have a battery. When the data carrier is within the range of the read/write head, power is transferred inductively and the data transfer initiated.

[0125] The data carrier 4001 can have stored thereon the type and size of blade, the time between re-sharpening, and the maximum speed allowable. This informa-

tion will be communicated to machine control via the read/write head 4006 and the interface 4010. The machine control C can write onto the data carrier 4001, via the data interface 4010 and the read/write head 4006, how often this blade is used, how long the blade is in use, the number of revolutions, the average speed, etc.

[0126] The system 135 can also comprise a data carrier 4031 embedded into the shear support for storing data from which data can be read and to which data can be written, a read/write head 4036 mounted to the far side upstanding wall of the shear support frame that reads/writes data from/to the data carrier 4031, a controller or interface 4040 located within the base compartment 136 (shown schematically) and communicating between the read/write head 4036 and machine control C. The data carrier 4031 can have stored thereon the number of food articles to be sliced simultaneously, size of each food article, gripper quantity and size to be used, food article tray height required, and food article lift tray tooling required. This data will be used for informing the operator which gripper and food article tray tooling should be used. The data carrier 4031 can also have stored thereon the amount of degrees the blade will need to slice the product (useful for timing the start/stop feed of the product), and information needed to automatically adjust the food article tray height position.

[0127] This information will be communicated to machine control via the read/write head 4036 and the interface 4040.

[0128] The machine control C can write onto the data carrier 4031, via the data interface 4040 and the read/write head 4036, how often this shear bar is used, how long in use, number of pounds produced, etc.

[0129] Preferably, the data carrier 4001 is a BL IDENT model TW-R30-B128 and the data carrier 4031 is a BL IDENT model TW-R20-B128 from Turck Inc. of Minneapolis, MN, US. The read write heads 4006, 4036 can be a model TB-M18-H1147 from Turck Inc. of Minneapolis, MN, US. The interface 4010, 4040 can also be obtained from Turck Inc. of Minneapolis, MN, US to be compatible with the read/write head and the particular machine control.

[0130] The system 135 can also be incorporated into the grippers and any other part where operation or maintenance information or instructions could be advantageously located.

Laser Safety Guard System

[0131] The laser safety guard system 123 is illustrated in Figures 53 and 54. The system comprises a near side laser sensor 5002 and a far side laser sensor 5004. Each sensor containing a laser emitter 5022 and a laser receiver 5026. Each sensor is protected in a housing 5006 that includes a base 5008 and an openable lid 5010. As shown in figure 79, springs 5012 are provided within the housing to urge the lid closed to the base 5008. Air cylinders 5014 are provided within the housing that, when supplied with pressurized air, opens the lid. Upon loss of electrical power, such as occurs during routine spray washing of the equipment, the lids are closed by force of the springs to seal the sensors within the housing to protect the sensors from spray wash and dirt.

[0132] The housing 5006 for far side sensor 5004 is mounted to the sweep mechanism housing 194 and the housing 5006 for the near side sensor 5002 is mounted to frame extension 548. As shown in figure 79, a conduit 501 extends from the housing base 5008 of the near side sensor 5002 to the sweep mechanism housing 194. The conduit 5011 carries electrical cables and pressurized air to the sensor 5002.

[0133] With the lid open, a laser curtain 5020, as shown in figure 78, of infrared laser beams is projected down from a laser emitter 5022 about 2 meters in depth and with a sweep of about 270°. A laser receiver 5026 senses any interference in the curtain caused by an intrusion. The laser beam emitter/receiver works on the principle of time of flight measurement. The emitter sends out very short pulses of light. When the light is incident on an object, it is reflected back and received by the receiver. The sensor calculates the time between sending the pulse and receiving the reflection to calculate the distance of the object.

[0134] The interference is communicated from the sensor to machine control C. Upon sensing the intrusion, a corresponding operating mechanism of the apparatus is halted. For example, if the lift tray is being lifted and an operator puts his hand through the laser curtain, the machine control halts movement of the lift tray mechanism. The laser curtains protect personnel on both the far side and near side of the apparatus 100.

[0135] The sensors 5002, 5004 are preferably model S300 SAFETY LASER SCANNER available from Sick AG of Germany.

Weighing and Classifying Conveyer

[0136] The weighing and classifying conveyor or output conveyor 102 is illustrated if Figures 55-60B and 80-82. The conveyor 102 includes four lanes for receiving up to four product groups in a row from the jump conveyor 3064. Each lane includes an input or deceleration conveyor 6002, a weighing scale conveyor 6006, and a classifying conveyor 6008.

[0137] The deceleration conveyor 6002 is pivotal about an axis 6012 under force from a lever 6014 that is moved by a linear actuator, such as a servomotor screw drive 6016. The deceleration conveyor 6002 is controllably pivotal to match the changing elevation of the jump conveyor 3064. Each conveyor 6002 comprises a belt 6020 that circulates around idle rollers 6022, 6024 and a drive roller 6028, and against roller 6029. The drive roller 6028 is driven by a drive belt 6034 driven by a servomotor 6036. All four lanes are driven together by a single motor.

[0138] Each weighing conveyor 6006 includes a re-

movable carrying unit 6006a and a drive unit 6006b. The carrying unit 6006a includes a belt 6050 that circulates around two rollers 6054, 6058. The roller 6058 includes a driven gear 6060 that is enmesh with a drive gear 6064. The drive gear 6064 is part of a drive unit 6006b. The drive gear is mounted on axle 6066 that is mounted for rotation to side frame members 6070, 6072 of the drive unit 6006b. The axle 6066 is driven by a belt 6078 that is circulated by a servomotor 6080. The side frame members 6070, 6072 are connected to a transverse member 6082 that is fastened to a load cell 6086.

[0139] The load cell can be as described in U.S. Patent Application No. 11/454143 filed on 6/15/2006, herein incorporated by reference. The four load cells 6086 are preferably viscous damped load cells for vibration resistance.

[0140] The removable carrying unit 6006a is easily separated from the side frame members 6070, 6072 of the drive unit 6006b for cleaning as demonstrated in Figures 56 and 57. Each side frame member 6070, 6072 includes two slots 6090, 6092 that each receive a stub axle 6100 of the conveyor and the side frame members are captured between a cap 6102 of the stub axle and a base 6104 of the stub axle.

[0141] The four scale conveyors, one in each lane, are driven independently by four motors 6080 as described.

[0142] The classifier conveyor 6008 includes four conveyors 6138a, 6138b, 6138c, 6138d. Each conveyor, such as 6138a, includes a conveyor belt 6140 that is circulated around idle rollers 6142, 6144 and drive roller 6146 and against roller 6148. The drive roller 6146 is driven in rotation by a belt 6150 driven by a servomotor 6152. All four conveyor belts 6140 are driven by the common servomotor 6152. Each conveyor, such as 6138a, includes pivotal frame member 6156 that is pivotal about an axis 6160. A linear actuator, such as a pneumatic cylinder 6164 is actuatable to pivot up or down the pivotal frame member 6156. The pivotal frame member carries the roller 6142 so pivoting of the frame member 6156 pivots the conveyor belt 6140 as well. Each conveyor 6138a, 6138b, 6138c, 6138d is individually pivotable by corresponding pneumatic cylinders 6164.

[0143] The conveyors 6138a, 6138b, 6138c, 6138c are pivotal from a down tilted angle position "A" corresponding to delivering off weight product to an off-weight conveyor (not shown), to a horizontal position "B" which is for on weight, acceptable product, and to a cleanup position "C". The cleanup position "C" is important in order to avoid interference with a downstream conveyor (not shown) when the weighing and classifying conveyor 102 is translated out to the cleanup position of figure 59.

[0144] The weighing and classifying conveyor 102 is supported on a pair of rails 6180, 6182 that are connected to be bottom wall 140 of the base section 104 of the apparatus 100. The conveyor 102 is fastened to four slide bearings 6186 that slide on the rails 6180, 6182. A linear actuator or pneumatic cylinder 6190 is fastened to the conveyor housing and includes a rod 6192 that extends rearward through the housing and is fastened to a stop 6196 provided on the rails between the conveyor 102 and the apparatus 100. When the rod 6192 is forced by air pressure delivered into the cylinder to extend, the conveyor 102 slides away from the apparatus 100 to a clean up position as shown in Figure 59. While a pneumatic cylinder is shown, any other means to move the conveyor away from the apparatus, including a motor, a screw drive, or human force, could be used in place of the pneumatic cylinder.

[0145] Figures 80-83 illustrates a position adjustment feature of the weighing and classifying conveyor 102. Each of the belts 6020 of the four deceleration conveyors 6002 comprises a plurality of belts elements 6206 that encircled the rollers 6022, 6024, and drive roller 6028. The rollers 6022 are each carried on a slidable carriage 6210. The slidable carriages 6210 are slidable along a support tube 6216. Each carriage 6210 has a threaded hole 6222 that receives a single threaded adjustment rod 6230 that is fixed to a frame of the conveyor but allowed to rotate. Each carriage 6210 has a dedicated single adjustment rod 6230 for moment all that dedicated carriage 6210. The rod 6230 allows fine positioning of the ends of the four deceleration conveyors 6002. This is particularly advantageous to ensure that slices delivered from the deceleration conveyors 6002 are perfectly centered when passing across the weighing conveyors 6006 for accurate weighing. Depending on conditions, the product slice from the food articles may not land precisely on the jump conveyor 3064 so that this adjustment is advantageous. Although a manual adjustment is described, it is readily understood that an automatic adjustment such as with a linear actuator, servomotor or servo screw drive could be used as well.

[0146] The conveyor 6002 comprises a belt 6020 that circulates around idle rollers 6022, 6024 and a drive roller 6028, and against roller 6029. The drive roller 6028 is driven by a drive belt 6034 driven by a servomotor 6036. All four lanes are driven together by a single motor.

Adjustable Conduit Connections

[0147] Because various compartments within the combination 100/102 must be compatible with the moving with respect to other compartments, accommodations must be made for differential movement and rotation with regard to conduits for signal and power cables and pneumatic tubing. A conduit 8000 shown in figure 5 is provided with a telescopic slide joint 8002 and upper rotary joint 8004 and a lower rotary joint 8006 to accommodate the relative pivoting motion between the food article feed drive compartment 196 and the base compartment 136. A conduit 8010 between the weighing and classifying conveyor 102 and the base compartment 136 requires a sliding joint 8012 wherein some excess conduit length is provided within the weighing and classifying conveyor 102.

Servomotors

[0148] The servomotors used within the combination apparatus 100/102 are air cooled except for the servomotor 2098 which is preferably water cooled. All the servomotors and other actuators are precisely controlled for movement and position by the machine control, so that conveyor movements, lift tray movements, sweep movements, elevation adjusting movements, food article end removal apparatus movements, food article feed movements, blade movements, clean up position movements, etc. are all coordinated for optimal machine performance.

Claims

1. A food article slicing machine, comprising:

   a slicing station comprising a knife blade and a knife blade drive driving the blade along a cutting path in a cutting plane;
   a food article feed apparatus supporting one or more food articles for movement along food article paths intersecting the cutting path; and
   a retraction mechanism configured to retract said knife blade from said cutting plane.

2. The slicing machine of claim 1, wherein said retraction mechanism has an engaged position where the blade is in the cutting plane and a retracted position being a horizontal distance from the cutting plane.

3. The slicing machine of claim 1, wherein said retraction mechanism has an engaged position where the blade is in the cutting plane and a retracted position being a horizontal distance from the cutting plane in an axial direction with respect to the knife blade axis of rotation.

4. The slicing machine of claim 1, wherein said retraction mechanism retracts the knife blade a horizontal distance from the cutting plane so the knife blade is disengaged from a non-advancing food article.

5. The slicing machine of claim 1, wherein said retraction mechanism comprises an actuator for moving the knife blade between the cutting plane and a retracted position.

6. The slicing machine of claim 5, wherein said retraction mechanism comprises a pivot bar for operatively connecting said actuator to said knife blade.

7. The slicing machine of claim 5, wherein said actuator has an extended position and a starting position; said knife blade is in a retracted position from the cutting plane when the actuator is in said extended position; said knife blade is coplanar with said cutting plane when the actuator is in said starting position.

8. The slicing machine of claim 1, further comprising a brake mechanism for stopping said knife blade.

9. The slicing machine of claim 1, further comprising a disc rotating in sync with and operatively connected to said knife blade;
   a brake caliper for clamping onto said disc to slow said disc;
   said caliper having an engaged position where the caliper applies pressure to said disc, and a disengaged position.

10. The slicing machine of claim 9, further comprising one or more friction pads for creating friction against said disc; said friction pads positioned between said brake caliper and said disc.

FIG. 1

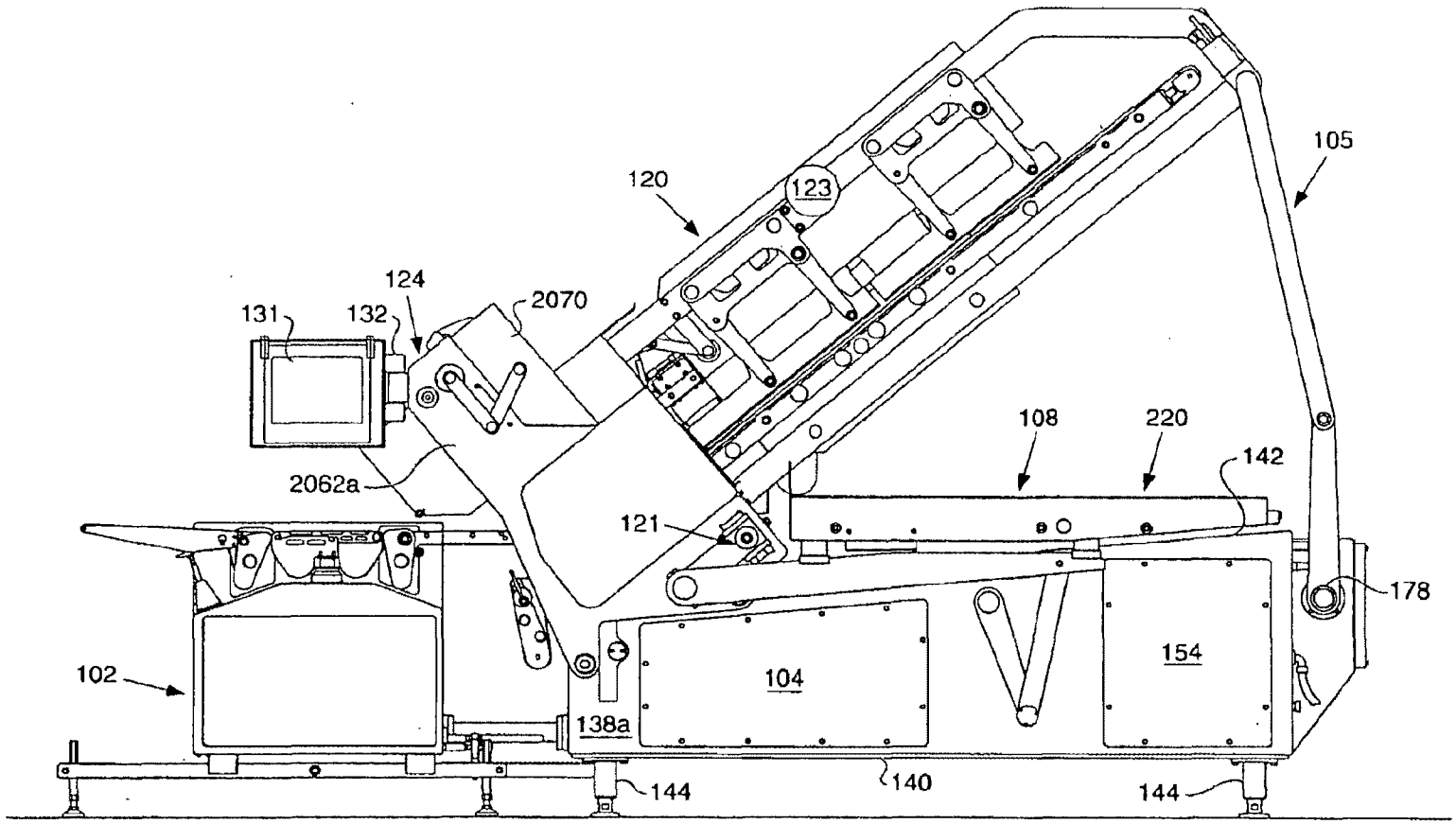
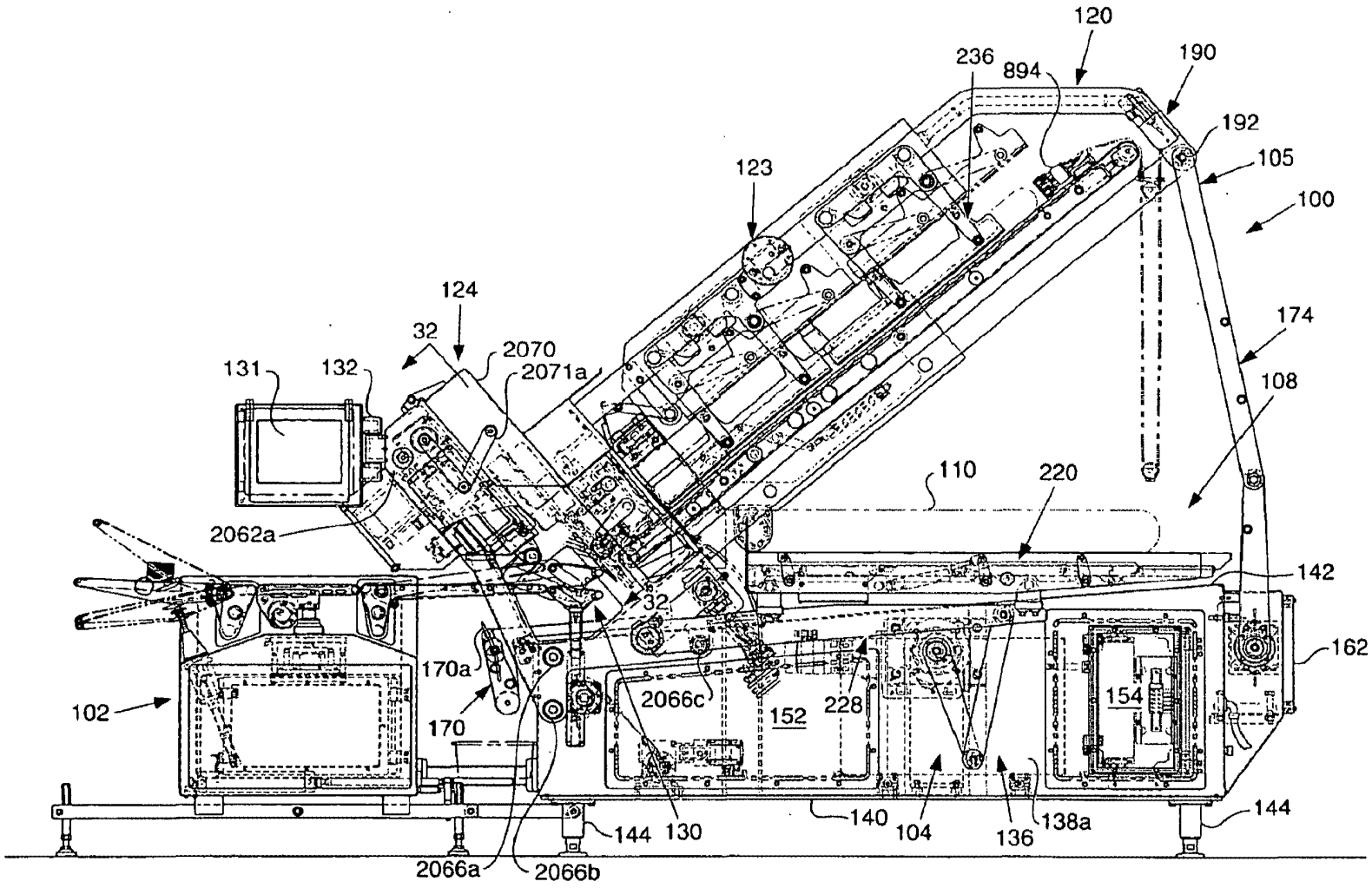

105
120
123
124
131
132
2070
108
220
142
2062a
121
178
102
104
154
138a
144
140
144

FIG. 2



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FIG. 3

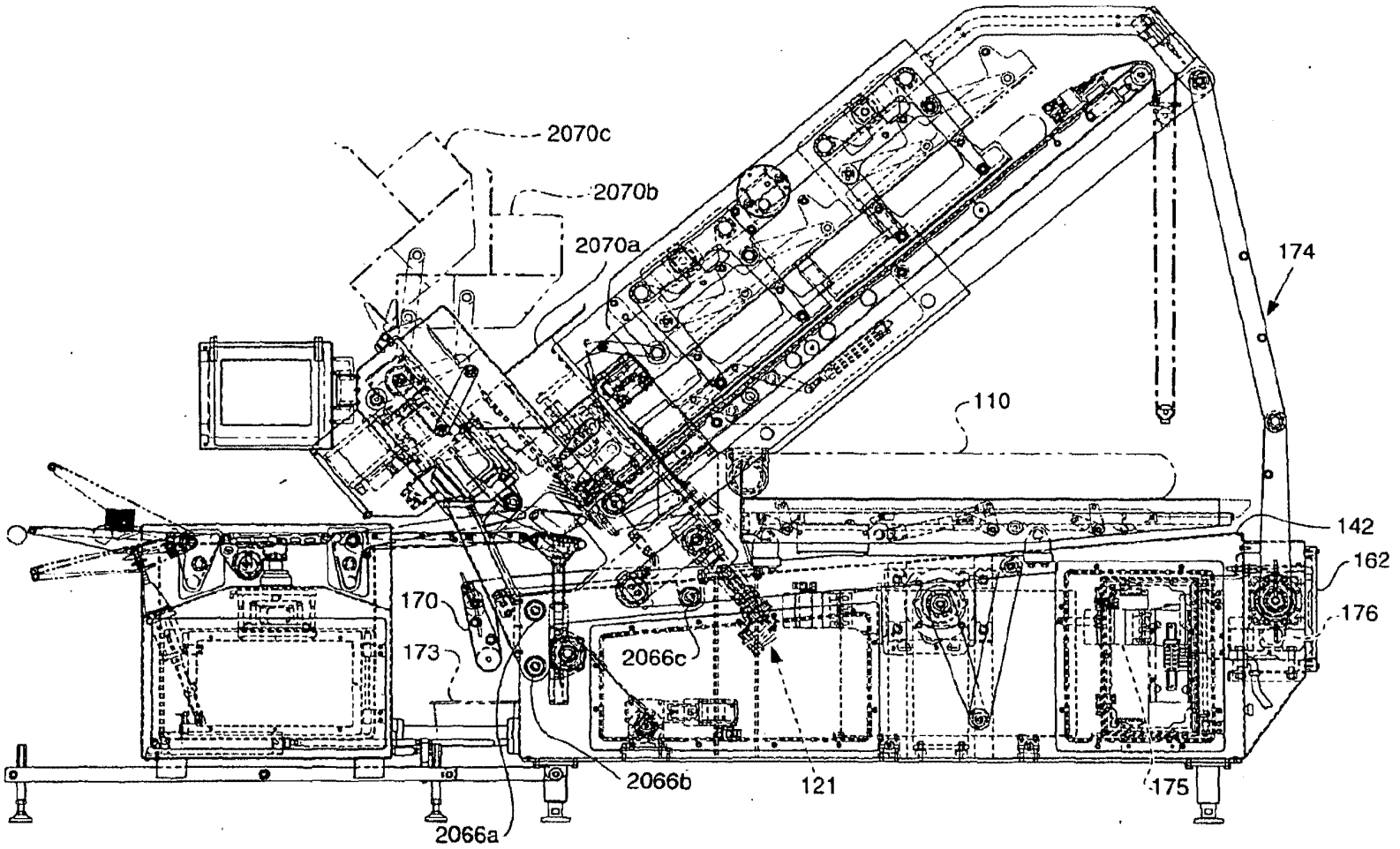

2070c
2070b
2070a
174
110
142
162
176
170
173
2066c
2066b
121
175
2066a

FIG. 4

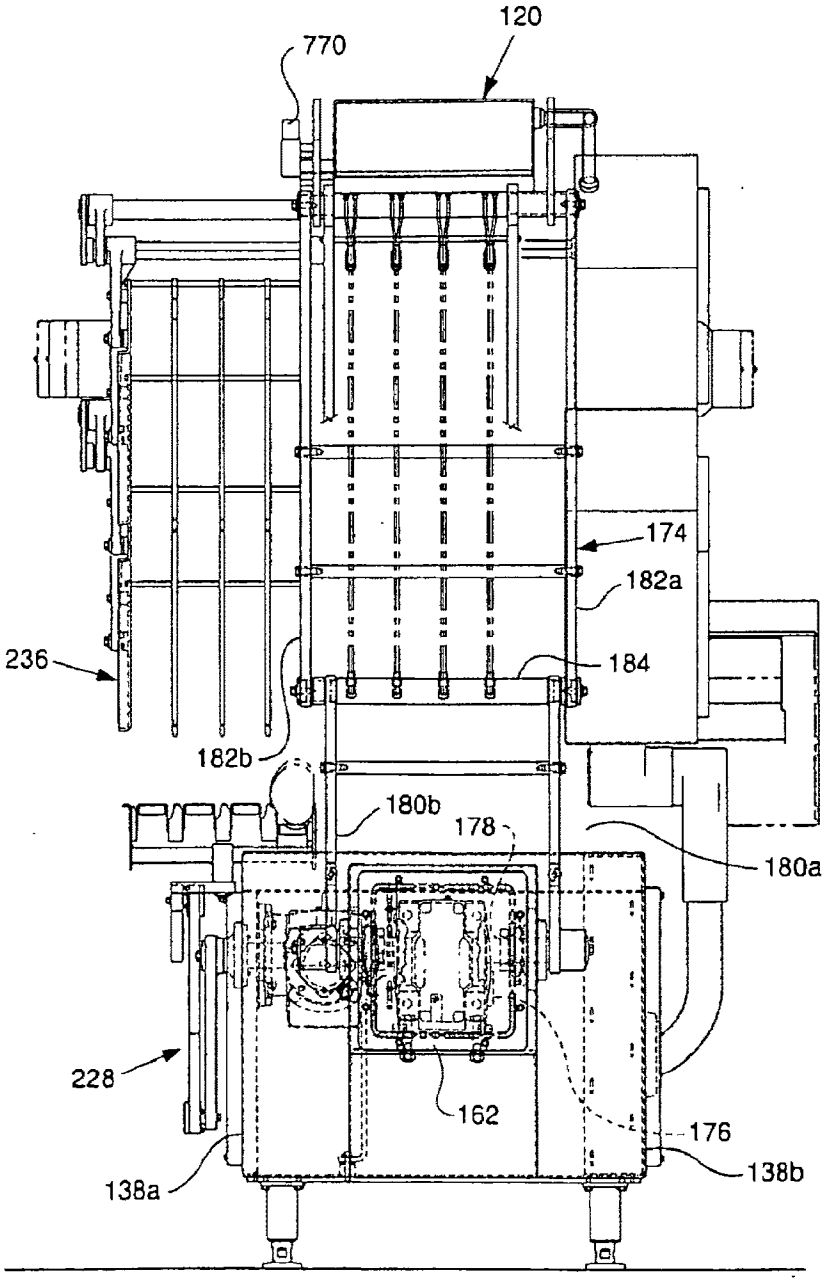

120
770
174
182a
236
184
182b
180b
178
180a
228
162
176
138b
138a

FIG. 4A

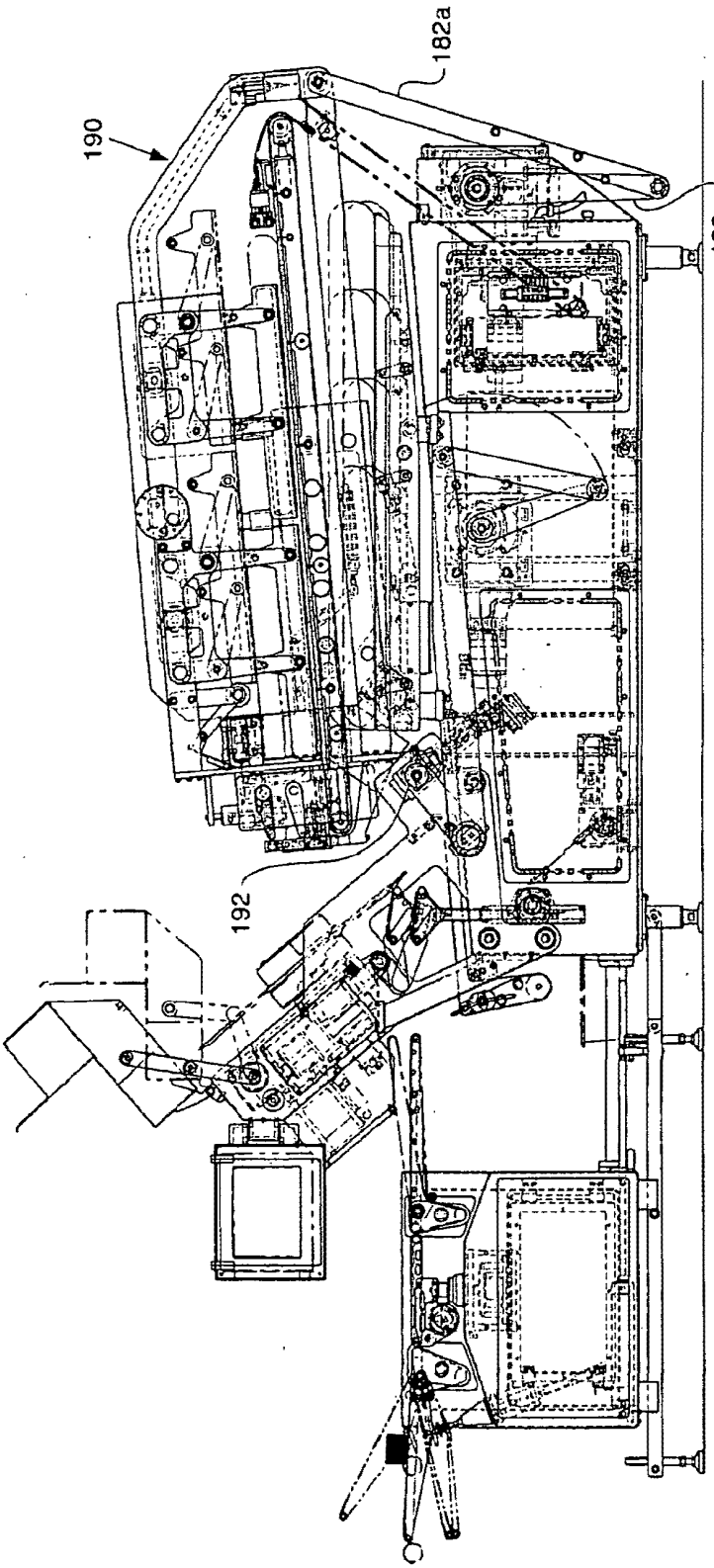


FIG. 4B

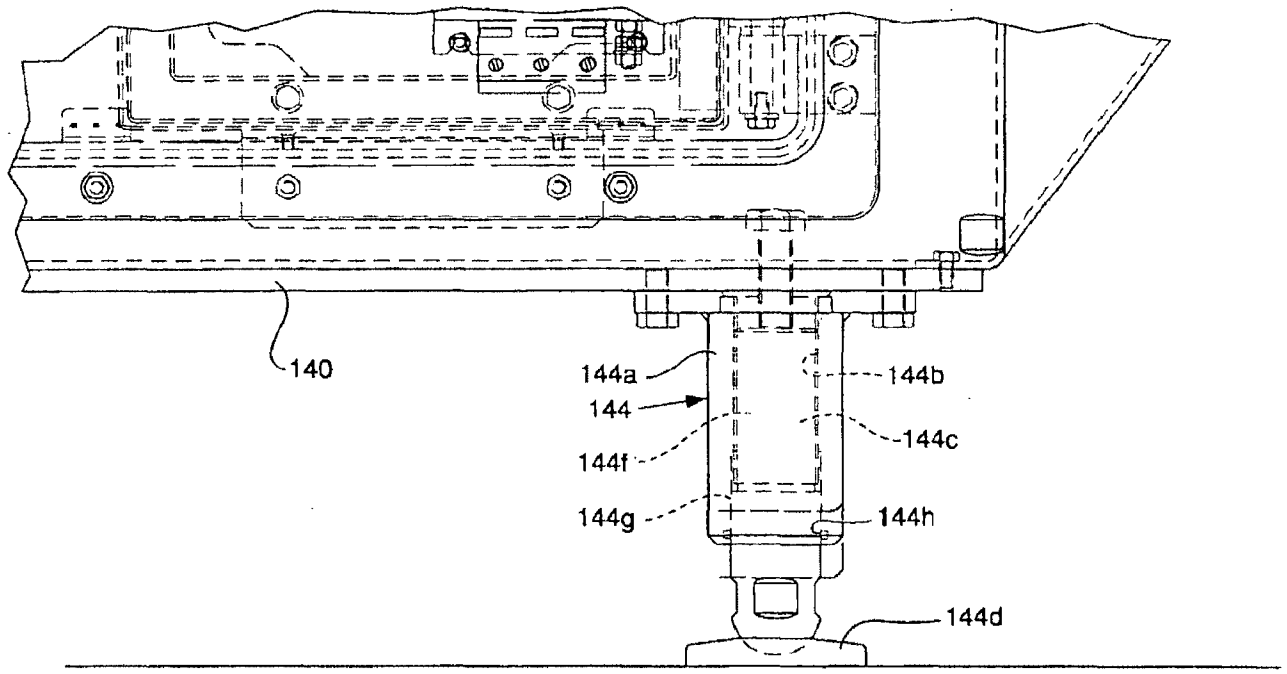


FIG. 5

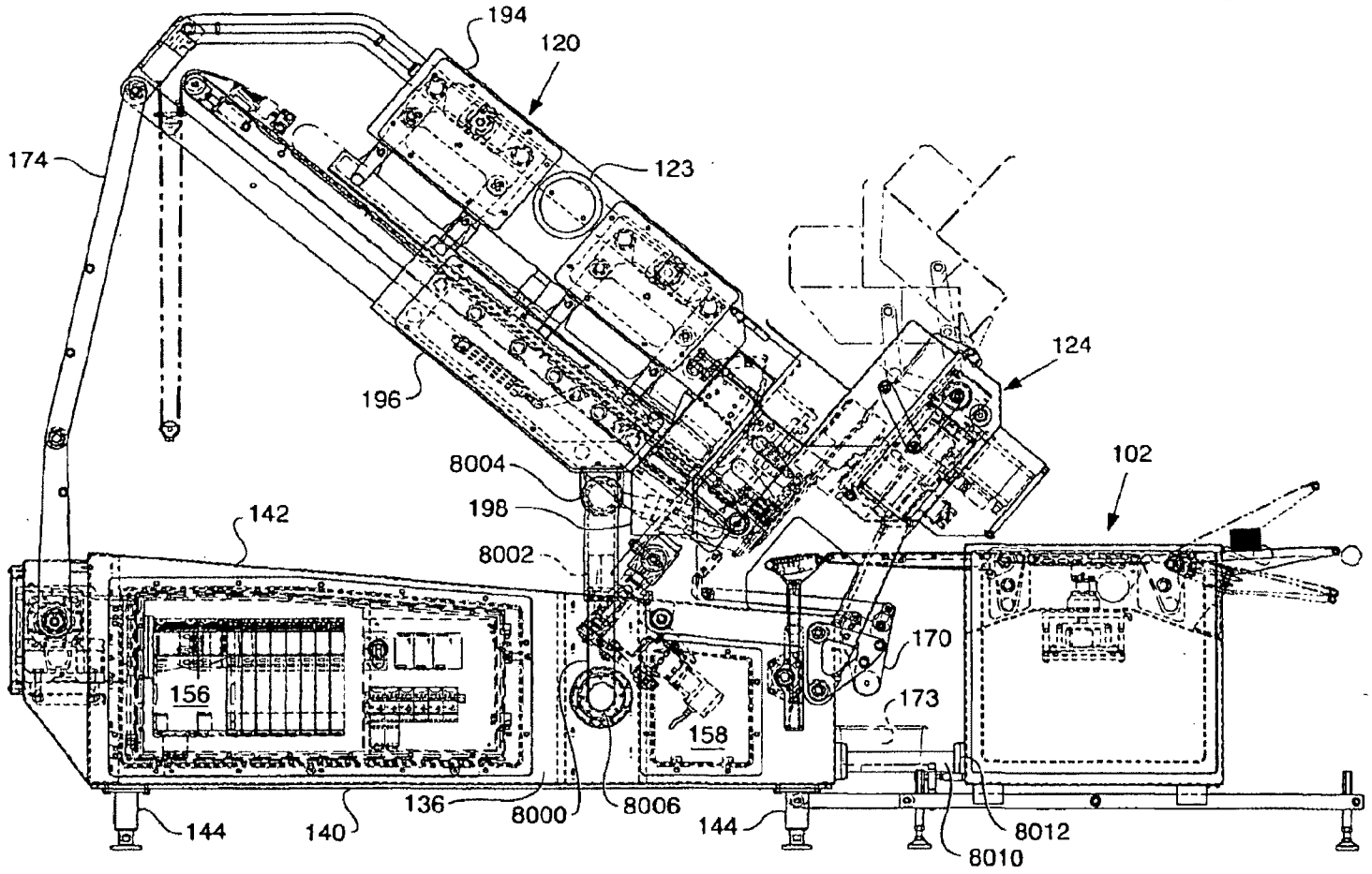

194
120
174
123
124
196
102
8004
198
142
8002
170
156
173
158
136
8000
8006
144
140
144
8012
8010

FIG. 8

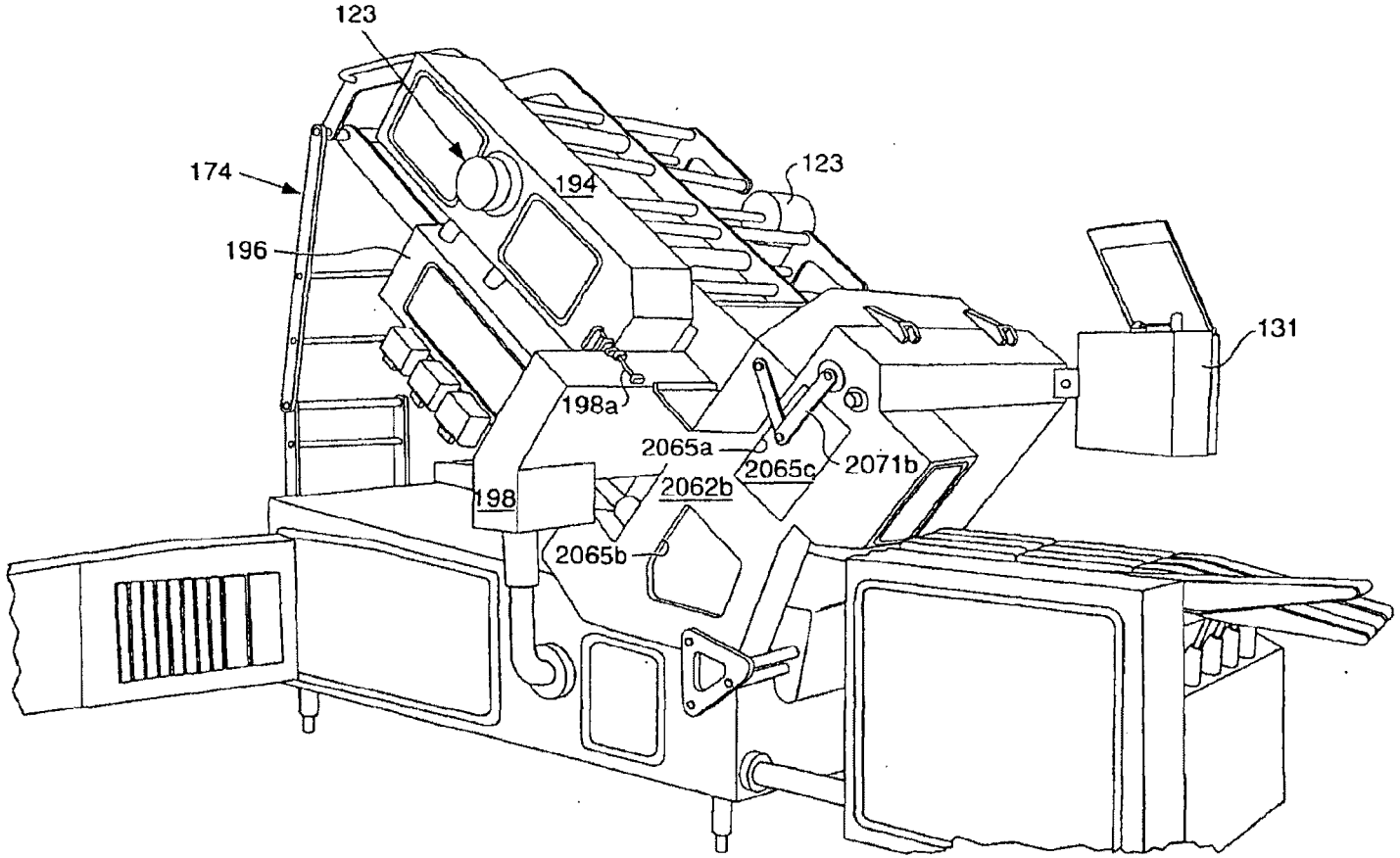

123
174
194
123
196
131
198a
2065a
2065c
2071b
2062b
198
2065b

FIG. 7

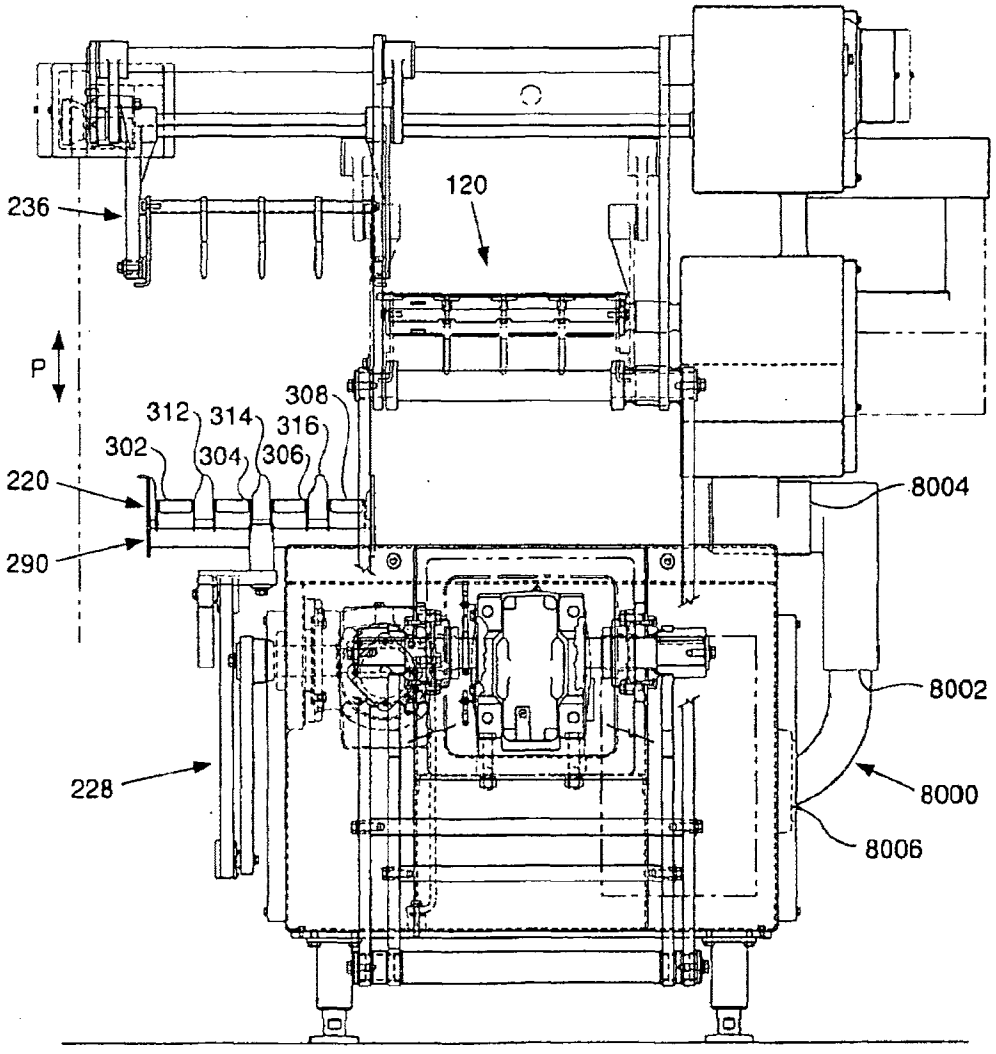

236
120
P
312
314
308
316
302
304
306
220
290
8004
8002
228
8000
8006

FIG. 8

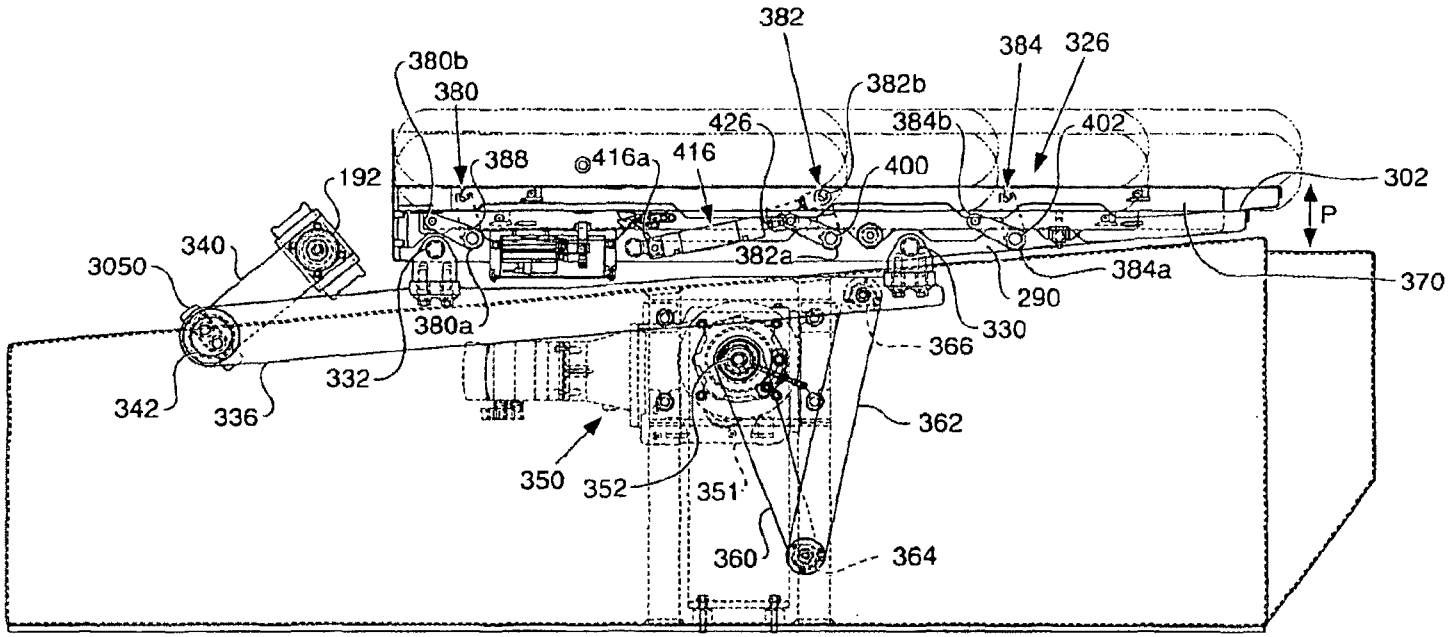

382
384
326
380b
380
382b
426
384b
402
388
416a
416
400
192
302
P
340
382a
3050
384a
370
290
380a
330
366
332
342
336
362
350
352
351
360
364

FIG. 8A

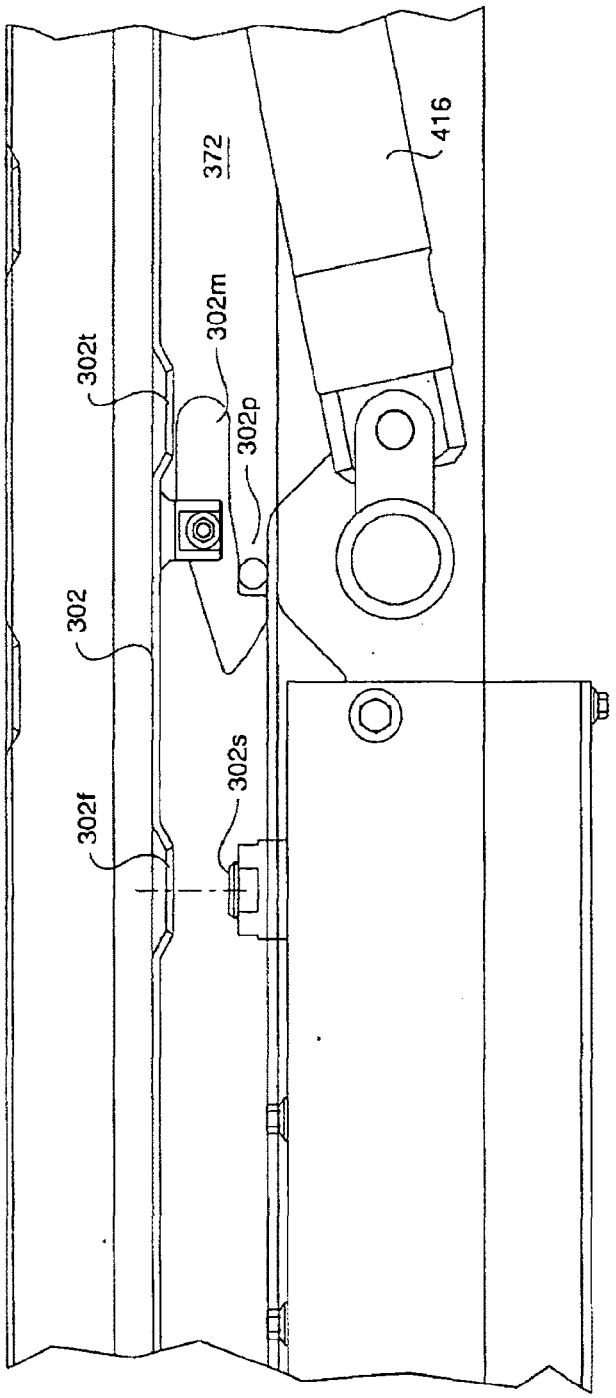


FIG. 9

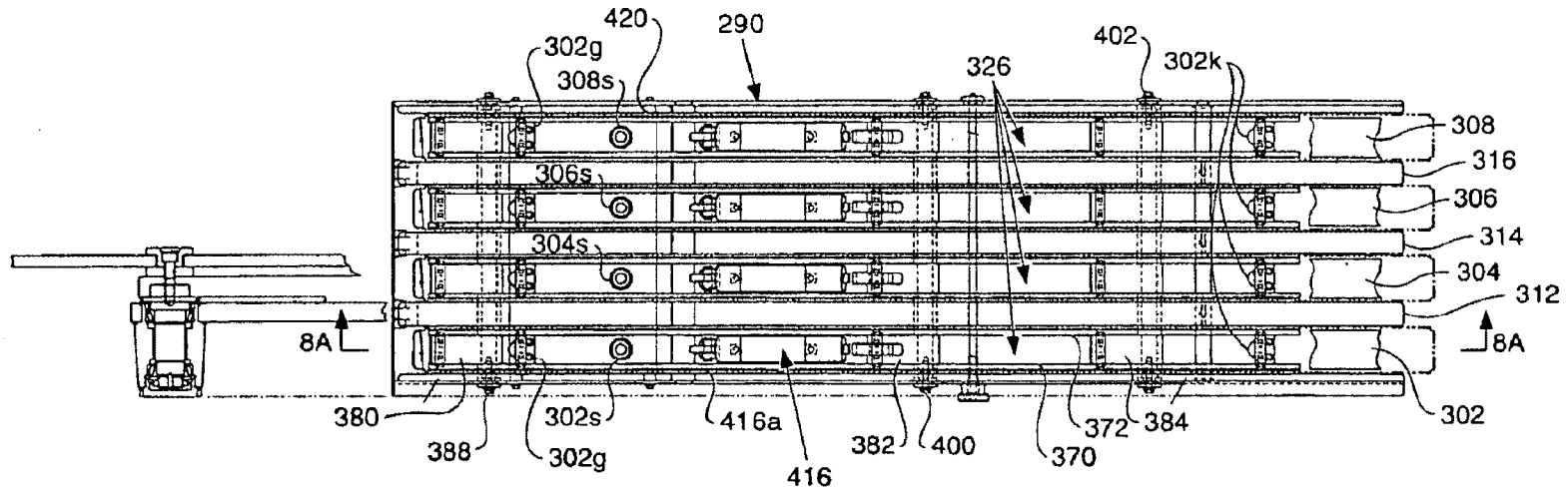

420
290
302g
308s
326
402
302k
308
316
306s
306
314
304s
304
312
8A
8A
380
388
302s
302g
416a
416
382
400
370
372
384
302

FIG. 10

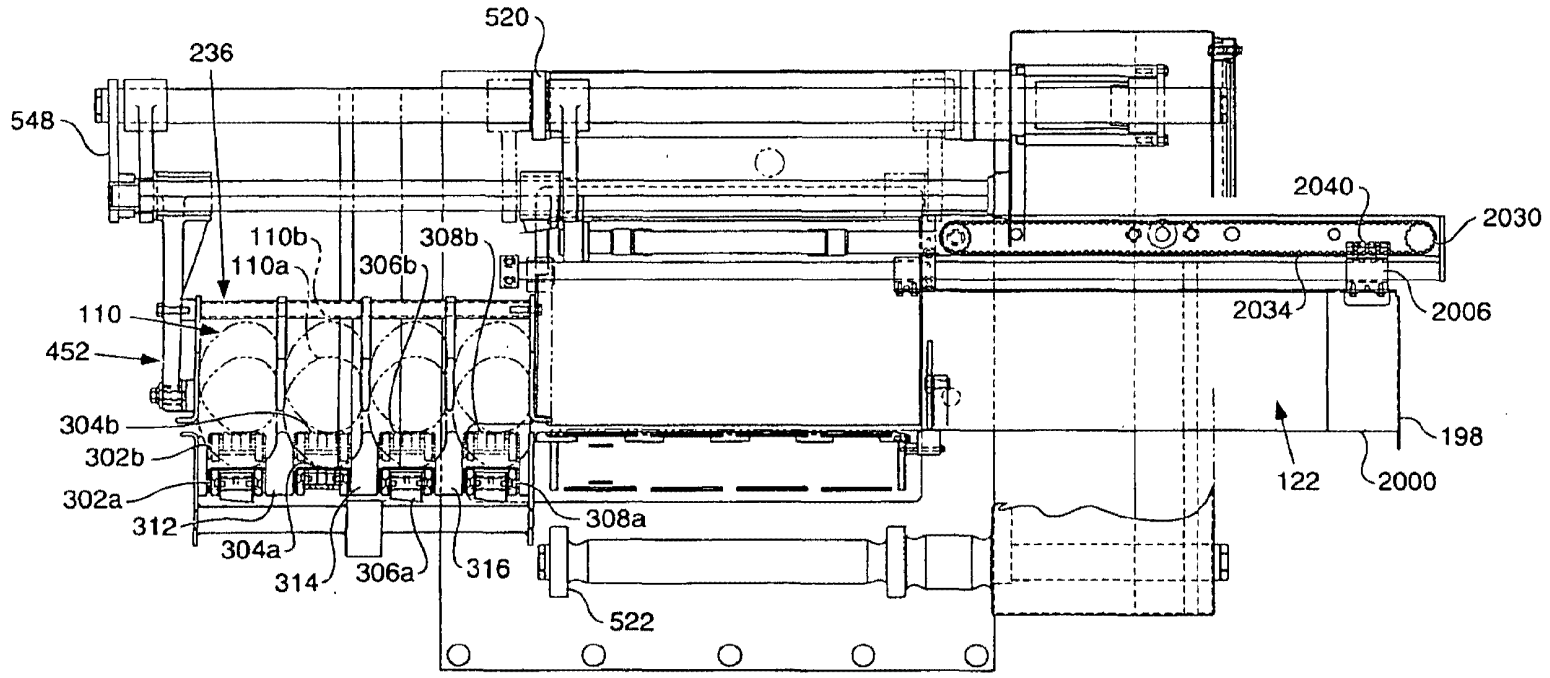
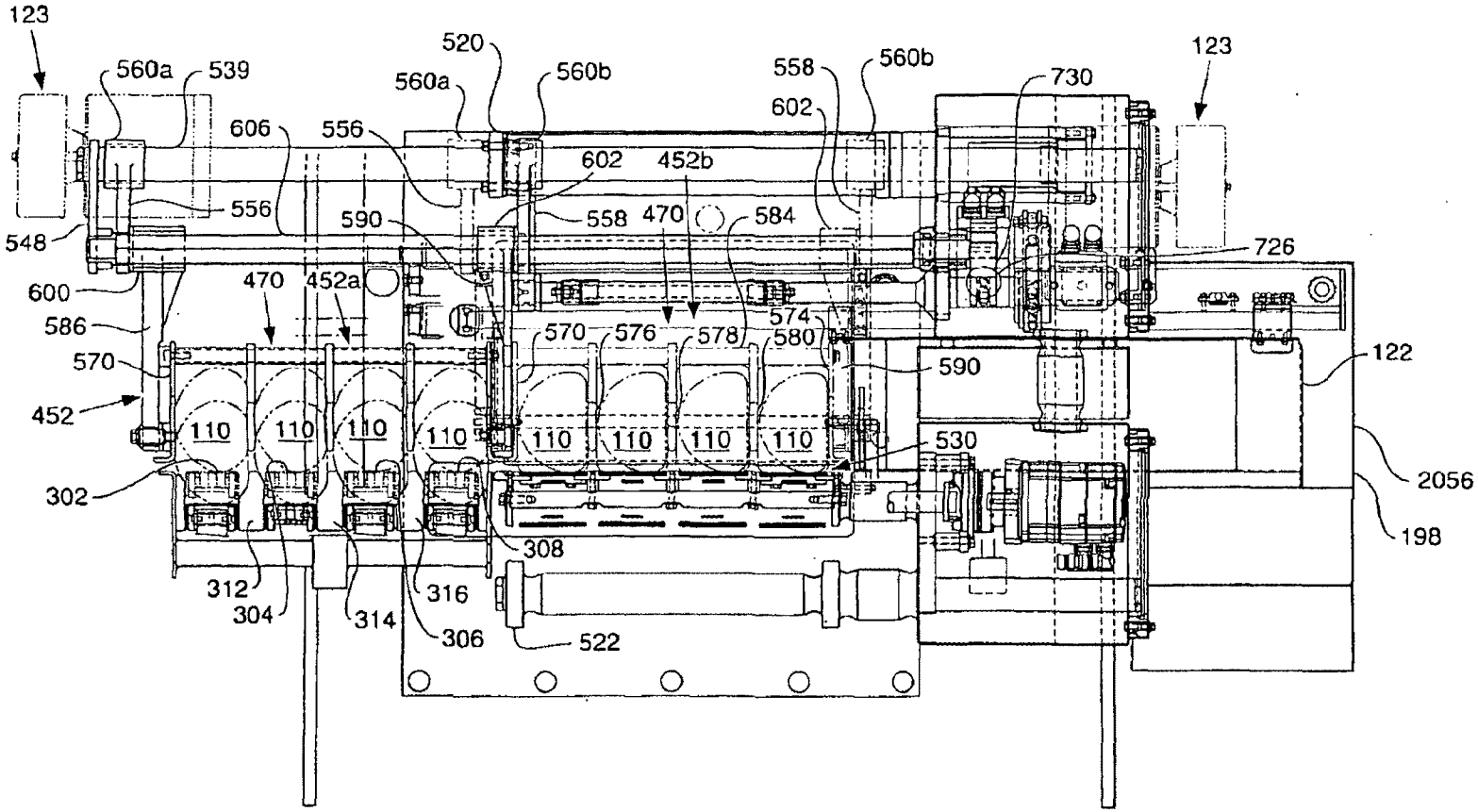
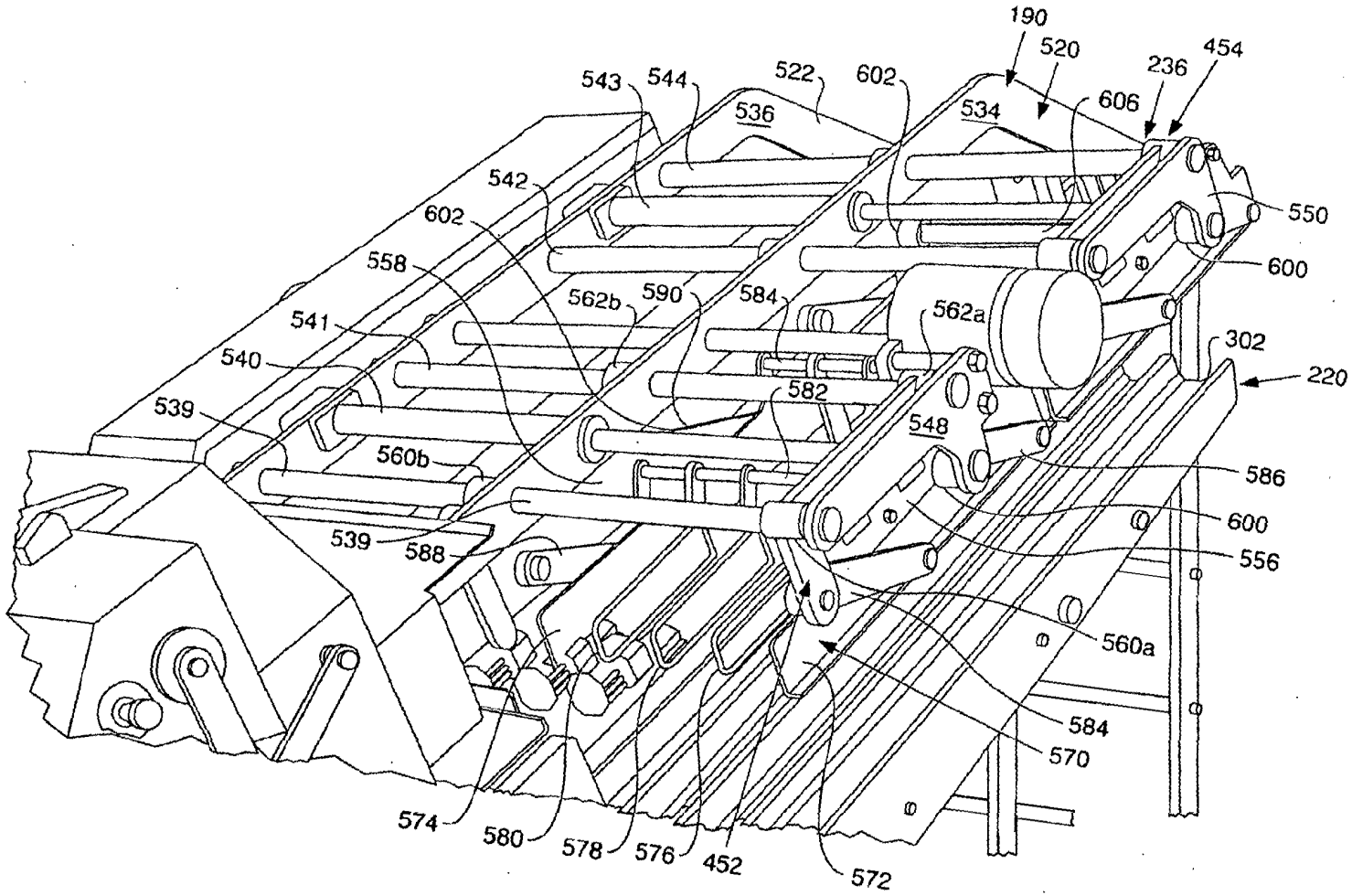

520
236
548
2040
2030
110b
110a
306b
308b
110
452
2034
2006
304b
302b
302a
312
304a
314
306a
316
308a
198
122
2000
522

FIG. 11



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FIG. 12



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FIG. 12A

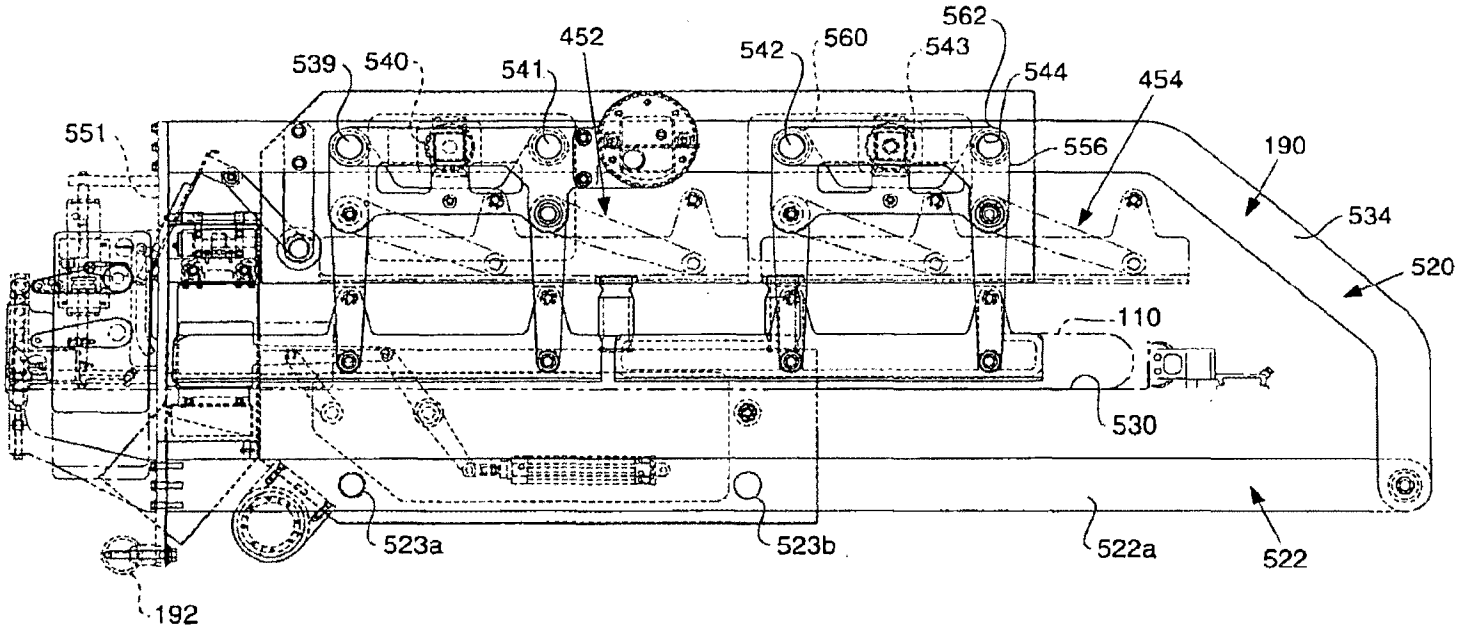

562
452
539
540
541
542
560
543
544
454
551
556
190
534
520
110
530
523a
523b
522a
522
192

FIG. 13

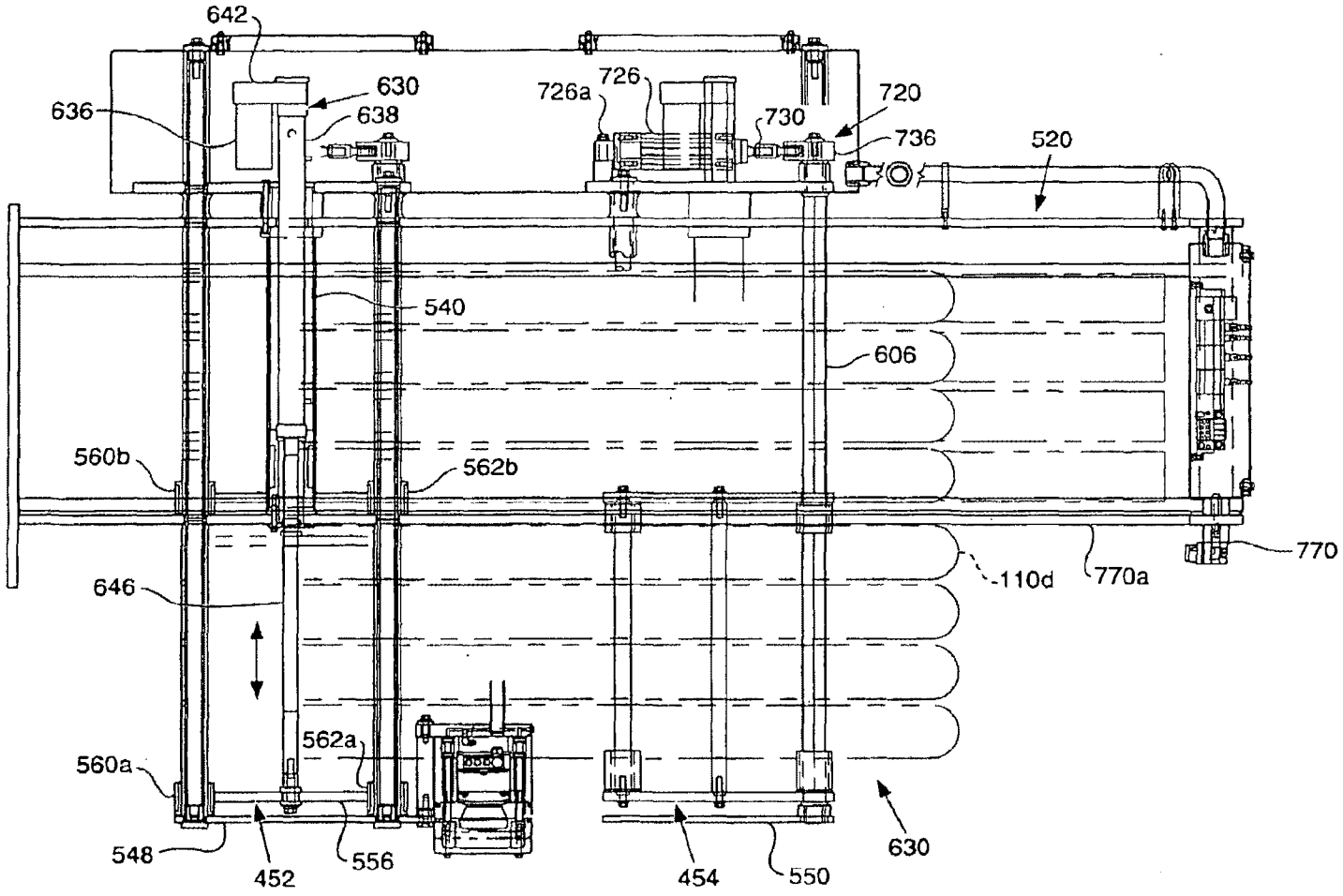

642
630
636
638
726a
726
730
720
736
520
540
606
560b
562b
770
770a
110d
646
562a
560a
548
452
556
454
550
630

FIG. 14

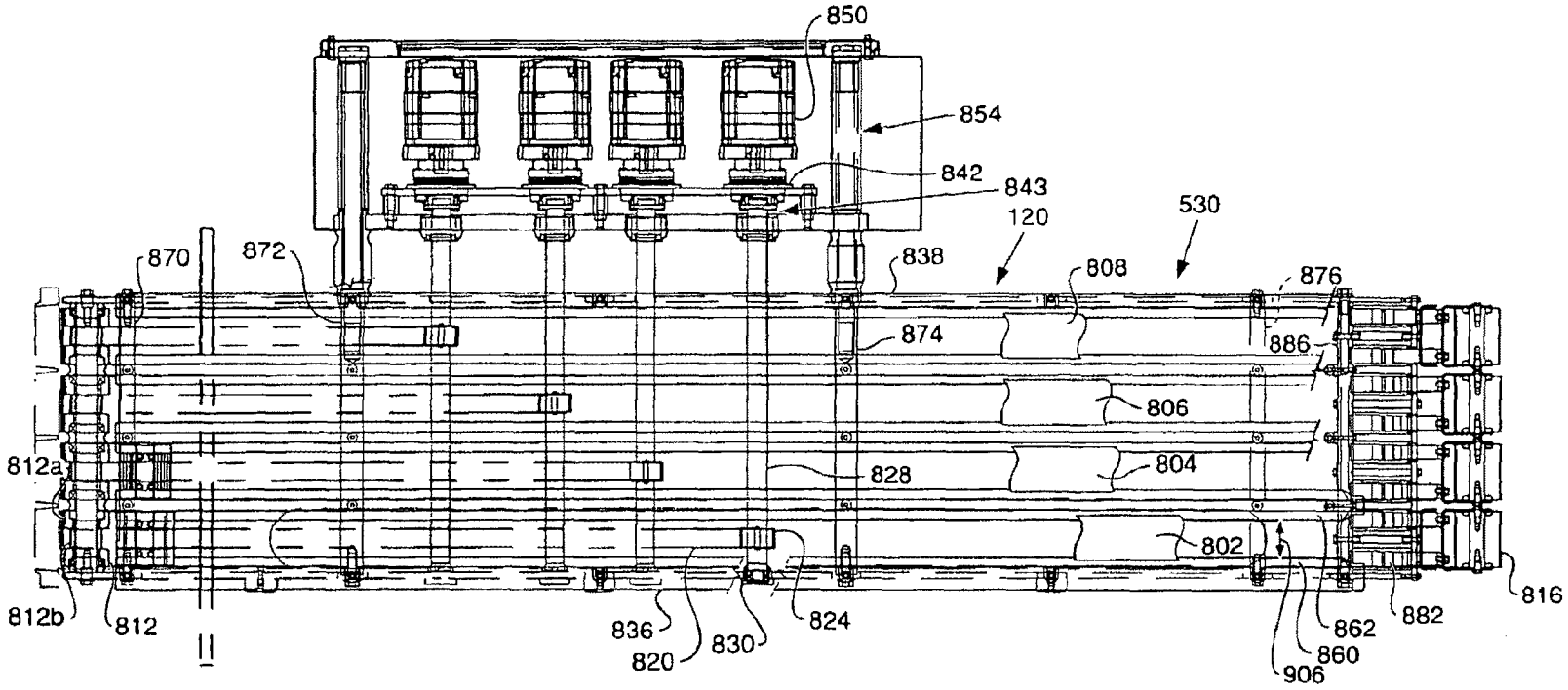

850
854
842
843
120
530
870
872
838
808
876
874
886
806
812a
828
804
802
816
812b
812
836
820
830
824
862
860
906
882

FIG. 15

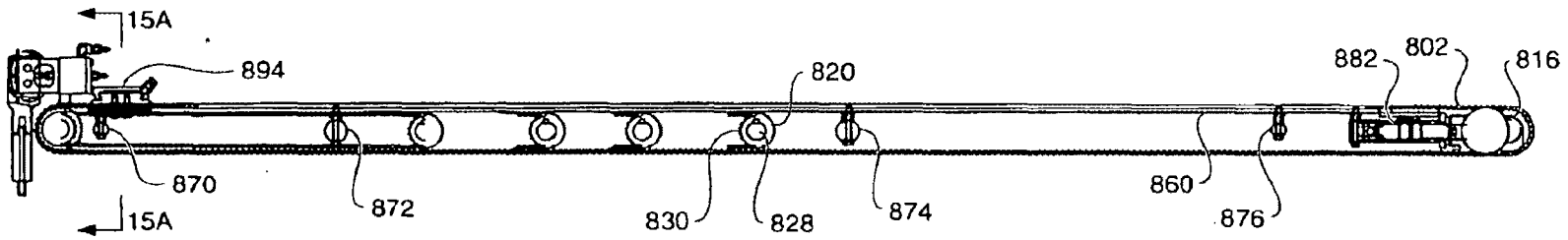
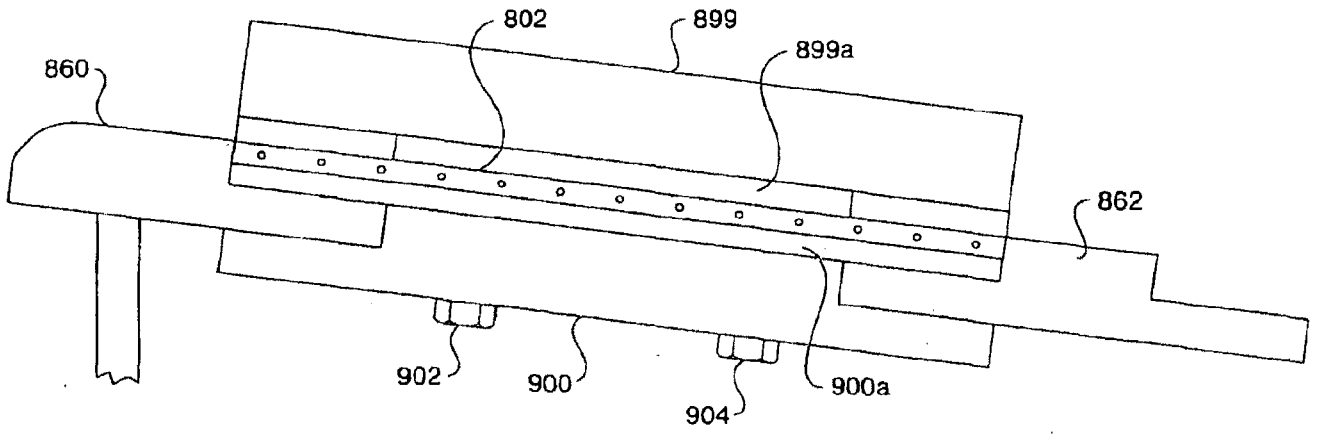


FIG. 15A



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FIG. 16

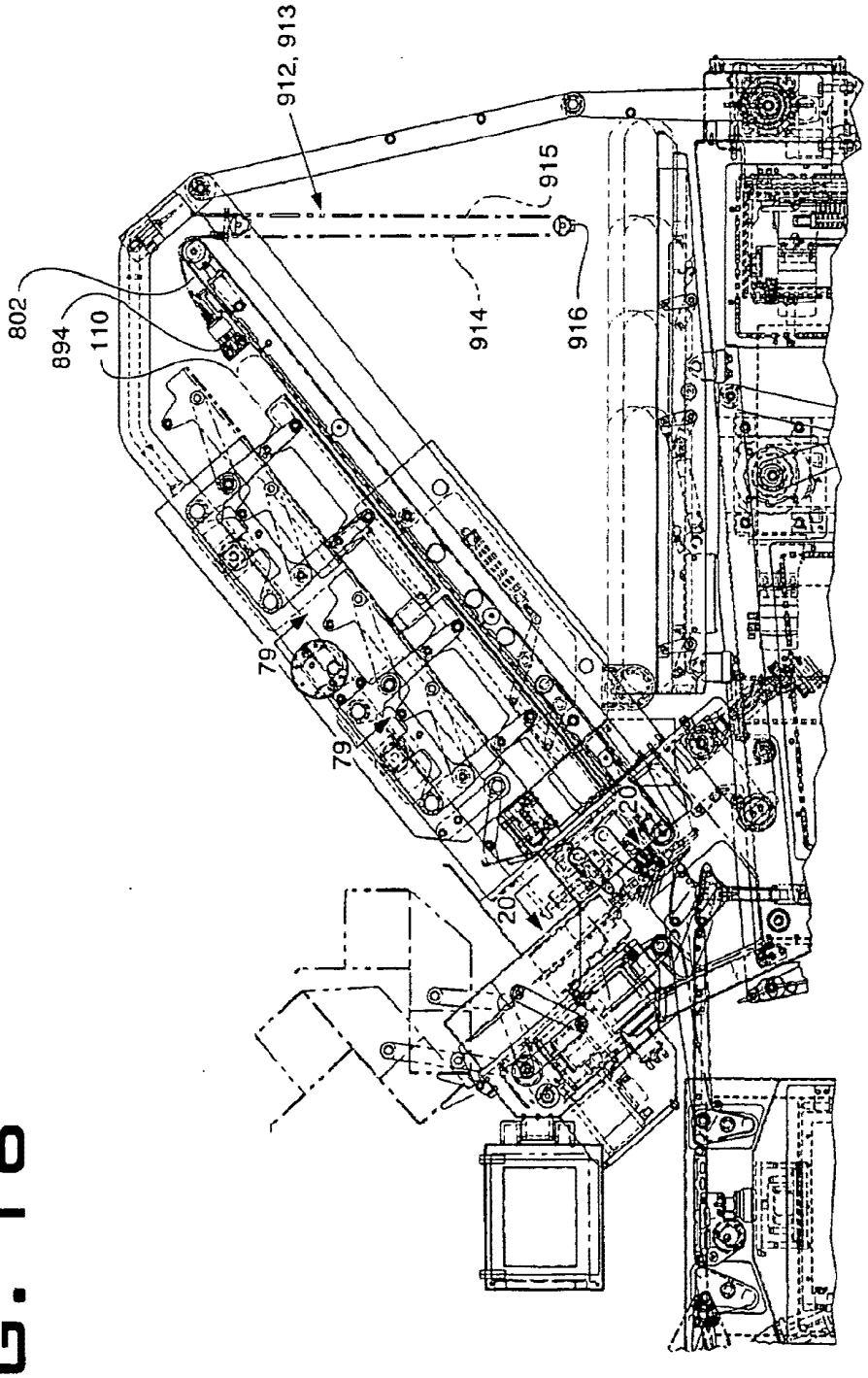


FIG. 17

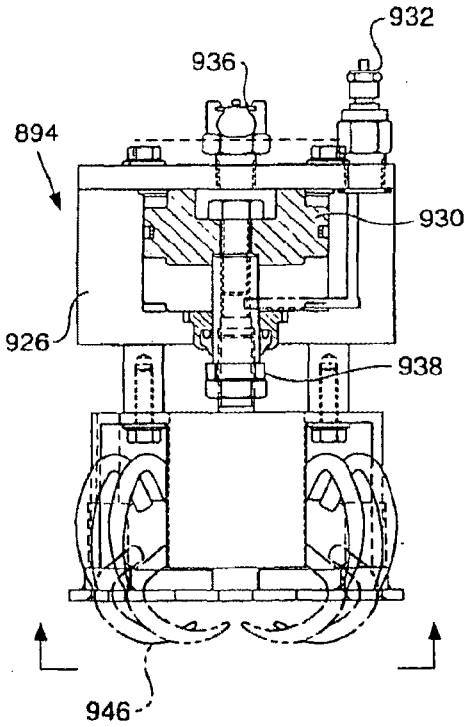


FIG. 17A

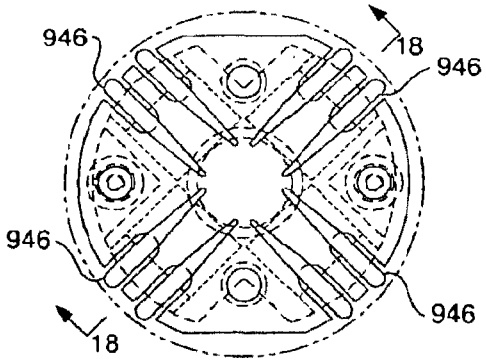


FIG. 18

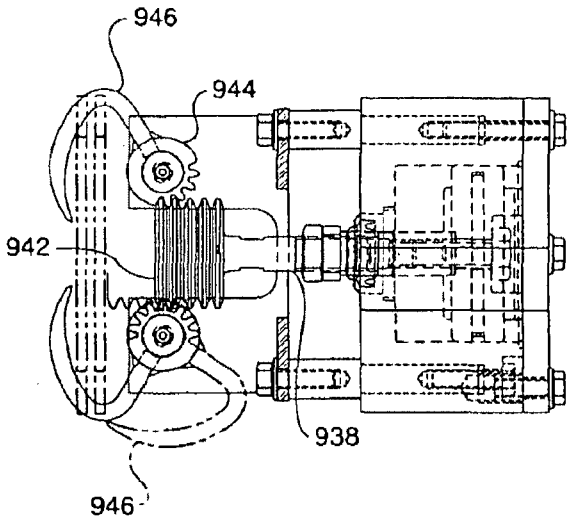


FIG. 19

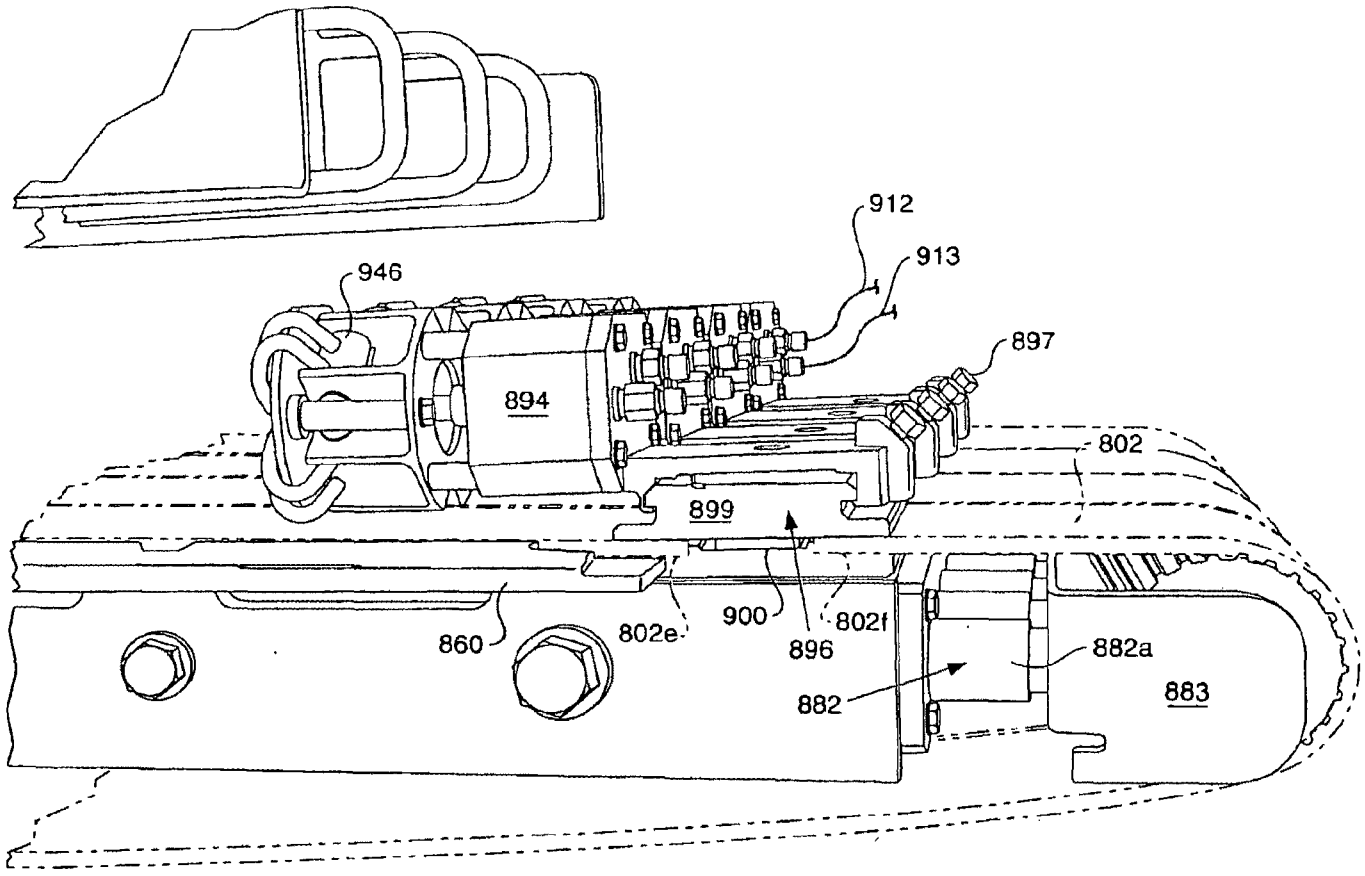


FIG. 20

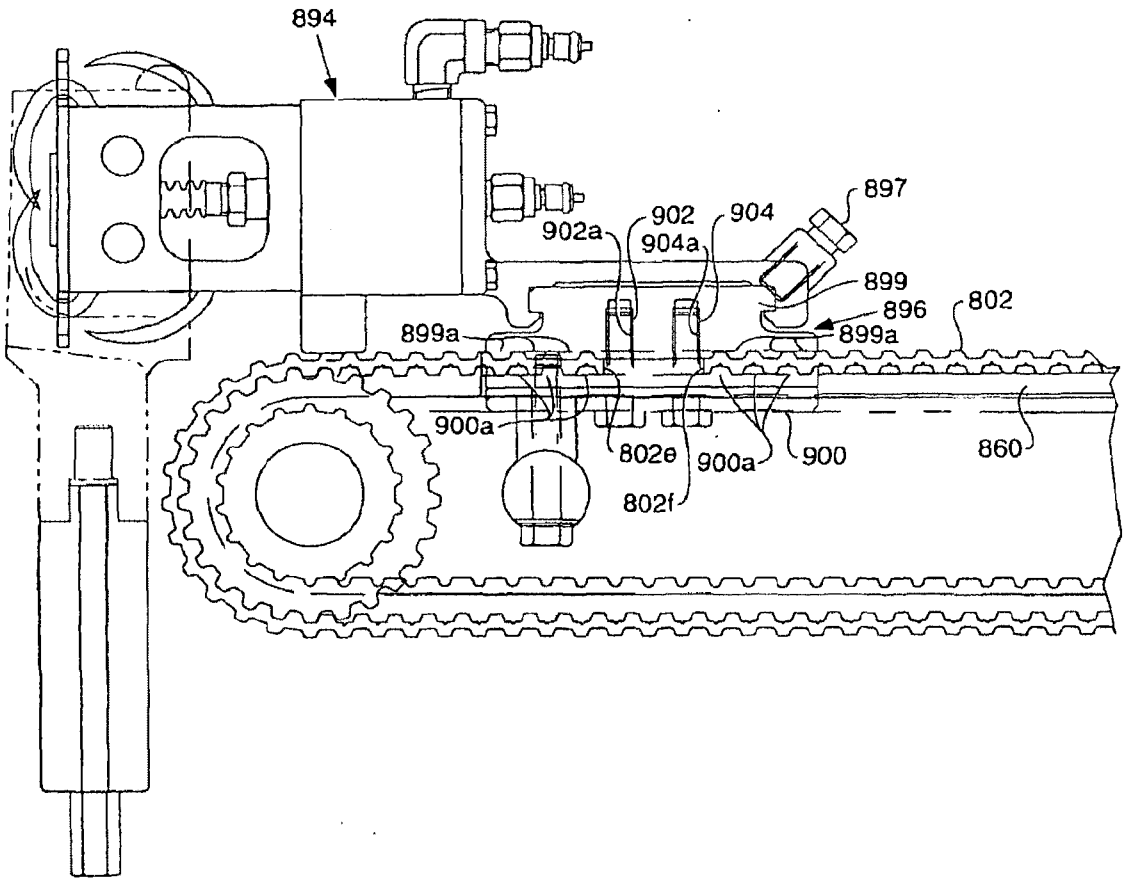
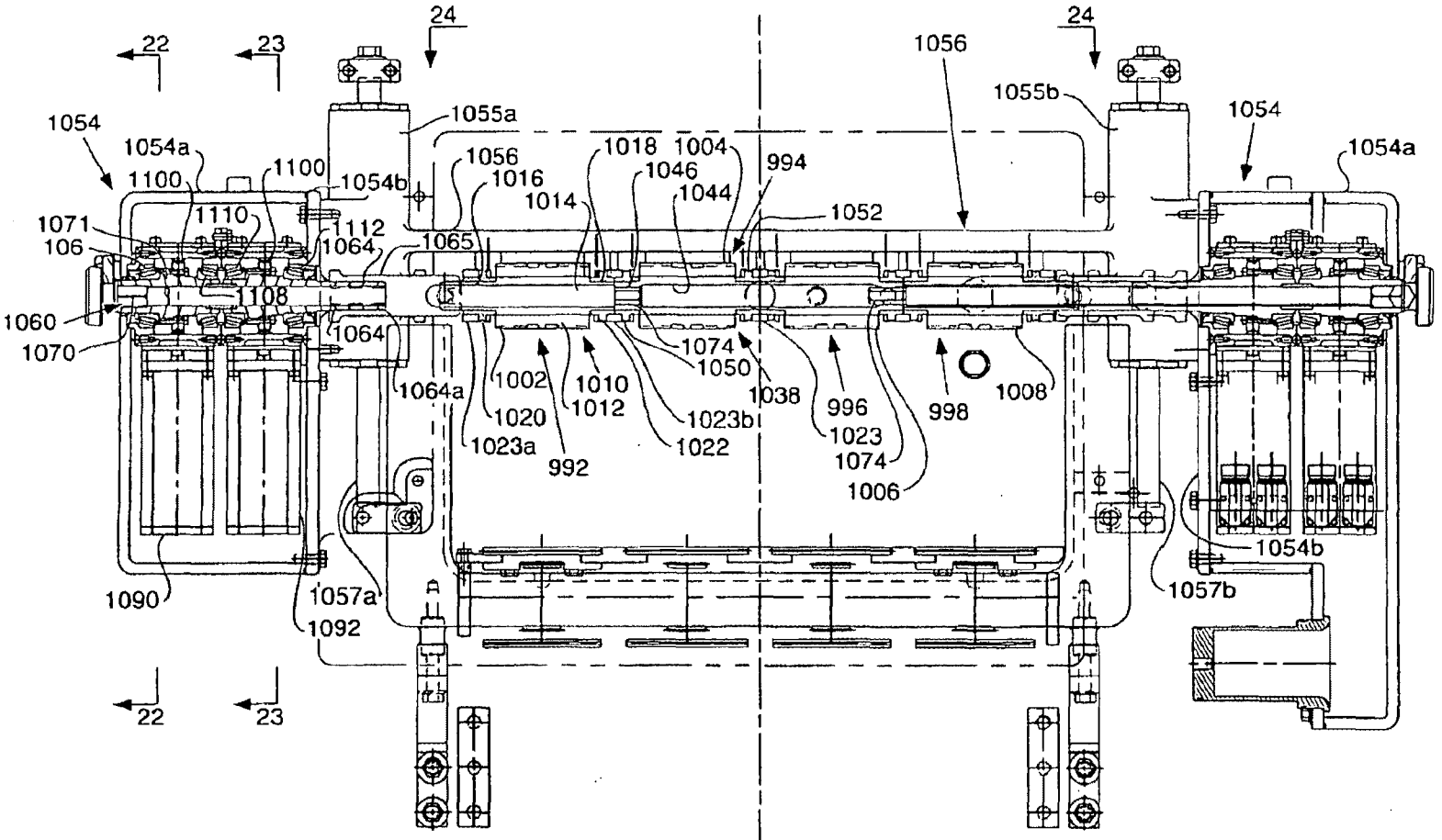

894
897
902
902a
904
904a
899
896
899a
802
899a
900a
802e
900a
900
860
802f

FIG. 21



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FIG. 23

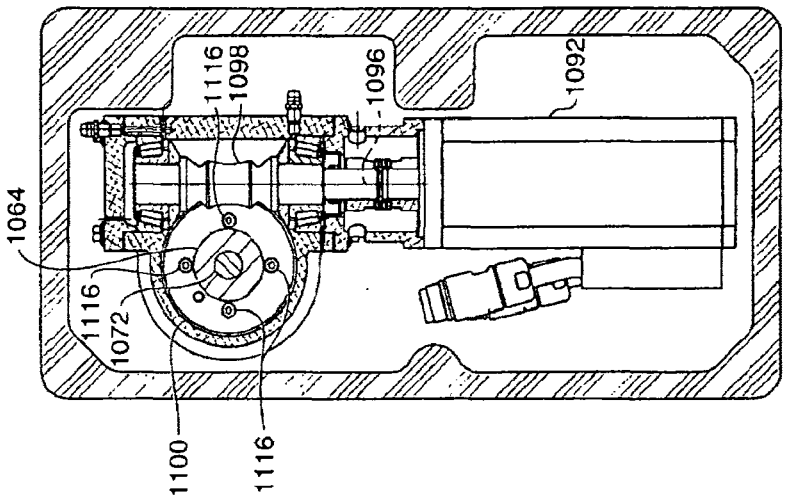

1064
1116
1072
1116
1098
1096
1092
1100
1116

FIG. 22

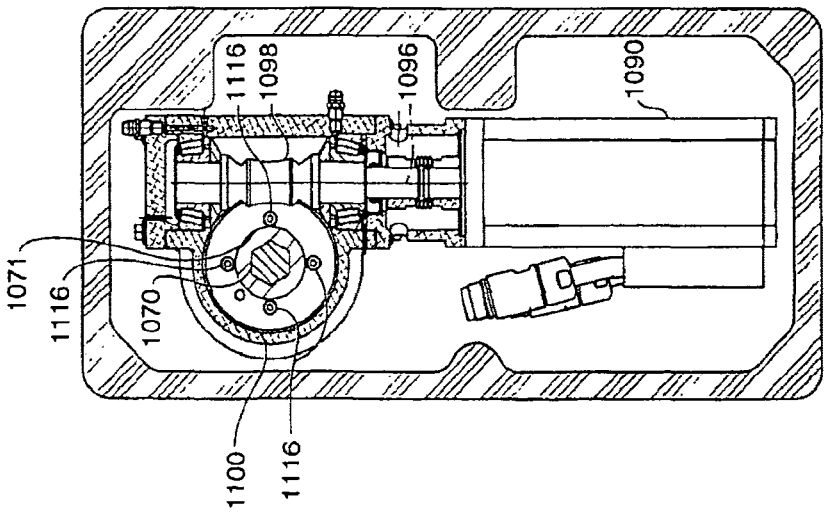

1071
1116
1070
1116
1098
1096
1090
1100
1116

FIG. 24

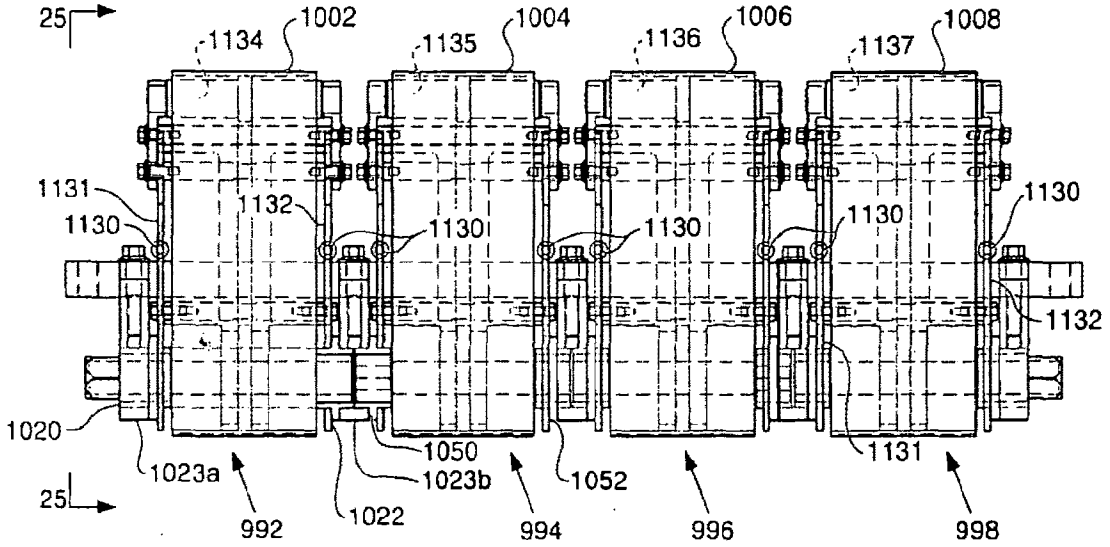

25
1134
1002
1135
1004
1136
1006
1137
1008
1131
1130
1132
1130
1130
1130
1130
1132
1020
1023a
1050
1023b
1052
1131
25
992
1022
994
996
998

FIG. 25

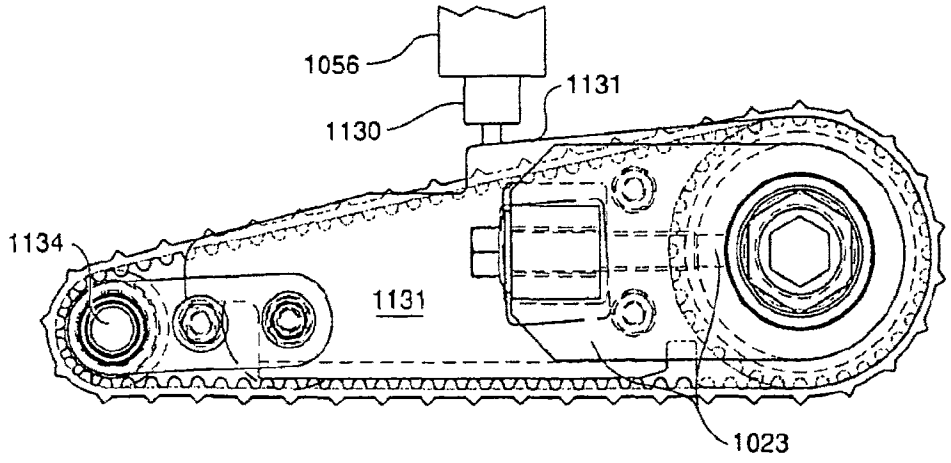
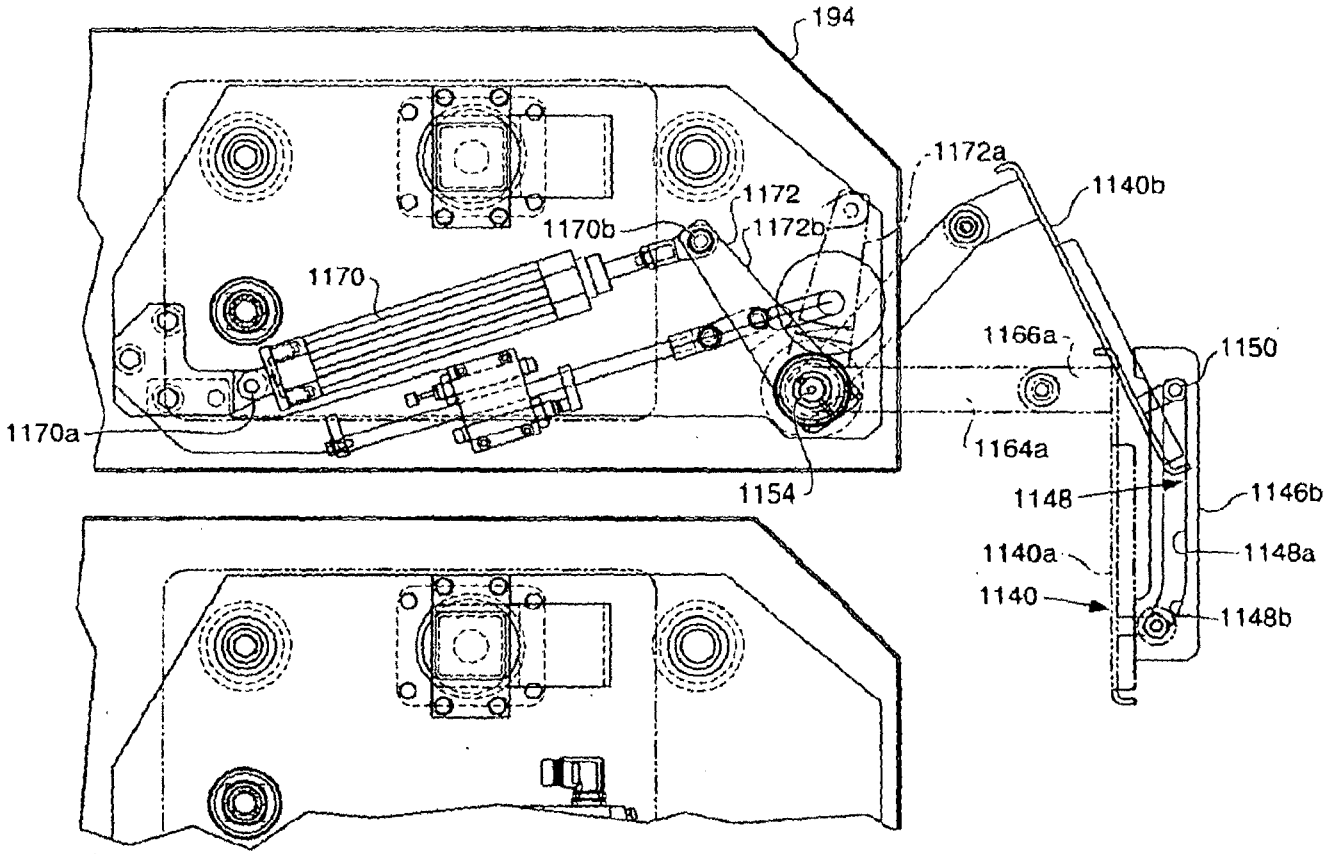

1056
1131
1130
1134
1131
1023

FIG. 26



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FIG. 27

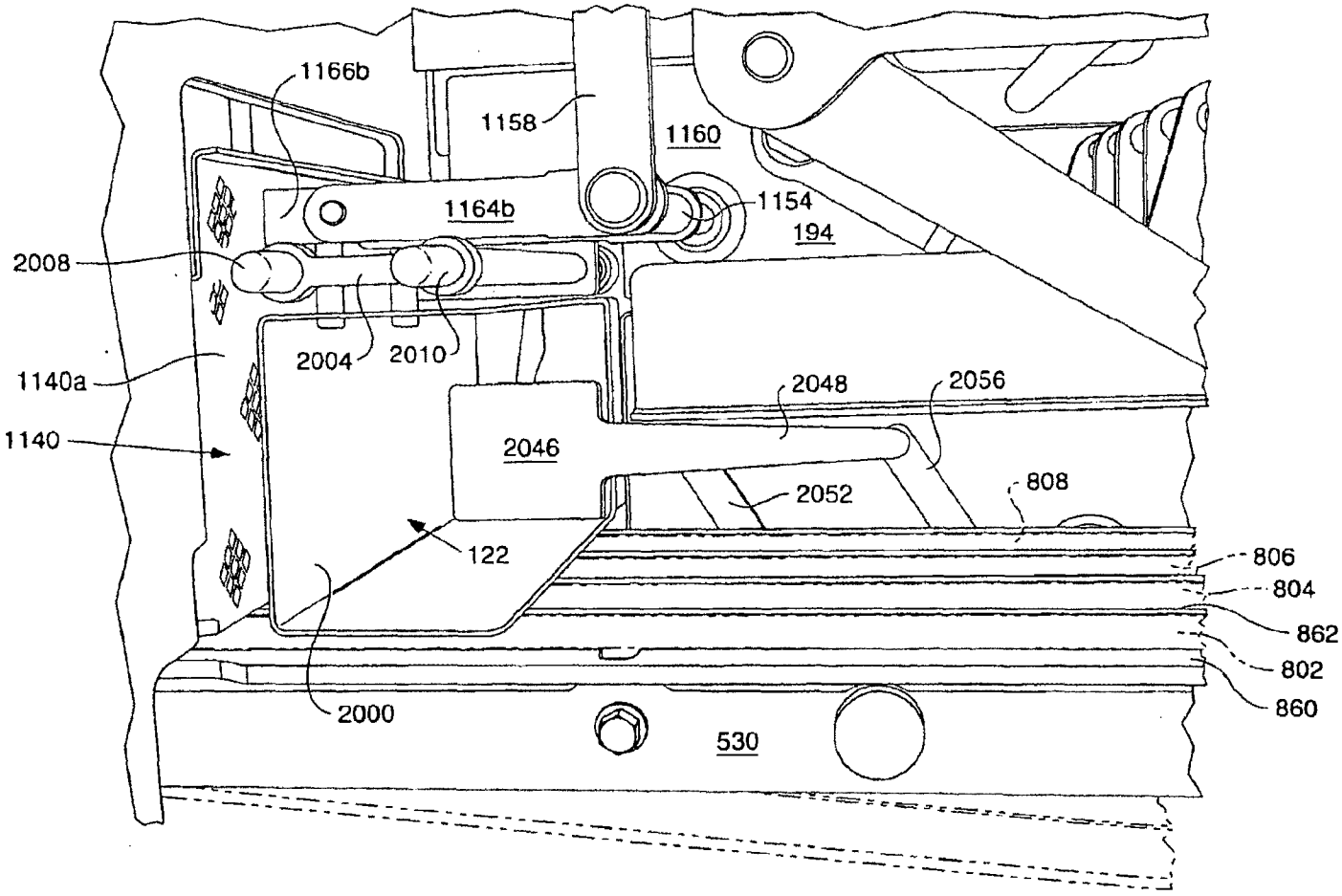

1166b
1158
1160
1164b
1154
194
2008
2004
2010
1140a
1140
2048
2056
2046
2052
808
122
806
804
862
802
860
2000
530

FIG. 28

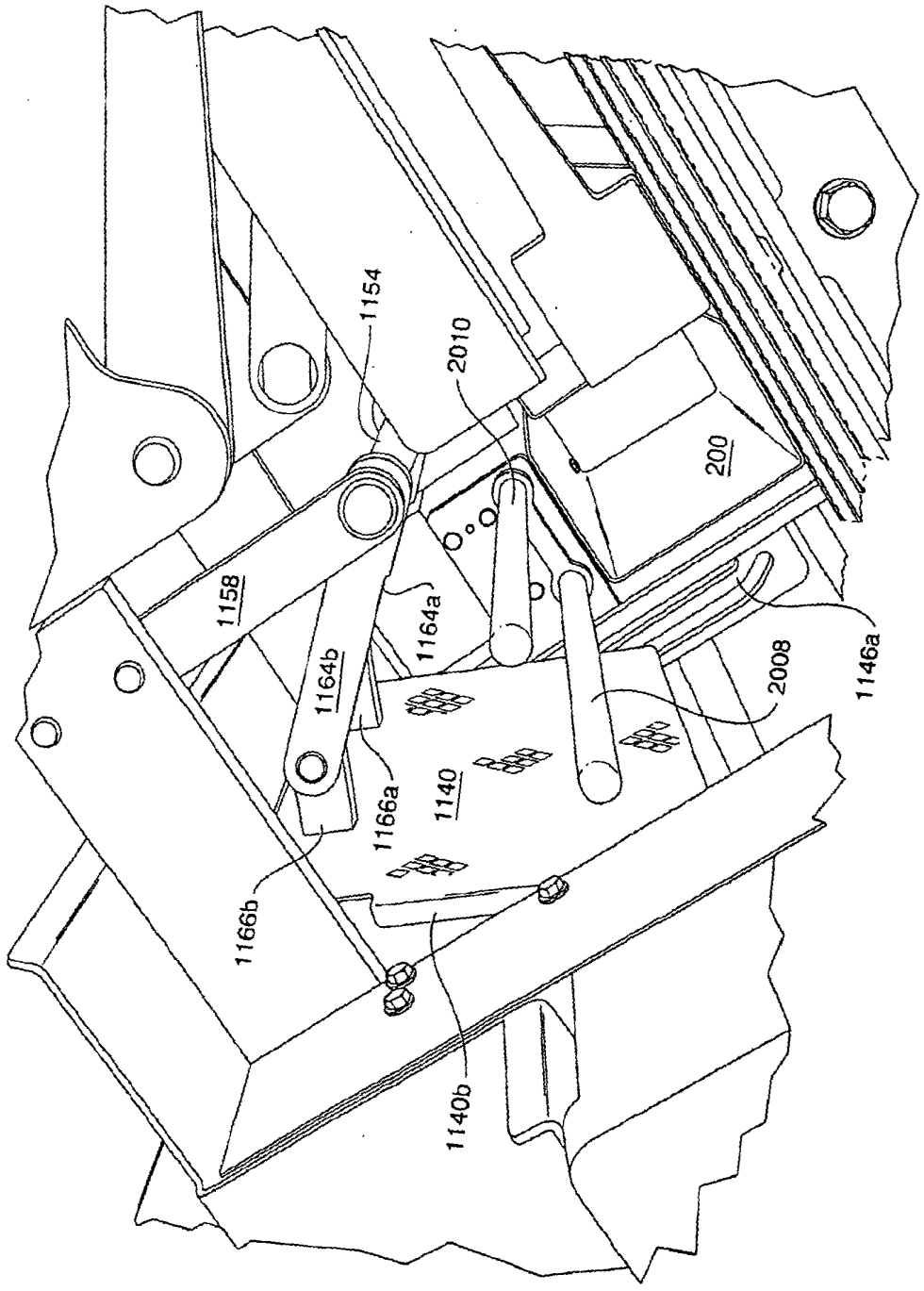

1154
2010
200
1158
1164a
1164b
1146a
2008
1166a
1140
1166b
1140b

FIG. 29

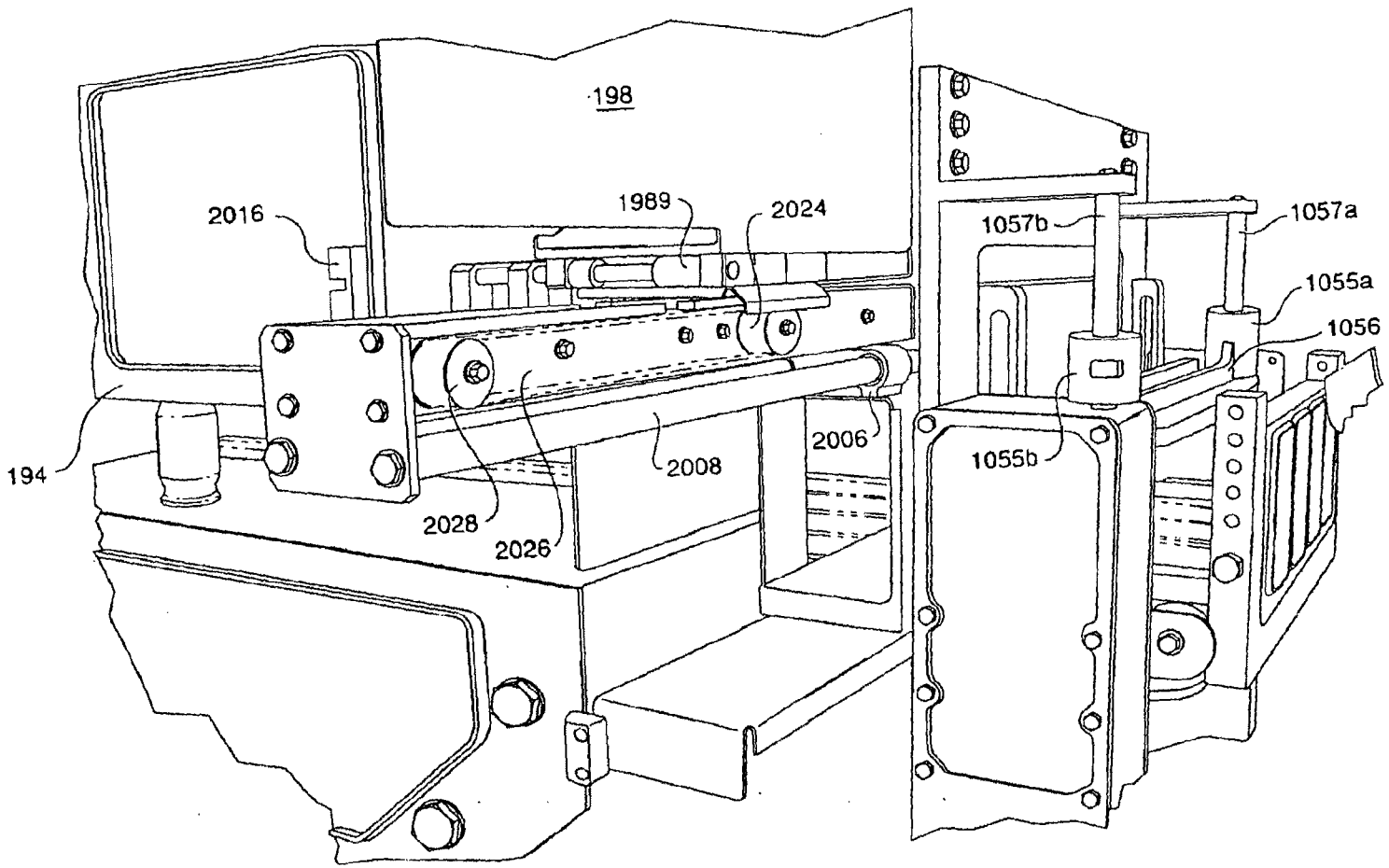

198
2016
1989
2024
1057b
1057a
1055a
1056
194
2008
2006
1055b
2028
2026

FIG. 30

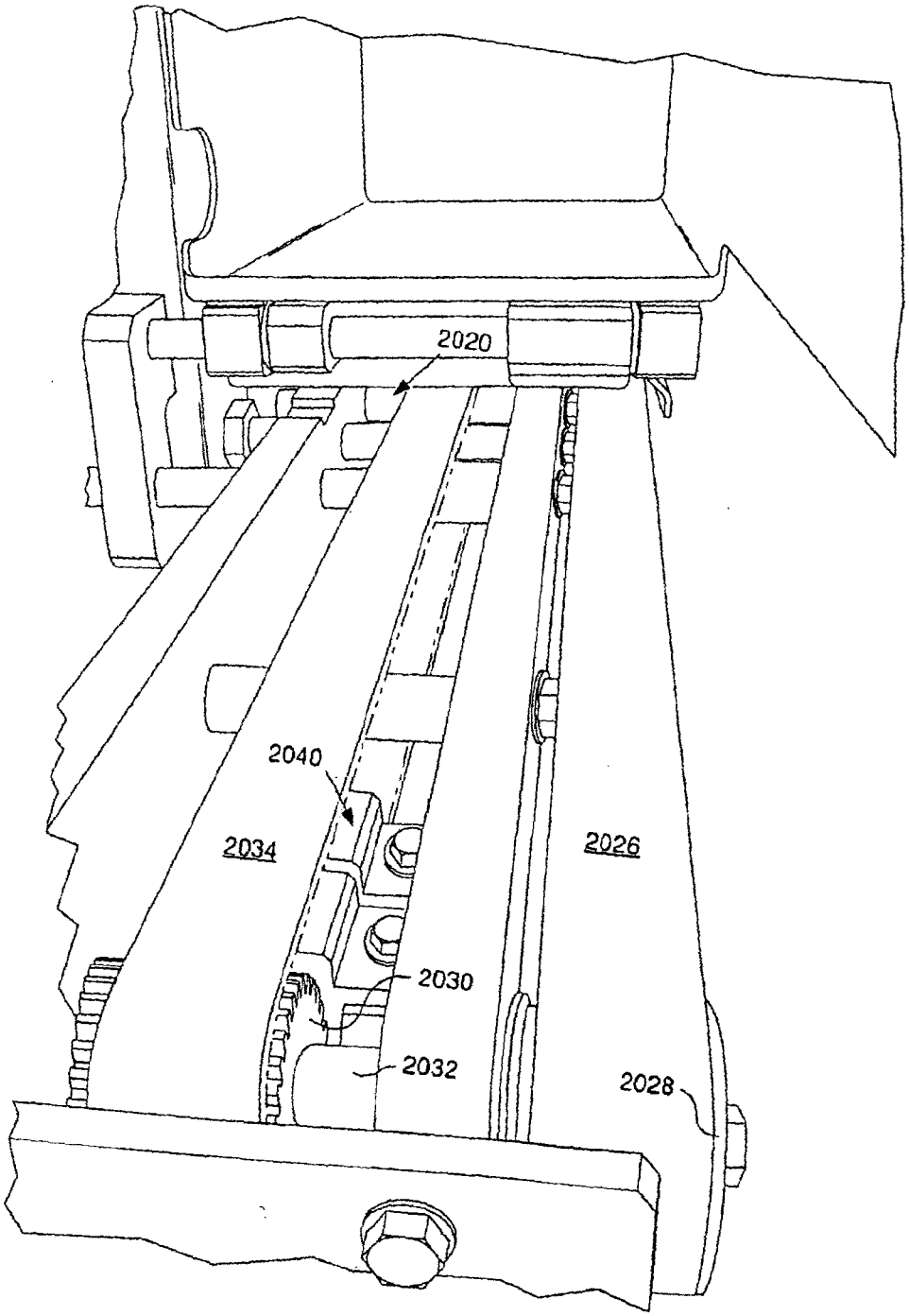


FIG. 31

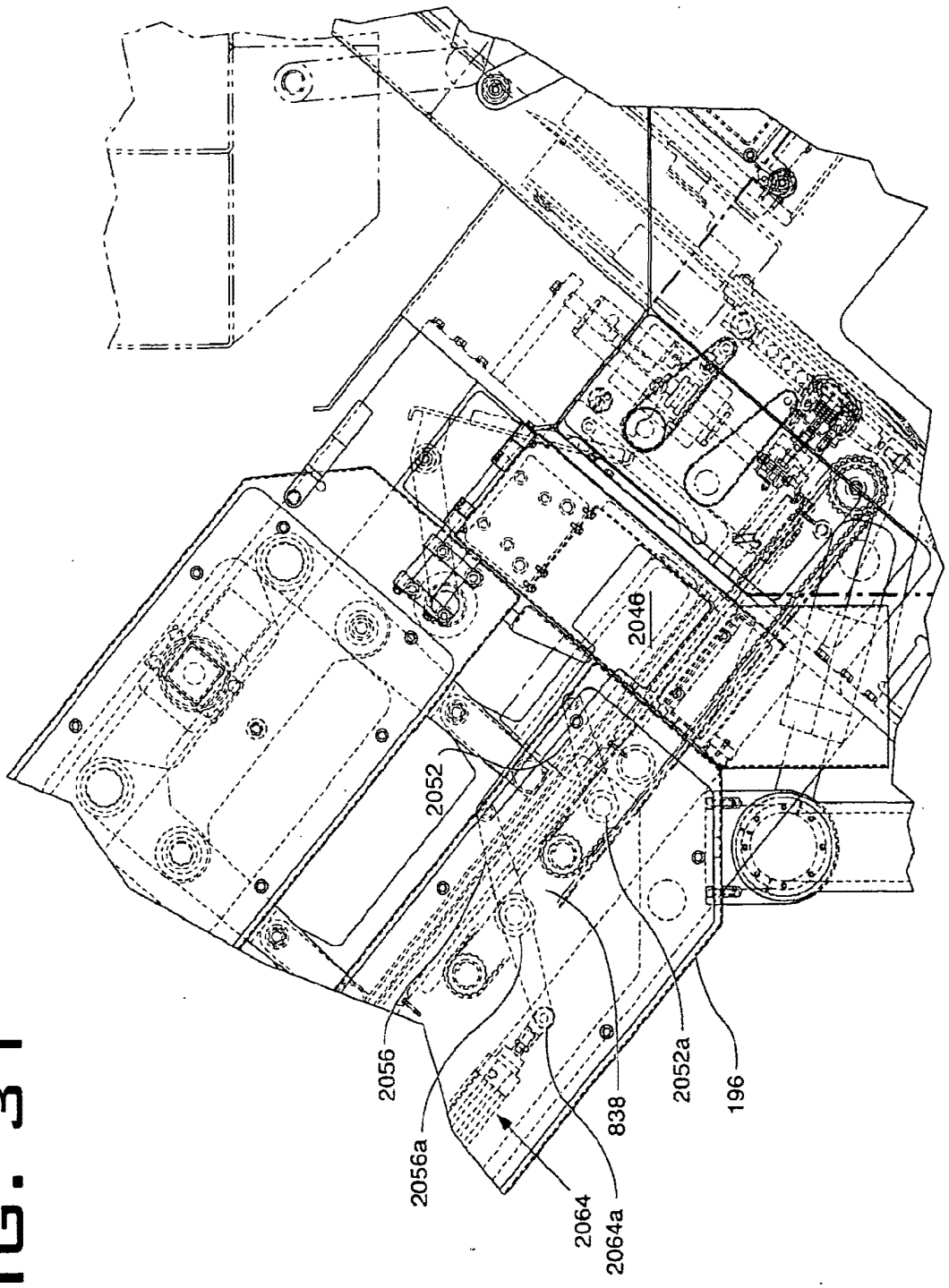
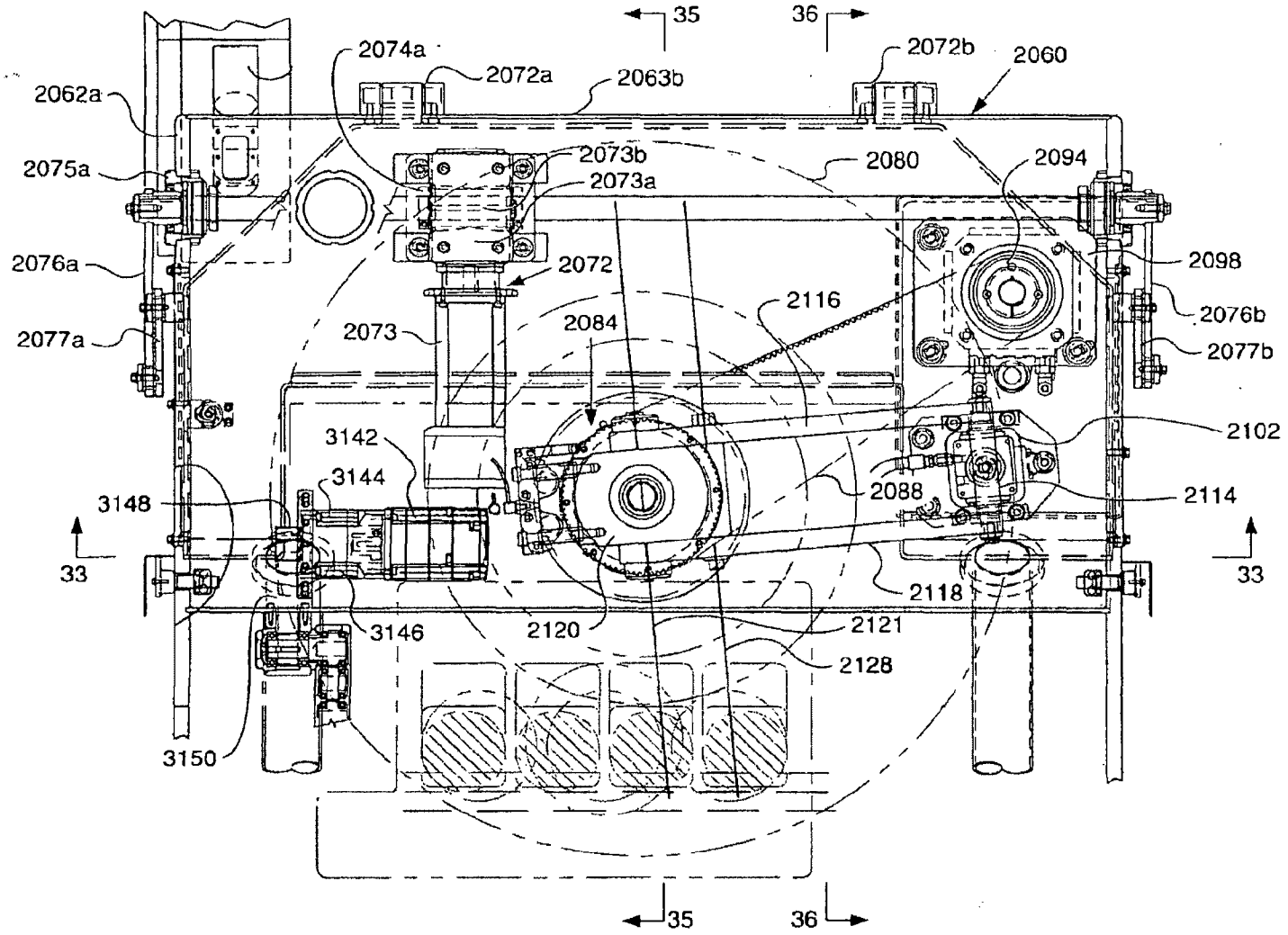
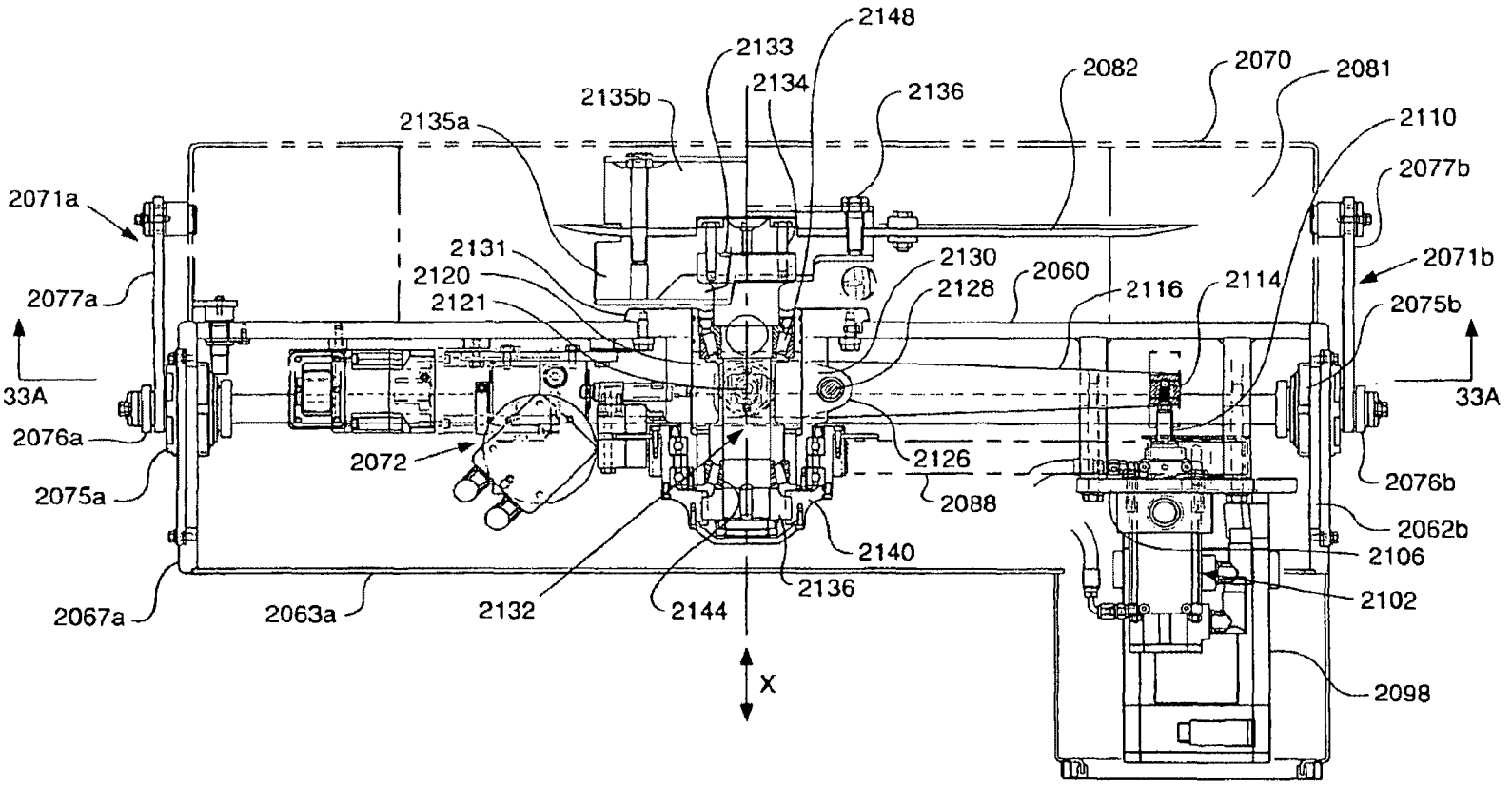


FIG. 32



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FIG. 33



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FIG. 33A

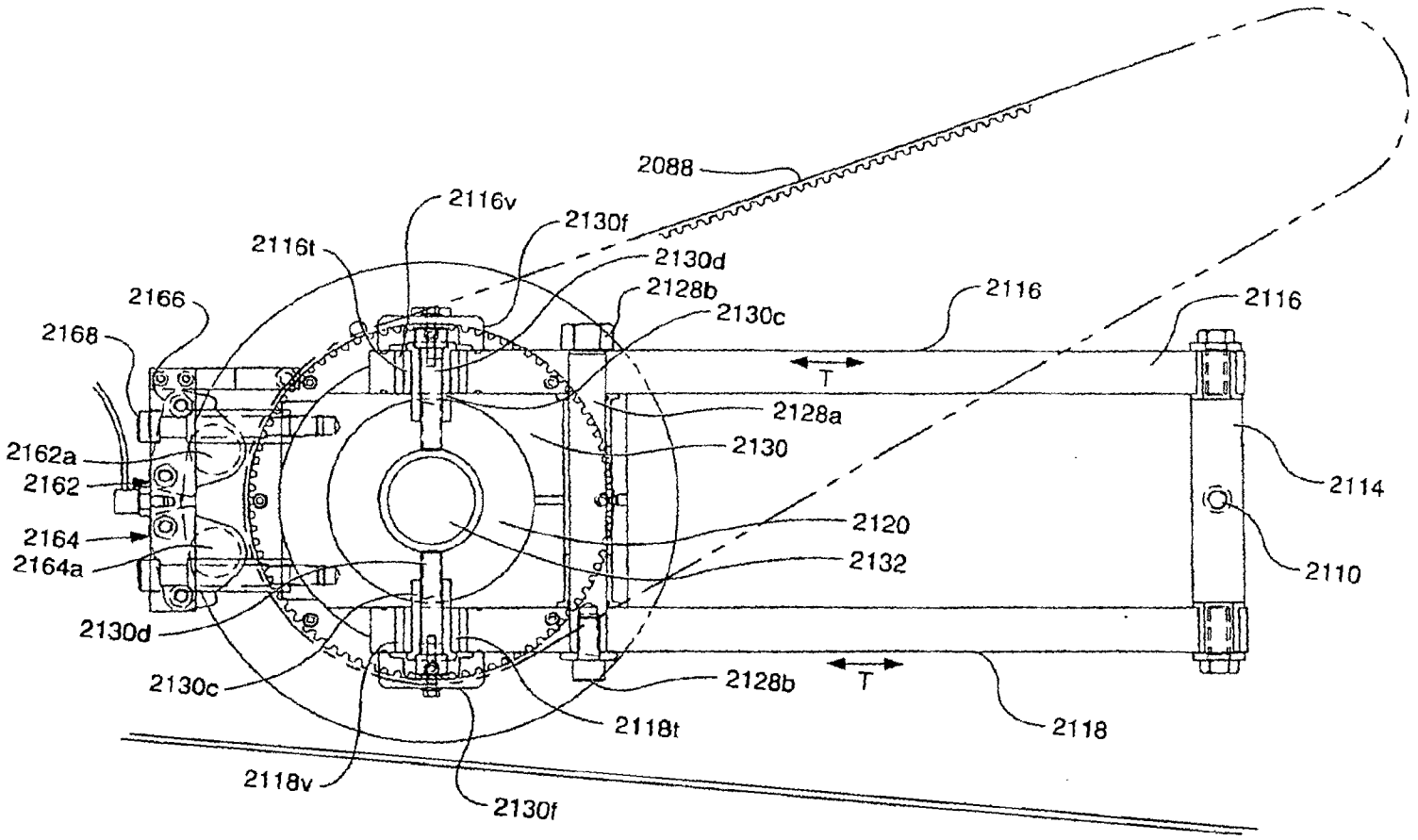

2088
2116v
2130f
2116t
2130d
2128b
2130c
2116
2116
2166
2168
T
2128a
2130
2162a
2162
2114
2120
2164
2164a
2132
2110
2130d
2130c
2128b
T
2118t
2118
2118v
2130f

FIG. 34

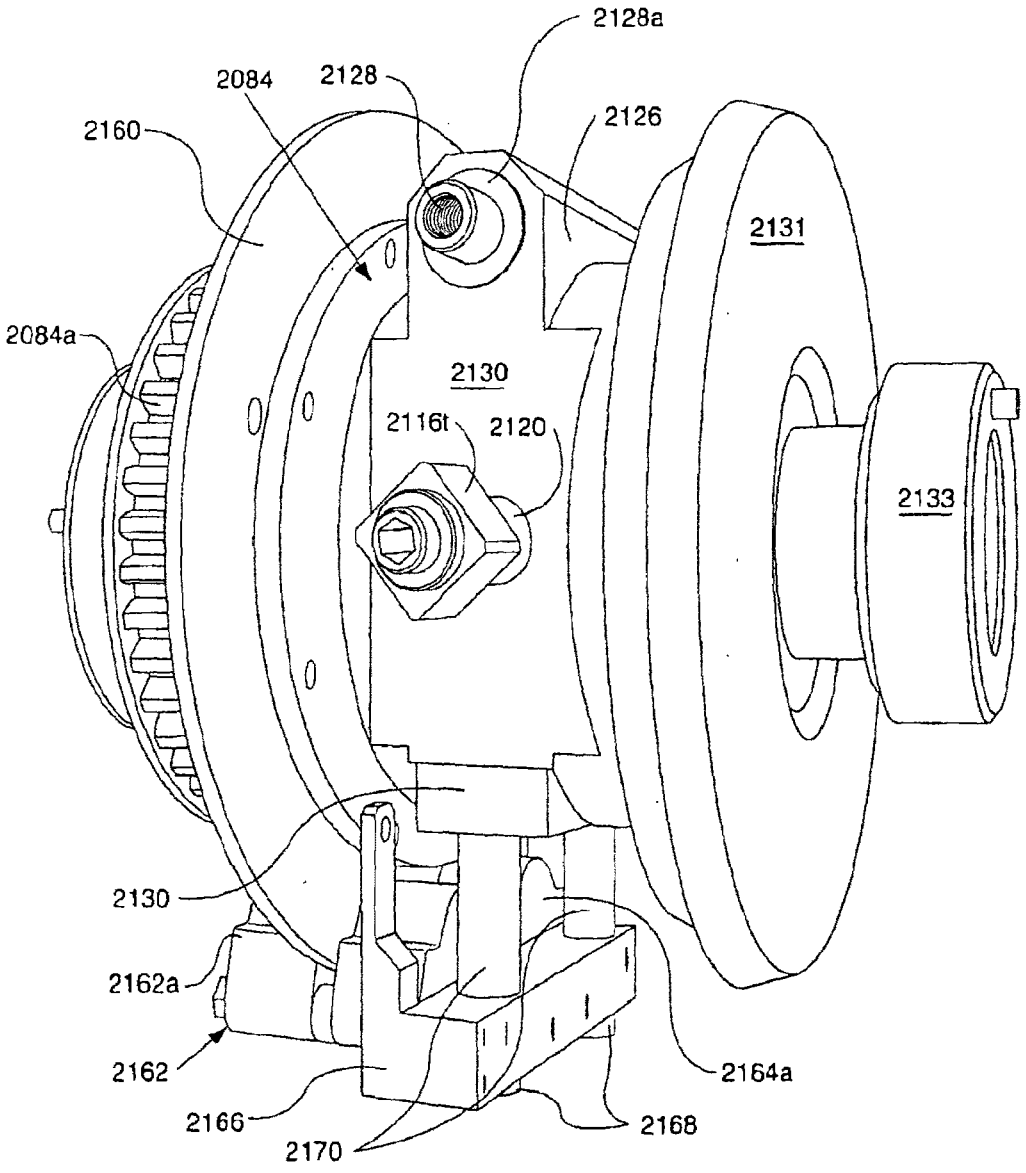

2128a
2084
2128
2126
2160
2131
2084a
2130
2116t
2120
2133
2130
2162a
2162
2164a
2166
2168
2170

FIG. 35

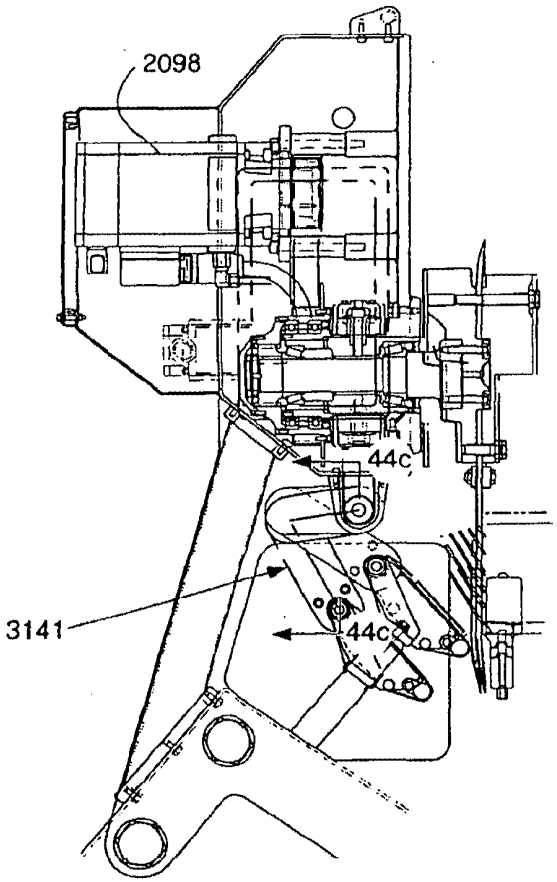

2098
44c
3141
44c

FIG. 36

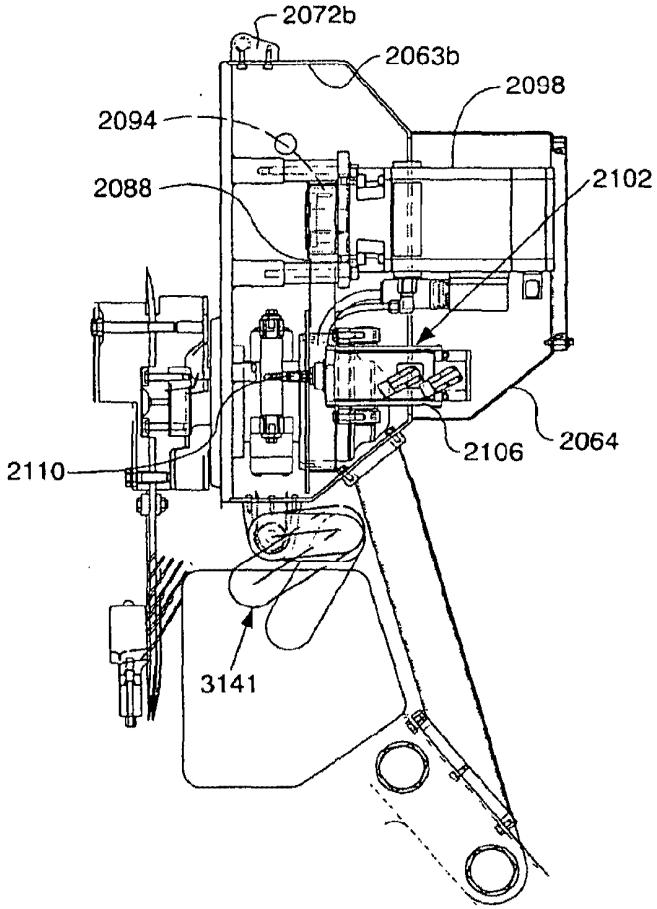

2072b
2063b
2098
2094
2088
2102
2106
2064
2110
3141

FIG. 37

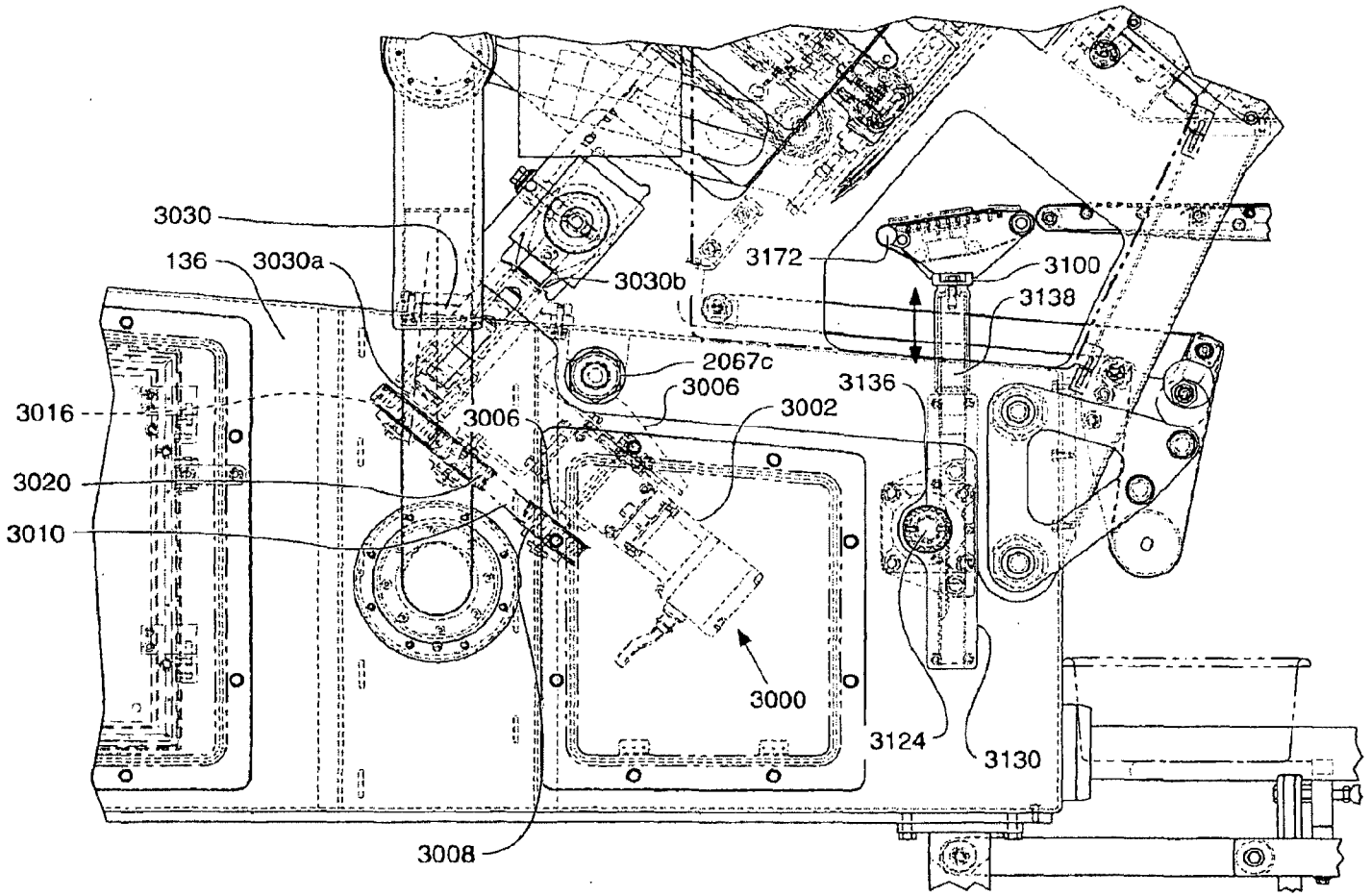

3030
136
3030a
3030b
3172
3100
3138
2067c
3006
3136
3016
3006
3002
3020
3010
3000
3124
3130
3008

FIG. 38

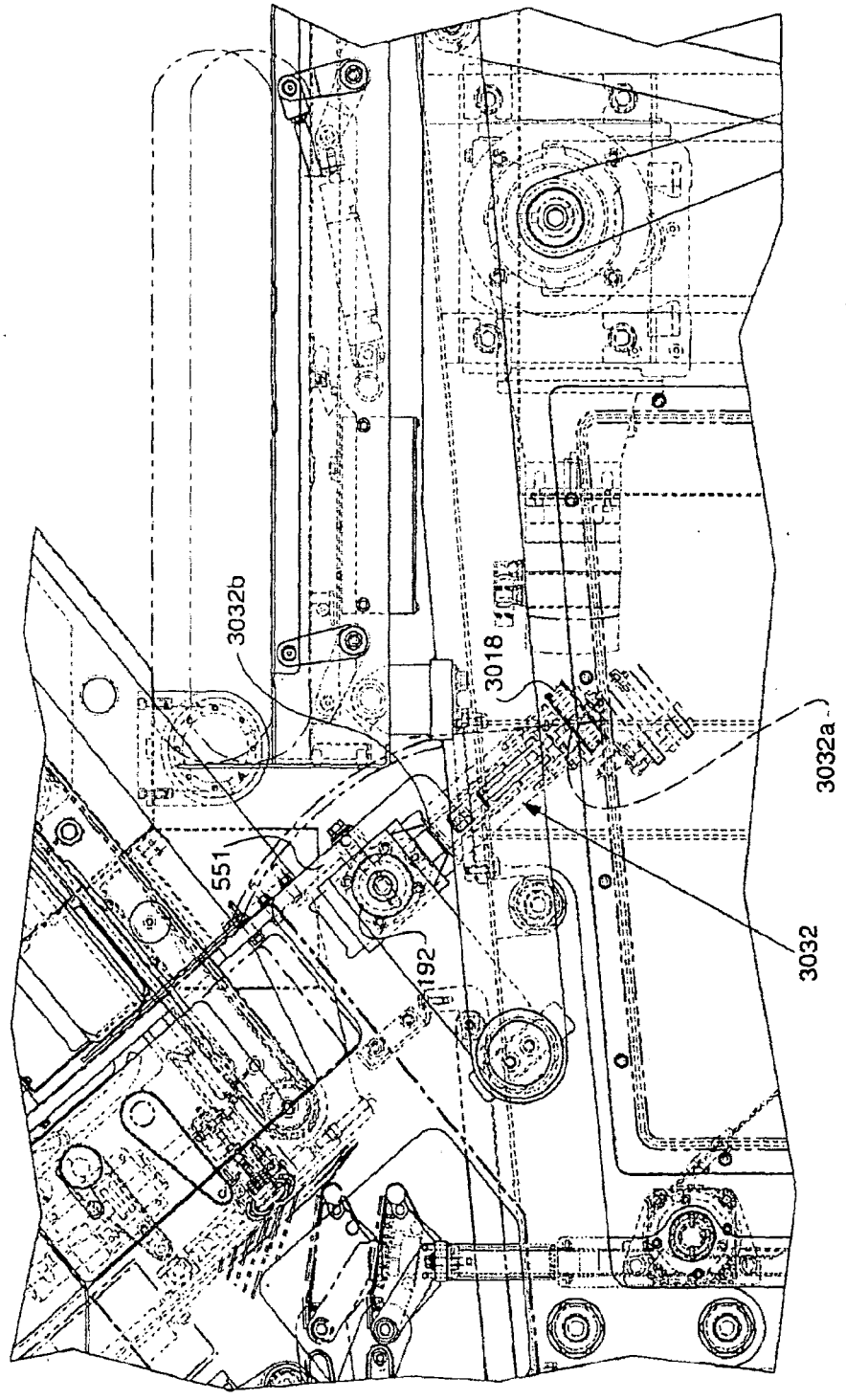


FIG. 39

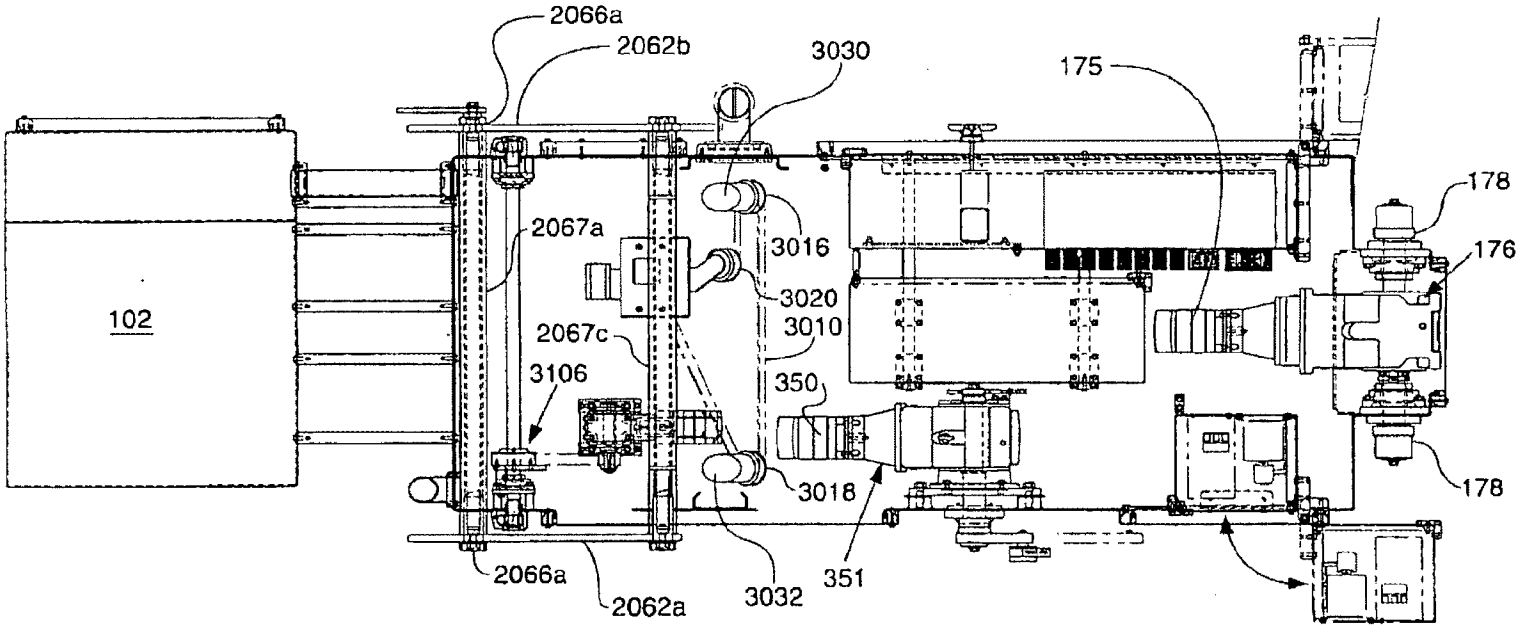

2066a
2062b
3030
175
178
2067a
3016
176
102
3020
3010
2067c
3106
350
3018
178
2066a
2062a
3032
351

FIG. 40

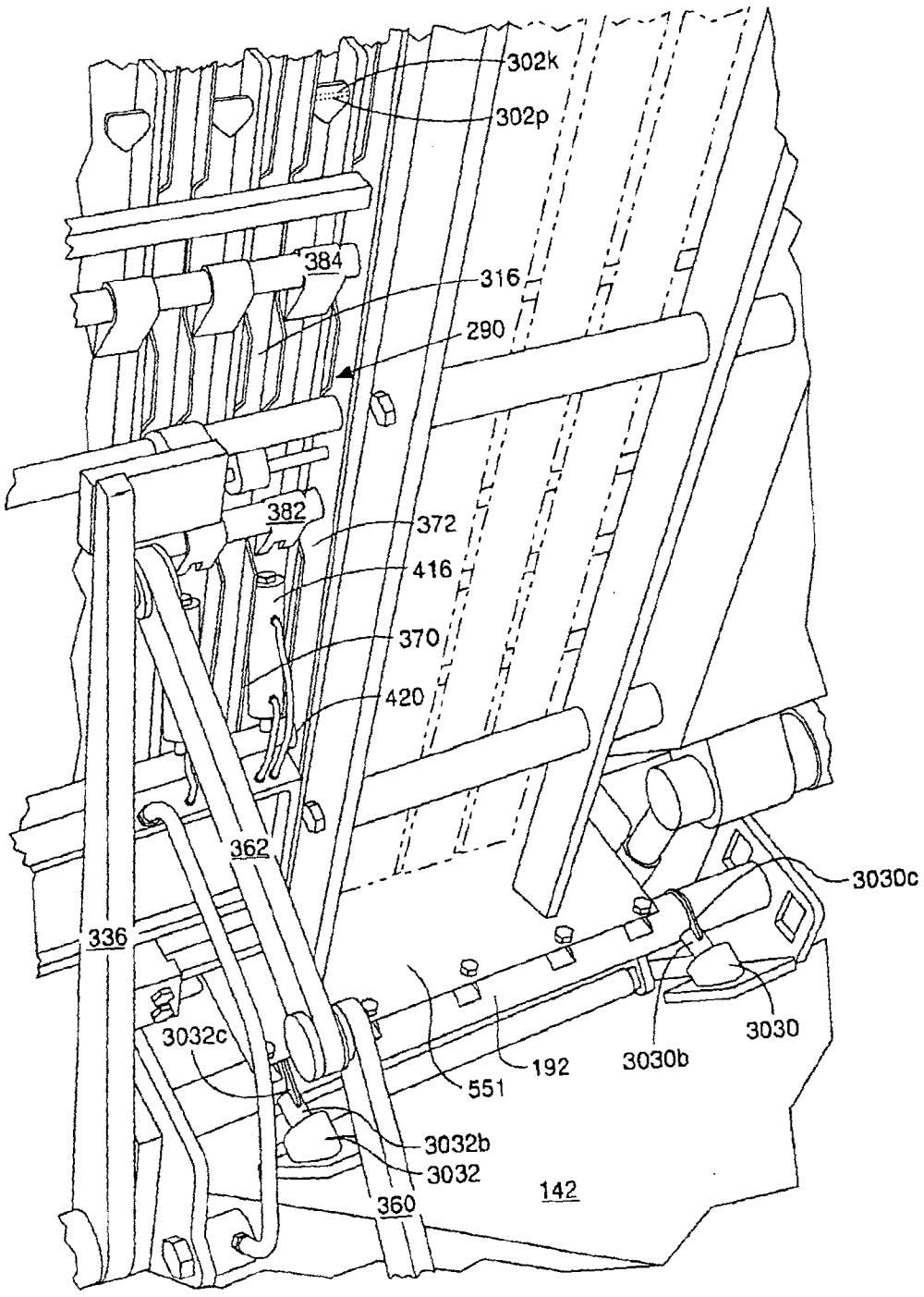

302k
302p
384
316
290
382
372
416
370
420
362
3030c
336
3032c
3030
192
3030b
551
3032b
3032
142
360

FIG. 41

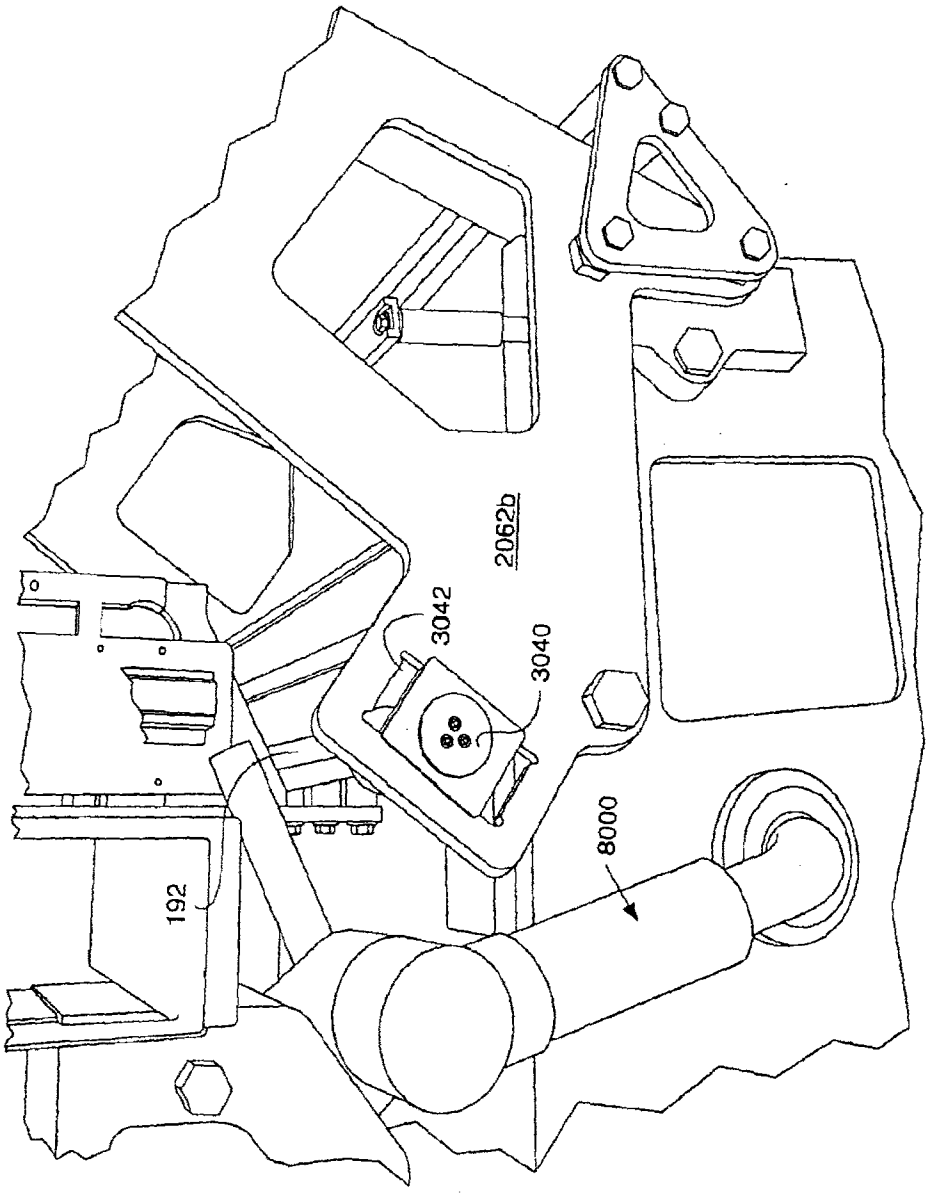


FIG. 42

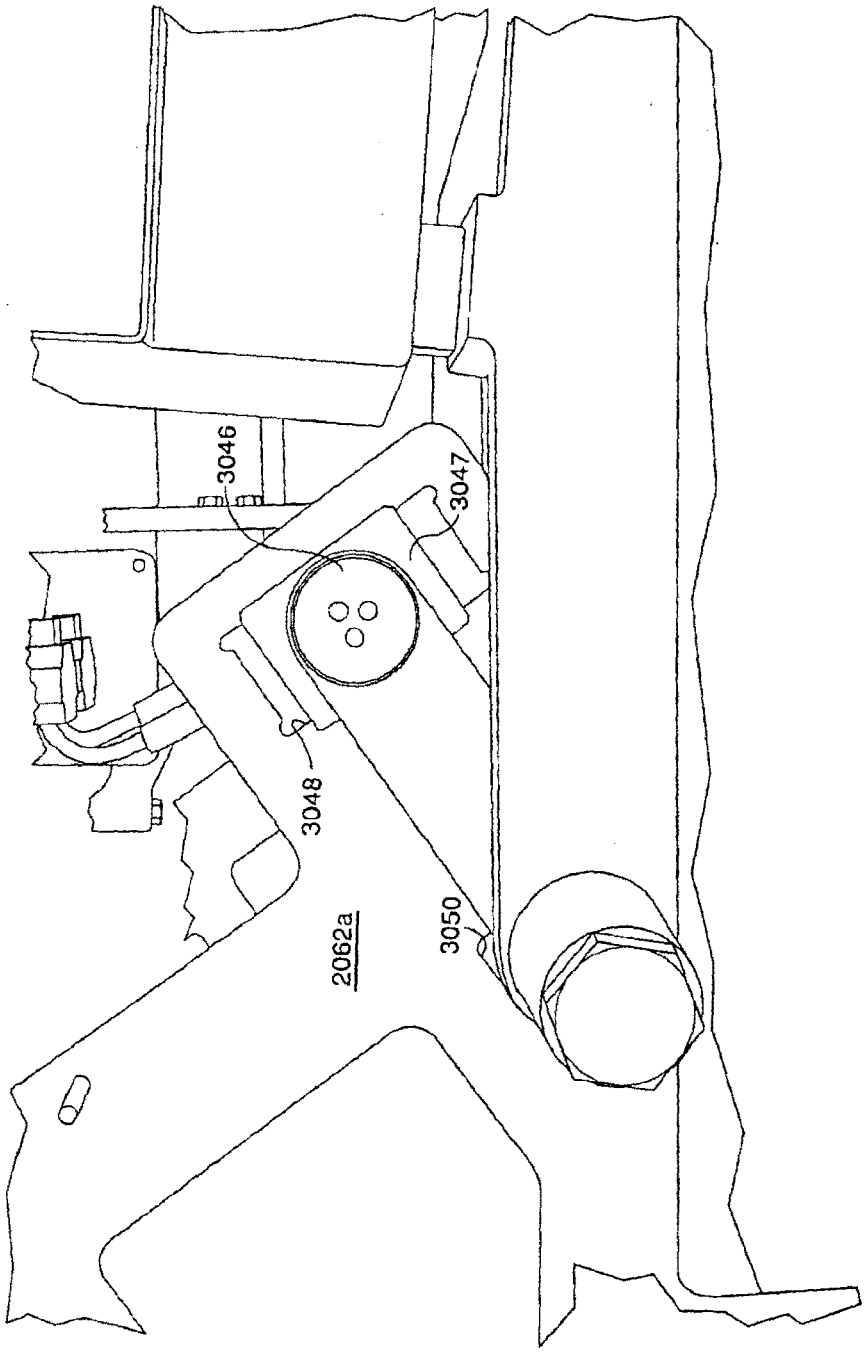


FIG. 43

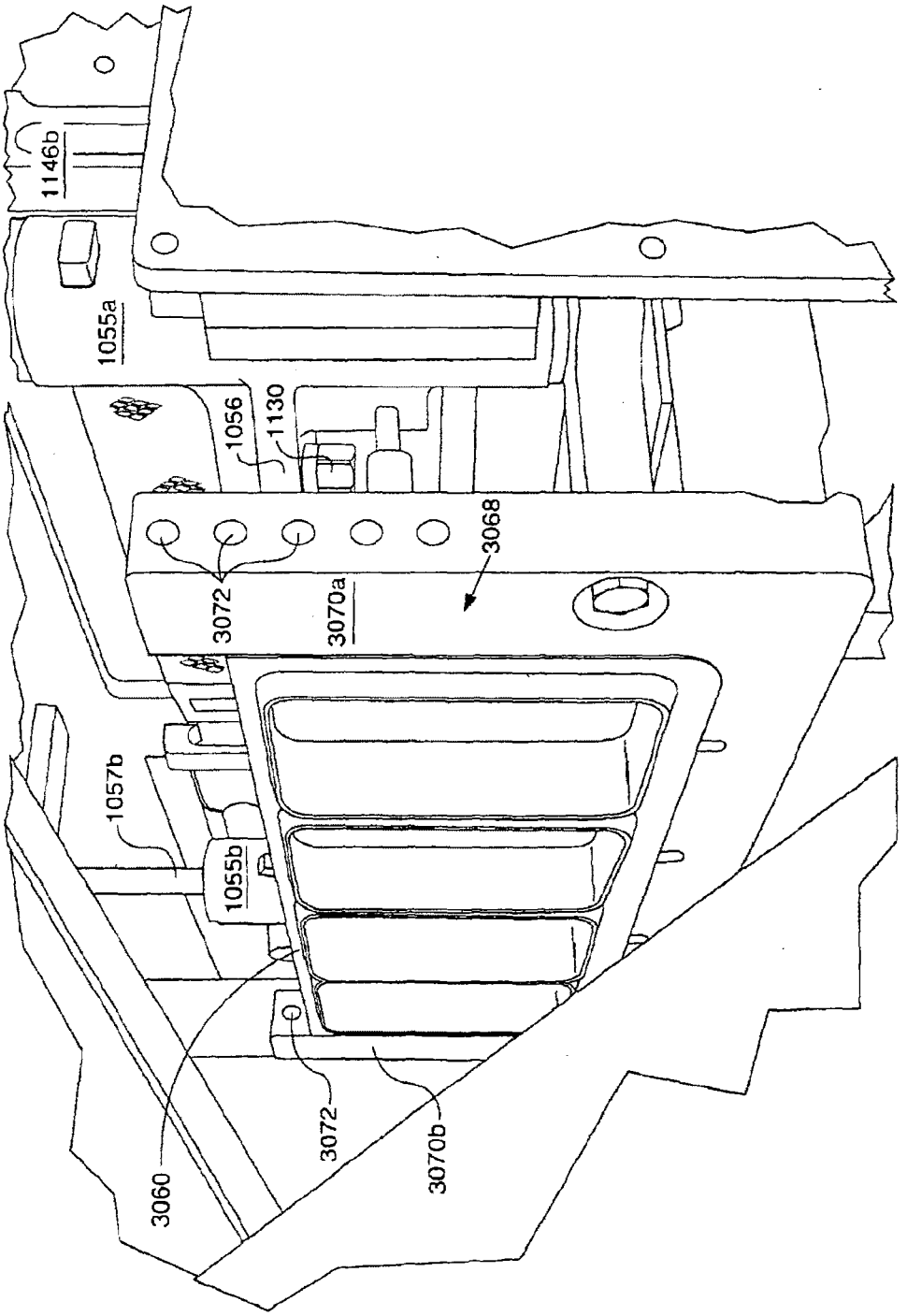

1146b
1055a
1056
1130
3068
3072
3070a
1057b
1055b
3060
3072
3070b

FIG. 44

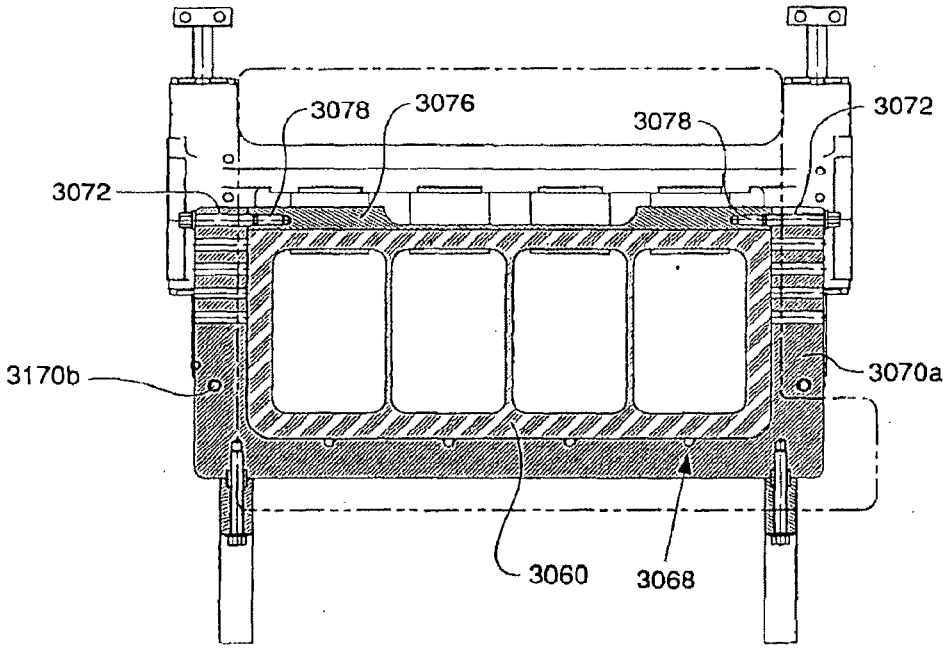


FIG. 44C

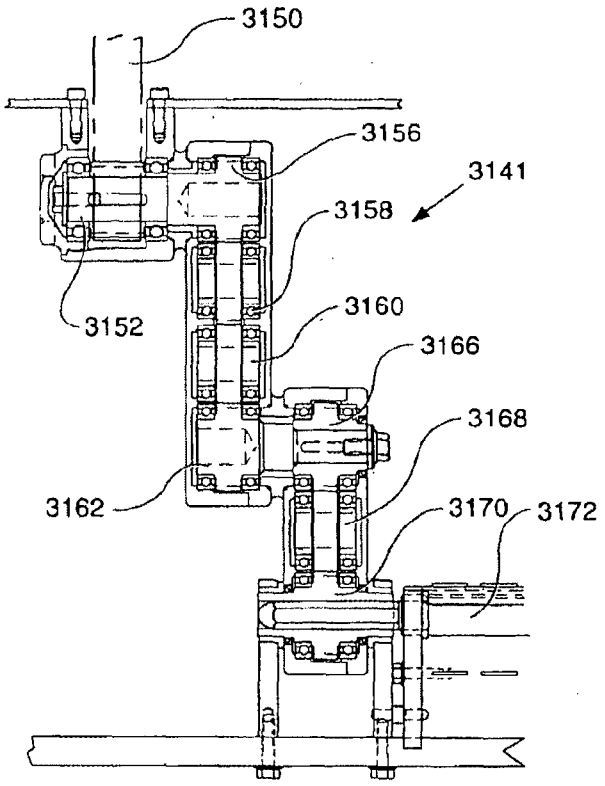


FIG. 44B

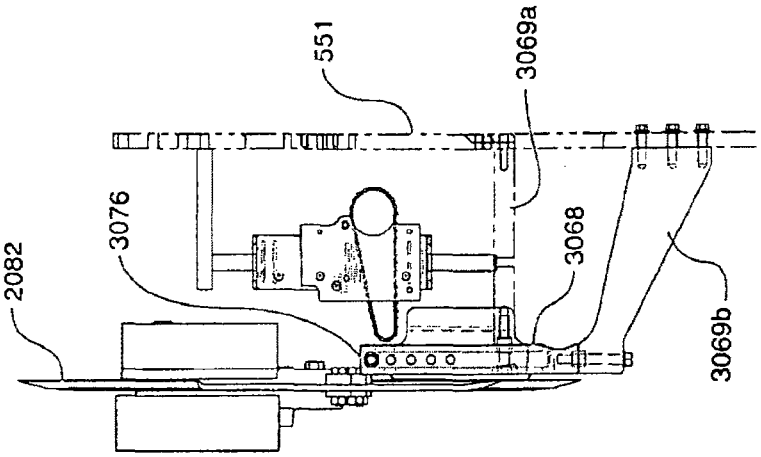


FIG. 44A

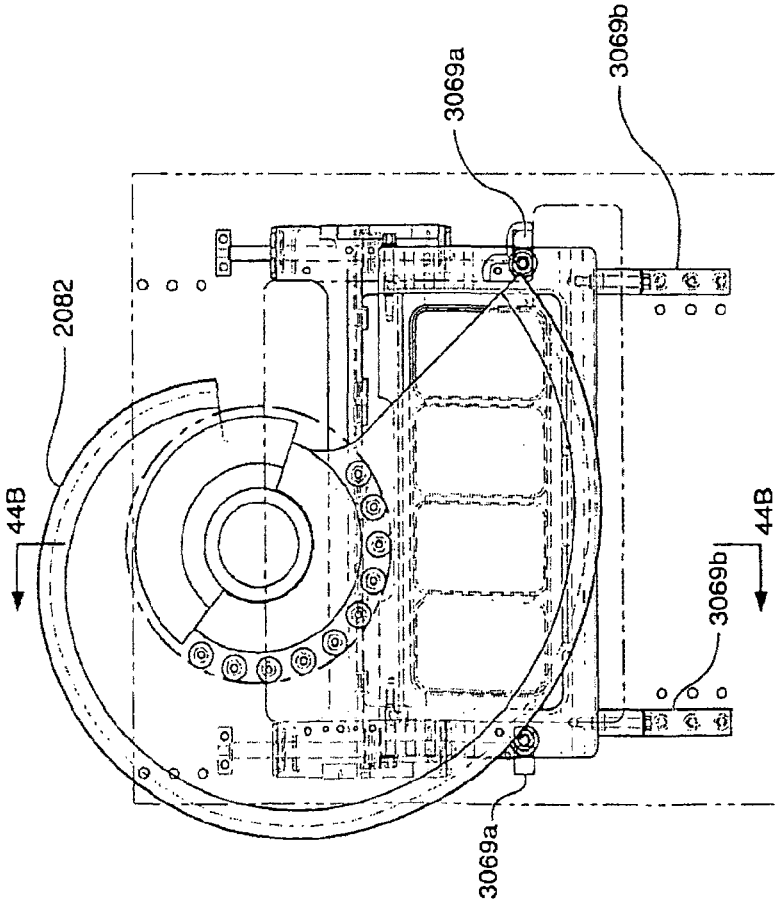


FIG. 45

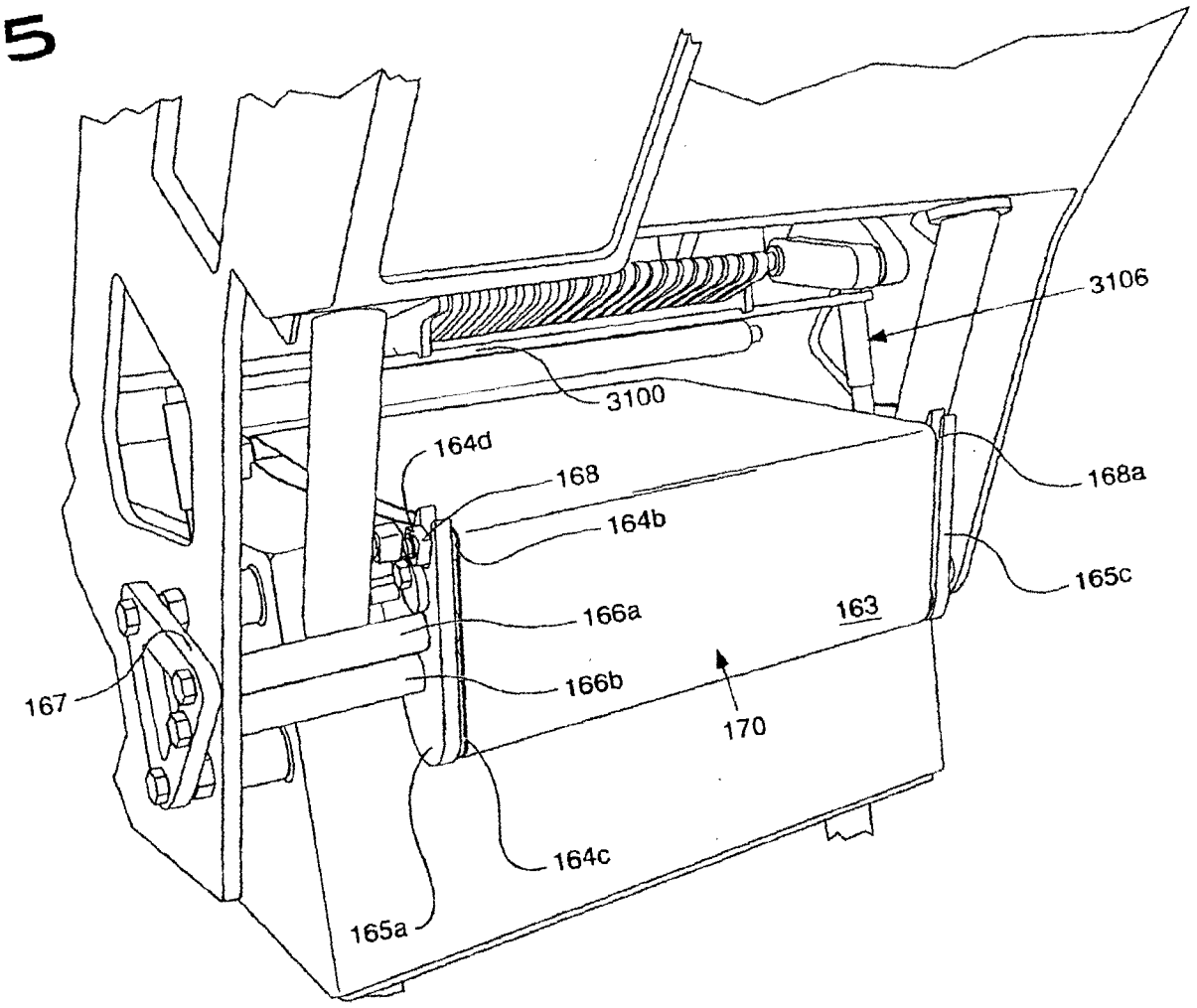

3106
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166a
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166b
170
164c
165a

FIG. 46

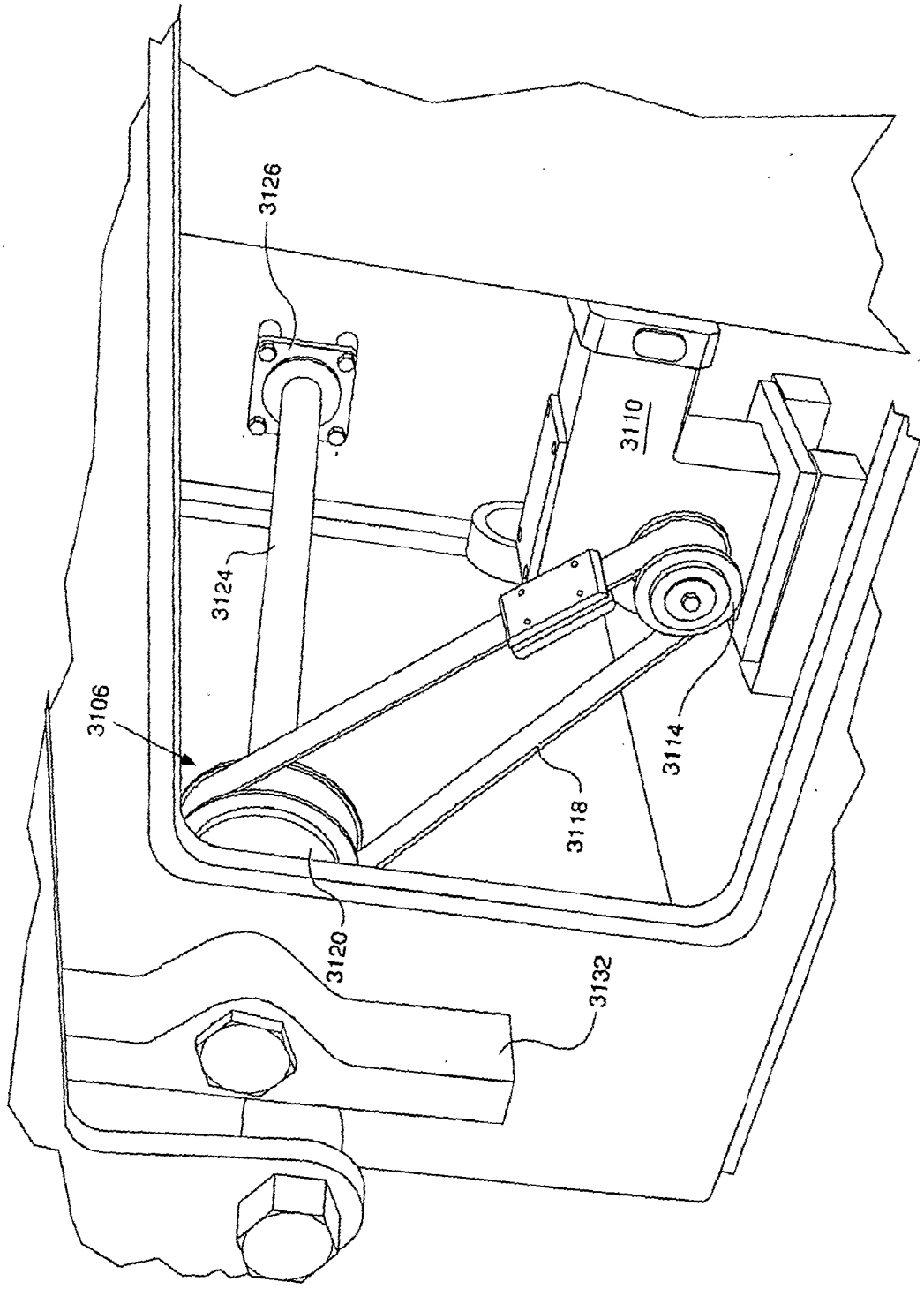
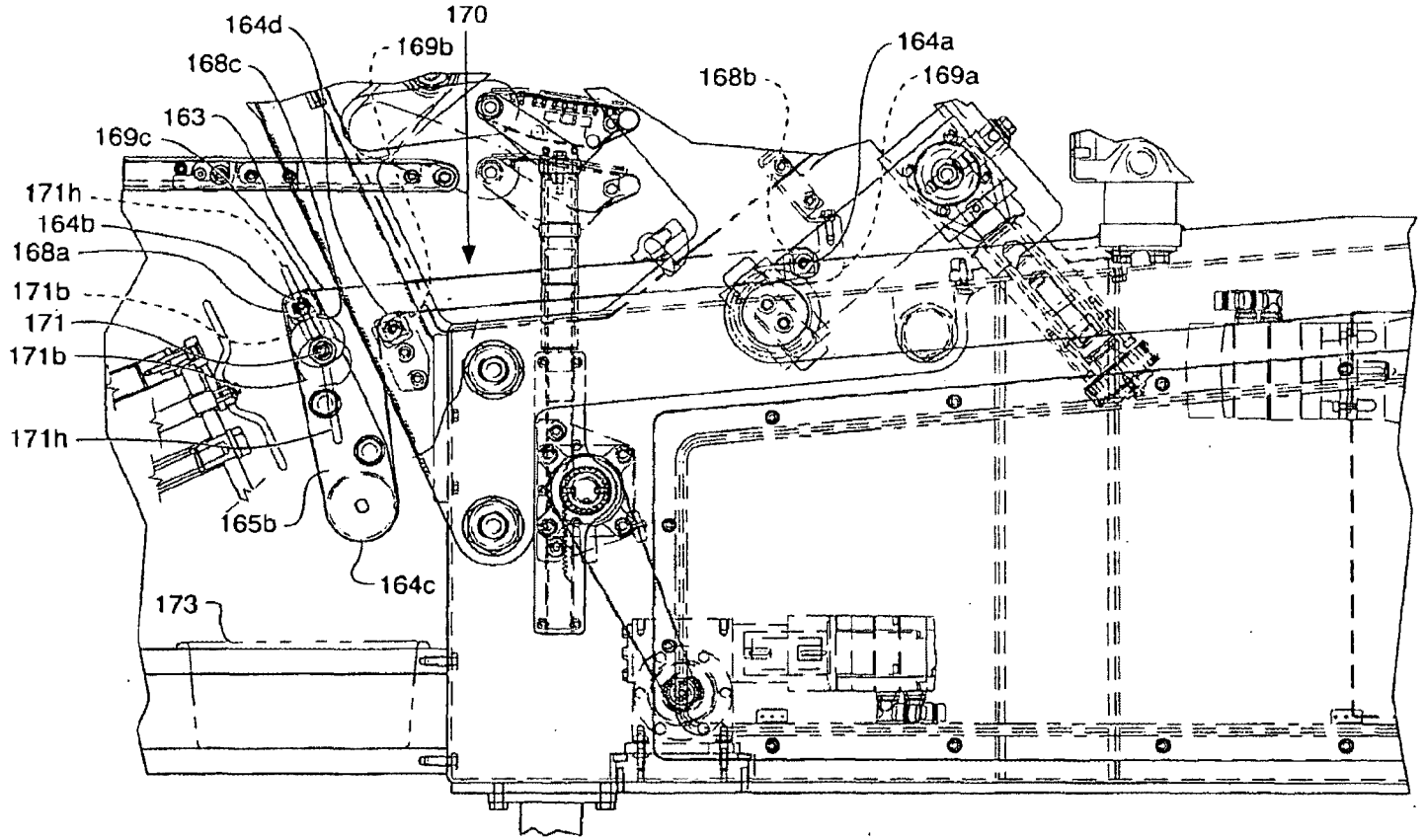


FIG. 46A



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FIG. 47

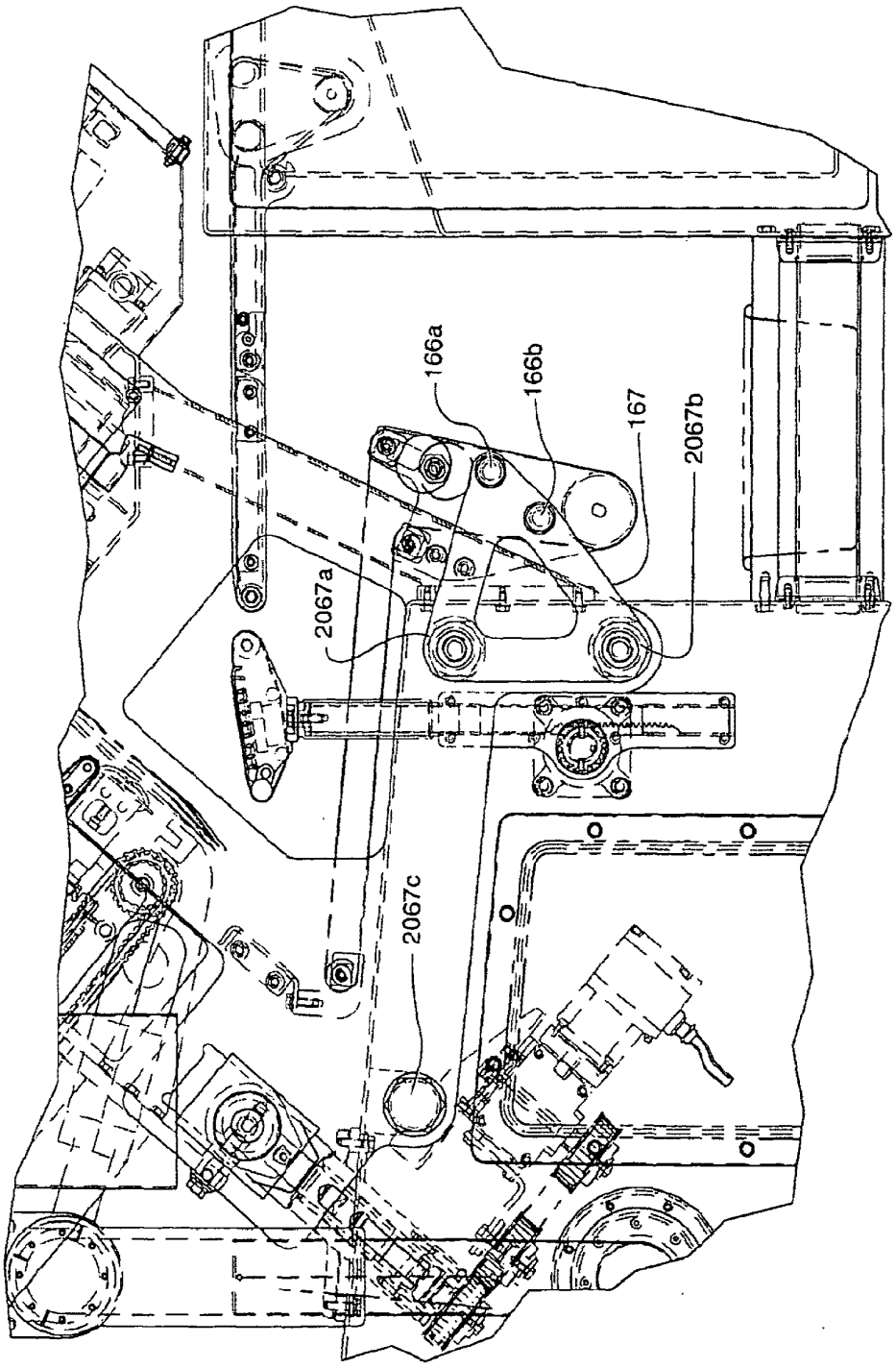


FIG. 48

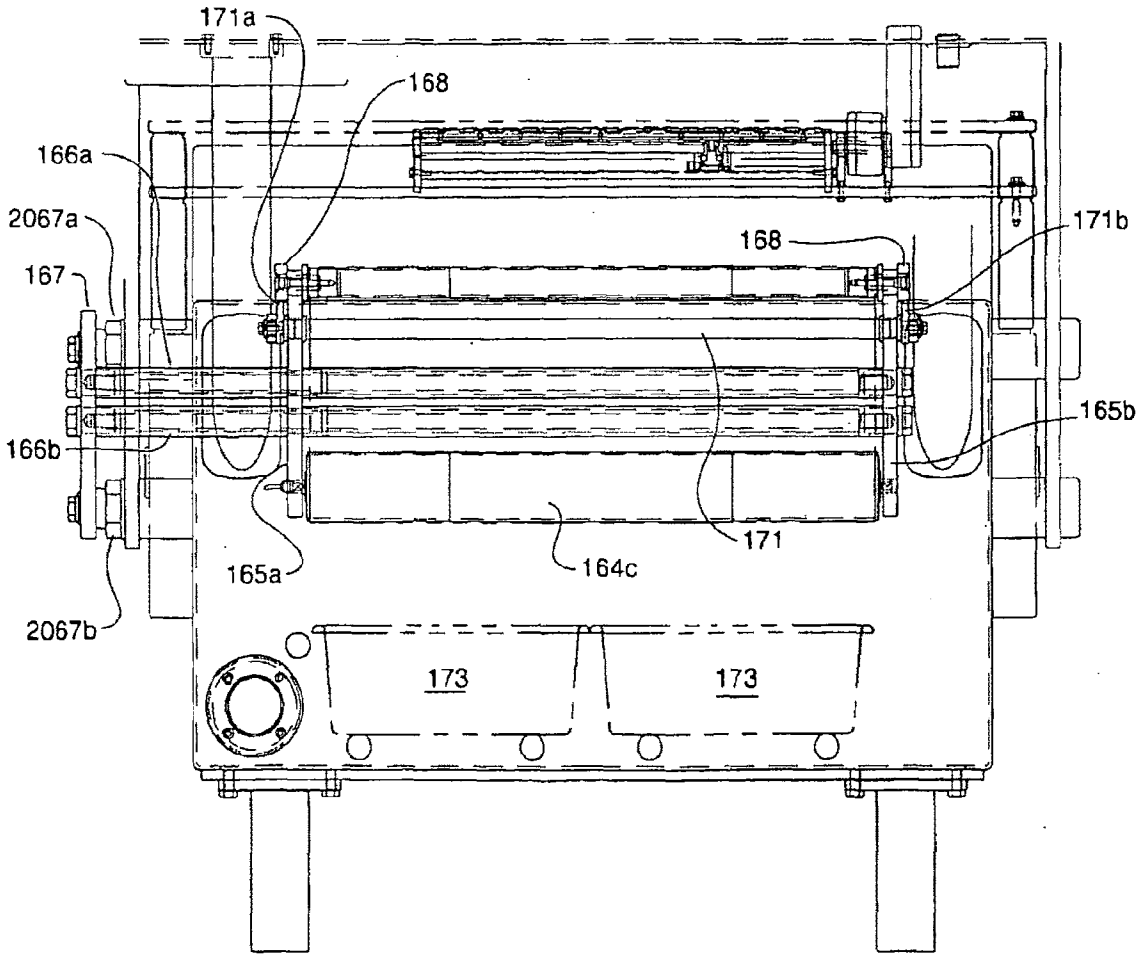

171a
168
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167
168
171b
165b
166b
171
165a
164c
2067b
173
173

FIG. 49

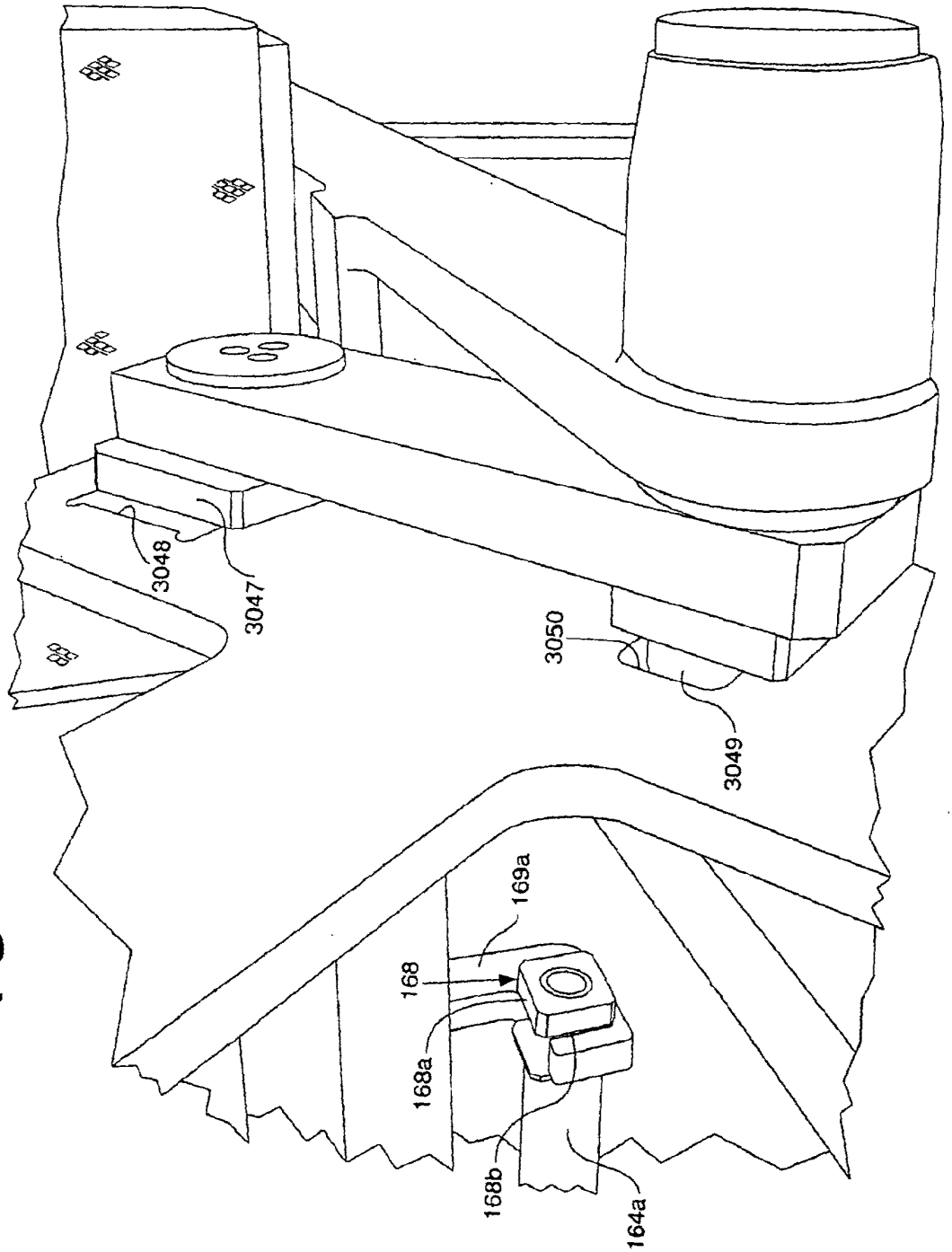


FIG. 50

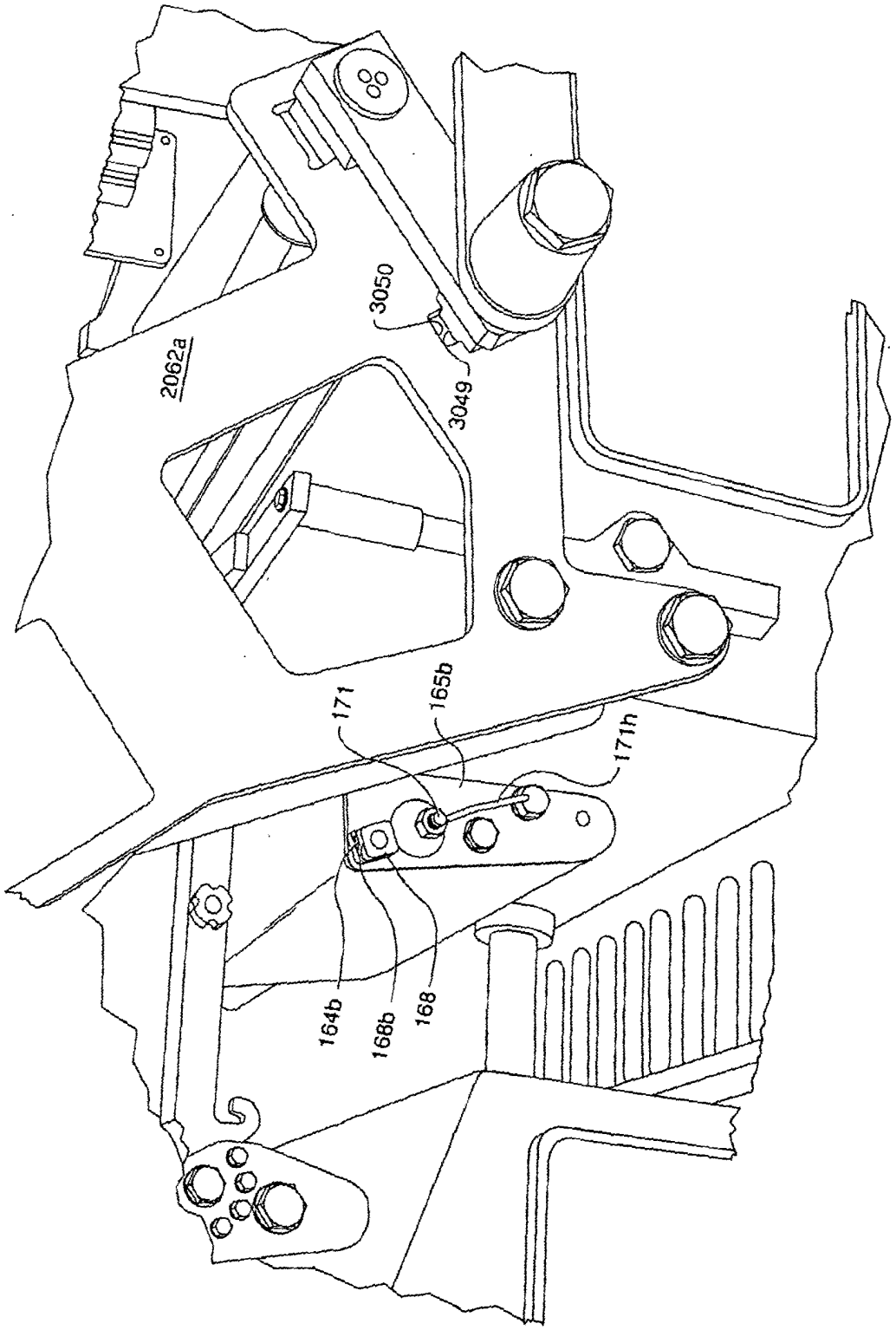


FIG. 51

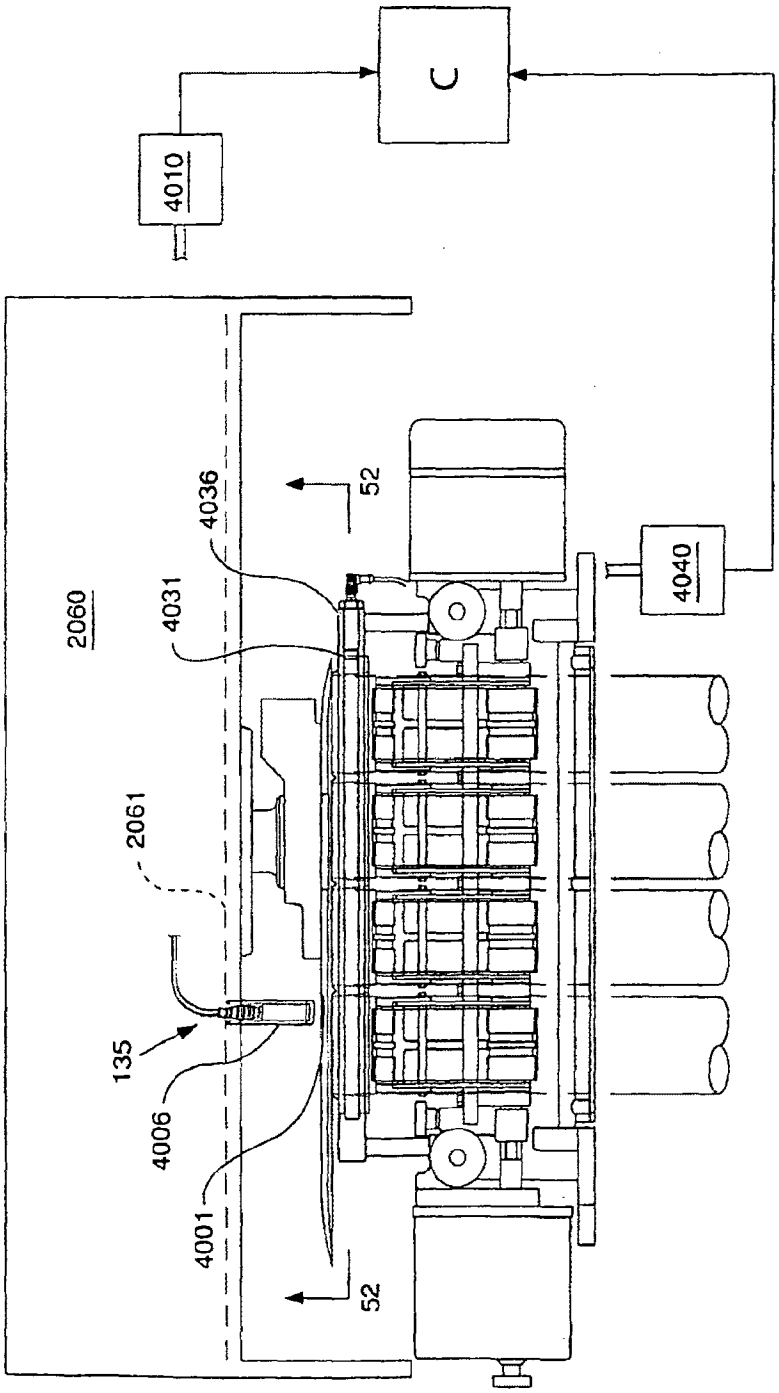


FIG. 52

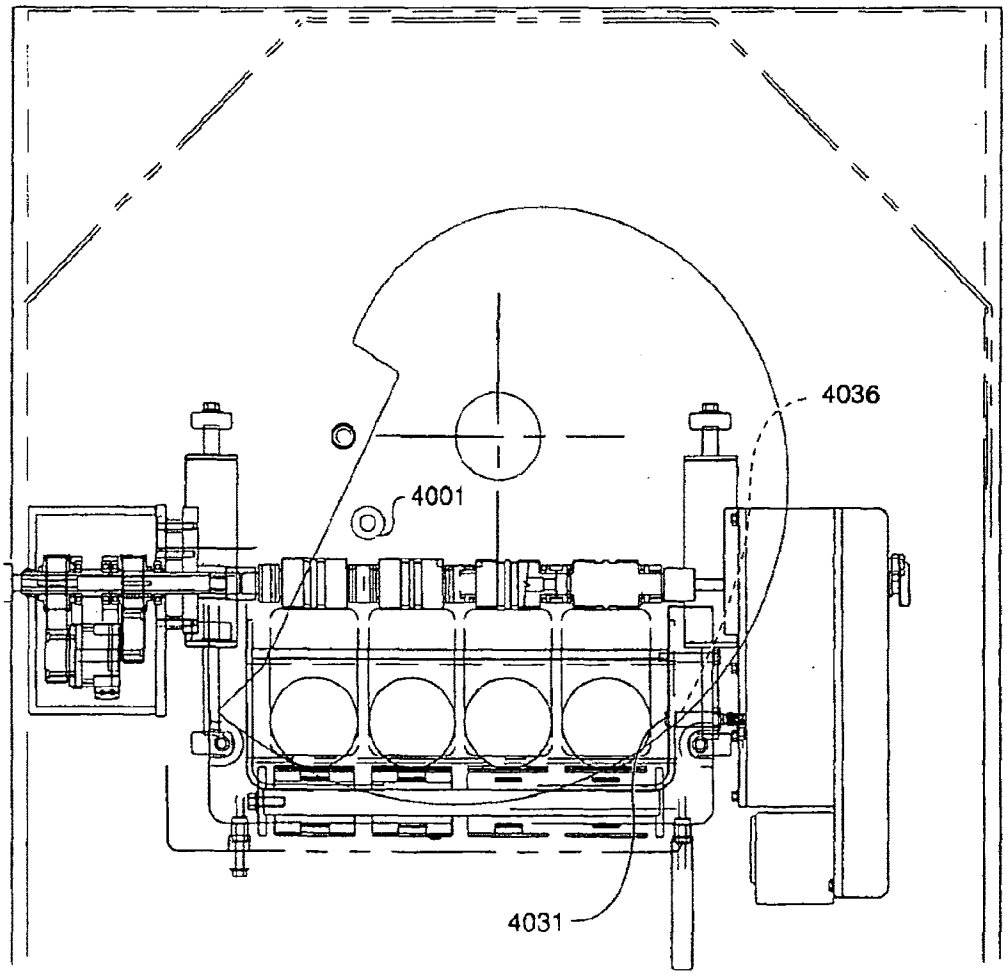


FIG. 53

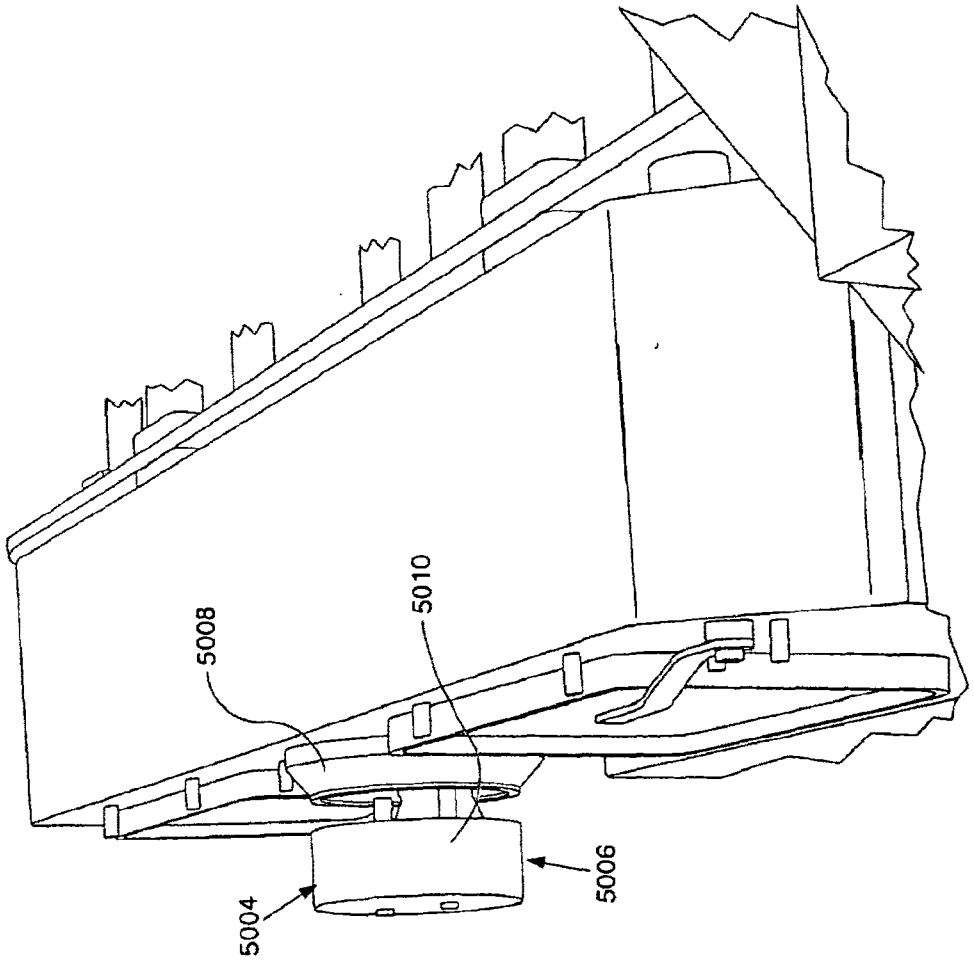


FIG. 54

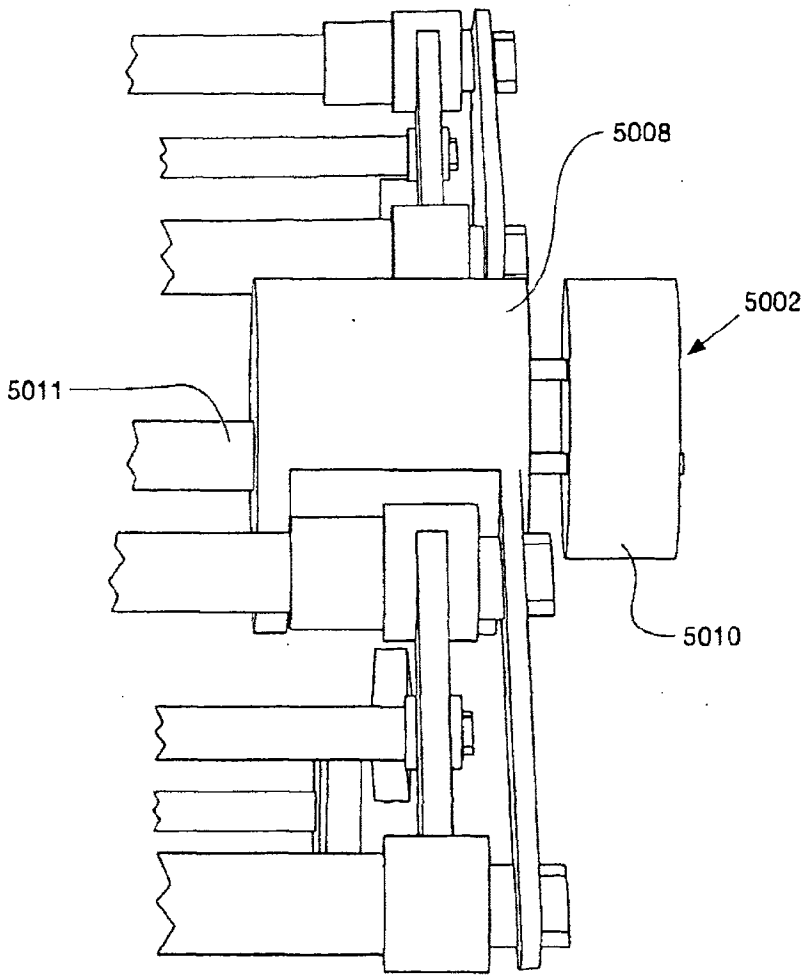


FIG. 55

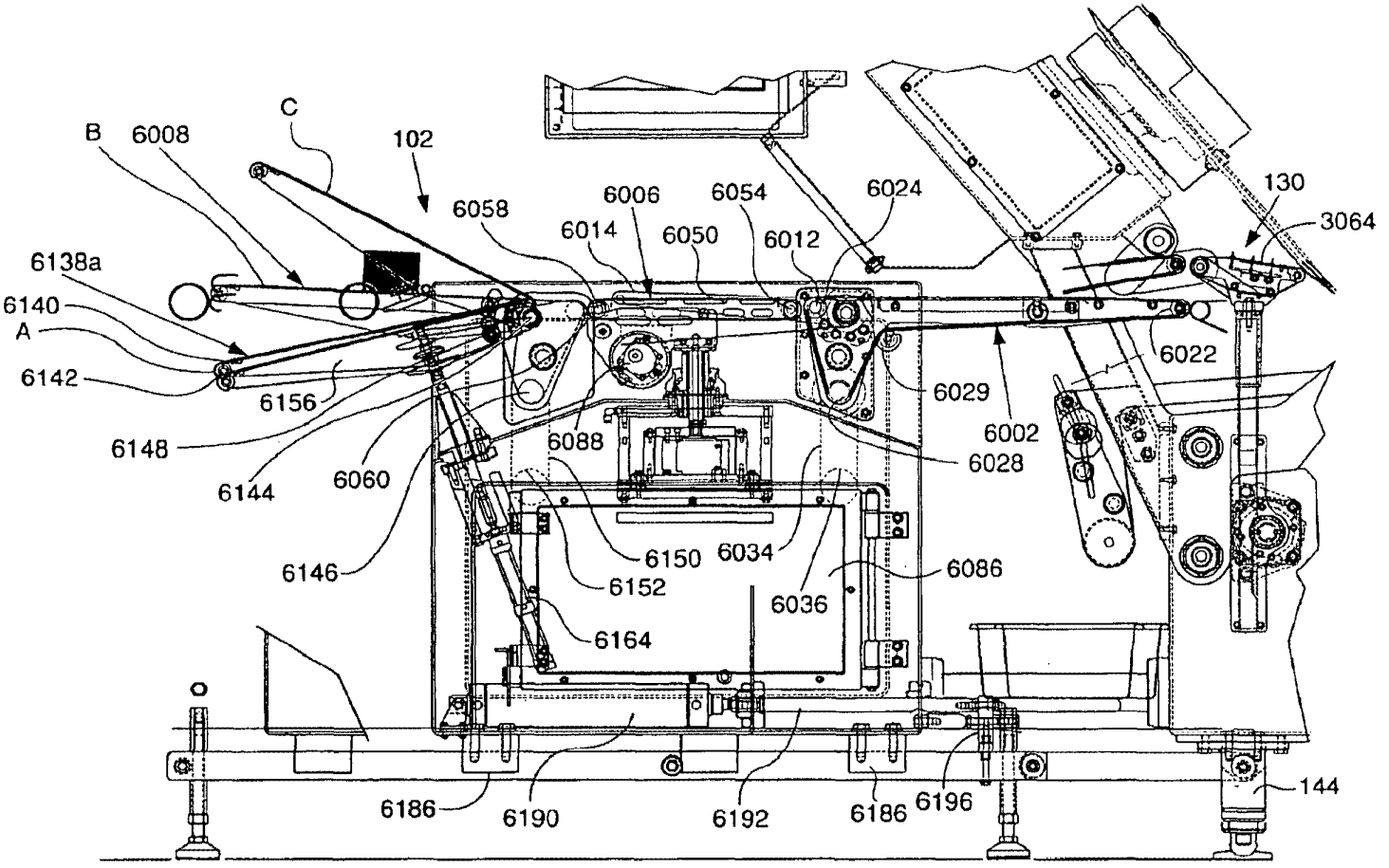

B
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6196
144

FIG. 56

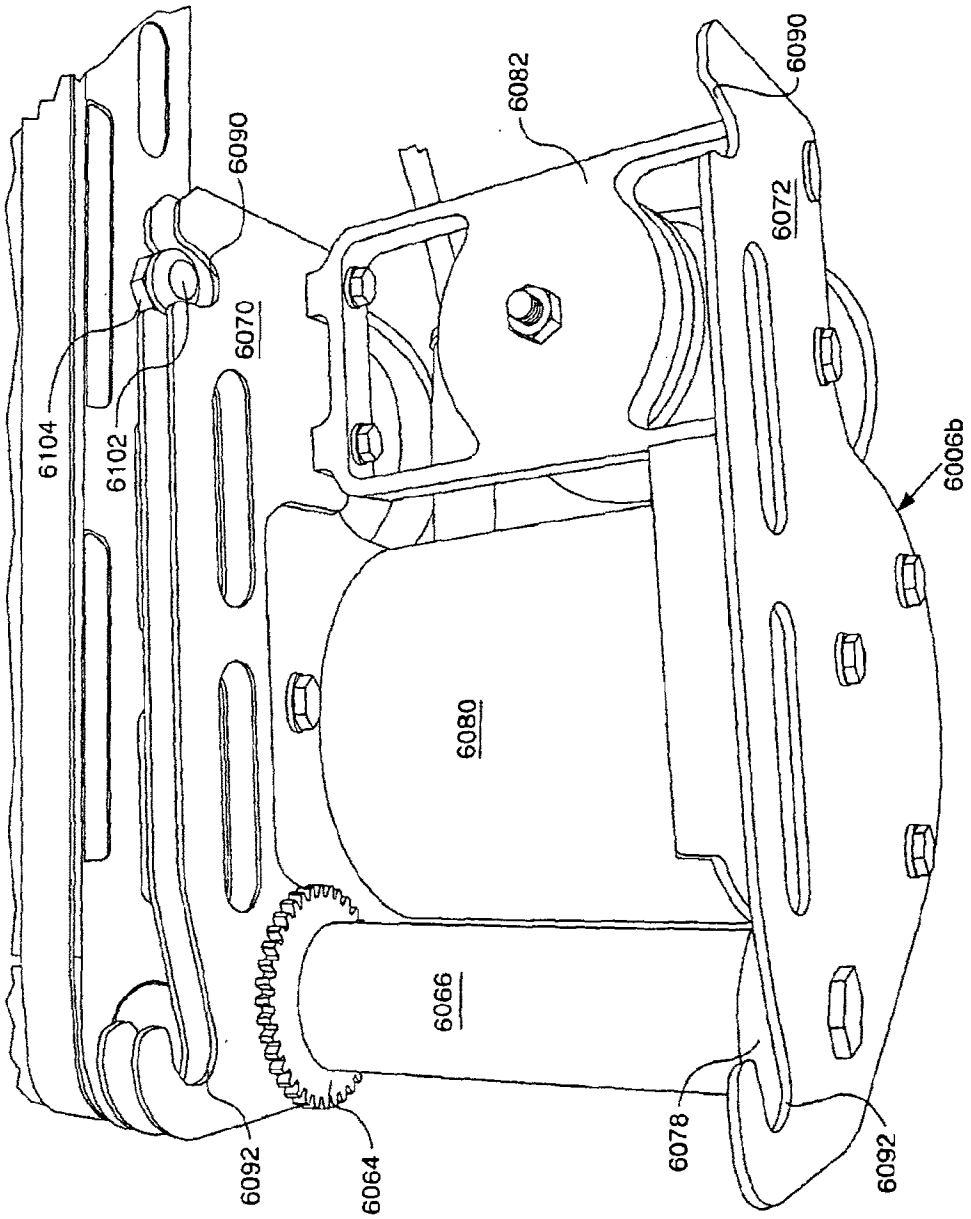

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FIG. 57

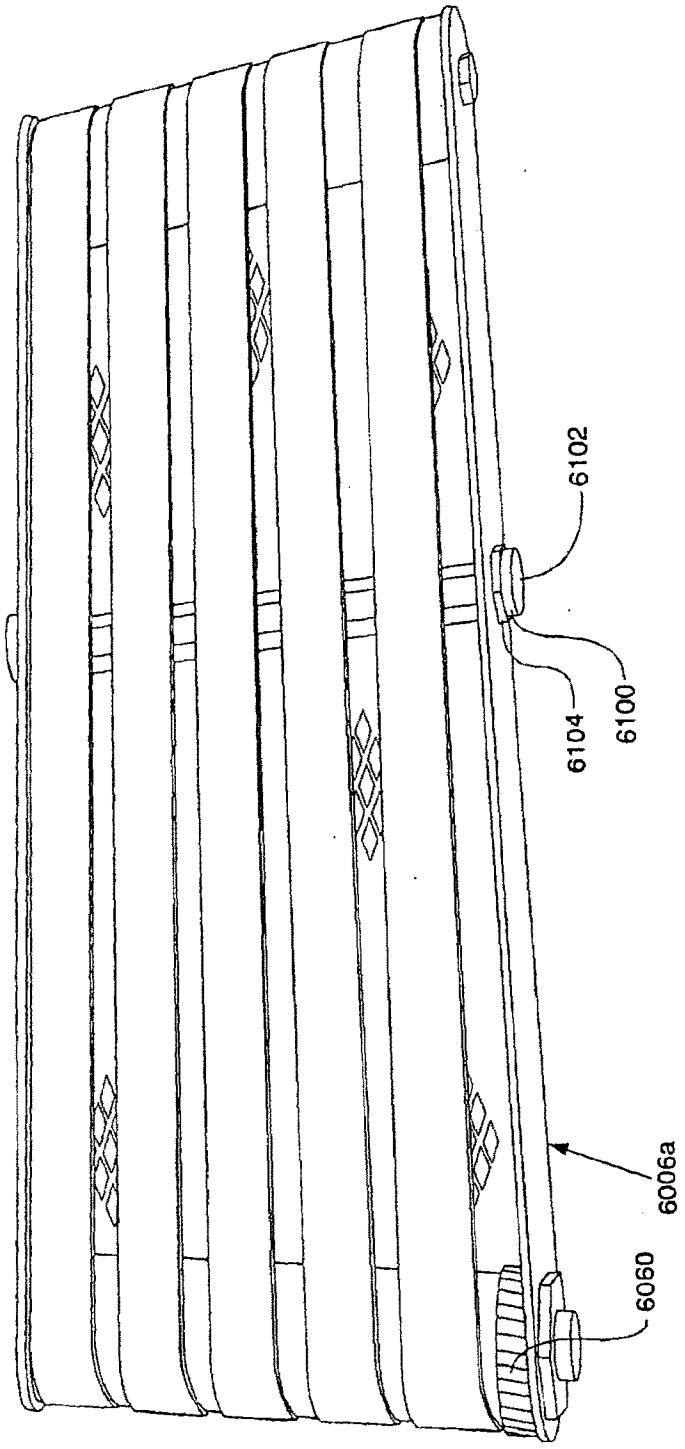


FIG. 58

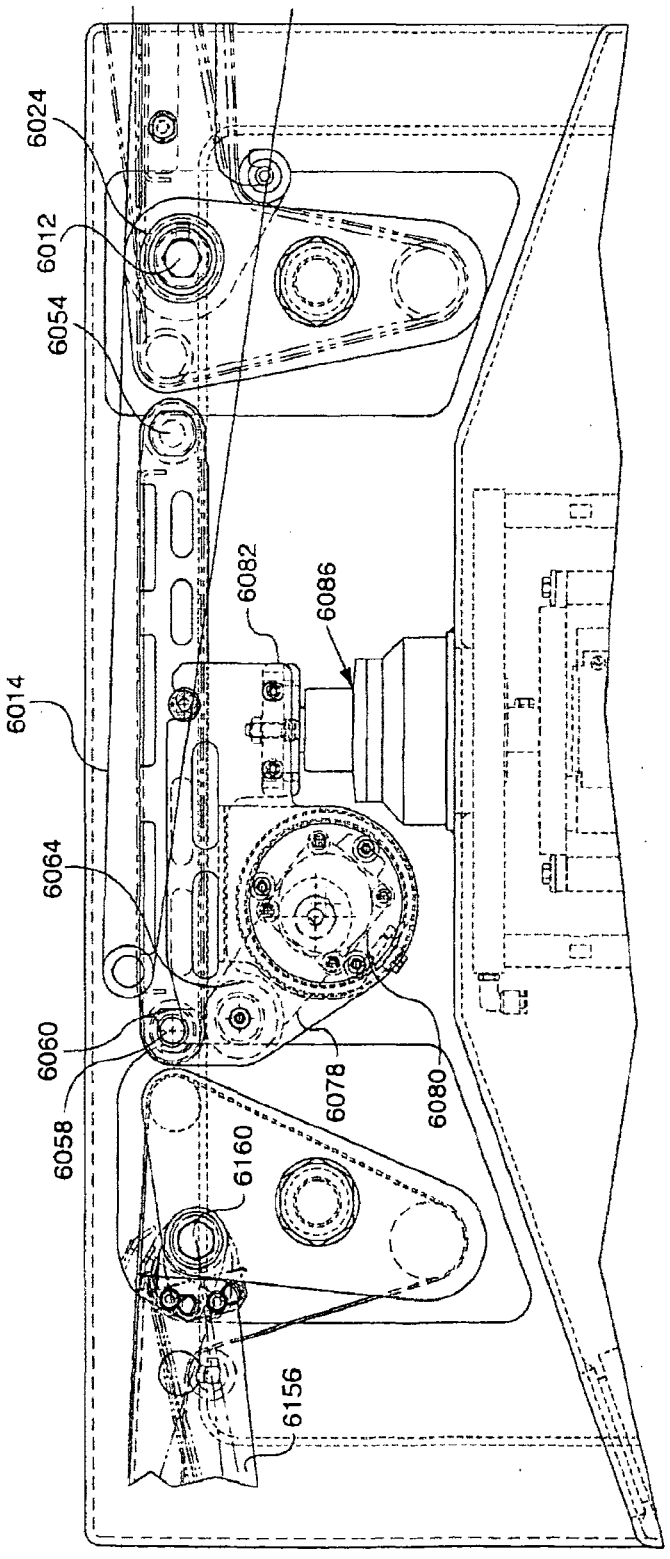

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6014
6064
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6078
6080
6160
6156

FIG. 59

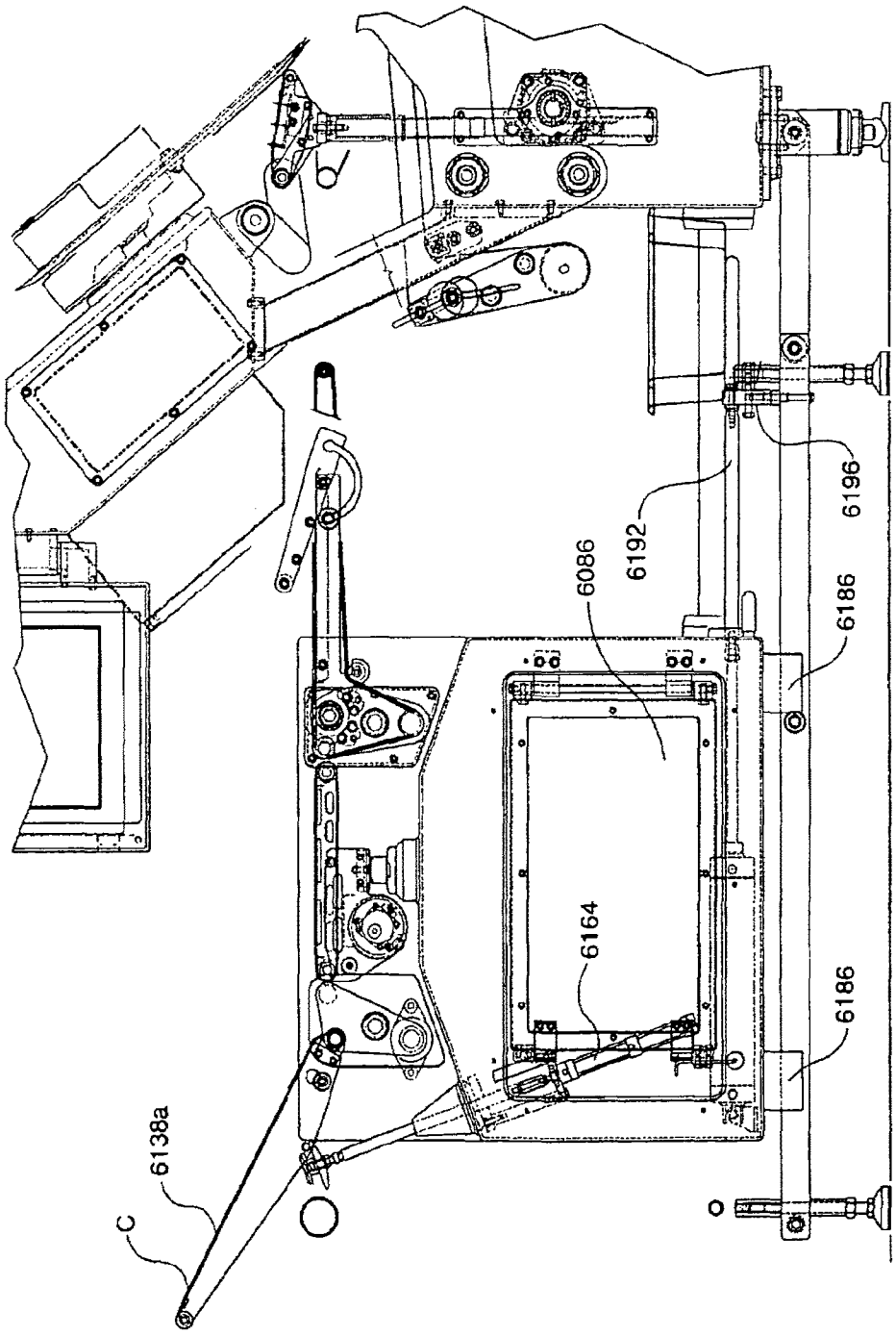
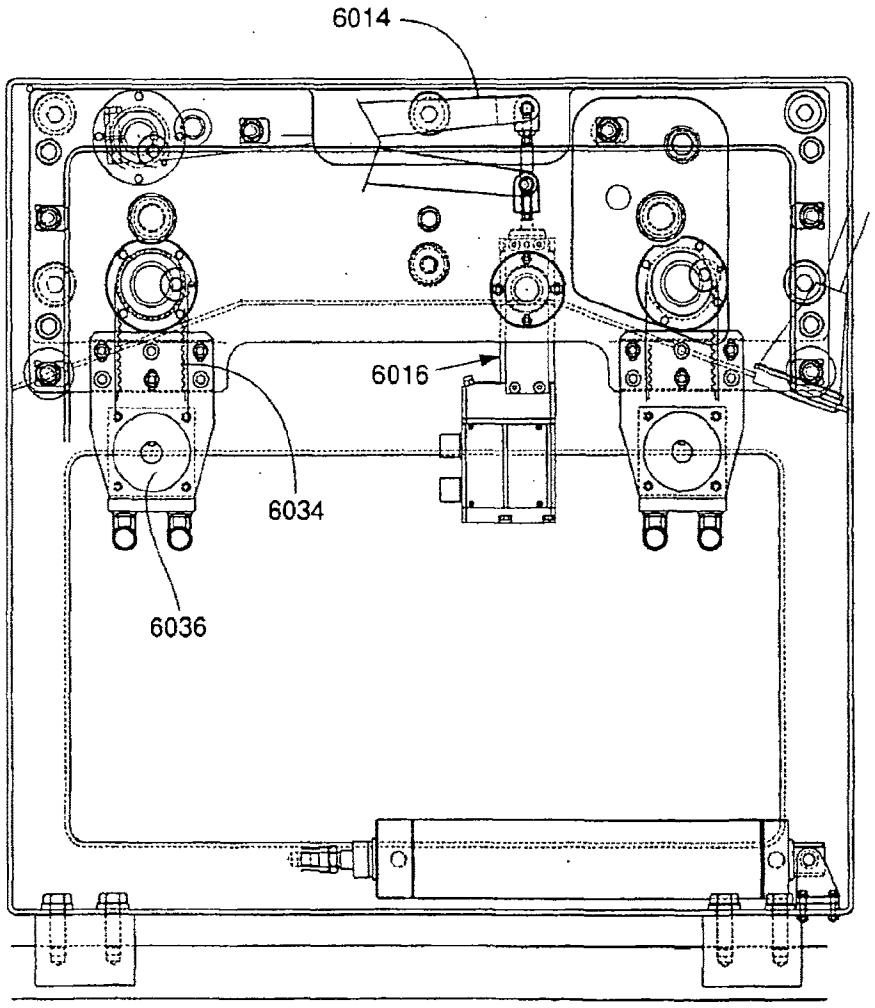


FIG. 60



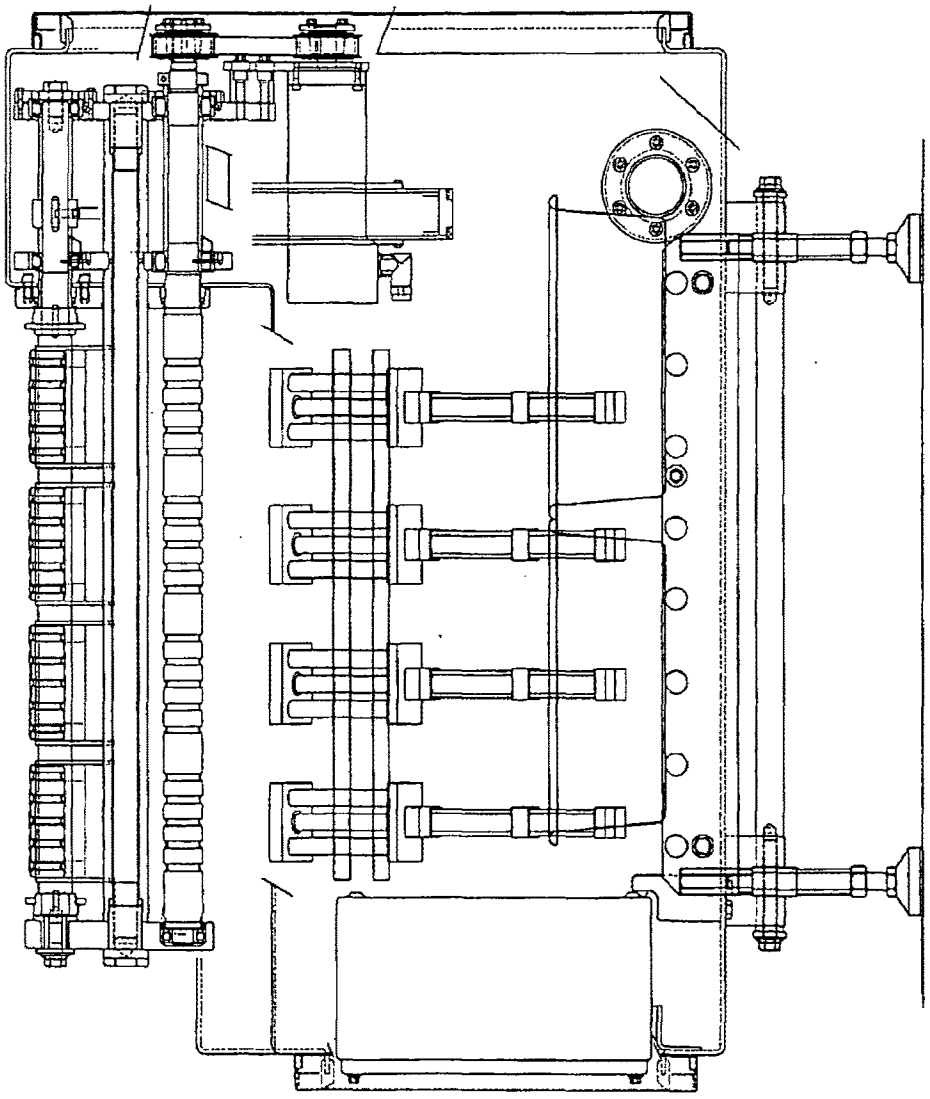


FIG. 60A

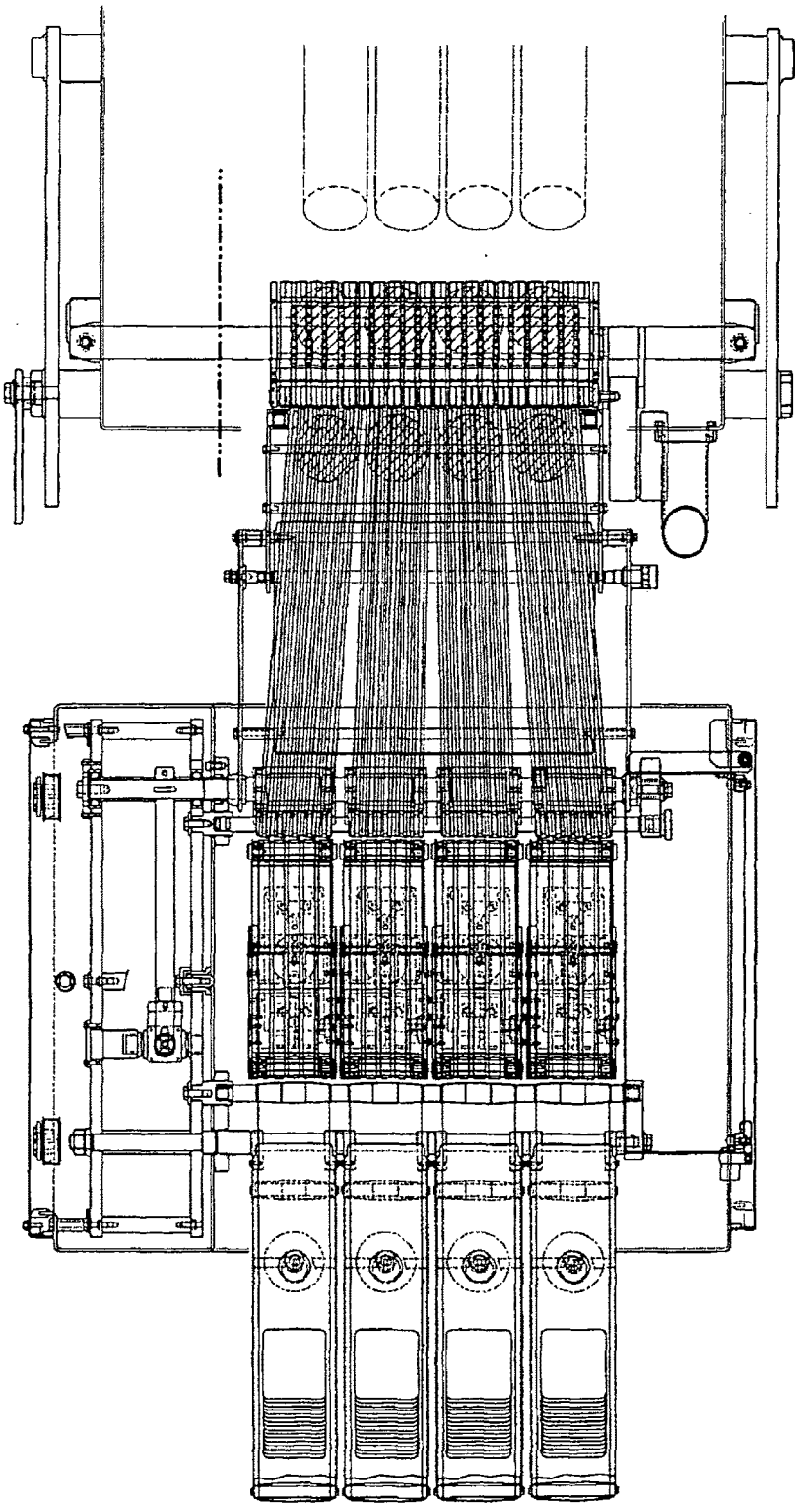


FIG. 60B

FIG. 61

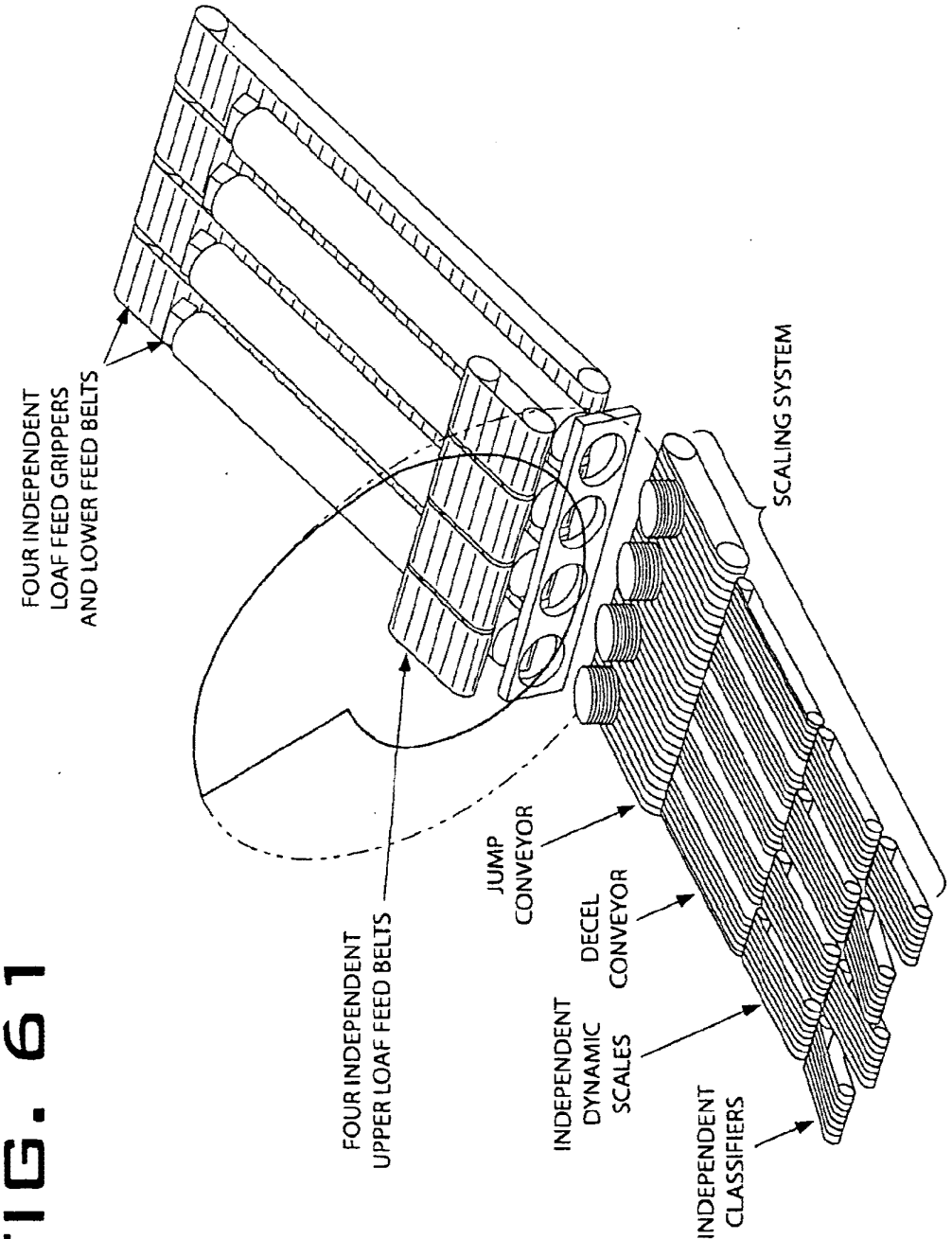

FOUR INDEPENDENT
LOAF FEED GRIPPERS
AND LOWER FEED BELTS
SCALING SYSTEM
FOUR INDEPENDENT
UPPER LOAF FEED BELTS
JUMP
CONVEYOR
DECEL
CONVEYOR
INDEPENDENT
DYNAMIC
SCALES
INDEPENDENT
CLASSIFIERS

FIG. 62

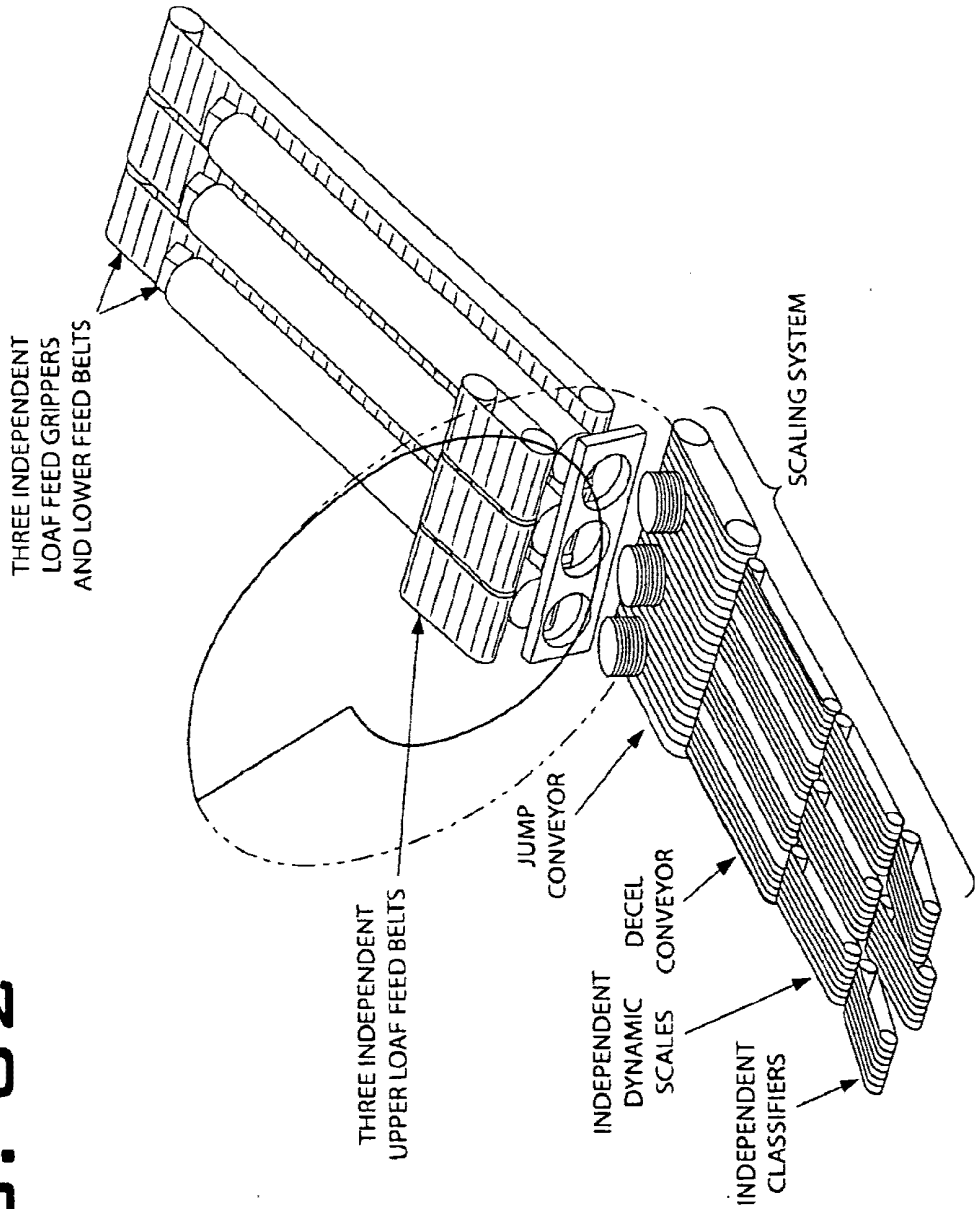

THREE INDEPENDENT
LOAF FEED GRIPPERS
AND LOWER FEED BELTS
SCALING SYSTEM
THREE INDEPENDENT
UPPER LOAF FEED BELTS
JUMP
CONVEYOR
INDEPENDENT
DYNAMIC
SCALES
DECEL
CONVEYOR
INDEPENDENT
CLASSIFIERS

FIG. 63

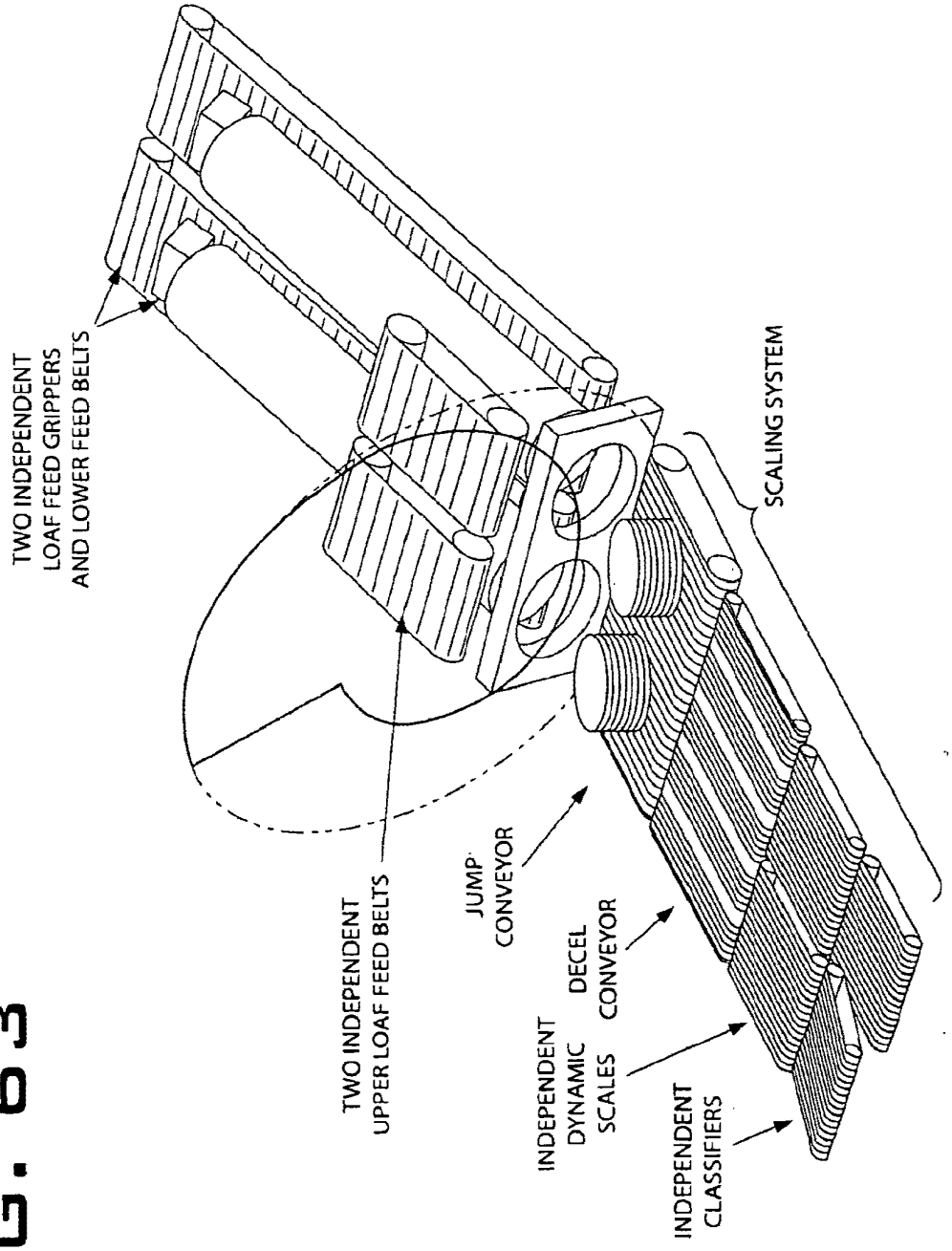
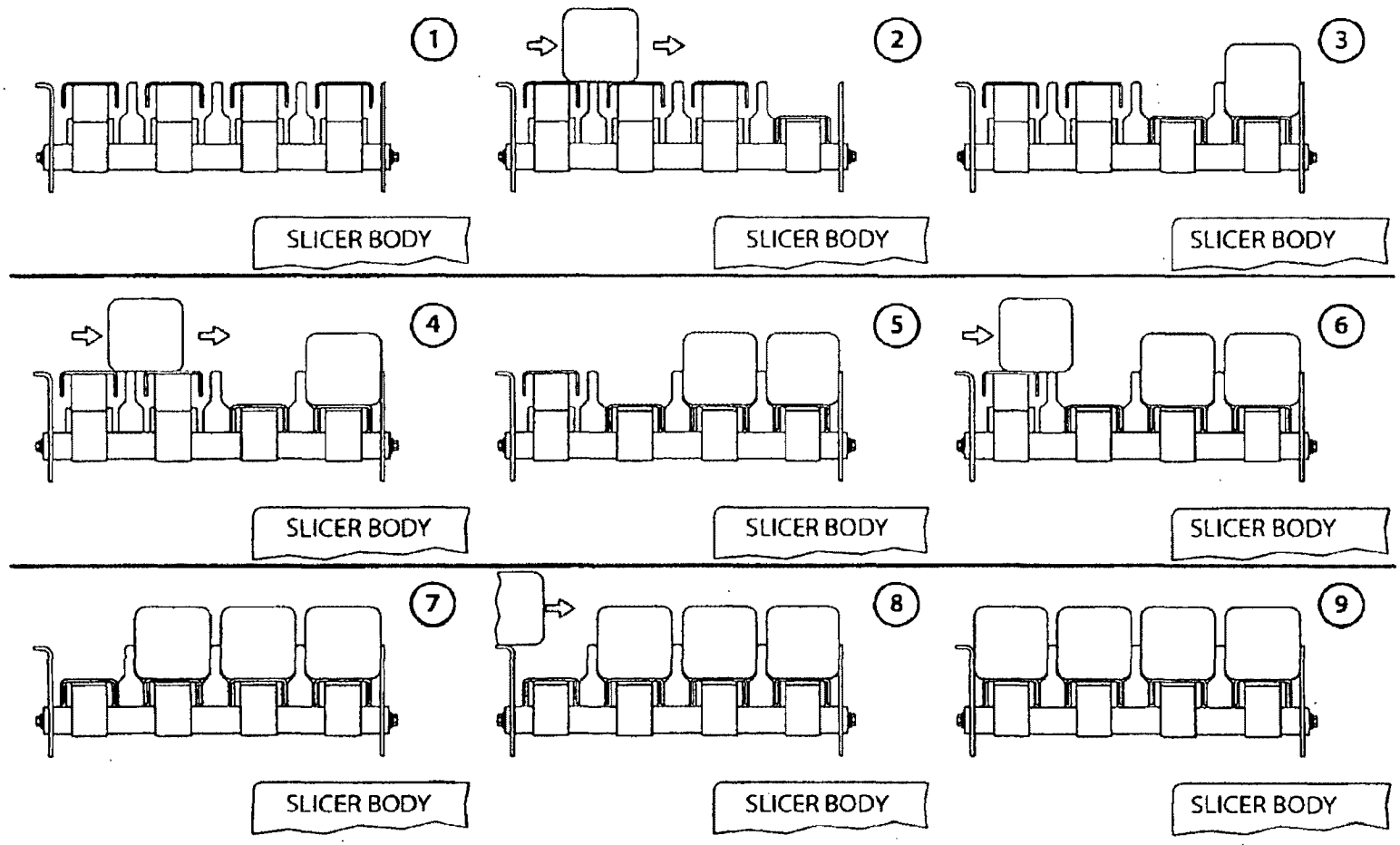

TWO INDEPENDENT
LOAF FEED GRIPPERS
AND LOWER FEED BELTS
SCALING SYSTEM
TWO INDEPENDENT
UPPER LOAF FEED BELTS
JUMP
CONVEYOR
INDEPENDENT
DYNAMIC
SCALES
DECEL
CONVEYOR
INDEPENDENT
CLASSIFIERS

FIG. 64



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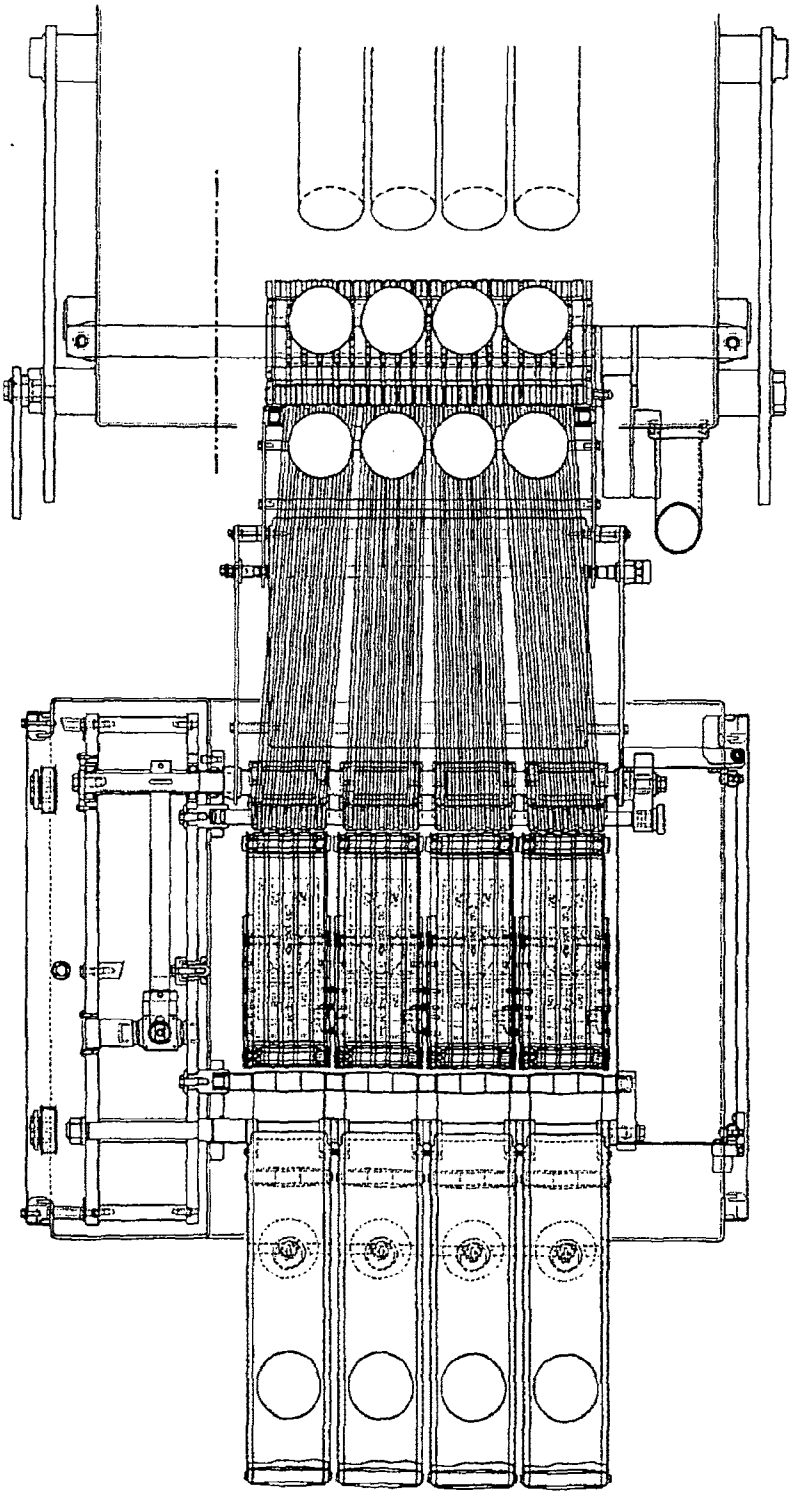


FIG. 65

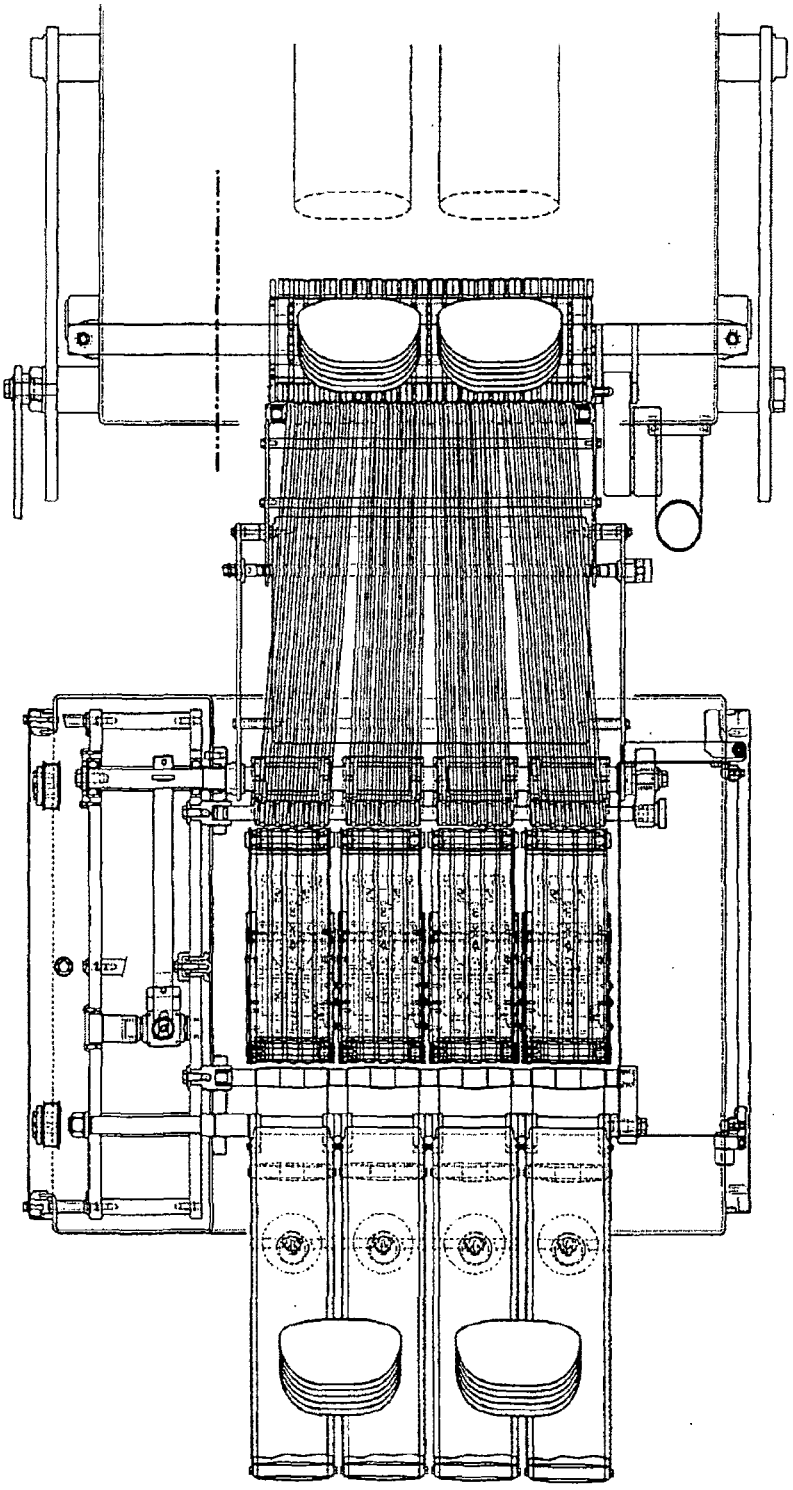


FIG. 66

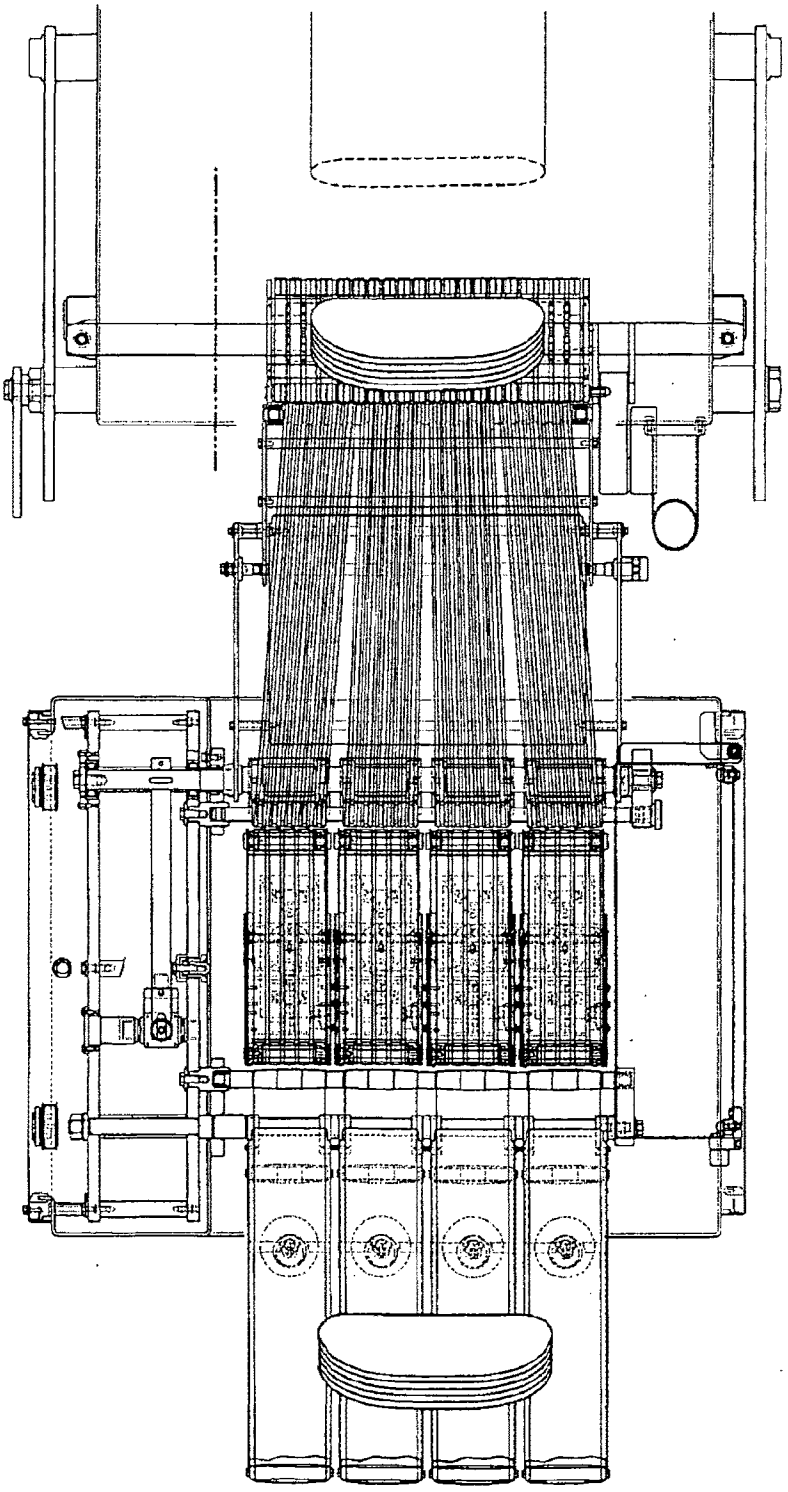


FIG. 67

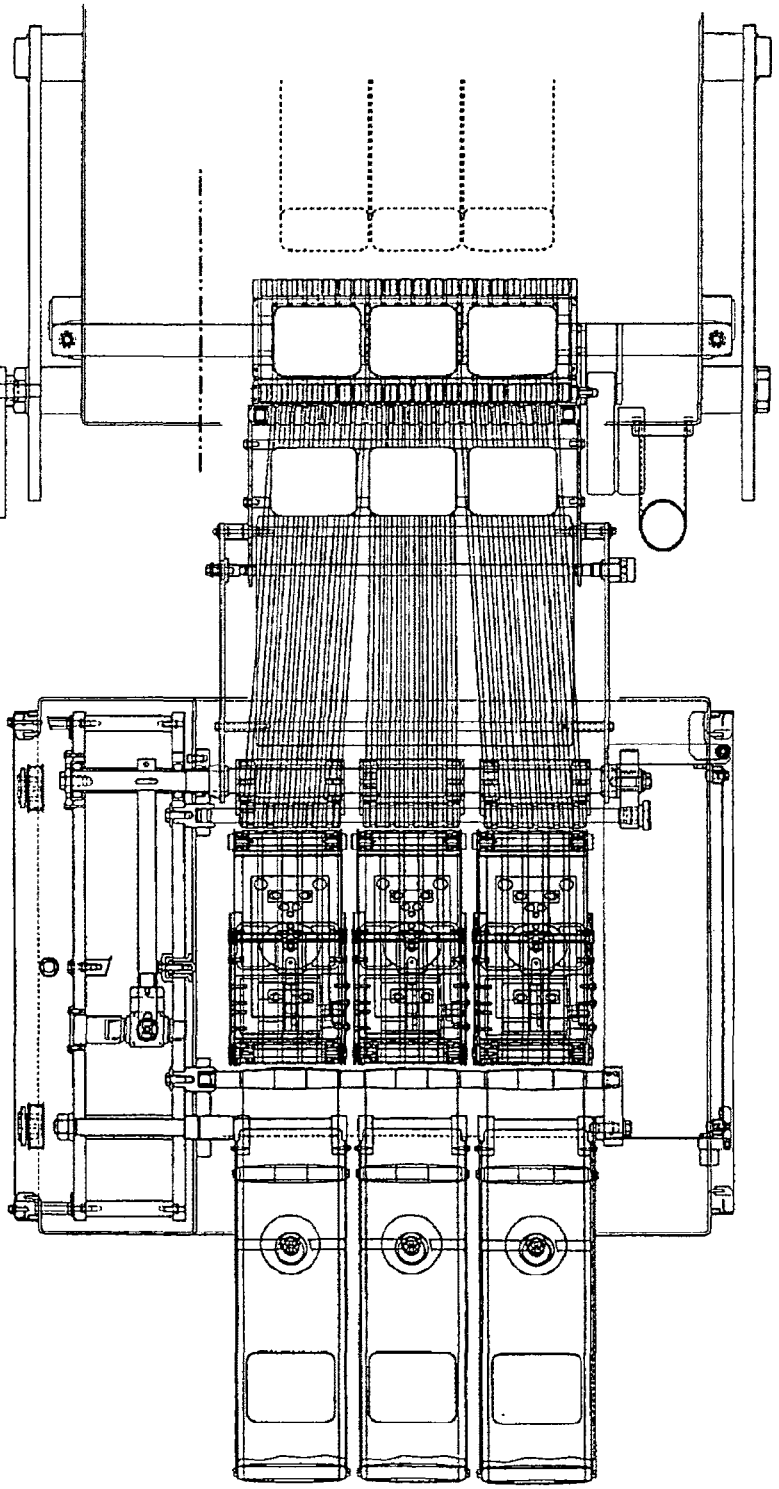


FIG. 68

FIG. 70

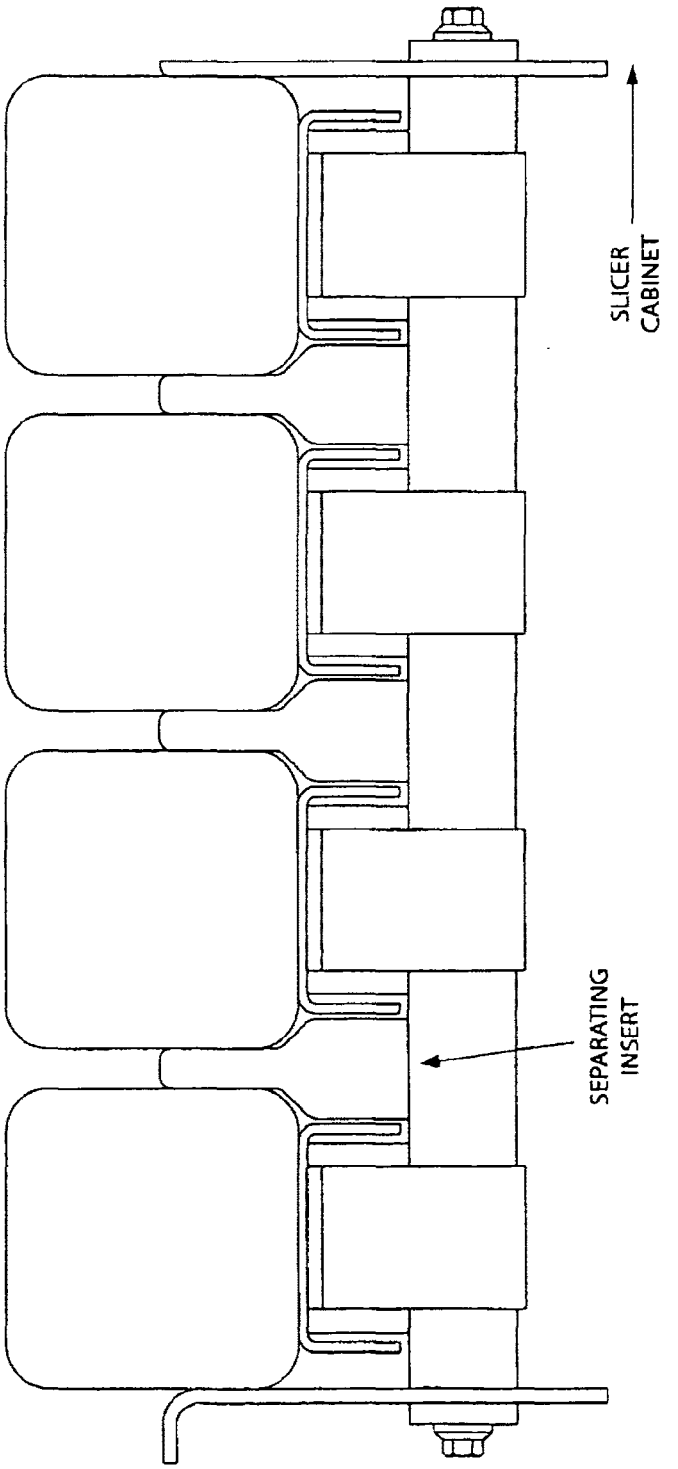


FIG. 71

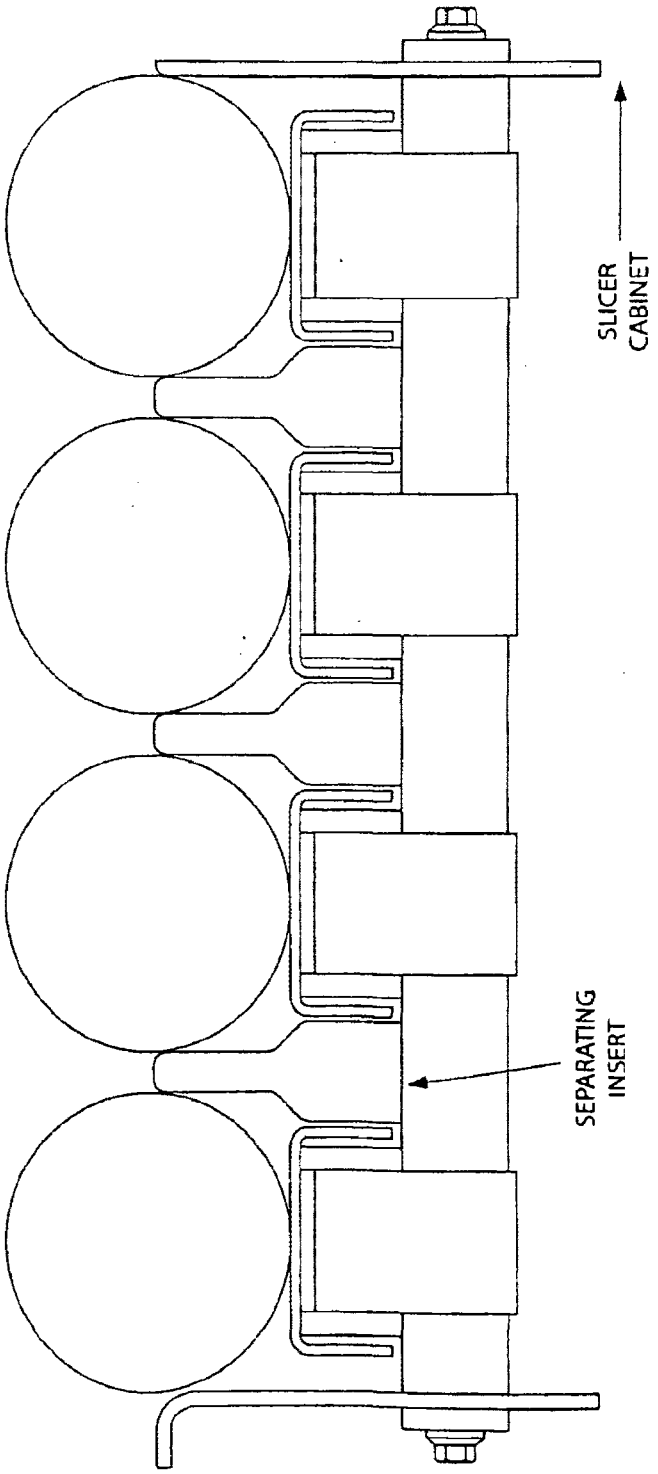


FIG. 72

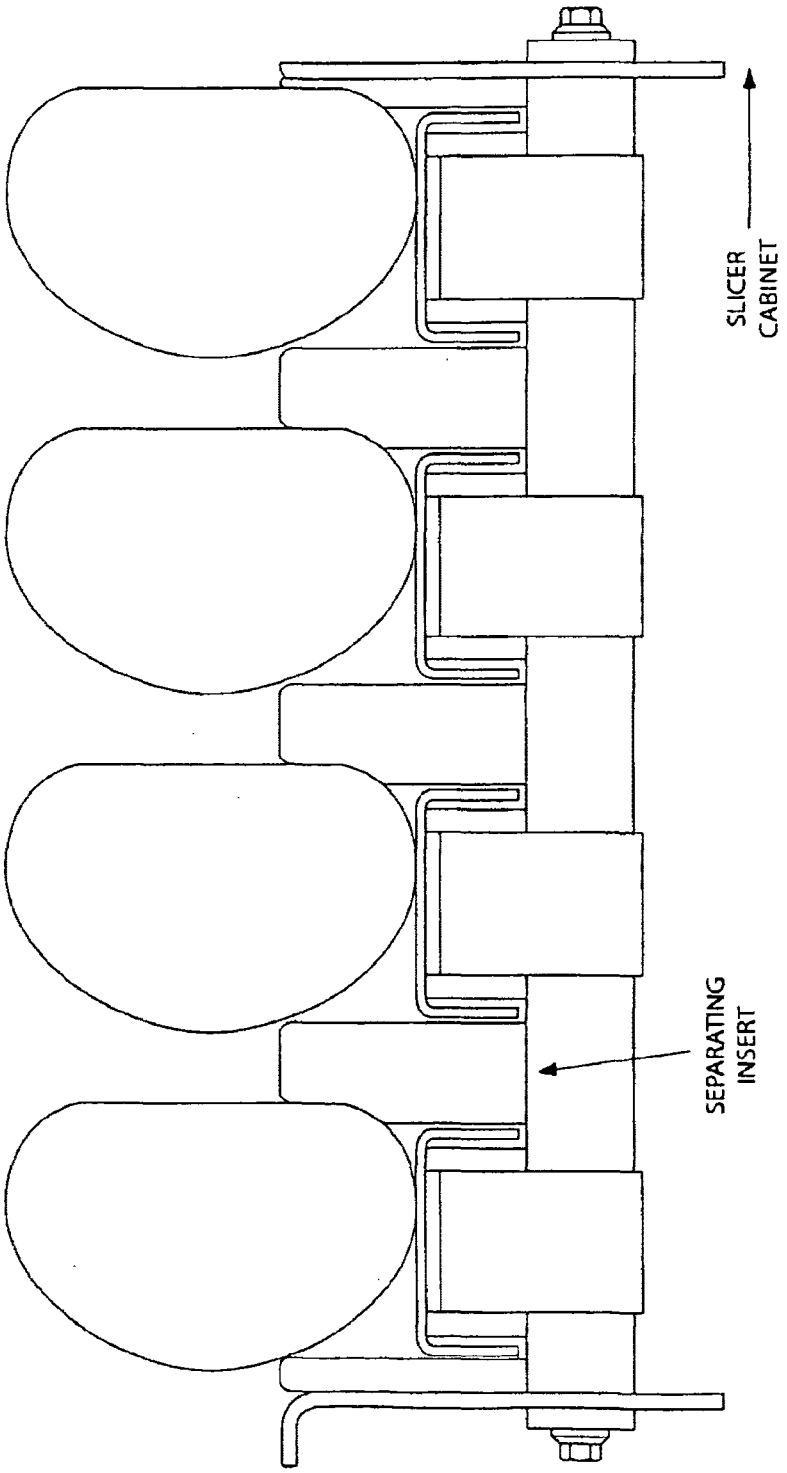


FIG. 73

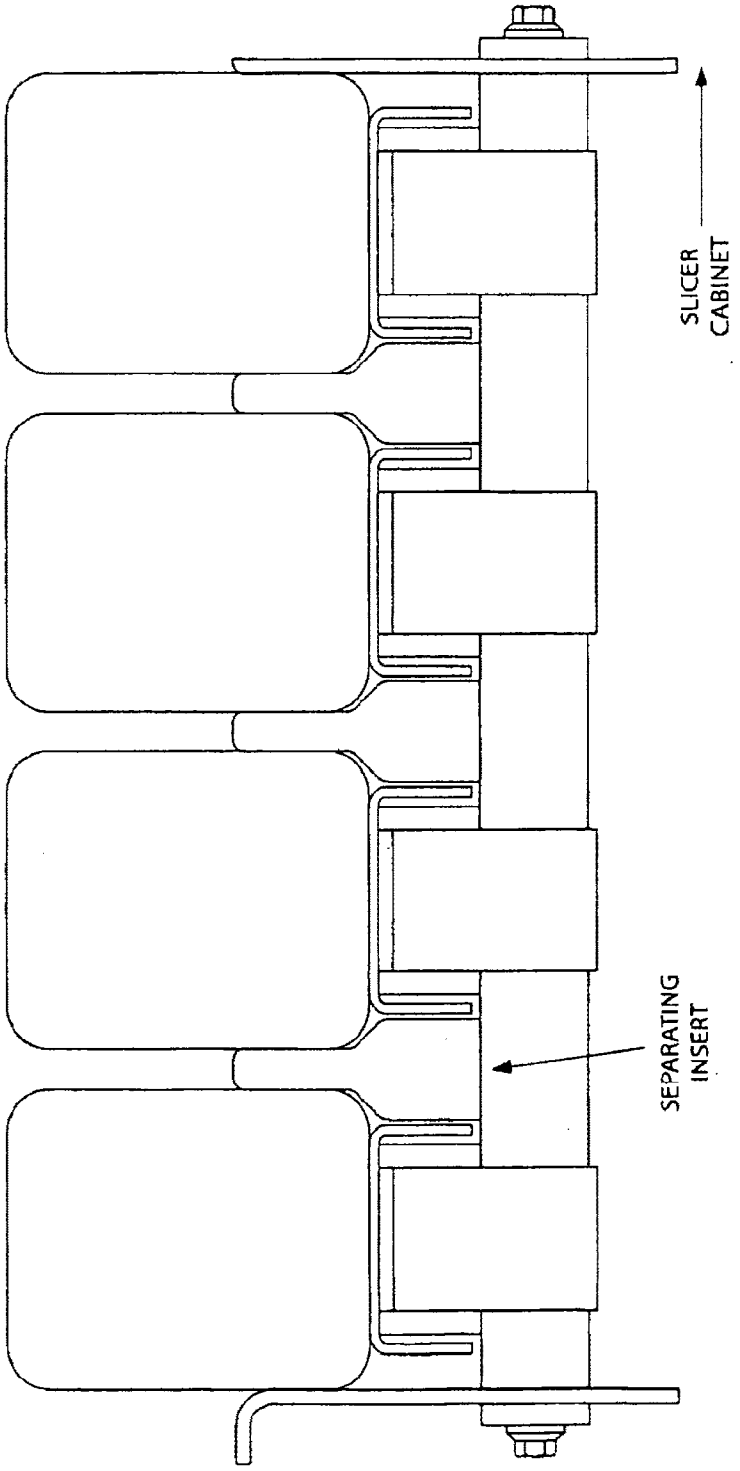
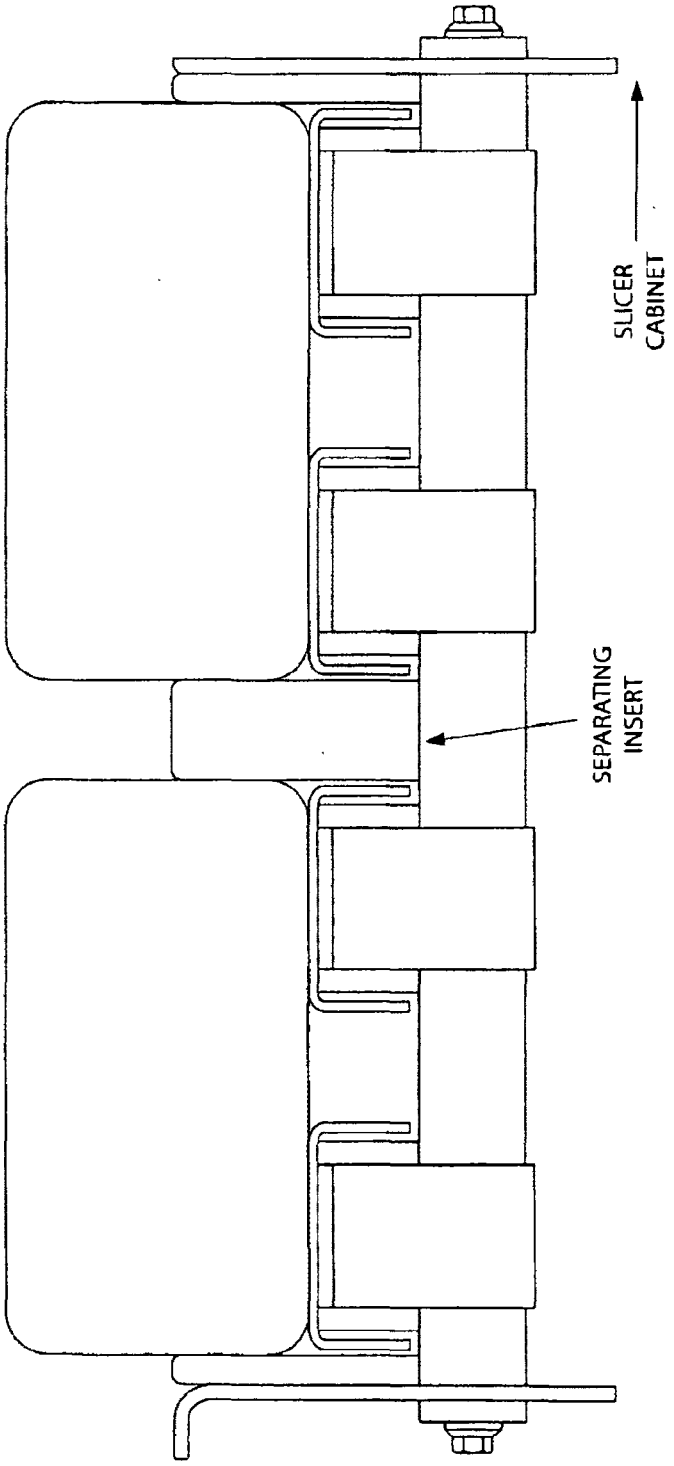


FIG. 74



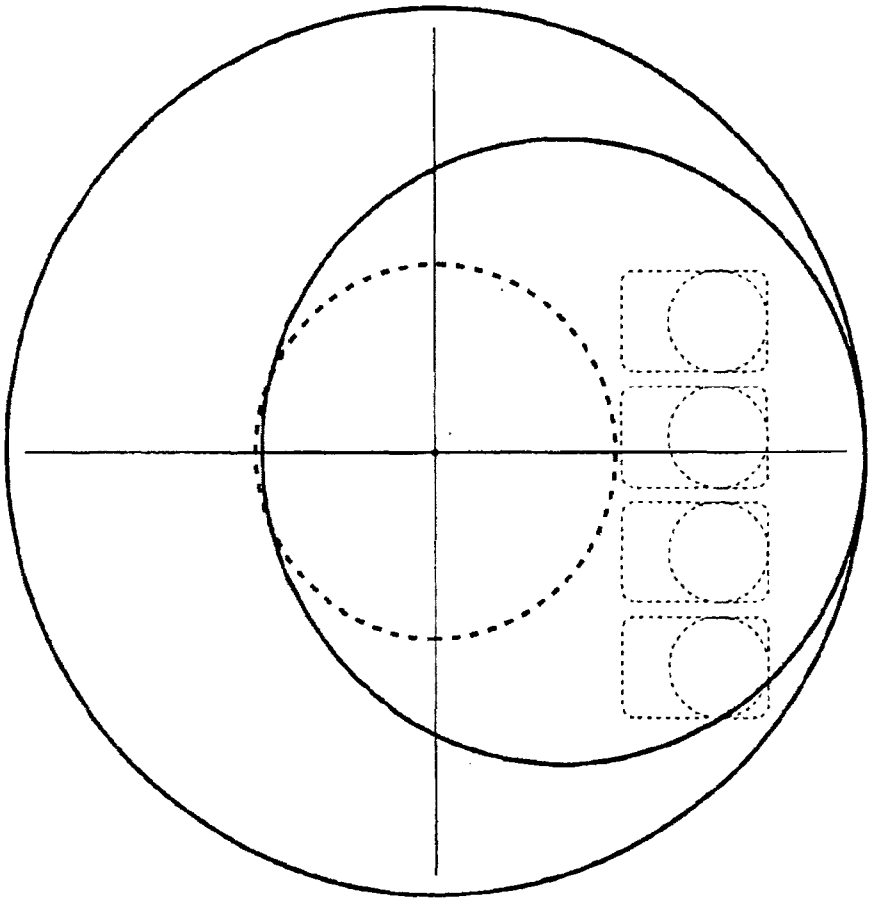


FIG. 75

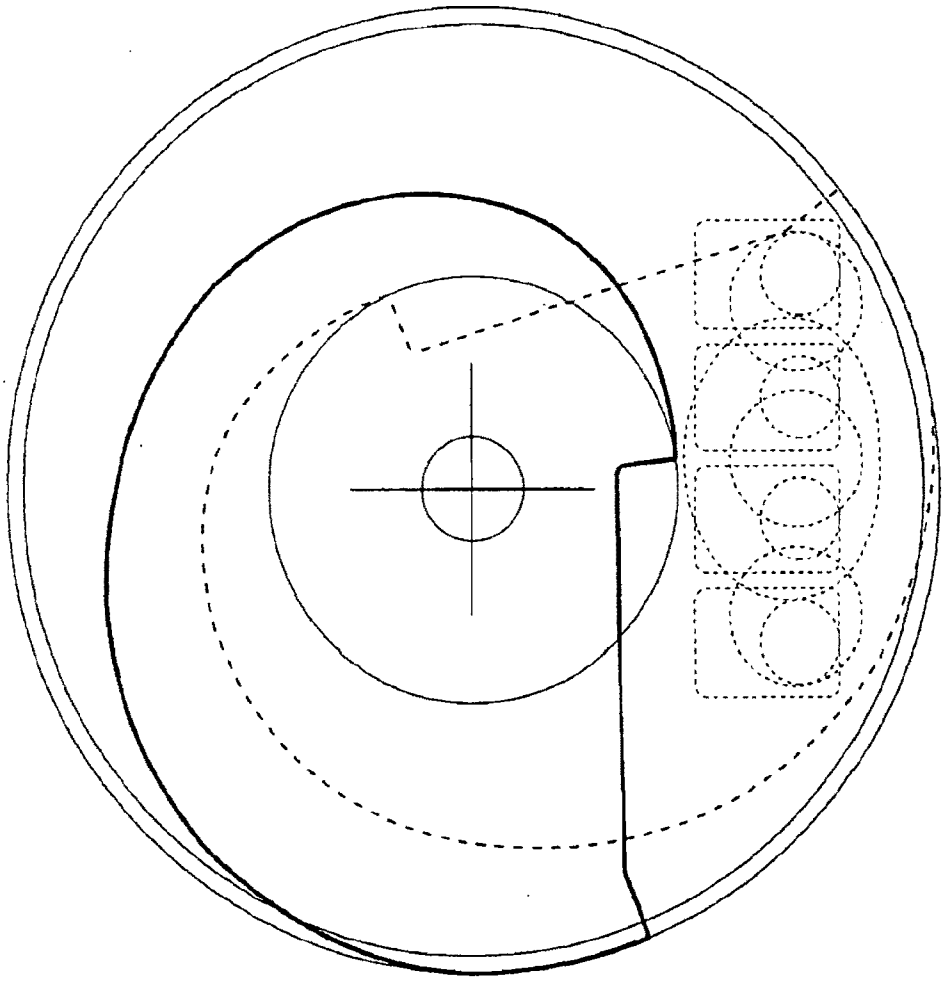


FIG. 76

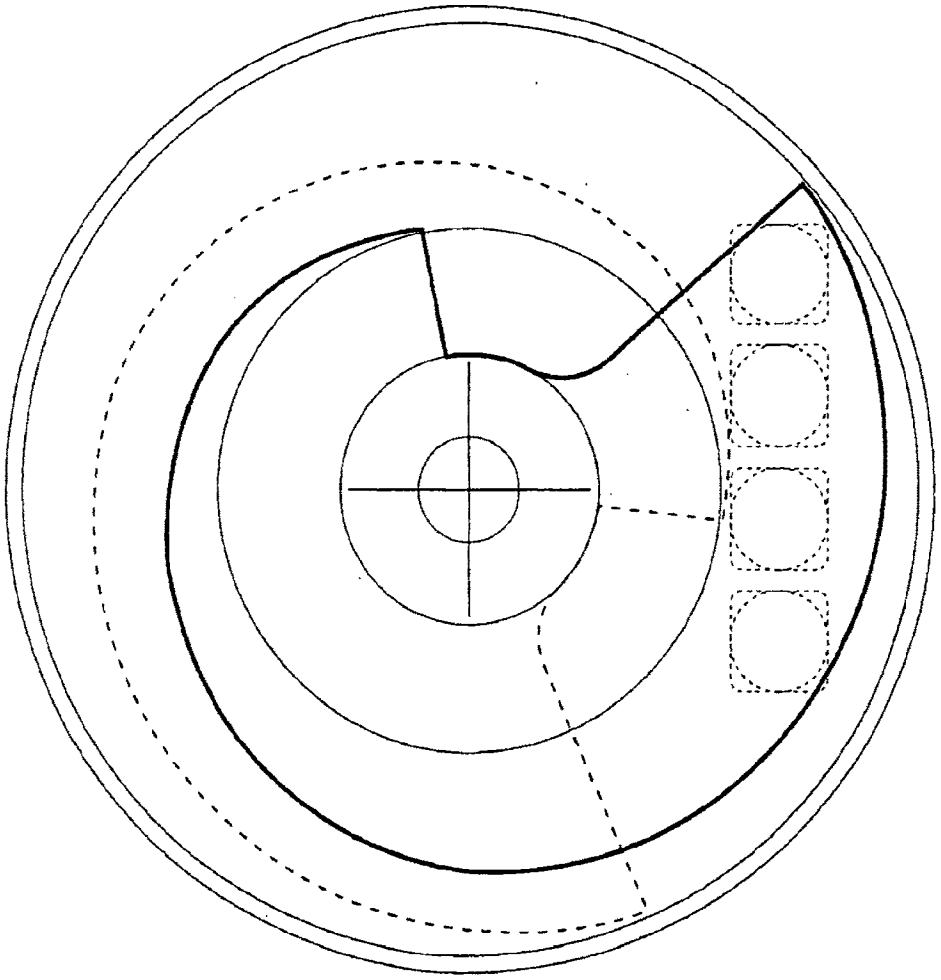


FIG. 77

FIG. 78

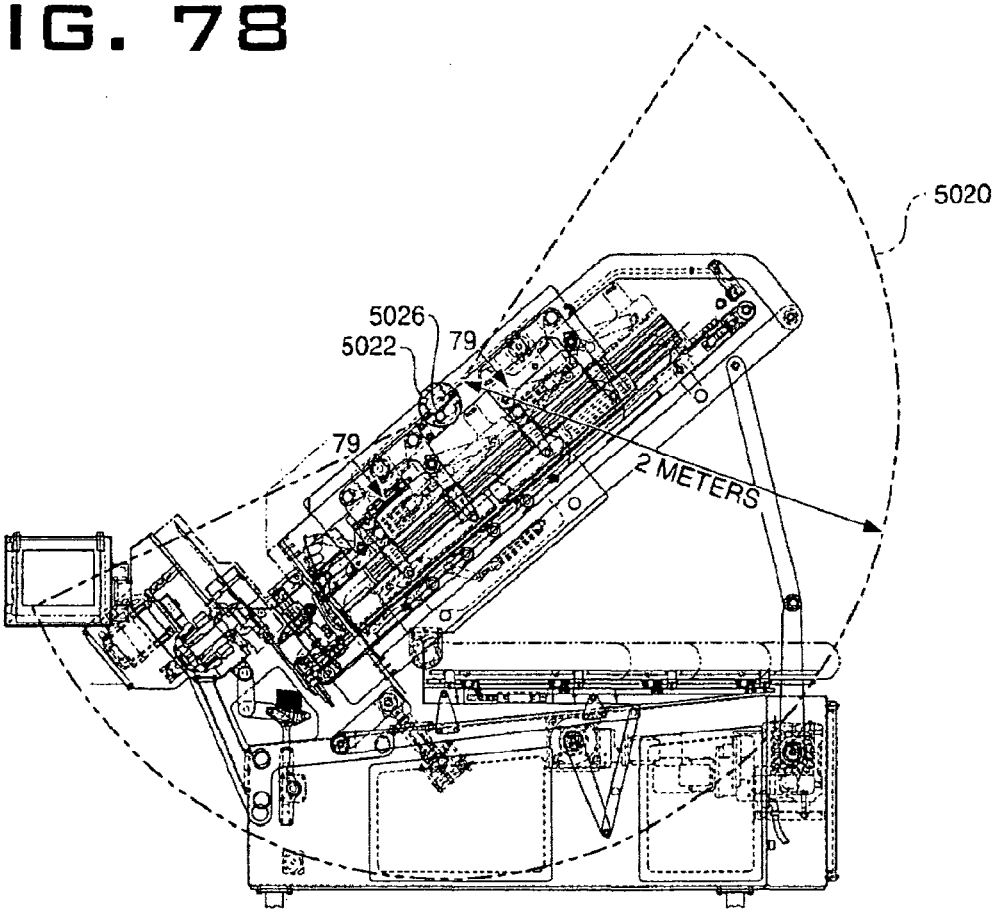

5020
5026
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2 METERS

FIG. 79

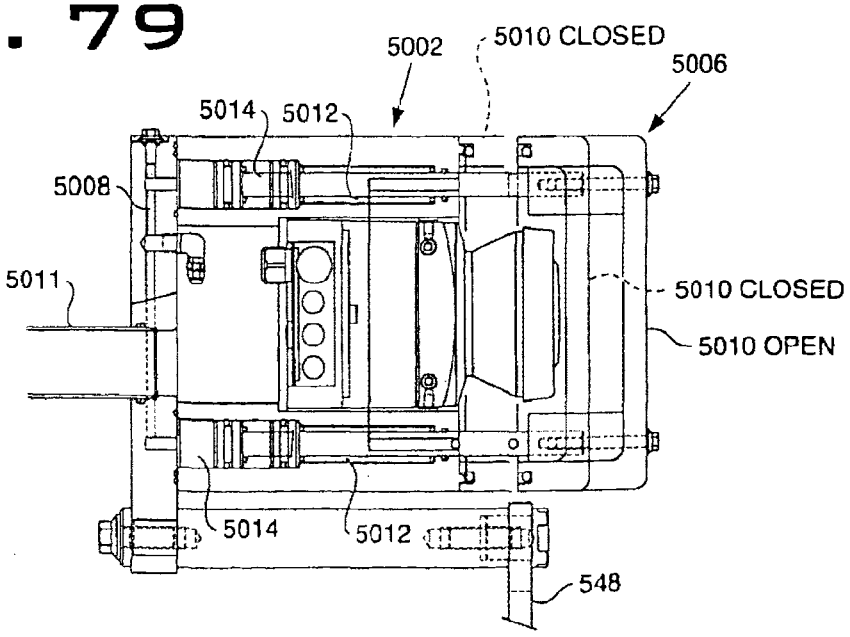

5002
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5012
548

FIG. 80

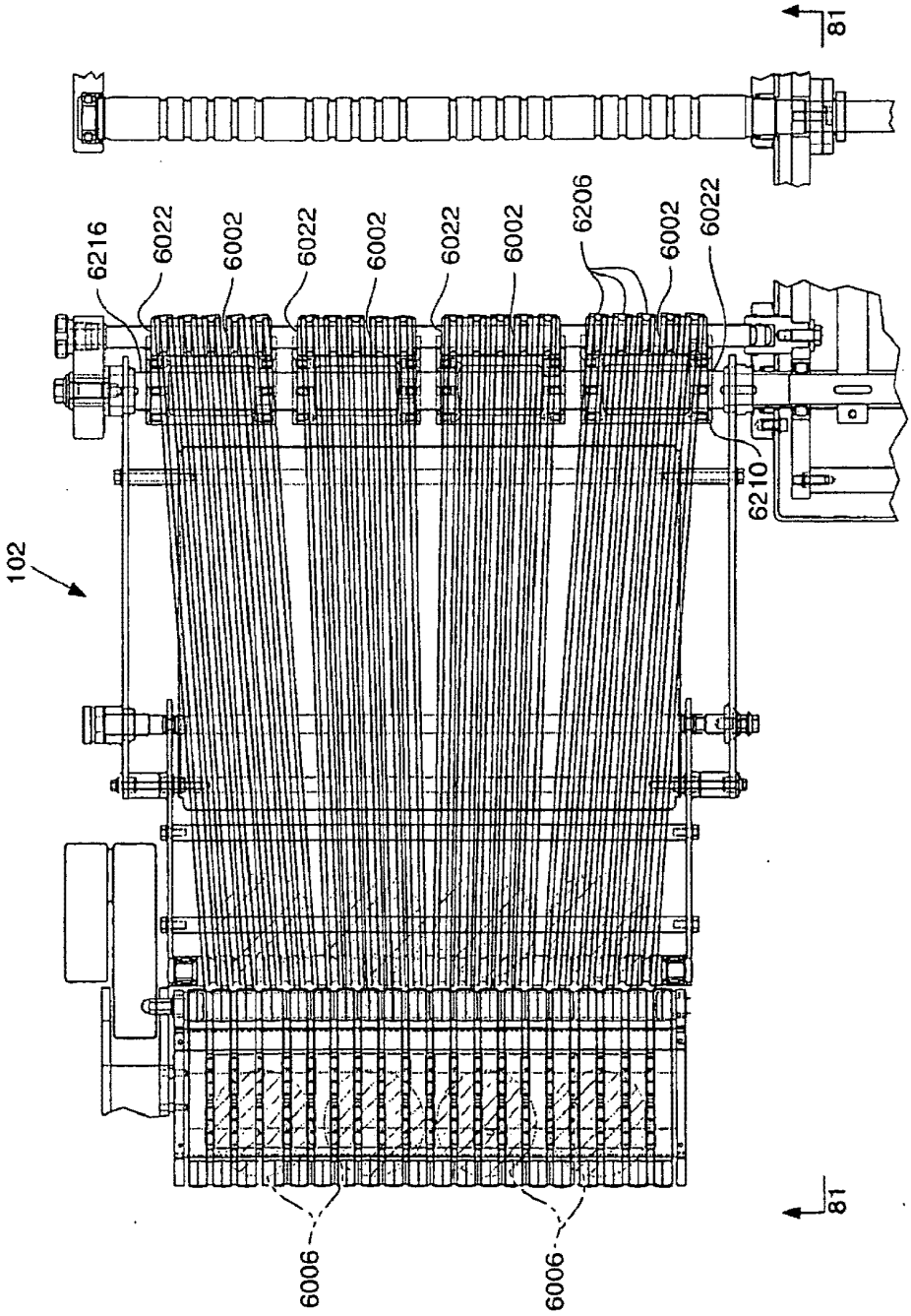

81
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6210
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FIG. 81

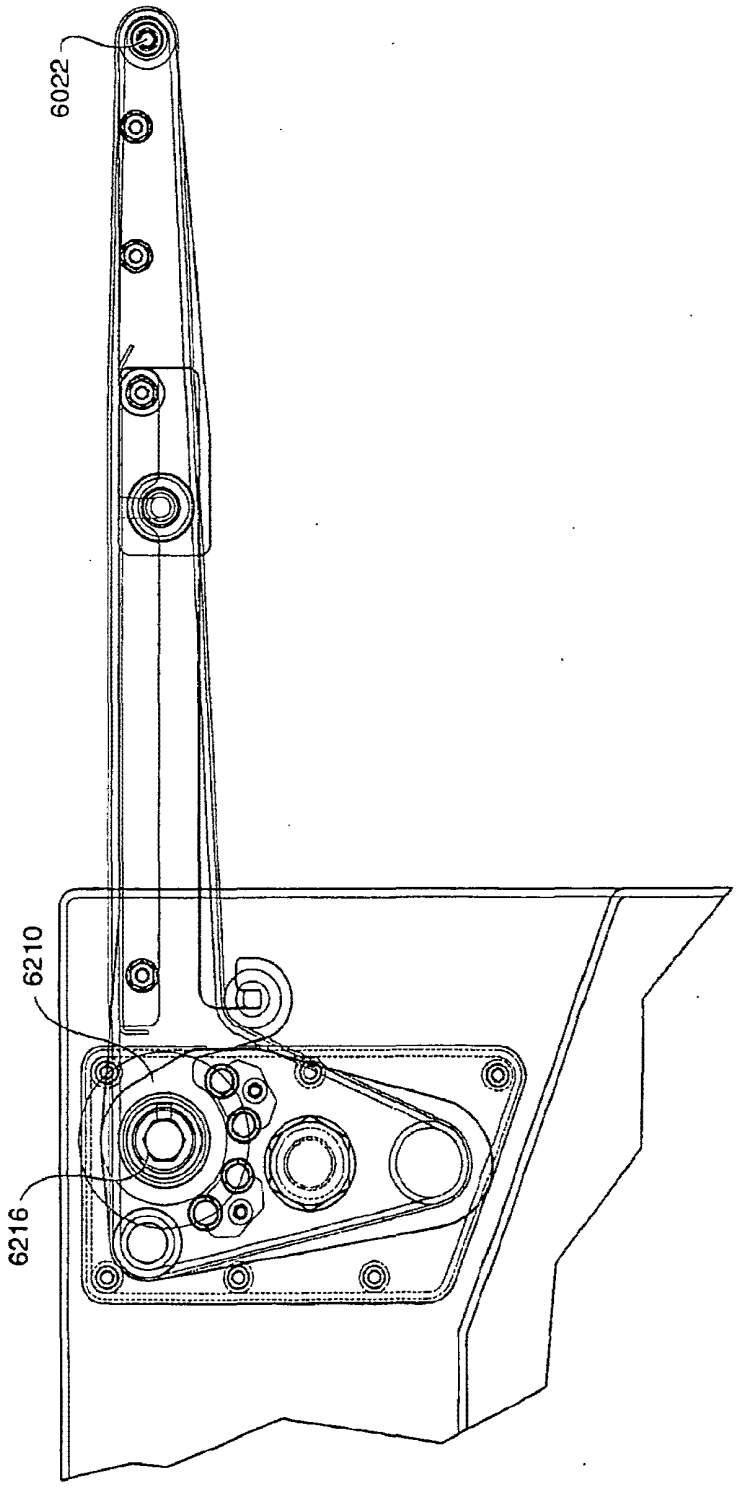


FIG. 83

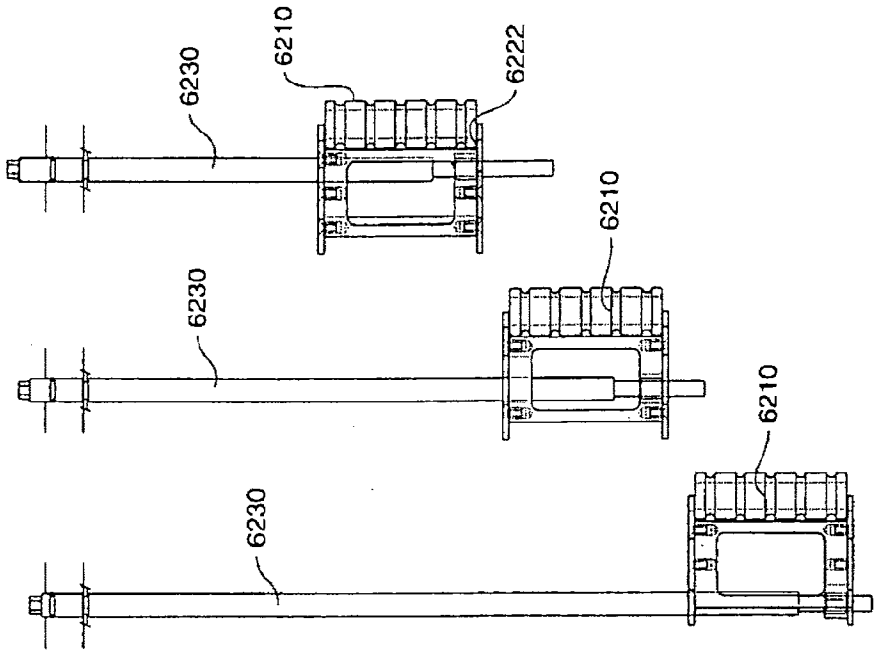
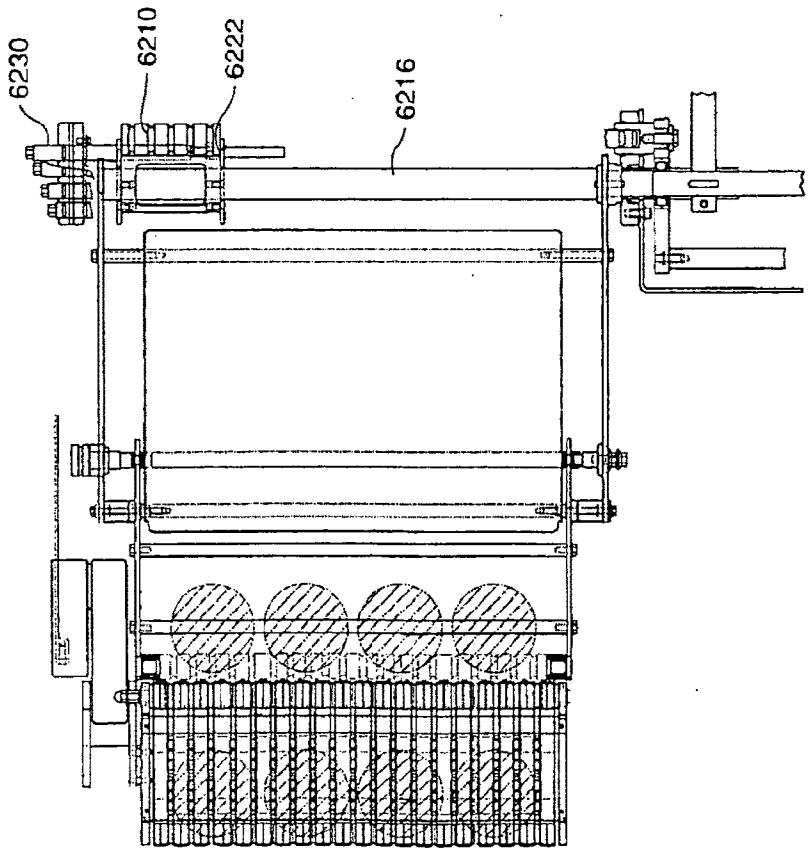


FIG. 82



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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- US 5974925 A **[0003]**
- EP 0713753 A **[0006] [0123]**
- US 99996107 P **[0023]**
- US 61000202 A **[0023]**
- US 11449574 B **[0121]**
- US 45414306 A **[0139]**

T10212PUS

MFP-0031US (T10212PUS – Jr/Ak)

Declaration for Utility Patent Application
37 C.F.R. 1.63

Title of Invention: **HIGH PERFORMANCE SLICING APPARATUS WITH AT LEAST ONE REMOVABLE CONVEYOR BELT UNIT**

As the/a below-named inventor, I hereby declare that:

This declaration is directed to:

__ The attached application, or

_X_ United States application or PCT international application number 14/094,136 filed on December 2, 2013.

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I have reviewed and understand the contents of the application, including the claims.

I am aware of the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in 37 C.F.R. Section 1.56.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

(1) Legal Name of Inventor: **Josef Mayer**

Signature: X _____ Date: X 17.01.2014

PTO/SB/08a (01-10)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	14094136
Filing Date	2013-12-02
First Named Inventor	Joseph Mayer
Art Unit	NYA
Examiner Name	NYA
Attorney Docket Number	MFP-0031US

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Examiner Initial*	Cite No	Patent Number	Kind Code[1]	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	6371283	B1	2002-04-16	Manchester	

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	1	20080073185	A1	2008-03-27	Brayman, et al.	

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	1	102008024314	DE	A1	2009-11-26	Bizerba GmbH & Co KG	English abstract provided	☐
	2	102010001969	DE	A1	2011-08-18	Robert Bosch GmbH	Machine translation of abstract provided	☐
	3	1584580	EP	A1	2005-10-12	R.J. Herbert Engineering Limited		☐

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)		
	Application Number	14094136
	Filing Date	2013-12-02
	First Named Inventor	Joseph Mayer
	Art Unit	NYA
	Examiner Name	NYA
	Attorney Docket Number	MFP-0031US

	4	1816092	EP	A1	2007-08-08	Vanderlande Industries		☐
	5	1877328	EP	B1	2008-11-05	Neolution	English abstract provided	☐
	6	2041315	GB	A	1980-09-10	Cope Whelon & Company		☐
	7	2239108	EP	A2	2010-10-13	Formax, Inc.		☐

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	1	Search Report regarding related Application No. 10 2013 206 510.8; dated November 8, 2013; 5 pgs.	☐
	2	English Translation of German Search Report dated November 8, 2013; DE Pat. App. No. 10 2013 206 510.8; 6 pgs.	☐

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[1] See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. [2] Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). [3] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [4] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [5] Applicant is to place a check mark here if English language translation is attached.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Not for submission under 37 CFR 1.99)

Application Number	14094136
Filing Date	2013-12-02
First Named Inventor	Joseph Mayer
Art Unit	NYA
Examiner Name	NYA
Attorney Docket Number	MFP-0031US

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

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OR

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☐ See attached certification statement.

☐ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Lukas M. Baldridge/	Date (YYYY-MM-DD)	2014-02-26
Name/Print	Lukas M. Baldridge	Registration Number	65,187

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Application Number:	14094136
Filing Date:	02-Dec-2013
Title of Invention:	High Performance Slicing Apparatus With At Least One Removable Conveyor Belt Unit
First Named Inventor/Applicant Name:	Josef Mayer
Filer:	Lukas M Baldridge/Mary Aiello
Attorney Docket Number:	MFP0031US (T10212PUS)

Filed as Large Entity

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Late Filing Fee for Oath or Declaration	1051	1	140	140
PROCESSING FEE, EXCEPT PROV. APPLS.	1830	1	140	140
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**280**

Electronic Acknowledgement Receipt

EFS ID:	18279609
Application Number:	14094136
International Application Number:	
Confirmation Number:	1104
Title of Invention:	High Performance Slicing Apparatus With At Least One Removable Conveyor Belt Unit
First Named Inventor/Applicant Name:	Josef Mayer
Customer Number:	23413
Filer:	Lukas M Baldridge/Mary Aiello
Filer Authorized By:	Lukas M Baldridge
Attorney Docket Number:	MFP0031US (T10212PUS)
Receipt Date:	26-FEB-2014
Filing Date:	02-DEC-2013
Time Stamp:	14:04:04
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$280
RAM confirmation Number	15936
Deposit Account	061130
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Miscellaneous Incoming Letter	71B2009.PDF	51702 68a656e12999cbfda3d327de94e8e87135e17f09	no	1
Warnings:					
Information:					
2	Translation of Foreign Priority Documents	6ZS7212.PDF	155718 5c2f60bbca41cc31a1ed5ba878ea0b2009ac0d5f	no	38
Warnings:					
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3	Specification	71B2135.PDF	253678 bfeafe8347982b8ace20bcf54a752e943b71ff4b	no	27
Warnings:					
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4	Specification	71B2089.PDF	236816 3c4d626221e2cb21068cb862127817c43c0459f5	no	25
Warnings:					
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5		71B2146.PDF	83121 43e2c7abf88483e7758085fae8427116625bbd40	yes	7

Multipart Description/PDF files in .zip description

Document Description	Start	End
Preliminary Amendment	1	1
Claims	2	6
Applicant Arguments/Remarks Made in an Amendment	7	7

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6	Foreign Reference	71D9174.PDF	1063811 298d0d4b047d5b404f386a2105b96789a8c058b8	no	12
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7	Foreign Reference	71D9182.PDF	1070941 27c3a2c45ab8b13f8a56fc93c7156ef737f35d5b	no	11
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Warnings:					
Information:					
9	Foreign Reference	70Z9146.PDF	1433648 5e2315cbcfdf4e199a8d27c400e24ba7b47b80d5	no	32
Warnings:					
Information:					
10	Foreign Reference	70Z9179.PDF	935468 33212565e654f89e17ba08dff16adc5af198f5f1	no	21
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13	Non Patent Literature	70Z9114.PDF	165962 a14c38db8f289d68b8c740a1ac3453e058d41640	no	5
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15	Oath or Declaration filed	70S3178.PDF	29140 573168d02a2383ae2035bc55951985f86074ee96	no	1
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16	Information Disclosure Statement (IDS) Form (SB08)	71D6734.PDF	612665 d010f2a17932d783fcfab4bef58bba0f02c52a4b	no	4
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17	Fee Worksheet (SB06)	fee-info.pdf	32596 2f57e7a1e524e94d4a406eab6b5e89000cca214d	no	2
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National Stage of an International Application under 35 U.S.C. 371

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MFP-0031US

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

INVENTOR: Joseph Mayer	) Group Art Unit: N/A
APPLICANT: Textor Maschinenbau Gmbh	)
SERIAL NUMBER: 14/094,136	) Examiner: N/A
FILED: DECEMBER 2, 2013	) Confirmation No.: 1104
FOR: HIGH PERFORMANCE SLICING APPARATUS WITH AT LEAST ONE REMOVABLE CONVEYOR BELT UNIT	)

Filed via EFS-web
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

SUBMISSION OF ENGLISH TRANSLATION

Enclosed herewith is a Declaration of Translator and English translation that is a true and accurate translation of U.S. application Serial No. 14/094136 as filed in the German language.

Applicants submit herewith the processing fee set forth in 37 CFR 1.17(i). Applicants believe this submission is timely and that no extension of time fees are required. The Commissioner is hereby authorized to charge Deposit Account No. 06-1130 for any fees necessary to advance prosecution of this application.

Respectfully submitted,

CANTOR COLBURN LLP

By: /Lukas M. Baldridge/
Lukas M. Baldridge
Reg. No. 65,187
Cantor Colburn LLP
(248) 524-2300

DECLARATION

I, Jeffrey C. Barfield of Alpenrosenstrasse 3, 82377 Penzberg, Germany, do hereby declare that I am conversant with the English and German languages and that I am a competent translator thereof.

I verify that the attached English translation is a true and accurate translation of US application Serial No. 14/094136 as filed in the German language.

I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Date: January 14, 2014



Jeffrey C. Barfield

HIGH-PERFORMANCE SLICING APPARATUS WITH AT LEAST ONE REMOVABLE CONVEYOR BELT UNIT

The invention relates to a slicing apparatus for food products, in particular to a high-performance slicer, having at least one belt conveyor.

Products in particular have to be supplied to a cutting plane in high-performance slicing apparatus so that the products can be cut into slices. The cut-off slices then furthermore have to be grouped into portions and subsequently transported away from the cutting zone. Actively driven conveyor belts are normally used for this conveying work. They are either belt conveyors or band conveyors having relatively wide, flat belts or bands or strap conveyors having a plurality of relatively narrow individual straps which can in particular have a circular cross-section.

Those conveyors which supply the products to the cutting plane should normally reach up to just before the cutting plane to ensure an ideal traction of the products. These conveyors are therefore often also called traction belts.

Those conveyors which collect the cut slices and group them to form portions of a plurality of slices are usually called portioning belts. At least two conveyors are often used which are arranged after one another to be able directly to start the placing of new slices on the first conveyor again after the transfer of the portion from the first conveyor to the second conveyor. These at least two conveyors arranged after one another will also together be called a "portioning belt" within the framework of the

present disclosure even though a plurality of individual conveyors arranged after one another are provided.

The invention is not restricted to such traction belts or portioning belts. The invention can in principle be realized at any kind of belt conveyor.

In practice, both the supply belts (in particular the traction belts) and the transport-away belts (in particular the portioning belts) are customarily greatly contaminated during the operation of a slicing apparatus. It is therefore necessary to clean these conveyor belts daily, frequently even several times daily. For this purpose, a removal of the belt bands or of the transport straps is normally required to be able to carry out a thorough cleaning.

It is known from the prior art to make possible such a removal in that the conveyors are suspended at one side at an apparatus frame to achieve a simple removal of the belt or band. In this respect, the conveyors remain in the apparatus during the cleaning. The disadvantage of such a procedure is that very huge belt racks are required as the width of the belt conveyor increases. Furthermore, a lot of room is required at the side next to the conveyor to remove the respective conveying means, for example the band, with a conveyor remaining at the apparatus.

Conveyors are furthermore known which can be removed simply including the respective conveying means. However, these conveyors are typically coupled to a drive unit via a coupling or via a coupling unit. This means that a coupling which establishes the connection to a drive motor in operation is seated on the drive roller of the conveyor. However, a very large width results due to such a type of construction since either the drive motor has to be arranged axially beside the drive roller of the

conveyor or it is necessary to arrange a coupling unit with a bearing axially to the drive roller of the conveyor, with this coupling unit then having to be coupled to a drive motor via a further connection, e.g. a toothed belt.

Both variants result in a large width and moreover do not make it possible to connect a plurality of drive to a removable conveyor.

It is the object of the invention to provide an apparatus of the initially named kind which does not have the mentioned disadvantages and which in partiuclar makes a cleaning possible which is as simple as possible with a space-saving and inexpensive manner of construction.

This object is satisfied by the features of claim 1.

In accordance with the invention, the belt conveyor is designed as a removable conveyor belt unit.

Preferred embodiments of the invention are also set forth in the dependent claims, in the description and in the drawings.

In accordance with an embodiment, the conveyor belt unit is arranged before the cutting plane, viewed in the conveying direction, and is in particular configured as a traction belt. In accordance with an alternative embodiment, the conveyor belt unit is arranged behind the cutting plane, viewed in the conveying direction, and is in particular configured as a portioning belt.

The conveyor belt unit can have, viewed in the conveying direction, an effective belt length or conveyor length which amounts to less than 500

mm, in particular less than 300 mm, in particular less than 200 mm, and in particular between 50 mm and 150 mm. The invention makes it possible to realize very short belt conveyors which, for example, only have a length of approximately 100 mm and which in this respect can have a plurality of independent drives. This is in particular of advantage for the design of a removable conveyor belt unit as a portioning unit in which at least one of the conveyors is to have a very short conveying length.

The conveyor belt unit preferably has a base which is arranged beneath the circulating conveyor belts or conveyor straps and with which the conveyor belt unit can be mechanically attached to a substructure of the belt conveyor. The base so-to-say represents the part of a mechanical interface at the conveyor unit side between the conveyor belt unit and the substructure. The substructure which remains in situ on the removal of the conveyor belt unit can be a component only of the respective belt conveyor, can belong to a higher-ranking conveyor path or can be integrated into a slicing apparatus. The substructure preferably has a mount adapted to the base of the conveyor belt unit which so-to-say forms the stationary part of the mechanical interface between the conveyor belt unit and the substructure.

In accordance with an embodiment, at least one direct drive for the conveyor belt unit is provided. Such an embodiment manages with a minimal number of components and is consequently extremely inexpensive. It is furthermore hereby possible to attach a plurality of drives to a single removable conveyor belt unit. Such a multidrive opens up a variety of configuration possibilities. It is thus possible, for example, to realize a multitrack operation in which the individual tracks can be driven and controlled independently from one another. This is particularly advantageous for portioning units. It was previously at least extremely

expensive and difficult, if not practically impossible, to realize multitrack portioning belts since the hygienic and functional accommodation of a plurality of drives could not be satisfactorily effected.

In accordance with a further embodiment of the invention, at least one drive motor is provided for the conveyor belt unit, with the drive motor being directly coupled to the conveyor belt unit. Such a coupling can take place, for example, via a belt connection by which relatively long paths can be overcome between the motor and that point of the conveyor belt unit at which the latter should be driven or via a toothed wheel arrangement, for example via a toothed wheel pair.

Provision can furthermore be made in accordance with the invention that a drive motor for the conveyor belt unit has a drive shaft and the conveyor belt unit has a drive wheel, with the drive shaft and the drive wheel being directly coupled to one another. This allows a particularly simple and inexpensive design which takes up little room without impairing the function and meets high hygienic demands.

Provision is made in a preferred embodiment that the drive motor is arranged beneath the conveyor belt unit. The width of the belt conveyor is hereby not unnecessarily increased. Construction space provided beneath the conveyor can thus be utilized. It is in particular possible to arrange a plurality of drives beside one another or behind one another beneath the conveyor belt unit.

A further embodiment of the invention proposes that the conveyor belt unit has a supported belt roller, with a drive wheel of the conveyor belt unit being supported via the support of the belt roller. The drive of the conveyor belt unit is hereby further simplified and components are saved

in that the support of the belt roller is utilized for the support of the drive wheel.

The drive wheel of the conveyor belt unit is in particular in this respect arranged coaxially to the belt roller and in particular axially beside the band roller. A drive motor cooperating with the drive wheel can thus generally be arranged at any desired point - in particular beneath the conveyor belt unit - which allows a direct coupling to the drive wheel, in particular via a belt connection or via a toothed wheel arrangement. In this respect, it is of particular advantage that it is not necessary to arrange the drive motor or its drive shaft in an axial extension of the belt roller so that an unnecessary widening of the belt conveyor is avoided.

In a particularly preferred embodiment of the invention, a respective relative movement between the drive motor and the conveyor belt unit is provided for cancelling and establishing a coupling between a drive motor for the conveyor belt unit and the conveyor belt unit. This relative movement can be a pivot movement which comprises a purely rotary movement or rotational movement, but can generally also be a more complex movement which is a superposition of a plurality of individual movements.

The drive-wise coupling between the motor and the conveyor unit can thus be cancelled simply by a movement of either the drive motor or of the conveyor belt unit to allow a removal of the conveyor unit.

It is of particular advantage in this concept that the drive motor can remain at the apparatus or at the substructure of the conveying device.

In a preferred embodiment, the spacing between a drive axle of the drive motor and a drive axle of the conveyor belt unit can be varied by the relative movement between the drive motor and the conveyor belt unit. The motor and the conveyor unit are consequently moved relative to one another such that a spacing change is effected between the two drive axles. In particular the spacing between a drive shaft of the drive motor and a drive wheel of the conveyor belt unit can hereby be varied. A drive belt can hereby be relaxed or tautened, for example, or a toothed wheel arrangement can be brought out of engagement or into engagement.

In accordance with an embodiment of the invention, a coupling between a drive for the conveyor belt unit and the conveyor belt unit can be cancelled by relaxing a drive belt and can be established by tautening the drive belt. The relaxing and tautening of the drive belt can in each case take place by a relative movement between the drive and the conveyor belt unit, as already explained above. Such a relative movement is, however, generally not compulsory.

In accordance with a further embodiment of the invention, a mount is provided for the conveyor belt unit which remains at the apparatus when the conveyor belt unit is removed and at which the conveyor belt unit can be latched, with the latched connection being able to be cancelled for removing the conveyor belt unit and being able to be established for installing the conveyor belt unit.

It is possible in a variant of the invention that a coupling between a drive of the conveyor belt unit and the conveyor belt unit can be cancelled or established for removing or for installing the conveyor belt unit simultaneously with a latching of the conveyor belt unit, for example a

latching of the conveyor belt unit at a mount remaining at the apparatus, as mentioned above.

It is hereby in particular possibly only to provide a single work process or actuation process with which the latched connection and the coupling are simultaneously cancelled to be able to remove the conveyor belt unit.

Provision can be made in an alternative variant of the invention that the coupling between a drive for the conveyor belt unit and the conveyor belt unit, on the one hand, and a removal movement or installation movement of the conveyor belt unit, on the other hand, are to be carried out simultaneously for the removal or for the installation of the conveyor belt unit, and indeed after the cancelling or before the establishing of a latched connection of the conveyor belt unit.

In this respect, the removal movement or installation movement of the conveyor belt unit is utilized in order simultaneously to cancel or establish the drive-wise coupling. The cancelling or establishing of the latched connection of the conveyor belt unit is a separate process, in contrast.

An actuation device can be provided for a coupling between a drive for the conveyor belt unit and the conveyor belt unit and/or for a latching of the conveyor belt unit at a mount of the apparatus. It can in this respect in particular be a mechanical actuation device to be actuated manually. This represents a particularly reliable and above all also inexpensive variant.

The actuation device can comprise a lever having a shaft, with a drive for the conveyor belt unit, in particular a linkage carrying a drive for the conveyor belt unit, being pivotable about a pivot axis and/or a latching

member for the conveyor belt unit being movable between a latched position and a release position by rotating the shaft.

When the actuation device is configured simultaneously to cancel or establish the coupling between the drive and the conveyor belt unit, on the one hand, and the latched connection between the conveyor belt unit and the mount, on the other hand, the shaft which can be set into rotation by means of the lever can be configured in this embodiment such that the drive or the linkage carrying the drive is pivoted and the latching member is moved simultaneously. In accordance with a particularly simple practical implementation, the shaft can be eccentric or can comprise an eccentrically configured section.

When a movement of the conveyor belt relative to the drive takes place for cancelling and established a coupling between a drive for the conveyor belt unit and the conveyor belt unit, it is not necessary that the conveyor belt unit as a whole is moved for this purpose. It is also possible that only an assembly or a component of the conveyor belt unit is moved relative to the drive.

In an embodiment, the conveyor belt unit can be designed for a multitrack operation and can in particular be able to be coupled to a plurality of independent drives which are each associated with at least one track.

In accordance with a further embodiment of the invention, the conveyor belt unit can comprise a plurality of individual conveyors which, viewed in the conveying direction, are arranged behind one another, which in particular follow one another directly and with which a respective separate drive is associated. This embodiment is particularly advantageous when the conveyor belt unit is a portioning unit or a portioning belt. At least one

individual conveyor or each individual conveyor can in this respect be configured with one track or for a multitrack operation.

When the conveyor belt unit, which can be removed as a whole, is a portioning belt which comprises two individual conveyors which follow one another and which are each configured with two tracks, a separate drive can be provided for each track of each individual conveyor so that, for example, four drive motors are or can be coupled to the conveyor belt unit which can be operated and controlled independently of one another. The drive motors can, for example, be arranged beneath the conveyor belt unit and can remain at the substructure, in particular at the apparatus, when the conveyor belt unit is removed.

If a plurality of drives are provided for the conveyor belt unit, it is possible in accordance with an embodiment that, viewed in the conveying direction, at least one drive is coupled to the conveyor belt unit at the left hand side and at least one further drive at the right hand side. The drives in this respect preferably each comprise a drive motor, with the drive motors in particular being arranged, viewed transversely to the conveying direction, beside one another beneath the conveyor belt unit with drive shafts facing outwardly to the respective side.

This concept is particularly advantageous for a two-track slicer since each of the two available sides can be used for the drive of the respective track, i.e. one drive for the left hand track and one drive for the right hand track. This concept can nevertheless also be used for slicers having more than two tracks. Optionally, for this purpose, a staggered arrangement of the drive motors can be provided behind one another, viewed in the conveying direction, to associate a separate drive with each track.

If the conveyor belt unit has a plurality of drives, provision can be made that the coupling between the drives and the conveyor belt unit can be simultaneously cancelled and established at least for a plurality of drives and in particular for all drives. This can take place, for example, by means of a throughgoing shaft which only has to be actuated from one side of the conveyor belt unit, but us simultaneously connected to all drive motors, in particular arranged next to one another viewed transversely to the conveying direction.

The conveyor belt unit can, for example, have a conveying width which lies in the range from approximately 300 mm to 700 mm.

At least one continuous belt or continuous band can be provided as conveying means for the conveyor belt unit, with alternatively a plurality of parallel continuous straps being able to serve as conveying means.

A particularly simple handling of the conveyor belt unit results when, in accordance with a further embodiment, the conveyor belt unit can be removed and/or installed without tools.

Provision can be made in a further embodiment of the invention that the conveyor belt unit can first be moved relative to the mount with a component in or against the conveying direction and can subsequently be raised from the mount for the removal and/or for the installation of the conveyor belt unit with a cancelled latched connection between the conveyor belt unit and a mount remaining at the substructure or at the apparatus. The movement of the conveyor belt unit in or against the conveying direction can provide a particularly stable and secure fastening of the conveyor belt unit to the apparatus mount. In addition, such an embodiment is advantageous when the installation situation does not

allow a direct raising or pivoting from the installation position. The conveyor belt unit can then be displaced for the removal before the actual taking out in or against the conveying direction or, on the installation of the conveyor belt unit, such a displacement can be carried out for reaching the final installation position.

Provision can be made in an alternative embodiment that the conveyor belt unit can first be pivoted about one of two supports of the mount and can subsequently be raised from the supports for removing and/or for installing the conveyor belt unit with a cancelled latched connection between the conveyor belt unit and a mount remaining at the substructure or at the apparatus. In this respect, provision can in particular be made that that support which does not serve for the pivoting of the conveyor belt unit is configured for a latching of the conveyor belt unit.

A particularly simple and inexpensive embodiment results when the supports are bar-shaped components. Such an embodiment requires little room, is sufficiently stable and allows, in a construction regard, a simple implementation of the desired pivot movement, on the one hand, and of the cancelling and establishing of the desired latched connection of the conveyor belt unit, on the other hand.

In a further embodiment, a plurality of conveyor belt units can be arranged behind one another and/or beside one another, viewed in the conveying direction. Provision is in particular made in this respect that the conveyor belt units can be removed and/or installed independently of one another.

The invention is consequently not restricted to such apparatus, in particular slicers or conveying devices, in which only a single removable conveyor belt unit is provided.

The invention additionally relates to a conveying device for food products, in particular for food products to be sliced or for sliced food products by means of an apparatus in accordance with any one of the preceding claims, wherein the conveying device comprises at least one belt conveyor which is configured as a removable conveyor belt unit.

Reference is made to the above statements with respect to advantageous further developments of this conveying device. The preferred embodiments of the slicing apparatus disclosed here are herewith also claimed for the conveying device.

The invention will be described in the following by way of example with reference to the drawing. There are shown:

Figs. 1 to 5	different views of a first embodiment of the invention;
Fig. 6	a second embodiment of the invention;
Fig. 7	schematically, a further embodiment of the invention;
Figs. 8 to 10	different views of a further embodiment of the invention;
Figs. 11, 12a, 12b, 13a and 13b	different views of a further embodiment of the invention; and

Figs. 14a and 14b schematic views of a further embodiment of the invention.

The embodiments of conveyor belt units in accordance with the invention described in the following are components of conveying devices or of slicing apparatus for food products.

The shown belt conveyors each comprise a single individual conveyor or two individual conveyors arranged directly behind one another and are designed for a single-track operation or for a multitrack operation. Each belt conveyor comprises a removable conveyor belt unit 13 and a substructure 41 having a mount 11 for the conveyor belt unit 13, wherein the substructure 41 of the conveyor belt unit can be integrated into a slicing apparatus, in particular into a high-performance slicer, or into a conveying device which is a component of a production line and is in this respect in particular associated with a high-performance slicer.

The embodiments described herein differ with respect to different aspects: Figs. 1 to 5 describe a single-track traction conveyor in which the conveyor belt unit 13 is configured as a traction belt. Such a traction conveyor is in particular a component of a product supply of a slicer with which one or more food products to be sliced are supplied to a cutting plane together.

Fig. 7 as well as Figs. 14a and 14b each schematically show a concept variant in which the coupling between the drive 15 and the conveyor belt unit 13 is effected by a removal movement or installation movement of the conveyor belt unit 13. This coupling or decoupling takes place in the other embodiments in contrast simultaneously with the establishing or

cancelling of a latched connection of the conveyor belt unit 13 at the substructure 41.

The embodiment of Figs. 8 to 10 relates to a single-track portioning conveyor in which a single removable conveyor belt unit 13 comprises two individual conveyors, namely a short portioning belt 71 and a long portioning belt 73.

The embodiment of Figs. 11 to 13 shows a two-track traction conveyor having a two-track conveyor belt unit 13.

Fig. 1 shows the single-track traction conveyor belt unit in its installation position at a slicer, not shown, with the conveyor belt unit 13 in the installation situation being attached and latched to a mount 11 which is here configured as a table or plate (cf. Fig. 3).

Fig. 2 shows the conveyor belt unit 13 in the removed state.

Fig. 3 shows the mount 11 after removal of the conveyor belt unit 13. The mount 11 is provided at its upper side with coupling elements 37 which are arranged at the left hand marginal region and at the right hand marginal region, which are of mushroom shape and which serve to be engaged behind by a base 25 (cf. Fig. 3) of the conveyor belt unit 13 which is provided with corresponding cut-outs 59 for this purpose.

Furthermore, a slit 39 is formed in the mount 11 at a side in the region between two coupling elements 37, through which slit a latching member 21 extends from below which serves to cooperate with a slit 23 formed in the base 25 of the conveyor belt unit 13 to latch the conveyor belt unit 13 to the mount 11.

The latching member 21 is a component of a latched connection which moreover inter alia comprises a lever 19 having a spigot 17. This actuation device will be described in more detail in the following in connection with Figs. 4 and 5.

The substructure 41, which includes the mount 11, is furthermore provided with a drive motor for the conveyor belt unit 13 arranged beneath the support 11 and of which only a drive shaft 51 is shown. With an installed conveyor belt unit 13, the drive shaft 51 drives a drive wheel 44 (cf. Fig. 1) of the conveyor belt unit 13 by means of a drive belt 27. The drive wheel 44 is arranged coaxially and laterally beside a belt roller 53 of the conveyor belt unit 13 about which belt roller continuous belts 55 are guided which serve as conveying means and define a product support surface.

In the installed state in accordance with Fig. 1 in which the base 25 of the conveyor belt unit 13 engages behind the coupling elements 37 and is secured by the latched connection 21 and is thus attached to the substructure 41 in a defined operating position, there is consequently a direct drive connection between the drive motor and the conveyor belt unit 13 via the drive belt 27 which runs around the drive shaft 51 of the motor and the drive wheel 44 of the conveyor belt unit 13.

The cooperation between the conveyor belt unit 13 and the substructure 41 is in particular characterized by three processes, namely (i) the movements of the conveyor belt unit 13 required for the removal and for the installation of the conveyor belt unit 13; (ii) the unlatching and the latching of the conveyor belt unit 13; and (iii) the cancelling and the

establishing of the coupling between the drive 15 and the conveyor belt unit 13.

Reference will also be made to Figs. 4 and 5 for this purpose in the following. Fig. 4 shows the conveyor belt unit 13 in the installed state, with the mount plate 11 having been omitted for better illustration to be able to better show the actuation device. Fig. 5 corresponds to the representation in Fig. 4, with the latching member 21 having additionally been omitted here to be able to better show a shaft 29 of the lever 19.

To be able to remove the conveyor belt unit 13 from the substructure 41 and thus from the mount table 11, the base 25 of the conveyor belt unit 13 has to be brought out of engagement with the coupling elements 37, and indeed by a displacement movement against the conveying direction F (cf. Fig. 1).

This removal movement is only possible when previously both the latched state and the coupling state of the drive 15 have been cancelled, i.e. a removal of the conveyor belt unit 13 is only possible after a previous unlatching of the base 25 and relaxation of the belt 27.

These two processes are carried out simultaneously with the aid of the manual actuation device. For this purpose, the lever 19 is first pulled somewhat outwardly via the spigot 17 by a user, whereby a shape-matched engagement (Fig. 1) of the spigot 17 with the mount 11, which prevents an unintentional unlatching, is cancelled. The lever 19 can then be pivoted by 180° clockwise, for instance, by the user. The latching member 21 initially still seated in the slit 23 of the base 25 hereby releases the base 25 and thus the conveyor belt unit 13. In addition, a linkage 35 which is pivotably supported about an axle 33 and is

connected to the drive motor is simultaneously moved counterclockwise by the pivoting of the lever 19, whereby the drive belt 27 can be relaxed and can be removed from the drive wheel 44 of the conveyor belt unit 13.

The pivot movement of the linkage 35 is effected by the concentrically configured shaft 29 of the lever 19 which extends through a cut-out 31 formed in the linkage 35. Consequently, the cut-out 31 of the linkage 35 and the lever shaft 29 in the region of this cut-out 31 are configured such that the shaft 29 so-to-say, in the manner of a crankshaft on rotation due to its eccentricity, pivots the linkage 35 in a defined manner counterclockwise (for relaxing the belt 27) or clockwise (for tautening the belt 27) depending on the direction of rotation.

The pivoting of the lever 19 clockwise therefore has two consequences: On the one hand, an unlatching of the conveyor belt unit 13 takes place; and, on the other hand, a relaxing of the drive belt 27 takes place. Both are necessary to be able to move the conveyor belt unit 13 and thus the base 25 out of engagement with the coupling elements 37 of the mount 11 and then to be able to remove it.

The installation of the conveyor belt unit 13 takes place in reverse order. First, the base 25 of the conveyor belt unit 13 is placed onto the support plate 11 and is then brought into engagement with the coupling elements 37 by a displacement movement in the conveying direction F to engage behind the coupling elements 37 in the region of the cut-outs 59 by means of the base 25. Subsequently, the drive belt 27 is laid around the drive wheel 44 of the conveyor belt unit 13, which is possible in this situation since the drive belt 27 is not yet taut. The lever 19 is thereupon pivoted about approximately 180° counterclockwise back into the starting position in accordance with Figs. 4 and 5. The linkage 35 is hereby pivoted

clockwise, whereby the belt 27 is tautened. At the same time, the hook-shaped free engagement end of the latching member 21 rotationally fixedly connected to the lever shaft 29 is pivoted from below through the slit 23 formed in the base 25 of the conveyor belt unit 13 and is brought into latching engagement with the slit boundary.

The conveyor belt unit 13 is then ready for operation and can be operated in the desired manner by a corresponding control of the drive motor 23.

Reference is also made with respect to this cooperation to the other embodiments also described here (with the exception of the principle explained with reference to Figs. 7 as well as 14a and 14b) which are based on the same basic concept.

The conveyor belt unit 13 shown in the embodiment of Fig. 6 is designed for a two-track operation. The conveyor belt unit 13 is shown here in the removed state and with removed belt conveying bands. Furthermore, a front belt deflection 61 of the conveyor belt unit 13 is shown in a state folded up.

Two belt rollers 53 are arranged axially beside one another and thus lying next to one another on a common axis in the rear drive region of the conveyor belt unit 13. A drive wheel 44, with which a drive motor can be coupled via a drive belt 27, as was likewise described in connection with the embodiment of Figs. 1 to 5, is associated with each belt roller 53 axially outwardly in accordance with the embodiment of Figs. 1 to 5.

In addition, as in the embodiment of Figs. 1 to 5, a base 25 having cut-outs 59 and a slit 23 is arranged at each side of the conveyor belt unit 13 to be able to be latched to a correspondingly configured mount.

The installation situation as well as the removal and the installation of such a two-track conveyor belt unit will be described in more detail in the following in connection with Figs. 11, 12a, 12b, 13a and 13b.

Whereas an actuation device is provided in the embodiments described above with reference to the Figures in order simultaneously to unlatch or latch the conveyor belt unit and to release or tauten the drive belt, provision is made in the embodiment shown schematically in Fig. 7 that, on the removal of the conveyor belt unit 13, an unlatching of a base 25 of the conveyor belt unit 13 first takes place and only then is simultaneously a removal movement of the conveyor belt unit 13 carried out and the drive belt 27 relaxed.

The mount 11 of the substructure here comprises two support bars 65, 67. The base 25 of the conveyor belt unit 13 is pivotably supported about the support bar 65 at the right here or about its center axis defining a pivot axis 63 for the removal or for the installation.

In the installation position shown, the base 25 of the conveyor belt unit 13 lies on both support bars 65, 67, with the front support bar 67 at the left here additionally being configured to latch the base 25 in the installation situation. This will be looked at in more detail in conjunction with the embodiment of Figs. 14a, 14b which is likewise based on the above-explained principle.

The relative arrangement of the drive motor 15 with the drive shaft 51, on the one hand, and the drive wheel 44 as well as the belt roller 53 of the conveyor belt unit 13, on the other hand, corresponds to the previously described embodiments. In the present embodiment of Fig. 7, it is,

however, a movement of the conveyor belt unit 13 itself which provides a reduction of the spacing between the axis of the drive shaft 51 and the axis of the drive wheel 44 and thus provides a relaxation of the belt 27 for removing the conveyor belt unit 13. Unlike the above-described embodiments in which the drive motor 15 together with drive shaft 51 is moved for the relaxation and tautening of the belt, provision is made in the embodiment of Fig. 7 that the motor 15 is arranged in a stationary manner and the spacing change between the stationary drive shaft 51 and the drive wheel 44 is effected by the explained movement of the conveyor belt unit 13.

The embodiment of Figs. 8 to 10 shows the implementation of the invention at a portioning conveyor.

The conveyor belt unit 13 is configured as a portioning belt having two individual conveyors 71, 73 arranged, viewed in the conveying direction, directly behind one another. The portioning belt 71 at the rear, viewed in the conveying direction F, on which the product slices cut off during cutting operation fall for forming portions is designed as very short and shorter by a multiple than the following second portioning belt 73 in which a plurality of continuous round belts extending in parallel are provided as conveying means. The first portioning belt 71 has a plurality of parallel narrow belt bands as conveying means.

The substructure 41 of this portioning conveyor is designed differently than, for example, the substructure 41 of the traction belt described in the embodiment of Figs. 1 to 5. Nevertheless, the unlatching and latching as well as the removal and the installation of the conveyor belt unit 13 at this substructure 41 take place as with the previously described traction belt at least with respect to the basic concept. In Figs. 8 to 10, a corresponding

actuation device is shown having a lever 19 and a throughgoing shaft 29 which carries latching members 21. This will be looked at in more detail in the following.

A special feature of the portioning unit in accordance with Figs. 8 to 10 is that a single conveyor belt unit 13, which can be handled as a whole and can thus be removed and installed as whole, has more than one belt conveyor, with the plurality of belt conveyors 71, 73 - two here - being able to be operated independently of one another since two separate drive motors 15 are arranged at the substructure 41 of this portioning unit which are each associated with one of the portioning belts 71, 73 and can be controlled independently of one another so that the two portioning belts 71, 73 can be operated completely independently of one another.

The two drive motors 15 are integrated in the substructure 41 in a space-saving manner and are thus arranged beneath the conveyor belt unit 13, with the two motors 15 being arranged at the same height, viewed in the conveying direction, and beside one another in the transverse direction and with the drive shafts 51 each facing outwardly.

The two portioning belts 71, 73 each have a belt roller 53 for driving the respective conveying means with which belt roller a respective coaxial drive wheel 44 is associated in accordance with the embodiment of Figs. 1 to 5. The two drive wheels 44 are each directly connected to one of the drive motors 15, and indeed via a drive belt 27 which runs around the respective drive wheel 44 and the respective drive shaft 51.

This portioning unit in accordance with the invention consequently realizes a high degree of functionality with a very simple and extremely compact basic structure.

In the representation of Fig. 9, in particular the two drive motors 15 can be recognized of which the one drives the short portioning belt 71 and the other drives the long portioning belt 73 via a respective drive belt 27. The direct coupling by means of the drive belts 27 makes it possible to drive belt rollers 53 or drive wheels 44 arranged offset in the conveying direction with drive motors 15 or drive shafts 51 located at the same height, viewed in the conveying direction. This concept consequently utilizes the circumstance that the two drive belts 27 can run on the two mutually opposite sides of the portioning unit and thus without mutual interference or influencing.

The two motors 15 are each fastened to a linkage 35 which is pivotably supported about an axle 33. The linkages 35 are each pivotable by means of a common lever shaft 29 which is connected to a lever 19 on a side of the portioning unit. The shaft 29 is configured eccentric in each case in the region of the linkages 35 such that by rotation of the shaft 29 by approximately 180° by means of the lever 19 a pivot movement of both linkages 35 simultaneously is effected such that both belts 27 are relaxed or tautened simultaneously.

Consequently, by a single manual actuation via the lever 19, a user can simultaneously pivot both motors 15 and can thus decouple both portioning belts 71, 73 simultaneously from their respective drives or couple them to their respective drives. A removal or an installation of this portioning conveyor unit is consequently possible in a fast and simple manner.

The enlarged representation of a part of Fig. 9 in Fig. 10 in particular shows the operation of the lever shaft 19 in the region of the left hand

drive motor 15 in Fig. 9. The eccentricity of the shaft 29 in the region of the linkage 35 provides the above-explained pivoting of the motor 15 attached to the linkage 35 on the rotation of the shaft 29. The shaft 29 is furthermore rotationally fixedly connected to two latching members 21 of which only one is shown in Fig. 10. In the installed state shown, the latching member 21 engages through a slit 23 formed in the base 25 of the conveyor belt unit 13 to latch the base 25 and thus the conveyor belt unit 13 to the substructure 41. By rotating the shaft 29 and thus pivoting the latching member 21, this latched connection is cancelled, while simultaneously the belt 27 is relaxed by pivoting the linkage 35.

It can moreover be seen from Figs. 8 to 10 that the drive belts 27 are each designed as toothed belts and the belt wheels 44 each arranged at the end face of the respective belt roller 53 are each provided in the form of a toothed wheel.

With the two-track traction belt in accordance with Figs. 11, 12a, 12b, 13a and 13b (cf. also the above statements on Fig. 6), a drive motor 15 which drives the respective belt roller 53 or the end face drive wheel 44 via a belt 27 is provided for each of the two tracks between which a partition wall 69 is arranged here.

This traction belt unit is consequently designed in a mirror image with respect to a center plane between the two tracks which extends perpendicular to the product support surfaces of the continuous belts 55, with both tracks, however, being formed at a single conveyor belt unit 13 which can be handled as a whole.

The removal and the installation of this conveyor belt unit 13, including the latching to the substructure 41 and the relaxing and tautening of the

drive belts 27 take place as in the embodiment of Figs. 1 to 5, which will be explained in more detail in the following.

Figs. 12a and 13a each show the operating position with a tautened drive belt 27, whereas Figs. 12b and 13b each show a situation in which the drive belts 27 are relaxed and the conveyor belt unit 13 is unlatched, with the base 25 of the conveyor belt unit 13 still being in engagement with the coupling elements 37 of the mount 11.

The comparison of Figs. 12a and 12b in particular shows that the lever 19 has to be pivoted by approximately 180° clockwise to bring the latching member 21 out of engagement with the slit 23 in the base 25 of the conveyor belt unit 13 and to pivot the linkage 35 counterclockwise to relax the belt 27.

Figs. 13a and 13b each show a section perpendicular to the conveying direction through the shaft 29 of the lever 19. In particular the eccentric design of the shaft 29 in the region of the linkage 35 and the cooperation of the shaft 29 with the latching member 21 can be recognized, said latching member being in latching engagement with the base 25 of the conveyor belt unit 13 in the region of the slit 23 in the installation situation in accordance with Fig. 13a and being out of engagement with the base 25 of the conveyor belt unit 13 in the unlatched state in accordance with Fig. 13b.

It can additionally be seen from Figs. 12b and 13b that the belt 27 is relaxed and thus moves out of engagement with the drive wheel 44 or is only laid loosely around the drive wheel 44 by the pivoting of the linkage 35 and thus of the drive shaft 51 of the motor in the direction of the drive wheel 44 of the conveyor belt unit 13 and by the spacing reduction

thereby effected between the drive shaft 51 and the drive wheel 44 so that the belt 27 can easily be taken off the drive wheel 44 and the conveyor belt unit 13 can simply be brought out of engagement with the coupling elements 37 of the mount 11 by displacement and can then be raised.

As already mentioned above in conjunction with Fig. 7, Figs. 14a and 14b schematically show a different removal concept for a conveyor belt unit 13 which can also be configured as a portioning belt or as a traction belt in this concept and which can each be designed either as single track or multitrack.

It is shown purely by way of example in Figs. 14a and 14b how the support bar 67 - at the left here - of the mount 11 or of the substructure 41 can be configured to not only be able to serve as a support for the base 25 of the conveyor belt unit 13, but rather also for latching the conveyor belt unit 13 to the substructure.

For this purpose, the base 25 is provided in the region of a latching section 77 of the support bar 67 with a mount 79 which is shaped in the form of a keyhole and into which the latching section 77 can only move in a rotational position of the support bar 67 corresponding to an unlatched position, as is shown in Fig. 14b.

In the latched position in accordance with Fig. 14a, the latching section 77 located in the mount 79 is oriented such that the latching section 77 cannot move out of the mount 79. The conveyor belt unit 13 is consequently latched and secured in the installation situation or operating position in the state in accordance with Fig. 14a.

To remove the conveyor belt unit 13, the support bar 67 at the left here is first rotated into the position in accordance with Fig. 14b so that the latching section 77 can move out of the mount 79 when the conveyor belt unit 13 is pivoted about the other support bar 65.

This pivoting of the conveyor belt unit 13 effects a spacing reduction between the drive wheel 44 of the conveyor belt unit 13 and the drive shaft 51 of the motor 15, whereby the drive belt 27 is relaxed. The conveyor belt unit 13 pivoted for the purpose of this belt relaxation can then be raised from the support bar 65.

Reference numeral list

11	mount
13	conveyor belt unit
15	drive motor
17	spigot
19	lever
21	latching member, latched connection
23	slit
25	base
27	drive belt
29	lever shaft
31	cut-out of the linkage
33	pivot axle of the linkage
35	linkage
37	coupling element of the mount
39	slit
41	substructure
44	drive wheel, belt wheel
51	drive shaft of the drive motor
53	belt roller of the conveyor belt unit
55	continuous belt, continuous band
57	continuous strap, round strap
59	cut-out of the base of the conveyor belt unit
61	belt deflection
63	pivot axle of the support bar
65	support bar
67	support bar
69	partition wall
71	first conveyor, short portioning belt
73	second conveyor, long portioning belt
77	latching section
79	mount
F	conveying direction

Claims

1. A slicing apparatus for food products, in particular a high-performance slicer, having at least one belt conveyor which is designed as a removable conveyor belt unit (13).

2. An apparatus in accordance with claim 1, characterized in that the conveyor belt unit (13) is arranged in front of the cutting plane, viewed in the conveying direction, and is in particular formed as a traction belt.

3. An apparatus in accordance with claim 1, characterized in that the conveyor belt unit (13) is arranged behind the cutting plane, viewed in the conveying direction, and is in particular formed as a portioning belt.

4. An apparatus in accordance with any one of the preceding claims, characterized in that the conveyor belt unit (13) has, viewed in the conveying direction, a belt length or conveyor length which amounts to less than 500 mm, in particular less than 300 mm, in particular less than 200 mm, and in particular between 50 mm and 150 mm.

5. An apparatus in accordance with any one of the preceding claims, characterized in that
at least one direct drive (15) for the conveyor belt unit (13) is provided.

6. An apparatus in accordance with any one of the preceding claims, characterized in that
at least one drive motor (15) for the conveyor belt unit (13) is provided, with the drive motor (15) being directly coupled with the conveyor belt unit (13), in particular via a belt connection or via a toothed wheel arrangement, preferably a toothed wheel pair.

7. An apparatus in accordance with any one of the preceding claims, characterized in that
a drive motor (15) for the conveyor belt unit (13) has a drive shaft (51) and the conveyor belt unit (13) has a drive wheel (44), with the drive shaft (51) and the drive wheel (44) being directly coupled to one another.

8. An apparatus in accordance with claim 6 or claim 7, characterized in that
the drive motor (15) is arranged beneath the conveyor belt unit (13).

9. An apparatus in accordance with any one of the preceding claims, characterized in that
the conveyor belt unit (13) has a supported belt roller (53), with a drive wheel (44) of the conveyor belt unit (13) being supported via the support of the belt roller (53).

10. An apparatus in accordance with claim 9,
characterized in that
the drive wheel (44) is arranged coaxially to the belt roller (53) and in partiuclar axially beside the belt roller (53).

11. An apparatus in accordance with any one of the preceding claims,
characterized in that
a respective relative movement is provided between the drive motor (15) and the conveyor belt unit (13), in particular a pivot movement, for cancelling and establishing a coupling between a drive motor (15) for the conveyor belt unit (13) and the conveyor belt unit (13).

12. An apparatus in accordance with claim 11,
characterized in that
the spacing between a drive axle, preferably a drive shaft (51), of the drive motor (15) and a drive axle, preferably a drive wheel (44), of the conveyor belt unit (13) can be varied by the relative movement.

13. An apparatus in accordance with any one of the preceding claims,
characterized in that
a coupling between a drive (15) for the conveyor belt unit (13) and the conveyor belt unit (13) can be cancelled by relaxing a drive belt (27) and can be established by tautening the drive belt (27), with the relaxing and tautening of the drive belt (27) each being provided by a relative movement between the drive (15) and the conveyor belt unit (13).

14. An apparatus in accordance with any one of the preceding claims,
characterized in that

a mount (11) is provided for the conveyor belt unit (13) which remains at the apparatus with a removed conveyor belt unit (13) and at which the conveyor belt unit (13) can be latched, with the latched connection being able to be cancelled for removing the conveyor belt unit (13) and being able to be established for installing the conveyor belt unit (13).

15. An apparatus in accordance with any one of the preceding claims, characterized in that
a coupling between a drive (15) for the conveyor belt unit (13) and the conveyor belt unit (13) can be cancelled or established simultaneously with a latching of the conveyor belt unit (13) for removing or installing the conveyor belt unit (13).

16. An apparatus in accordance with any one of the claims 1 to 14, characterized in that
the coupling between a drive (15) for the conveyor belt unit (13) and the conveyor belt unit (13) can be carried out simultaneously with a removal movement or installation movement of the conveyor belt unit (13) after the cancelling or before the establishing of a latched connection of the conveyor belt unit (13) for removing or for installing the conveyor belt unit (13).

17. An apparatus in accordance with any one of the preceding claims, characterized in that
an actuation device (19), in particular a mechanical actuation device (19) to be actuated manually, is provided for a coupling between a drive (15) for the conveyor belt unit (13) and the conveyor belt unit (13) and/or for a latching of the conveyor belt unit (13) to a mount (11).

18. An apparatus in accordance with any one of the preceding claims, characterized in that
an actuation device (19) is provided with which a coupling can be simultaneously cancelled and established between a drive (15) for the conveyor belt unit (13) and the conveyor belt unit (13), on the one hand, and a latching of the conveyor belt unit (13) to a mount (11) of the apparatus, on the other hand.

19. An apparatus in accordance with claim 17 or claim 18, characterized in that
the actuation device comprises a lever (19) having a shaft (29), in particular an eccentric shaft, with a linkage (35) carrying a drive (15) for the conveyor belt unit (13) being pivotable about a pivot axis (33) by rotating the shaft (29) and/or with a latching member (21) for the conveyor belt unit (13) being movable between a latched position (21) and a release position.

20. An apparatus in accordance with any one of the preceding claims, characterized in that
the conveyor belt unit (13) or an assembly or a component of the conveyor belt unit (13) is movable, in particular by folding over or pivoting, relative to the drive (15) for cancelling and establishing a coupling between a drive (15) for the conveyor belt unit (13) and the conveyor belt unit (13).

21. An apparatus in accordance with any one of the preceding claims, characterized in that

the conveyor belt unit (13) is designed for a multitrack operation and can in particular be coupled to a plurality of independent drives (15) which are each associated with at least one track.

22. An apparatus in accordance with any one of the preceding claims, characterized in that
the conveyor belt unit (13), in particular configured as a portioning belt, comprises a plurality of individual conveyors (71, 73) which are arranged, viewed in the conveying direction, behind one another, in particular directly following one another, and with which a separate drive (15) is associated.

23. An apparatus in accordance with claim 21 or claim 22, characterized in that,
viewed in the conveying direction, at least one drive (15) is coupled to the conveyor belt unit (13) at the left side and at least one further drive (15) at the right side, with in particular the drives each comprising a drive motor (15) and with the drive motors (15) preferably being arranged, viewed transversely to the conveying direction, next to one another beneath the conveyor belt unit (13) with drive shafts (51) facing outwardly to the respective side.

24. An apparatus in accordance with any one of the claims 21 to 23, characterized in that
the coupling between the drives (15) and the conveyor belt unit (13) can be simultaneously cancelled and established at least for a plurality of drives (15), in particular for all drives (15).

25. An apparatus in accordance with any one of the preceding claims, characterized in that

the conveyor belt unit (13) has a conveying width in the range from approximately 300 mm to 700 mm.

26. An apparatus in accordance with any one of the preceding claims, characterized in that
at least one continuous belt or continuous band (55) or a plurality of parallel continuous straps (57) is/are provided as conveying means of the conveyor belt unit (13).

27. An apparatus in accordance with any one of the preceding claims, characterized in that
the conveyor belt unit (13) can be removed and/or installed without tools.

28. An apparatus in accordance with any one of the preceding claims, characterized in that
the conveyor belt unit (13) can first be moved with a component in or against the conveying direction relative to the mount (11) and can subsequently be raised from the mount (11) for removing and/or for installing the conveyor belt unit (13) with a cancelled latched connection between the conveyor belt unit (13) and a mount (11) remaining at the apparatus.

29. An apparatus in accordance with any one of the claims 1 to 27, characterized in that
the conveyor belt unit (13) can first be pivoted about the one of two supports (65, 67), in particular bar-shaped supports, of the mount (11), and can subsequently be raised from the supports (65, 67) for removing and/or for installing the conveyor belt unit (13) with a cancelled latched connection between the conveyor belt unit (13)

and a mount (11) remaining at the apparatus, with the other one of the supports (65, 67) in particular being configured for latching the conveyor belt unit (13).

30. An apparatus in accordance with any one of the preceding claims, characterized in that
a plurality of conveyor belt units (13) are arranged behind one another and/or beside one another, viewed in the conveying direction, with the conveyor belt units (13) in particular being able to be removed and/or installed independently of one another.

31. A conveying device for food products to be sliced or for sliced food products which comprises at least one belt conveyor which is designed as a removable conveyor belt unit (13).

32. A conveying device in accordance with claim 31, having the characterizing features of at least one of the claims 1 to 30.

Abstract

The invention relates to a slicing apparatus for food products, in particular to a high-performance slicer, having at least one belt conveyor which is configured as a removable conveyor belt unit.

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HIGH-PERFORMANCE SLICING APPARATUS WITH AT LEAST ONE REMOVABLE CONVEYOR BELT UNIT

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This patent application claims priority to German Patent Application Serial No. 102012222042.9, filed December 3, 2012 and German Patent Application Serial No. 102013206510.8, filed April 12, 2013, which are incorporated herein by reference in their entirety.

FIELD OF THE INVENTION

[0002] The invention relates to a slicing apparatus for food products, in particular to a high-performance slicer, having at least one belt conveyor.

BACKGROUND

[0003] Products in particular have to be supplied to a cutting plane in high-performance slicing apparatus so that the products can be cut into slices. The cut-off slices then furthermore have to be grouped into portions and subsequently transported away from the cutting zone. Actively driven conveyor belts are normally used for this conveying work. They are either belt conveyors or band conveyors having relatively wide, flat belts or bands or strap conveyors having a plurality of relatively narrow individual straps which can in particular have a circular cross-section.

[0004] Those conveyors which supply the products to the cutting plane should normally reach up to just before the cutting plane to ensure an ideal traction of the products. These conveyors are therefore often also called traction belts.

[0005] Those conveyors which collect the cut slices and group them to form portions of a plurality of slices are usually called portioning belts. At least two conveyors are often used which are arranged after one another to be able directly to start the placing of new slices on the first conveyor again after the transfer of the portion from the first conveyor to the second conveyor. These at least two conveyors arranged after one another will also together be called a "portioning belt" within the framework of the present disclosure even though a plurality of individual conveyors arranged after one another are provided.

[0006] The invention is not restricted to such traction belts or portioning belts. The invention can in principle be realized at any kind of belt conveyor.

[0007] In practice, both the supply belts (in particular the traction belts) and the transport-away belts (in particular the portioning belts) are customarily greatly contaminated during the operation of a slicing apparatus. It is therefore necessary to clean these conveyor belts daily, frequently even several times daily. For this purpose, a removal of the belt bands or of the transport straps is normally required to be able to carry out a thorough cleaning.

[0008] It is known from the prior art to make possible such a removal in that the conveyors are suspended at one side at an apparatus frame to achieve a simple removal of the belt or band. In this respect, the conveyors remain in the apparatus during the cleaning. The disadvantage of such a procedure is that very huge belt racks are required as the width of the belt conveyor increases. Furthermore, a lot of room is required at the side next to the conveyor to remove the respective conveying means, for example the band, with a conveyor remaining at the apparatus.

[0009] Conveyors are furthermore known which can be removed simply including the respective conveying means. However, these conveyors are typically coupled to a drive unit via a coupling or via a coupling unit. This means that a coupling which establishes the connection to a drive motor in operation is seated on the drive roller of the conveyor.

However, a very large width results due to such a type of construction since either the drive motor has to be arranged axially beside the drive roller of the conveyor or it is necessary to arrange a coupling unit with a bearing axially to the drive roller of the conveyor, with this coupling unit then having to be coupled to a drive motor via a further connection, e.g. a toothed belt.

[0010] Both variants result in a large width and moreover do not make it possible to connect a plurality of drive to a removable conveyor.

SUMMARY OF THE INVENTION

[0011] It is ~~the object~~ a feature of the invention to provide an apparatus of the initially named kind which does not have the mentioned disadvantages and which in partiuclar makes a cleaning possible which is as simple as possible with a space-saving and inexpensive manner of construction.

~~This object is satisfied by the features of claim 1.~~

[0012] In accordance with an embodiment of the invention, the belt conveyor is designed as a removable conveyor belt unit.

[0013] ~~Preferred embodiments~~ Embodiments of the invention are also set forth in the dependent claims, in the description and in the drawings.

[0014] In accordance with an embodiment, the conveyor belt unit is arranged before the cutting plane, viewed in the conveying direction, and is in particular configured as a traction belt. In accordance with an alternative embodiment, the conveyor belt unit is arranged behind the cutting plane, viewed in the conveying direction, and is in particular configured as a portioning belt.

[0015] The conveyor belt unit can have, viewed in the conveying direction, an effective belt length or conveyor length which amounts to less than 500 mm, in particular less than 300 mm, in particular less than 200 mm, and in particular between 50 mm and 150 mm. The invention makes it possible to realize very short belt conveyors which, for example, only have a length of approximately 100 mm and which in this respect can have a plurality of independent drives. This is in particular of advantage for the design of a removable conveyor belt unit as a portioning unit in which at least one of the conveyors is to have a very short conveying length.

[0016] The conveyor belt unit ~~preferably has~~ may include a base which is arranged beneath the circulating conveyor belts or conveyor straps and with which the conveyor belt unit can be mechanically attached to a substructure of the belt conveyor. The base so-to-say represents the part of a mechanical interface at the conveyor unit side between the conveyor belt unit and the substructure. The substructure which remains in situ on the removal of the conveyor belt unit can be a component only of the respective belt conveyor, can belong to a higher-ranking conveyor path or can be integrated into a slicing apparatus. The substructure ~~preferably has~~ may include a mount adapted to the base of the conveyor belt unit which so-to-say forms the stationary part of the mechanical interface between the conveyor belt unit and the substructure.

[0017] In accordance with an embodiment, at least one direct drive for the conveyor belt unit is provided. Such an embodiment manages with a minimal number of components and is consequently extremely inexpensive. It is furthermore hereby possible to attach a plurality of drives to a single removable conveyor belt unit. Such a multidrive opens up a variety of configuration possibilities. It is thus possible, for example, to realize a multitrack operation in which the individual tracks can be driven and controlled independently from one another. This is particularly advantageous for portioning units. It was previously at least extremely expensive and difficult, if not practically impossible, to realize multitrack portioning belts since the hygienic and functional accommodation of a plurality of drives could not be satisfactorily effected.

[0018] In accordance with a further embodiment of the invention, at least one drive motor is provided for the conveyor belt unit, with the drive motor being directly coupled to the conveyor belt unit. Such a coupling can take place, for example, via a belt connection by which relatively long paths can be overcome between the motor and that point of the conveyor belt unit at which the latter should be driven or via a toothed wheel arrangement, for example via a toothed wheel pair.

[0019] Provision can furthermore be made in accordance with an embodiment of the invention that a drive motor for the conveyor belt unit has a drive shaft and the conveyor belt unit has a drive wheel, with the drive shaft and the drive wheel being directly coupled to one another. This allows a particularly simple and inexpensive design which takes up little room without impairing the function and meets high hygienic demands.

[0020] Provision is made in ~~a preferred~~ an embodiment that the drive motor is arranged beneath the conveyor belt unit. The width of the belt conveyor is hereby not unnecessarily increased. Construction space provided beneath the conveyor can thus be utilized. It is in particular possible to arrange a plurality of drives beside one another or behind one another beneath the conveyor belt unit.

[0021] A further embodiment of the invention proposes that the conveyor belt unit has a supported belt roller, with a drive wheel of the conveyor belt unit being supported via the support of the belt roller. The drive of the conveyor belt unit is hereby further simplified and components are saved in that the support of the belt roller is utilized for the support of the drive wheel.

[0022] The drive wheel of the conveyor belt unit is in particular in this respect arranged coaxially to the belt roller and in particular axially beside the band roller. A drive motor cooperating with the drive wheel can thus generally be arranged at any desired point - in particular beneath the conveyor belt unit - which allows a direct coupling to the drive

wheel, in particular via a belt connection or via a toothed wheel arrangement. In this respect, it is of particular advantage that it is not necessary to arrange the drive motor or its drive shaft in an axial extension of the belt roller so that an unnecessary widening of the belt conveyor is avoided.

[0023] In ~~a particularly preferred~~ one embodiment of the invention, a respective relative movement between the drive motor and the conveyor belt unit is provided for cancelling and establishing a coupling between a drive motor for the conveyor belt unit and the conveyor belt unit. This relative movement can be a pivot movement which comprises a purely rotary movement or rotational movement, but can generally also be a more complex movement which is a superposition of a plurality of individual movements.

[0024] The drive-wise coupling between the motor and the conveyor unit can thus be cancelled simply by a movement of either the drive motor or of the conveyor belt unit to allow a removal of the conveyor unit.

[0025] It is of particular advantage in this concept that the drive motor can remain at the apparatus or at the substructure of the conveying device.

[0026] In ~~a preferred~~ one embodiment, the spacing between a drive axle of the drive motor and a drive axle of the conveyor belt unit can be varied by the relative movement between the drive motor and the conveyor belt unit. The motor and the conveyor unit are consequently moved relative to one another such that a spacing change is effected between the two drive axles. In particular the spacing between a drive shaft of the drive motor and a drive wheel of the conveyor belt unit can hereby be varied. A drive belt can hereby be relaxed or tautened, for example, or a toothed wheel arrangement can be brought out of engagement or into engagement.

[0027] In accordance with an embodiment of the invention, a coupling between a drive for the conveyor belt unit and the conveyor belt unit can be cancelled by relaxing a drive belt

and can be established by tautening the drive belt. The relaxing and tautening of the drive belt can in each case take place by a relative movement between the drive and the conveyor belt unit, as already explained above. Such a relative movement is, however, generally not compulsory.

[0028] In accordance with a further embodiment of the invention, a mount is provided for the conveyor belt unit which remains at the apparatus when the conveyor belt unit is removed and at which the conveyor belt unit can be latched, with the latched connection being able to be cancelled for removing the conveyor belt unit and being able to be established for installing the conveyor belt unit.

[0029] It is possible in a variant of the invention that a coupling between a drive of the conveyor belt unit and the conveyor belt unit can be cancelled or established for removing or for installing the conveyor belt unit simultaneously with a latching of the conveyor belt unit, for example a latching of the conveyor belt unit at a mount remaining at the apparatus, as mentioned above.

[0030] It is hereby in particular possibly only to provide a single work process or actuation process with which the latched connection and the coupling are simultaneously cancelled to be able to remove the conveyor belt unit.

[0031] Provision can be made in an alternative variant of the invention that the coupling between a drive for the conveyor belt unit and the conveyor belt unit, on the one hand, and a removal movement or installation movement of the conveyor belt unit, on the other hand, are to be carried out simultaneously for the removal or for the installation of the conveyor belt unit, and indeed after the cancelling or before the establishing of a latched connection of the conveyor belt unit.

[0032] In this respect, the removal movement or installation movement of the conveyor belt unit is utilized in order simultaneously to cancel or establish the drive-wise coupling.

The cancelling or establishing of the latched connection of the conveyor belt unit is a separate process, in contrast.

[0033] An actuation device can be provided for a coupling between a drive for the conveyor belt unit and the conveyor belt unit and/or for a latching of the conveyor belt unit at a mount of the apparatus. It can in this respect in particular be a mechanical actuation device to be actuated manually. This represents a particularly reliable and above all also inexpensive variant.

[0034] The actuation device can comprise a lever having a shaft, with a drive for the conveyor belt unit, in particular a linkage carrying a drive for the conveyor belt unit, being pivotable about a pivot axis and/or a latching member for the conveyor belt unit being movable between a latched position and a release position by rotating the shaft.

[0035] When the actuation device is configured simultaneously to cancel or establish the coupling between the drive and the conveyor belt unit, on the one hand, and the latched connection between the conveyor belt unit and the mount, on the other hand, the shaft which can be set into rotation by means of the lever can be configured in this embodiment such that the drive or the linkage carrying the drive is pivoted and the latching member is moved simultaneously. In accordance with a particularly simple practical implementation, the shaft can be eccentric or can comprise an eccentrically configured section.

[0036] When a movement of the conveyor belt relative to the drive takes place for cancelling and established a coupling between a drive for the conveyor belt unit and the conveyor belt unit, it is not necessary that the conveyor belt unit as a whole is moved for this purpose. It is also possible that only an assembly or a component of the conveyor belt unit is moved relative to the drive.

[0037] In an embodiment, the conveyor belt unit can be designed for a multitrack operation and can in particular be able to be coupled to a plurality of independent drives which are each associated with at least one track.

[0038] In accordance with a further embodiment of the invention, the conveyor belt unit can comprise a plurality of individual conveyors which, viewed in the conveying direction, are arranged behind one another, which in particular follow one another directly and with which a respective separate drive is associated. This embodiment is particularly advantageous when the conveyor belt unit is a portioning unit or a portioning belt. At least one individual conveyor or each individual conveyor can in this respect be configured with one track or for a multitrack operation.

[0039] When the conveyor belt unit, which can be removed as a whole, is a portioning belt which comprises two individual conveyors which follow one another and which are each configured with two tracks, a separate drive can be provided for each track of each individual conveyor so that, for example, four drive motors are or can be coupled to the conveyor belt unit which can be operated and controlled independently of one another. The drive motors can, for example, be arranged beneath the conveyor belt unit and can remain at the substructure, in particular at the apparatus, when the conveyor belt unit is removed.

[0040] If a plurality of drives are provided for the conveyor belt unit, it is possible in accordance with an embodiment that, viewed in the conveying direction, at least one drive is coupled to the conveyor belt unit at the left hand side and at least one further drive at the right hand side. The drives in this respect ~~preferably~~ may each comprise a drive motor, with the drive motors in particular being arranged, viewed transversely to the conveying direction, beside one another beneath the conveyor belt unit with drive shafts facing outwardly to the respective side.

[0041] This concept is particularly advantageous for a two-track slicer since each of the two available sides can be used for the drive of the respective track, i.e. one drive for the

left hand track and one drive for the right hand track. This concept can nevertheless also be used for slicers having more than two tracks. Optionally, for this purpose, a staggered arrangement of the drive motors can be provided behind one another, viewed in the conveying direction, to associate a separate drive with each track.

[0042] If the conveyor belt unit has a plurality of drives, provision can be made that the coupling between the drives and the conveyor belt unit can be simultaneously cancelled and established at least for a plurality of drives and in particular for all drives. This can take place, for example, by means of a throughgoing shaft which only has to be actuated from one side of the conveyor belt unit, but us simultaneously connected to all drive motors, in particular arranged next to one another viewed transversely to the conveying direction.

[0043] The conveyor belt unit can, for example, have a conveying width which lies in the range from approximately 300 mm to 700 mm.

[0044] At least one continuous belt or continuous band can be provided as conveying means for the conveyor belt unit, with alternatively a plurality of parallel continuous straps being able to serve as conveying means.

[0045] A particularly simple handling of the conveyor belt unit results when, in accordance with a further embodiment, the conveyor belt unit can be removed and/or installed without tools.

[0046] Provision can be made in a further embodiment of the invention that the conveyor belt unit can first be moved relative to the mount with a component in or against the conveying direction and can subsequently be raised from the mount for the removal and/or for the installation of the conveyor belt unit with a cancelled latched connection between the conveyor belt unit and a mount remaining at the substructure or at the apparatus. The movement of the conveyor belt unit in or against the conveying direction can provide a

particularly stable and secure fastening of the conveyor belt unit to the apparatus mount. In addition, such an embodiment is advantageous when the installation situation does not allow a direct raising or pivoting from the installation position. The conveyor belt unit can then be displaced for the removal before the actual taking out in or against the conveying direction or, on the installation of the conveyor belt unit, such a displacement can be carried out for reaching the final installation position.

[0047] Provision can be made in an alternative embodiment that the conveyor belt unit can first be pivoted about one of two supports of the mount and can subsequently be raised from the supports for removing and/or for installing the conveyor belt unit with a cancelled latched connection between the conveyor belt unit and a mount remaining at the substructure or at the apparatus. In this respect, provision can in particular be made that that support which does not serve for the pivoting of the conveyor belt unit is configured for a latching of the conveyor belt unit.

[0048] A particularly simple and inexpensive embodiment results when the supports are bar-shaped components. Such an embodiment requires little room, is sufficiently stable and allows, in a construction regard, a simple implementation of the desired pivot movement, on the one hand, and of the cancelling and establishing of the desired latched connection of the conveyor belt unit, on the other hand.

[0049] In a further embodiment, a plurality of conveyor belt units can be arranged behind one another and/or beside one another, viewed in the conveying direction. Provision is in particular made in this respect that the conveyor belt units can be removed and/or installed independently of one another.

[0050] The invention is consequently not restricted to such apparatus, in particular slicers or conveying devices, in which only a single removable conveyor belt unit is provided.

[0051] The invention additionally relates to a conveying device for food products, in particular for food products to be sliced or for sliced food products by means of an apparatus in accordance with any one of the preceding claims, wherein the conveying device comprises at least one belt conveyor which is configured as a removable conveyor belt unit.

[0052] Reference is made to the above statements with respect to advantageous further developments of this conveying device. The ~~preferred~~ embodiments of the slicing apparatus disclosed here are herewith also claimed for the conveying device.

BRIEF DESCRIPTION OF THE DRAWINGS

[0053] The invention will be described in the following by way of example with reference to the drawing. There are shown:

[0054] Figs. 1 to 5 illustrate different views of a first embodiment of the invention;

[0054] Fig. 6 illustrates a second embodiment of the invention;

[0055] Fig. 7 schematically[[,]] illustrates a further embodiment of the invention;

[0056] Figs. 8 to 10 illustrate different views of a further embodiment of the invention;

[0057] Figs. 11, 12a, 12b, 13a and 13b illustrate different views of a further embodiment of the invention; and

[0058] Figs. 14a and 14b illustrate schematic views of a further embodiment of the invention.

DESCRIPTION OF THE EMBODIMENTS

[0059] The embodiments of conveyor belt units in accordance with the invention described in the following are components of conveying devices or of slicing apparatus for food products.

[0060] The shown belt conveyors each comprise a single individual conveyor or two individual conveyors arranged directly behind one another and are designed for a single-track operation or for a multitrack operation. Each belt conveyor comprises a removable conveyor belt unit 13 and a substructure 41 having a mount 11 for the conveyor belt unit 13, wherein the substructure 41 of the conveyor belt unit can be integrated into a slicing apparatus, in particular into a high-performance slicer, or into a conveying device which is a component of a production line and is in this respect in particular associated with a high-performance slicer.

[0061] The embodiments described herein differ with respect to different aspects: Figs. 1 to 5 describe a single-track traction conveyor in which the conveyor belt unit 13 is configured as a traction belt. Such a traction conveyor is in particular a component of a product supply of a slicer with which one or more food products to be sliced are supplied to a cutting plane together.

[0062] Fig. 7 as well as Figs. 14a and 14b each schematically show a concept variant in which the coupling between the drive 15 and the conveyor belt unit 13 is effected by a removal movement or installation movement of the conveyor belt unit 13. This coupling or decoupling takes place in the other embodiments in contrast simultaneously with the establishing or cancelling of a latched connection of the conveyor belt unit 13 at the substructure 41.

[0058] The embodiment of Figs. 8 to 10 relates to a single-track portioning conveyor in which a single removable conveyor belt unit 13 comprises two individual conveyors, namely a short portioning belt 71 and a long portioning belt 73.

[0063] The embodiment of Figs. 11 to 13 shows a two-track traction conveyor having a two-track conveyor belt unit 13.

[0064] Fig. 1 shows the single-track traction conveyor belt unit in its installation position at a slicer, not shown, with the conveyor belt unit 13 in the installation situation being attached and latched to a mount 11 which is here configured as a table or plate (cf. Fig. 3).

[0065] Fig. 2 shows the conveyor belt unit 13 in the removed state.

[0066] Fig. 3 shows the mount 11 after removal of the conveyor belt unit 13. The mount 11 is provided at its upper side with coupling elements 37 which are arranged at the left hand marginal region and at the right hand marginal region, which are of mushroom shape and which serve to be engaged behind by a base 25 (cf. Fig. 3) of the conveyor belt unit 13 which is provided with corresponding cut-outs 59 for this purpose.

[0067] Furthermore, a slit 39 is formed in the mount 11 at a side in the region between two coupling elements 37, through which slit a latching member 21 extends from below which serves to cooperate with a slit 23 formed in the base 25 of the conveyor belt unit 13 to latch the conveyor belt unit 13 to the mount 11.

[0068] The latching member 21 is a component of a latched connection which moreover inter alia comprises a lever 19 having a spigot 17. This actuation device will be described in more detail in the following in connection with Figs. 4 and 5.

[0069] The substructure 41, which includes the mount 11, is furthermore provided with a drive motor for the conveyor belt unit 13 arranged beneath the support 11 and of which only a drive shaft 51 is shown. With an installed conveyor belt unit 13, the drive shaft 51 drives a drive wheel 44 (cf. Fig. 1) of the conveyor belt unit 13 by means of a drive belt 27. The drive wheel 44 is arranged coaxially and laterally beside a belt roller 53 of the

conveyor belt unit 13 about which belt roller continuous belts 55 are guided which serve as conveying means and define a product support surface.

[0070] In the installed state in accordance with Fig. 1 in which the base 25 of the conveyor belt unit 13 engages behind the coupling elements 37 and is secured by the latched connection 21 and is thus attached to the substructure 41 in a defined operating position, there is consequently a direct drive connection between the drive motor and the conveyor belt unit 13 via the drive belt 27 which runs around the drive shaft 51 of the motor and the drive wheel 44 of the conveyor belt unit 13.

[0071 The cooperation between the conveyor belt unit 13 and the substructure 41 is in particular characterized by three processes, namely (i) the movements of the conveyor belt unit 13 required for the removal and for the installation of the conveyor belt unit 13; (ii) the unlatching and the latching of the conveyor belt unit 13; and (iii) the cancelling and the establishing of the coupling between the drive 15 and the conveyor belt unit 13.

[0072] Reference will also be made to Figs. 4 and 5 for this purpose in the following. Fig. 4 shows the conveyor belt unit 13 in the installed state, with the mount plate 11 having been omitted for better illustration to be able to better show the actuation device. Fig. 5 corresponds to the representation in Fig. 4, with the latching member 21 having additionally been omitted here to be able to better show a shaft 29 of the lever 19.

[0073] To be able to remove the conveyor belt unit 13 from the substructure 41 and thus from the mount table 11, the base 25 of the conveyor belt unit 13 has to be brought out of engagement with the coupling elements 37, and indeed by a displacement movement against the conveying direction F (cf. Fig. 1).

[0074] This removal movement is only possible when previously both the latched state and the coupling state of the drive 15 have been cancelled, i.e. a removal of the conveyor

belt unit 13 is only possible after a previous unlatching of the base 25 and relaxation of the belt 27.

[0075] These two processes are carried out simultaneously with the aid of the manual actuation device. For this purpose, the lever 19 is first pulled somewhat outwardly via the spigot 17 by a user, whereby a shape-matched engagement (Fig. 1) of the spigot 17 with the mount 11, which prevents an unintentional unlatching, is cancelled. The lever 19 can then be pivoted by 180° clockwise, for instance, by the user. The latching member 21 initially still seated in the slit 23 of the base 25 hereby releases the base 25 and thus the conveyor belt unit 13. In addition, a linkage 35 which is pivotably supported about an axle 33 and is connected to the drive motor is simultaneously moved counterclockwise by the pivoting of the lever 19, whereby the drive belt 27 can be relaxed and can be removed from the drive wheel 44 of the conveyor belt unit 13.

[0076] The pivot movement of the linkage 35 is effected by the concentrically configured shaft 29 of the lever 19 which extends through a cut-out 31 formed in the linkage 35. Consequently, the cut-out 31 of the linkage 35 and the lever shaft 29 in the region of this cut-out 31 are configured such that the shaft 29 so-to-say, in the manner of a crankshaft on rotation due to its eccentricity, pivots the linkage 35 in a defined manner counterclockwise (for relaxing the belt 27) or clockwise (for tautening the belt 27) depending on the direction of rotation.

[0077] The pivoting of the lever 19 clockwise therefore has two consequences: On the one hand, an unlatching of the conveyor belt unit 13 takes place; and, on the other hand, a relaxing of the drive belt 27 takes place. Both are necessary to be able to move the conveyor belt unit 13 and thus the base 25 out of engagement with the coupling elements 37 of the mount 11 and then to be able to remove it.

[0078] The installation of the conveyor belt unit 13 takes place in reverse order. First, the base 25 of the conveyor belt unit 13 is placed onto the support plate 11 and is then brought

into engagement with the coupling elements 37 by a displacement movement in the conveying direction F to engage behind the coupling elements 37 in the region of the cut-outs 59 by means of the base 25. Subsequently, the drive belt 27 is laid around the drive wheel 44 of the conveyor belt unit 13, which is possible in this situation since the drive belt 27 is not yet taut. The lever 19 is thereupon pivoted about approximately 180° counterclockwise back into the starting position in accordance with Figs. 4 and 5. The linkage 35 is hereby pivoted clockwise, whereby the belt 27 is tautened. At the same time, the hook-shaped free engagement end of the latching member 21 rotationally fixedly connected to the lever shaft 29 is pivoted from below through the slit 23 formed in the base 25 of the conveyor belt unit 13 and is brought into latching engagement with the slit boundary.

[0079] The conveyor belt unit 13 is then ready for operation and can be operated in the desired manner by a corresponding control of the drive motor 23.

[0080] Reference is also made with respect to this cooperation to the other embodiments also described here (with the exception of the principle explained with reference to Figs. 7 as well as 14a and 14b) which are based on the same basic concept.

[0081] The conveyor belt unit 13 shown in the embodiment of Fig. 6 is designed for a two-track operation. The conveyor belt unit 13 is shown here in the removed state and with removed belt conveying bands. Furthermore, a front belt deflection 61 of the conveyor belt unit 13 is shown in a state folded up.

[0082] Two belt rollers 53 are arranged axially beside one another and thus lying next to one another on a common axis in the rear drive region of the conveyor belt unit 13. A drive wheel 44, with which a drive motor can be coupled via a drive belt 27, as was likewise described in connection with the embodiment of Figs. 1 to 5, is associated with each belt roller 53 axially outwardly in accordance with the embodiment of Figs. 1 to 5.

[0083] In addition, as in the embodiment of Figs. 1 to 5, a base 25 having cut-outs 59 and a slit 23 is arranged at each side of the conveyor belt unit 13 to be able to be latched to a correspondingly configured mount.

[0084] The installation situation as well as the removal and the installation of such a two-track conveyor belt unit will be described in more detail in the following in connection with Figs. 11, 12a, 12b, 13a and 13b.

[0085] Whereas an actuation device is provided in the embodiments described above with reference to the Figures in order simultaneously to unlatch or latch the conveyor belt unit and to release or tauten the drive belt, provision is made in the embodiment shown schematically in Fig. 7 that, on the removal of the conveyor belt unit 13, an unlatching of a base 25 of the conveyor belt unit 13 first takes place and only then is simultaneously a removal movement of the conveyor belt unit 13 carried out and the drive belt 27 relaxed.

[0086] The mount 11 of the substructure here comprises two support bars 65, 67. The base 25 of the conveyor belt unit 13 is pivotably supported about the support bar 65 at the right here or about its center axis defining a pivot axis 63 for the removal or for the installation.

[0087] In the installation position shown, the base 25 of the conveyor belt unit 13 lies on both support bars 65, 67, with the front support bar 67 at the left here additionally being configured to latch the base 25 in the installation situation. This will be looked at in more detail in conjunction with the embodiment of Figs. 14a, 14b which is likewise based on the above-explained principle.

[0088] The relative arrangement of the drive motor 15 with the drive shaft 51, on the one hand, and the drive wheel 44 as well as the belt roller 53 of the conveyor belt unit 13, on the other hand, corresponds to the previously described embodiments. In the present embodiment of Fig. 7, it is, however, a movement of the conveyor belt unit 13 itself which provides a reduction of the spacing between the axis of the drive shaft 51 and the axis of

the drive wheel 44 and thus provides a relaxation of the belt 27 for removing the conveyor belt unit 13. Unlike the above-described embodiments in which the drive motor 15 together with drive shaft 51 is moved for the relaxation and tautening of the belt, provision is made in the embodiment of Fig. 7 that the motor 15 is arranged in a stationary manner and the spacing change between the stationary drive shaft 51 and the drive wheel 44 is effected by the explained movement of the conveyor belt unit 13.

[0089] The embodiment of Figs. 8 to 10 shows the implementation of the invention at a portioning conveyor.

[0090] The conveyor belt unit 13 is configured as a portioning belt having two individual conveyors 71, 73 arranged, viewed in the conveying direction, directly behind one another. The portioning belt 71 at the rear, viewed in the conveying direction F, on which the product slices cut off during cutting operation fall for forming portions is designed as very short and shorter by a multiple than the following second portioning belt 73 in which a plurality of continuous round belts extending in parallel are provided as conveying means. The first portioning belt 71 has a plurality of parallel narrow belt bands as conveying means.

[0091] The substructure 41 of this portioning conveyor is designed differently than, for example, the substructure 41 of the traction belt described in the embodiment of Figs. 1 to 5. Nevertheless, the unlatching and latching as well as the removal and the installation of the conveyor belt unit 13 at this substructure 41 take place as with the previously described traction belt at least with respect to the basic concept. In Figs. 8 to 10, a corresponding actuation device is shown having a lever 19 and a throughgoing shaft 29 which carries latching members 21. This will be looked at in more detail in the following.

[0092] A special feature of the portioning unit in accordance with Figs. 8 to 10 is that a single conveyor belt unit 13, which can be handled as a whole and can thus be removed and installed as whole, has more than one belt conveyor, with the plurality of belt

conveyors 71, 73 - two here - being able to be operated independently of one another since two separate drive motors 15 are arranged at the substructure 41 of this portioning unit which are each associated with one of the portioning belts 71, 73 and can be controlled independently of one another so that the two portioning belts 71, 73 can be operated completely independently of one another.

[0093] The two drive motors 15 are integrated in the substructure 41 in a space-saving manner and are thus arranged beneath the conveyor belt unit 13, with the two motors 15 being arranged at the same height, viewed in the conveying direction, and beside one another in the transverse direction and with the drive shafts 51 each facing outwardly.

[0094] The two portioning belts 71, 73 each have a belt roller 53 for driving the respective conveying means with which belt roller a respective coaxial drive wheel 44 is associated in accordance with the embodiment of Figs. 1 to 5. The two drive wheels 44 are each directly connected to one of the drive motors 15, and indeed via a drive belt 27 which runs around the respective drive wheel 44 and the respective drive shaft 51.

[0095] This portioning unit in accordance with an embodiment of the invention consequently realizes a high degree of functionality with a very simple and extremely compact basic structure.

[0096] In the representation of Fig. 9, in particular the two drive motors 15 can be recognized of which the one drives the short portioning belt 71 and the other drives the long portioning belt 73 via a respective drive belt 27. The direct coupling by means of the drive belts 27 makes it possible to drive belt rollers 53 or drive wheels 44 arranged offset in the conveying direction with drive motors 15 or drive shafts 51 located at the same height, viewed in the conveying direction. This concept consequently utilizes the circumstance that the two drive belts 27 can run on the two mutually opposite sides of the portioning unit and thus without mutual interference or influencing.

[0097] The two motors 15 are each fastened to a linkage 35 which is pivotably supported about an axle 33. The linkages 35 are each pivotable by means of a common lever shaft 29 which is connected to a lever 19 on a side of the portioning unit. The shaft 29 is configured eccentric in each case in the region of the linkages 35 such that by rotation of the shaft 29 by approximately 180° by means of the lever 19 a pivot movement of both linkages 35 simultaneously is effected such that both belts 27 are relaxed or tautened simultaneously.

[0098] Consequently, by a single manual actuation via the lever 19, a user can simultaneously pivot both motors 15 and can thus decouple both portioning belts 71, 73 simultaneously from their respective drives or couple them to their respective drives. A removal or an installation of this portioning conveyor unit is consequently possible in a fast and simple manner.

[0099] The enlarged representation of a part of Fig. 9 in Fig. 10 in particular shows the operation of the lever shaft 19 in the region of the left hand drive motor 15 in Fig. 9. The eccentricity of the shaft 29 in the region of the linkage 35 provides the above-explained pivoting of the motor 15 attached to the linkage 35 on the rotation of the shaft 29. The shaft 29 is furthermore rotationally fixedly connected to two latching members 21 of which only one is shown in Fig. 10. In the installed state shown, the latching member 21 engages through a slit 23 formed in the base 25 of the conveyor belt unit 13 to latch the base 25 and thus the conveyor belt unit 13 to the substructure 41. By rotating the shaft 29 and thus pivoting the latching member 21, this latched connection is cancelled, while simultaneously the belt 27 is relaxed by pivoting the linkage 35.

[00100] It can moreover be seen from Figs. 8 to 10 that the drive belts 27 are each designed as toothed belts and the belt wheels 44 each arranged at the end face of the respective belt roller 53 are each provided in the form of a toothed wheel.

[00101] With the two-track traction belt in accordance with Figs. 11, 12a, 12b, 13a and 13b (cf. also the above statements on Fig. 6), a drive motor 15 which drives the respective

belt roller 53 or the end face drive wheel 44 via a belt 27 is provided for each of the two tracks between which a partition wall 69 is arranged here.

[00102] This traction belt unit is consequently designed in a mirror image with respect to a center plane between the two tracks which extends perpendicular to the product support surfaces of the continuous belts 55, with both tracks, however, being formed at a single conveyor belt unit 13 which can be handled as a whole.

[00103] The removal and the installation of this conveyor belt unit 13, including the latching to the substructure 41 and the relaxing and tautening of the drive belts 27 take place as in the embodiment of Figs. 1 to 5, which will be explained in more detail in the following.

[0104] Figs. 12a and 13a each show the operating position with a tautened drive belt 27, whereas Figs. 12b and 13b each show a situation in which the drive belts 27 are relaxed and the conveyor belt unit 13 is unlatched, with the base 25 of the conveyor belt unit 13 still being in engagement with the coupling elements 37 of the mount 11.

[0105] The comparison of Figs. 12a and 12b in particular shows that the lever 19 has to be pivoted by approximately 180° clockwise to bring the latching member 21 out of engagement with the slit 23 in the base 25 of the conveyor belt unit 13 and to pivot the linkage 35 counterclockwise to relax the belt 27.

[0106] Figs. 13a and 13b each show a section perpendicular to the conveying direction through the shaft 29 of the lever 19. In particular the eccentric design of the shaft 29 in the region of the linkage 35 and the cooperation of the shaft 29 with the latching member 21 can be recognized, said latching member being in latching engagement with the base 25 of the conveyor belt unit 13 in the region of the slit 23 in the installation situation in accordance with Fig. 13a and being out of engagement with the base 25 of the conveyor belt unit 13 in the unlatched state in accordance with Fig. 13b.

[0107] It can additionally be seen from Figs. 12b and 13b that the belt 27 is relaxed and thus moves out of engagement with the drive wheel 44 or is only laid loosely around the drive wheel 44 by the pivoting of the linkage 35 and thus of the drive shaft 51 of the motor in the direction of the drive wheel 44 of the conveyor belt unit 13 and by the spacing reduction thereby effected between the drive shaft 51 and the drive wheel 44 so that the belt 27 can easily be taken off the drive wheel 44 and the conveyor belt unit 13 can simply be brought out of engagement with the coupling elements 37 of the mount 11 by displacement and can then be raised.

[0108] As already mentioned above in conjunction with Fig. 7, Figs. 14a and 14b schematically show a different removal concept for a conveyor belt unit 13 which can also be configured as a portioning belt or as a traction belt in this concept and which can each be designed either as single track or multitrack.

[0109] It is shown purely by way of example in Figs. 14a and 14b how the support bar 67 - at the left here - of the mount 11 or of the substructure 41 can be configured to not only be able to serve as a support for the base 25 of the conveyor belt unit 13, but rather also for latching the conveyor belt unit 13 to the substructure.

[0110] For this purpose, the base 25 is provided in the region of a latching section 77 of the support bar 67 with a mount 79 which is shaped in the form of a keyhole and into which the latching section 77 can only move in a rotational position of the support bar 67 corresponding to an unlatched position, as is shown in Fig. 14b.

[0111] In the latched position in accordance with Fig. 14a, the latching section 77 located in the mount 79 is oriented such that the latching section 77 cannot move out of the mount 79. The conveyor belt unit 13 is consequently latched and secured in the installation situation or operating position in the state in accordance with Fig. 14a.

[0112] To remove the conveyor belt unit 13, the support bar 67 at the left here is first rotated into the position in accordance with Fig. 14b so that the latching section 77 can move out of the mount 79 when the conveyor belt unit 13 is pivoted about the other support bar 65.

[0113] This pivoting of the conveyor belt unit 13 effects a spacing reduction between the drive wheel 44 of the conveyor belt unit 13 and the drive shaft 51 of the motor 15, whereby the drive belt 27 is relaxed. The conveyor belt unit 13 pivoted for the purpose of this belt relaxation can then be raised from the support bar 65.

[0114] While the invention has been described in detail in connection with only a limited number of embodiments, it should be readily understood that the invention is not limited to such disclosed embodiments. Rather, the invention can be modified to incorporate any number of variations, alterations, substitutions or equivalent arrangements not heretofore described, but which are commensurate with the spirit and scope of the invention. Additionally, while various embodiments of the invention have been described, it is to be understood that aspects of the invention may include only some of the described embodiments. Accordingly, the invention is not to be seen as limited by the foregoing description, but is only limited by the scope of the appended claims.

~~Reference numeral list~~

~~11 mount~~

~~13 conveyor belt unit~~

~~15 drive motor~~

~~17 spigot~~

~~19 lever~~

~~21 latching member, latched connection~~

~~23 slit~~

~~25 base~~

~~27 drive belt~~

~~29 lever shaft~~

~~31 cut-out of the linkage~~

~~33 pivot axle of the linkage~~

~~35 linkage~~

~~37 coupling element of the mount~~

~~39 slit~~

~~41 substructure~~

~~44 drive wheel, belt wheel~~

~~51 drive shaft of the drive motor~~

~~53 belt roller of the conveyor belt unit~~

~~55 continuous belt, continuous band~~

~~57 continuous strap, round strap~~

~~59 cut-out of the base of the conveyor belt unit~~

~~61 belt deflection~~

~~63 pivot axle of the support bar~~

~~65 support bar~~

~~67 support bar~~

~~69 partition wall~~

~~71 first conveyor, short portioning belt~~

~~73 second conveyor, long portioning belt~~

~~77 latching section~~

~~79 mount~~

~~F conveying direction~~

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Abstract

The invention relates to a slicing apparatus for food products, in particular to a high-performance slicer, having at least one belt conveyor which is configured as a removable conveyor belt unit.

HIGH-PERFORMANCE SLICING APPARATUS WITH AT LEAST ONE REMOVABLE CONVEYOR BELT UNIT

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This patent application claims priority to German Patent Application Serial No. 102012222042.9, filed December 3, 2012 and German Patent Application Serial No. 102013206510.8, filed April 12, 2013, which are incorporated herein by reference in their entirety.

FIELD OF THE INVENTION

[0002] The invention relates to a slicing apparatus for food products, in particular to a high-performance slicer, having at least one belt conveyor.

BACKGROUND

[0003] Products in particular have to be supplied to a cutting plane in high-performance slicing apparatus so that the products can be cut into slices. The cut-off slices then furthermore have to be grouped into portions and subsequently transported away from the cutting zone. Actively driven conveyor belts are normally used for this conveying work. They are either belt conveyors or band conveyors having relatively wide, flat belts or bands or strap conveyors having a plurality of relatively narrow individual straps which can in particular have a circular cross-section.

[0004] Those conveyors which supply the products to the cutting plane should normally reach up to just before the cutting plane to ensure an ideal traction of the products. These conveyors are therefore often also called traction belts.

[0005] Those conveyors which collect the cut slices and group them to form portions of a plurality of slices are usually called portioning belts. At least two conveyors are often used which are arranged after one another to be able directly to start the placing of new slices on the first conveyor again after the transfer of the portion from the first conveyor to the second conveyor. These at least two conveyors arranged after one another will also together be called a "portioning belt" within the framework of the present disclosure even though a plurality of individual conveyors arranged after one another are provided.

[0006] The invention is not restricted to such traction belts or portioning belts. The invention can in principle be realized at any kind of belt conveyor.

[0007] In practice, both the supply belts (in particular the traction belts) and the transport-away belts (in particular the portioning belts) are customarily greatly contaminated during the operation of a slicing apparatus. It is therefore necessary to clean these conveyor belts daily, frequently even several times daily. For this purpose, a removal of the belt bands or of the transport straps is normally required to be able to carry out a thorough cleaning.

[0008] It is known from the prior art to make possible such a removal in that the conveyors are suspended at one side at an apparatus frame to achieve a simple removal of the belt or band. In this respect, the conveyors remain in the apparatus during the cleaning. The disadvantage of such a procedure is that very huge belt racks are required as the width of the belt conveyor increases. Furthermore, a lot of room is required at the side next to the conveyor to remove the respective conveying means, for example the band, with a conveyor remaining at the apparatus.

[0009] Conveyors are furthermore known which can be removed simply including the respective conveying means. However, these conveyors are typically coupled to a drive unit via a coupling or via a coupling unit. This means that a coupling which establishes the connection to a drive motor in operation is seated on the drive roller of the conveyor. However, a very large width results due to such a type of construction since either the

drive motor has to be arranged axially beside the drive roller of the conveyor or it is necessary to arrange a coupling unit with a bearing axially to the drive roller of the conveyor, with this coupling unit then having to be coupled to a drive motor via a further connection, e.g. a toothed belt.

[0010] Both variants result in a large width and moreover do not make it possible to connect a plurality of drive to a removable conveyor.

SUMMARY OF THE INVENTION

[0011] It is a feature of the invention to provide an apparatus of the initially named kind which does not have the mentioned disadvantages and which in partiuclar makes a cleaning possible which is as simple as possible with a space-saving and inexpensive manner of construction.

[0012] In accordance with an embodiment of the invention, the belt conveyor is designed as a removable conveyor belt unit.

[0013] Embodiments of the invention are also set forth in the dependent claims, in the description and in the drawings.

[0014] In accordance with an embodiment, the conveyor belt unit is arranged before the cutting plane, viewed in the conveying direction, and is in particular configured as a traction belt. In accordance with an alternative embodiment, the conveyor belt unit is arranged behind the cutting plane, viewed in the conveying direction, and is in particular configured as a portioning belt.

[0015] The conveyor belt unit can have, viewed in the conveying direction, an effective belt length or conveyor length which amounts to less than 500 mm, in particular less than 300 mm, in particular less than 200 mm, and in particular between 50 mm and 150 mm.

The invention makes it possible to realize very short belt conveyors which, for example, only have a length of approximately 100 mm and which in this respect can have a plurality of independent drives. This is in particular of advantage for the design of a removable conveyor belt unit as a portioning unit in which at least one of the conveyors is to have a very short conveying length.

[0016] The conveyor belt unit may include a base which is arranged beneath the circulating conveyor belts or conveyor straps and with which the conveyor belt unit can be mechanically attached to a substructure of the belt conveyor. The base so-to-say represents the part of a mechanical interface at the conveyor unit side between the conveyor belt unit and the substructure. The substructure which remains in situ on the removal of the conveyor belt unit can be a component only of the respective belt conveyor, can belong to a higher-ranking conveyor path or can be integrated into a slicing apparatus. The substructure may include a mount adapted to the base of the conveyor belt unit which so-to-say forms the stationary part of the mechanical interface between the conveyor belt unit and the substructure.

[0017] In accordance with an embodiment, at least one direct drive for the conveyor belt unit is provided. Such an embodiment manages with a minimal number of components and is consequently extremely inexpensive. It is furthermore hereby possible to attach a plurality of drives to a single removable conveyor belt unit. Such a multidrive opens up a variety of configuration possibilities. It is thus possible, for example, to realize a multitrack operation in which the individual tracks can be driven and controlled independently from one another. This is particularly advantageous for portioning units. It was previously at least extremely expensive and difficult, if not practically impossible, to realize multitrack portioning belts since the hygienic and functional accommodation of a plurality of drives could not be satisfactorily effected.

[0018] In accordance with a further embodiment of the invention, at least one drive motor is provided for the conveyor belt unit, with the drive motor being directly coupled to the

conveyor belt unit. Such a coupling can take place, for example, via a belt connection by which relatively long paths can be overcome between the motor and that point of the conveyor belt unit at which the latter should be driven or via a toothed wheel arrangement, for example via a toothed wheel pair.

[0019] Provision can furthermore be made in accordance with an embodiment of the invention that a drive motor for the conveyor belt unit has a drive shaft and the conveyor belt unit has a drive wheel, with the drive shaft and the drive wheel being directly coupled to one another. This allows a particularly simple and inexpensive design which takes up little room without impairing the function and meets high hygienic demands.

[0020] Provision is made in an embodiment that the drive motor is arranged beneath the conveyor belt unit. The width of the belt conveyor is hereby not unnecessarily increased. Construction space provided beneath the conveyor can thus be utilized. It is in particular possible to arrange a plurality of drives beside one another or behind one another beneath the conveyor belt unit.

[0021] A further embodiment of the invention proposes that the conveyor belt unit has a supported belt roller, with a drive wheel of the conveyor belt unit being supported via the support of the belt roller. The drive of the conveyor belt unit is hereby further simplified and components are saved in that the support of the belt roller is utilized for the support of the drive wheel.

[0022] The drive wheel of the conveyor belt unit is in particular in this respect arranged coaxially to the belt roller and in particular axially beside the band roller. A drive motor cooperating with the drive wheel can thus generally be arranged at any desired point - in particular beneath the conveyor belt unit - which allows a direct coupling to the drive wheel, in particular via a belt connection or via a toothed wheel arrangement. In this respect, it is of particular advantage that it is not necessary to arrange the drive motor or its

drive shaft in an axial extension of the belt roller so that an unnecessary widening of the belt conveyor is avoided.

[0023] In one embodiment of the invention, a respective relative movement between the drive motor and the conveyor belt unit is provided for cancelling and establishing a coupling between a drive motor for the conveyor belt unit and the conveyor belt unit. This relative movement can be a pivot movement which comprises a purely rotary movement or rotational movement, but can generally also be a more complex movement which is a superposition of a plurality of individual movements.

[0024] The drive-wise coupling between the motor and the conveyor unit can thus be cancelled simply by a movement of either the drive motor or of the conveyor belt unit to allow a removal of the conveyor unit.

[0025] It is of particular advantage in this concept that the drive motor can remain at the apparatus or at the substructure of the conveying device.

[0026] In one embodiment, the spacing between a drive axle of the drive motor and a drive axle of the conveyor belt unit can be varied by the relative movement between the drive motor and the conveyor belt unit. The motor and the conveyor unit are consequently moved relative to one another such that a spacing change is effected between the two drive axles. In particular the spacing between a drive shaft of the drive motor and a drive wheel of the conveyor belt unit can hereby be varied. A drive belt can hereby be relaxed or tautened, for example, or a toothed wheel arrangement can be brought out of engagement or into engagement.

[0027] In accordance with an embodiment of the invention, a coupling between a drive for the conveyor belt unit and the conveyor belt unit can be cancelled by relaxing a drive belt and can be established by tautening the drive belt. The relaxing and tautening of the drive belt can in each case take place by a relative movement between the drive and the

conveyor belt unit, as already explained above. Such a relative movement is, however, generally not compulsory.

[0028] In accordance with a further embodiment of the invention, a mount is provided for the conveyor belt unit which remains at the apparatus when the conveyor belt unit is removed and at which the conveyor belt unit can be latched, with the latched connection being able to be cancelled for removing the conveyor belt unit and being able to be established for installing the conveyor belt unit.

[0029] It is possible in a variant of the invention that a coupling between a drive of the conveyor belt unit and the conveyor belt unit can be cancelled or established for removing or for installing the conveyor belt unit simultaneously with a latching of the conveyor belt unit, for example a latching of the conveyor belt unit at a mount remaining at the apparatus, as mentioned above.

[0030] It is hereby in particular possibly only to provide a single work process or actuation process with which the latched connection and the coupling are simultaneously cancelled to be able to remove the conveyor belt unit.

[0031] Provision can be made in an alternative variant of the invention that the coupling between a drive for the conveyor belt unit and the conveyor belt unit, on the one hand, and a removal movement or installation movement of the conveyor belt unit, on the other hand, are to be carried out simultaneously for the removal or for the installation of the conveyor belt unit, and indeed after the cancelling or before the establishing of a latched connection of the conveyor belt unit.

[0032] In this respect, the removal movement or installation movement of the conveyor belt unit is utilized in order simultaneously to cancel or establish the drive-wise coupling. The cancelling or establishing of the latched connection of the conveyor belt unit is a separate process, in contrast.

[0033] An actuation device can be provided for a coupling between a drive for the conveyor belt unit and the conveyor belt unit and/or for a latching of the conveyor belt unit at a mount of the apparatus. It can in this respect in particular be a mechanical actuation device to be actuated manually. This represents a particularly reliable and above all also inexpensive variant.

[0034] The actuation device can comprise a lever having a shaft, with a drive for the conveyor belt unit, in particular a linkage carrying a drive for the conveyor belt unit, being pivotable about a pivot axis and/or a latching member for the conveyor belt unit being movable between a latched position and a release position by rotating the shaft.

[0035] When the actuation device is configured simultaneously to cancel or establish the coupling between the drive and the conveyor belt unit, on the one hand, and the latched connection between the conveyor belt unit and the mount, on the other hand, the shaft which can be set into rotation by means of the lever can be configured in this embodiment such that the drive or the linkage carrying the drive is pivoted and the latching member is moved simultaneously. In accordance with a particularly simple practical implementation, the shaft can be eccentric or can comprise an eccentrically configured section.

[0036] When a movement of the conveyor belt relative to the drive takes place for cancelling and established a coupling between a drive for the conveyor belt unit and the conveyor belt unit, it is not necessary that the conveyor belt unit as a whole is moved for this purpose. It is also possible that only an assembly or a component of the conveyor belt unit is moved relative to the drive.

[0037] In an embodiment, the conveyor belt unit can be designed for a multitrack operation and can in particular be able to be coupled to a plurality of independent drives which are each associated with at least one track.

[0038] In accordance with a further embodiment of the invention, the conveyor belt unit can comprise a plurality of individual conveyors which, viewed in the conveying direction, are arranged behind one another, which in particular follow one another directly and with which a respective separate drive is associated. This embodiment is particularly advantageous when the conveyor belt unit is a portioning unit or a portioning belt. At least one individual conveyor or each individual conveyor can in this respect be configured with one track or for a multitrack operation.

[0039] When the conveyor belt unit, which can be removed as a whole, is a portioning belt which comprises two individual conveyors which follow one another and which are each configured with two tracks, a separate drive can be provided for each track of each individual conveyor so that, for example, four drive motors are or can be coupled to the conveyor belt unit which can be operated and controlled independently of one another. The drive motors can, for example, be arranged beneath the conveyor belt unit and can remain at the substructure, in particular at the apparatus, when the conveyor belt unit is removed.

[0040] If a plurality of drives are provided for the conveyor belt unit, it is possible in accordance with an embodiment that, viewed in the conveying direction, at least one drive is coupled to the conveyor belt unit at the left hand side and at least one further drive at the right hand side. The drives in this respect may each comprise a drive motor, with the drive motors in particular being arranged, viewed transversely to the conveying direction, beside one another beneath the conveyor belt unit with drive shafts facing outwardly to the respective side.

[0041] This concept is particularly advantageous for a two-track slicer since each of the two available sides can be used for the drive of the respective track, i.e. one drive for the left hand track and one drive for the right hand track. This concept can nevertheless also be used for slicers having more than two tracks. Optionally, for this purpose, a staggered arrangement of the drive motors can be provided behind one another, viewed in the conveying direction, to associate a separate drive with each track.

[0042] If the conveyor belt unit has a plurality of drives, provision can be made that the coupling between the drives and the conveyor belt unit can be simultaneously cancelled and established at least for a plurality of drives and in particular for all drives. This can take place, for example, by means of a throughgoing shaft which only has to be actuated from one side of the conveyor belt unit, but us simultaneously connected to all drive motors, in particular arranged next to one another viewed transversely to the conveying direction.

[0043] The conveyor belt unit can, for example, have a conveying width which lies in the range from approximately 300 mm to 700 mm.

[0044] At least one continuous belt or continuous band can be provided as conveying means for the conveyor belt unit, with alternatively a plurality of parallel continuous straps being able to serve as conveying means.

[0045] A particularly simple handling of the conveyor belt unit results when, in accordance with a further embodiment, the conveyor belt unit can be removed and/or installed without tools.

[0046] Provision can be made in a further embodiment of the invention that the conveyor belt unit can first be moved relative to the mount with a component in or against the conveying direction and can subsequently be raised from the mount for the removal and/or for the installation of the conveyor belt unit with a cancelled latched connection between the conveyor belt unit and a mount remaining at the substructure or at the apparatus. The movement of the conveyor belt unit in or against the conveying direction can provide a particularly stable and secure fastening of the conveyor belt unit to the apparatus mount. In addition, such an embodiment is advantageous when the installation situation does not allow a direct raising or pivoting from the installation position. The conveyor belt unit can then be displaced for the removal before the actual taking out in or against the conveying

direction or, on the installation of the conveyor belt unit, such a displacement can be carried out for reaching the final installation position.

[0047] Provision can be made in an alternative embodiment that the conveyor belt unit can first be pivoted about one of two supports of the mount and can subsequently be raised from the supports for removing and/or for installing the conveyor belt unit with a cancelled latched connection between the conveyor belt unit and a mount remaining at the substructure or at the apparatus. In this respect, provision can in particular be made that that support which does not serve for the pivoting of the conveyor belt unit is configured for a latching of the conveyor belt unit.

[0048] A particularly simple and inexpensive embodiment results when the supports are bar-shaped components. Such an embodiment requires little room, is sufficiently stable and allows, in a construction regard, a simple implementation of the desired pivot movement, on the one hand, and of the cancelling and establishing of the desired latched connection of the conveyor belt unit, on the other hand.

[0049] In a further embodiment, a plurality of conveyor belt units can be arranged behind one another and/or beside one another, viewed in the conveying direction. Provision is in particular made in this respect that the conveyor belt units can be removed and/or installed independently of one another.

[0050] The invention is consequently not restricted to such apparatus, in particular slicers or conveying devices, in which only a single removable conveyor belt unit is provided.

[0051] The invention additionally relates to a conveying device for food products, in particular for food products to be sliced or for sliced food products by means of an apparatus in accordance with any one of the preceding claims, wherein the conveying device comprises at least one belt conveyor which is configured as a removable conveyor belt unit.

[0052] Reference is made to the above statements with respect to advantageous further developments of this conveying device. The embodiments of the slicing apparatus disclosed here are herewith also claimed for the conveying device.

BRIEF DESCRIPTION OF THE DRAWINGS

[0053] The invention will be described in the following by way of example with reference to the drawing. There are shown:

[0054] Figs. 1 to 5 illustrate different views of a first embodiment of the invention;

[0054] Fig. 6 illustrates a second embodiment of the invention;

[0055] Fig. 7 schematically[[,]] illustrates a further embodiment of the invention;

[0056] Figs. 8 to 10 illustrate different views of a further embodiment of the invention;

[0057] Figs. 11, 12a, 12b, 13a and 13b illustrate different views of a further embodiment of the invention; and

[0058] Figs. 14a and 14b illustrate schematic views of a further embodiment of the invention.

DESCRIPTION OF THE EMBODIMENTS

[0059] The embodiments of conveyor belt units in accordance with the invention described in the following are components of conveying devices or of slicing apparatus for food products.

[0060] The shown belt conveyors each comprise a single individual conveyor or two individual conveyors arranged directly behind one another and are designed for a single-track operation or for a multitrack operation. Each belt conveyor comprises a removable conveyor belt unit 13 and a substructure 41 having a mount 11 for the conveyor belt unit 13, wherein the substructure 41 of the conveyor belt unit can be integrated into a slicing apparatus, in particular into a high-performance slicer, or into a conveying device which is a component of a production line and is in this respect in particular associated with a high-performance slicer.

[0061] The embodiments described herein differ with respect to different aspects: Figs. 1 to 5 describe a single-track traction conveyor in which the conveyor belt unit 13 is configured as a traction belt. Such a traction conveyor is in particular a component of a product supply of a slicer with which one or more food products to be sliced are supplied to a cutting plane together.

[0062] Fig. 7 as well as Figs. 14a and 14b each schematically show a concept variant in which the coupling between the drive 15 and the conveyor belt unit 13 is effected by a removal movement or installation movement of the conveyor belt unit 13. This coupling or decoupling takes place in the other embodiments in contrast simultaneously with the establishing or cancelling of a latched connection of the conveyor belt unit 13 at the substructure 41.

[0058] The embodiment of Figs. 8 to 10 relates to a single-track portioning conveyor in which a single removable conveyor belt unit 13 comprises two individual conveyors, namely a short portioning belt 71 and a long portioning belt 73.

[0063] The embodiment of Figs. 11 to 13 shows a two-track traction conveyor having a two-track conveyor belt unit 13.

[0064] Fig. 1 shows the single-track traction conveyor belt unit in its installation position at a slicer, not shown, with the conveyor belt unit 13 in the installation situation being attached and latched to a mount 11 which is here configured as a table or plate (cf. Fig. 3).

[0065] Fig. 2 shows the conveyor belt unit 13 in the removed state.

[0066] Fig. 3 shows the mount 11 after removal of the conveyor belt unit 13. The mount 11 is provided at its upper side with coupling elements 37 which are arranged at the left hand marginal region and at the right hand marginal region, which are of mushroom shape and which serve to be engaged behind by a base 25 (cf. Fig. 3) of the conveyor belt unit 13 which is provided with corresponding cut-outs 59 for this purpose.

[0067] Furthermore, a slit 39 is formed in the mount 11 at a side in the region between two coupling elements 37, through which slit a latching member 21 extends from below which serves to cooperate with a slit 23 formed in the base 25 of the conveyor belt unit 13 to latch the conveyor belt unit 13 to the mount 11.

[0068] The latching member 21 is a component of a latched connection which moreover inter alia comprises a lever 19 having a spigot 17. This actuation device will be described in more detail in the following in connection with Figs. 4 and 5.

[0069] The substructure 41, which includes the mount 11, is furthermore provided with a drive motor for the conveyor belt unit 13 arranged beneath the support 11 and of which only a drive shaft 51 is shown. With an installed conveyor belt unit 13, the drive shaft 51 drives a drive wheel 44 (cf. Fig. 1) of the conveyor belt unit 13 by means of a drive belt 27. The drive wheel 44 is arranged coaxially and laterally beside a belt roller 53 of the conveyor belt unit 13 about which belt roller continuous belts 55 are guided which serve as conveying means and define a product support surface.

[0070] In the installed state in accordance with Fig. 1 in which the base 25 of the conveyor belt unit 13 engages behind the coupling elements 37 and is secured by the latched connection 21 and is thus attached to the substructure 41 in a defined operating position, there is consequently a direct drive connection between the drive motor and the conveyor belt unit 13 via the drive belt 27 which runs around the drive shaft 51 of the motor and the drive wheel 44 of the conveyor belt unit 13.

[0071] The cooperation between the conveyor belt unit 13 and the substructure 41 is in particular characterized by three processes, namely (i) the movements of the conveyor belt unit 13 required for the removal and for the installation of the conveyor belt unit 13; (ii) the unlatching and the latching of the conveyor belt unit 13; and (iii) the cancelling and the establishing of the coupling between the drive 15 and the conveyor belt unit 13.

[0072] Reference will also be made to Figs. 4 and 5 for this purpose in the following. Fig. 4 shows the conveyor belt unit 13 in the installed state, with the mount plate 11 having been omitted for better illustration to be able to better show the actuation device. Fig. 5 corresponds to the representation in Fig. 4, with the latching member 21 having additionally been omitted here to be able to better show a shaft 29 of the lever 19.

[0073] To be able to remove the conveyor belt unit 13 from the substructure 41 and thus from the mount table 11, the base 25 of the conveyor belt unit 13 has to be brought out of engagement with the coupling elements 37, and indeed by a displacement movement against the conveying direction F (cf. Fig. 1).

[0074] This removal movement is only possible when previously both the latched state and the coupling state of the drive 15 have been cancelled, i.e. a removal of the conveyor belt unit 13 is only possible after a previous unlatching of the base 25 and relaxation of the belt 27.

[0075] These two processes are carried out simultaneously with the aid of the manual actuation device. For this purpose, the lever 19 is first pulled somewhat outwardly via the spigot 17 by a user, whereby a shape-matched engagement (Fig. 1) of the spigot 17 with the mount 11, which prevents an unintentional unlatching, is cancelled. The lever 19 can then be pivoted by 180° clockwise, for instance, by the user. The latching member 21 initially still seated in the slit 23 of the base 25 hereby releases the base 25 and thus the conveyor belt unit 13. In addition, a linkage 35 which is pivotably supported about an axle 33 and is connected to the drive motor is simultaneously moved counterclockwise by the pivoting of the lever 19, whereby the drive belt 27 can be relaxed and can be removed from the drive wheel 44 of the conveyor belt unit 13.

[0076] The pivot movement of the linkage 35 is effected by the concentrically configured shaft 29 of the lever 19 which extends through a cut-out 31 formed in the linkage 35. Consequently, the cut-out 31 of the linkage 35 and the lever shaft 29 in the region of this cut-out 31 are configured such that the shaft 29 so-to-say, in the manner of a crankshaft on rotation due to its eccentricity, pivots the linkage 35 in a defined manner counterclockwise (for relaxing the belt 27) or clockwise (for tautening the belt 27) depending on the direction of rotation.

[0077] The pivoting of the lever 19 clockwise therefore has two consequences: On the one hand, an unlatching of the conveyor belt unit 13 takes place; and, on the other hand, a relaxing of the drive belt 27 takes place. Both are necessary to be able to move the conveyor belt unit 13 and thus the base 25 out of engagement with the coupling elements 37 of the mount 11 and then to be able to remove it.

[0078] The installation of the conveyor belt unit 13 takes place in reverse order. First, the base 25 of the conveyor belt unit 13 is placed onto the support plate 11 and is then brought into engagement with the coupling elements 37 by a displacement movement in the conveying direction F to engage behind the coupling elements 37 in the region of the cut-outs 59 by means of the base 25. Subsequently, the drive belt 27 is laid around the drive

wheel 44 of the conveyor belt unit 13, which is possible in this situation since the drive belt 27 is not yet taut. The lever 19 is thereupon pivoted about approximately 180° counterclockwise back into the starting position in accordance with Figs. 4 and 5. The linkage 35 is hereby pivoted clockwise, whereby the belt 27 is tautened. At the same time, the hook-shaped free engagement end of the latching member 21 rotationally fixedly connected to the lever shaft 29 is pivoted from below through the slit 23 formed in the base 25 of the conveyor belt unit 13 and is brought into latching engagement with the slit boundary.

[0079] The conveyor belt unit 13 is then ready for operation and can be operated in the desired manner by a corresponding control of the drive motor 23.

[0080] Reference is also made with respect to this cooperation to the other embodiments also described here (with the exception of the principle explained with reference to Figs. 7 as well as 14a and 14b) which are based on the same basic concept.

[0081] The conveyor belt unit 13 shown in the embodiment of Fig. 6 is designed for a two-track operation. The conveyor belt unit 13 is shown here in the removed state and with removed belt conveying bands. Furthermore, a front belt deflection 61 of the conveyor belt unit 13 is shown in a state folded up.

[0082] Two belt rollers 53 are arranged axially beside one another and thus lying next to one another on a common axis in the rear drive region of the conveyor belt unit 13. A drive wheel 44, with which a drive motor can be coupled via a drive belt 27, as was likewise described in connection with the embodiment of Figs. 1 to 5, is associated with each belt roller 53 axially outwardly in accordance with the embodiment of Figs. 1 to 5.

[0083] In addition, as in the embodiment of Figs. 1 to 5, a base 25 having cut-outs 59 and a slit 23 is arranged at each side of the conveyor belt unit 13 to be able to be latched to a correspondingly configured mount.

[0084] The installation situation as well as the removal and the installation of such a two-track conveyor belt unit will be described in more detail in the following in connection with Figs. 11, 12a, 12b, 13a and 13b.

[0085] Whereas an actuation device is provided in the embodiments described above with reference to the Figures in order simultaneously to unlatch or latch the conveyor belt unit and to release or tauten the drive belt, provision is made in the embodiment shown schematically in Fig. 7 that, on the removal of the conveyor belt unit 13, an unlatching of a base 25 of the conveyor belt unit 13 first takes place and only then is simultaneously a removal movement of the conveyor belt unit 13 carried out and the drive belt 27 relaxed.

[0086] The mount 11 of the substructure here comprises two support bars 65, 67. The base 25 of the conveyor belt unit 13 is pivotably supported about the support bar 65 at the right here or about its center axis defining a pivot axis 63 for the removal or for the installation.

[0087] In the installation position shown, the base 25 of the conveyor belt unit 13 lies on both support bars 65, 67, with the front support bar 67 at the left here additionally being configured to latch the base 25 in the installation situation. This will be looked at in more detail in conjunction with the embodiment of Figs. 14a, 14b which is likewise based on the above-explained principle.

[0088] The relative arrangement of the drive motor 15 with the drive shaft 51, on the one hand, and the drive wheel 44 as well as the belt roller 53 of the conveyor belt unit 13, on the other hand, corresponds to the previously described embodiments. In the present embodiment of Fig. 7, it is, however, a movement of the conveyor belt unit 13 itself which provides a reduction of the spacing between the axis of the drive shaft 51 and the axis of the drive wheel 44 and thus provides a relaxation of the belt 27 for removing the conveyor belt unit 13. Unlike the above-described embodiments in which the drive motor 15 together with drive shaft 51 is moved for the relaxation and tautening of the belt, provision is made

in the embodiment of Fig. 7 that the motor 15 is arranged in a stationary manner and the spacing change between the stationary drive shaft 51 and the drive wheel 44 is effected by the explained movement of the conveyor belt unit 13.

[0089] The embodiment of Figs. 8 to 10 shows the implementation of the invention at a portioning conveyor.

[0090] The conveyor belt unit 13 is configured as a portioning belt having two individual conveyors 71, 73 arranged, viewed in the conveying direction, directly behind one another. The portioning belt 71 at the rear, viewed in the conveying direction F, on which the product slices cut off during cutting operation fall for forming portions is designed as very short and shorter by a multiple than the following second portioning belt 73 in which a plurality of continuous round belts extending in parallel are provided as conveying means. The first portioning belt 71 has a plurality of parallel narrow belt bands as conveying means.

[0091] The substructure 41 of this portioning conveyor is designed differently than, for example, the substructure 41 of the traction belt described in the embodiment of Figs. 1 to 5. Nevertheless, the unlatching and latching as well as the removal and the installation of the conveyor belt unit 13 at this substructure 41 take place as with the previously described traction belt at least with respect to the basic concept. In Figs. 8 to 10, a corresponding actuation device is shown having a lever 19 and a throughgoing shaft 29 which carries latching members 21. This will be looked at in more detail in the following.

[0092] A special feature of the portioning unit in accordance with Figs. 8 to 10 is that a single conveyor belt unit 13, which can be handled as a whole and can thus be removed and installed as whole, has more than one belt conveyor, with the plurality of belt conveyors 71, 73 - two here - being able to be operated independently of one another since two separate drive motors 15 are arranged at the substructure 41 of this portioning unit which are each associated with one of the portioning belts 71, 73 and can be controlled

independently of one another so that the two portioning belts 71, 73 can be operated completely independently of one another.

[0093] The two drive motors 15 are integrated in the substructure 41 in a space-saving manner and are thus arranged beneath the conveyor belt unit 13, with the two motors 15 being arranged at the same height, viewed in the conveying direction, and beside one another in the transverse direction and with the drive shafts 51 each facing outwardly.

[0094] The two portioning belts 71, 73 each have a belt roller 53 for driving the respective conveying means with which belt roller a respective coaxial drive wheel 44 is associated in accordance with the embodiment of Figs. 1 to 5. The two drive wheels 44 are each directly connected to one of the drive motors 15, and indeed via a drive belt 27 which runs around the respective drive wheel 44 and the respective drive shaft 51.

[0095] This portioning unit in accordance with an embodiment of the invention consequently realizes a high degree of functionality with a very simple and extremely compact basic structure.

[0096] In the representation of Fig. 9, in particular the two drive motors 15 can be recognized of which the one drives the short portioning belt 71 and the other drives the long portioning belt 73 via a respective drive belt 27. The direct coupling by means of the drive belts 27 makes it possible to drive belt rollers 53 or drive wheels 44 arranged offset in the conveying direction with drive motors 15 or drive shafts 51 located at the same height, viewed in the conveying direction. This concept consequently utilizes the circumstance that the two drive belts 27 can run on the two mutually opposite sides of the portioning unit and thus without mutual interference or influencing.

[0097] The two motors 15 are each fastened to a linkage 35 which is pivotably supported about an axle 33. The linkages 35 are each pivotable by means of a common lever shaft 29 which is connected to a lever 19 on a side of the portioning unit. The shaft 29 is configured

eccentric in each case in the region of the linkages 35 such that by rotation of the shaft 29 by approximately 180° by means of the lever 19 a pivot movement of both linkages 35 simultaneously is effected such that both belts 27 are relaxed or tautened simultaneously.

[0098] Consequently, by a single manual actuation via the lever 19, a user can simultaneously pivot both motors 15 and can thus decouple both portioning belts 71, 73 simultaneously from their respective drives or couple them to their respective drives. A removal or an installation of this portioning conveyor unit is consequently possible in a fast and simple manner.

[0099] The enlarged representation of a part of Fig. 9 in Fig. 10 in particular shows the operation of the lever shaft 19 in the region of the left hand drive motor 15 in Fig. 9. The eccentricity of the shaft 29 in the region of the linkage 35 provides the above-explained pivoting of the motor 15 attached to the linkage 35 on the rotation of the shaft 29. The shaft 29 is furthermore rotationally fixedly connected to two latching members 21 of which only one is shown in Fig. 10. In the installed state shown, the latching member 21 engages through a slit 23 formed in the base 25 of the conveyor belt unit 13 to latch the base 25 and thus the conveyor belt unit 13 to the substructure 41. By rotating the shaft 29 and thus pivoting the latching member 21, this latched connection is cancelled, while simultaneously the belt 27 is relaxed by pivoting the linkage 35.

[00100] It can moreover be seen from Figs. 8 to 10 that the drive belts 27 are each designed as toothed belts and the belt wheels 44 each arranged at the end face of the respective belt roller 53 are each provided in the form of a toothed wheel.

[00101] With the two-track traction belt in accordance with Figs. 11, 12a, 12b, 13a and 13b (cf. also the above statements on Fig. 6), a drive motor 15 which drives the respective belt roller 53 or the end face drive wheel 44 via a belt 27 is provided for each of the two tracks between which a partition wall 69 is arranged here.

[00102] This traction belt unit is consequently designed in a mirror image with respect to a center plane between the two tracks which extends perpendicular to the product support surfaces of the continuous belts 55, with both tracks, however, being formed at a single conveyor belt unit 13 which can be handled as a whole.

[00103] The removal and the installation of this conveyor belt unit 13, including the latching to the substructure 41 and the relaxing and tautening of the drive belts 27 take place as in the embodiment of Figs. 1 to 5, which will be explained in more detail in the following.

[0104] Figs. 12a and 13a each show the operating position with a tautened drive belt 27, whereas Figs. 12b and 13b each show a situation in which the drive belts 27 are relaxed and the conveyor belt unit 13 is unlatched, with the base 25 of the conveyor belt unit 13 still being in engagement with the coupling elements 37 of the mount 11.

[0105] The comparison of Figs. 12a and 12b in particular shows that the lever 19 has to be pivoted by approximately 180° clockwise to bring the latching member 21 out of engagement with the slit 23 in the base 25 of the conveyor belt unit 13 and to pivot the linkage 35 counterclockwise to relax the belt 27.

[0106] Figs. 13a and 13b each show a section perpendicular to the conveying direction through the shaft 29 of the lever 19. In particular the eccentric design of the shaft 29 in the region of the linkage 35 and the cooperation of the shaft 29 with the latching member 21 can be recognized, said latching member being in latching engagement with the base 25 of the conveyor belt unit 13 in the region of the slit 23 in the installation situation in accordance with Fig. 13a and being out of engagement with the base 25 of the conveyor belt unit 13 in the unlatched state in accordance with Fig. 13b.

[0107] It can additionally be seen from Figs. 12b and 13b that the belt 27 is relaxed and thus moves out of engagement with the drive wheel 44 or is only laid loosely around the

drive wheel 44 by the pivoting of the linkage 35 and thus of the drive shaft 51 of the motor in the direction of the drive wheel 44 of the conveyor belt unit 13 and by the spacing reduction thereby effected between the drive shaft 51 and the drive wheel 44 so that the belt 27 can easily be taken off the drive wheel 44 and the conveyor belt unit 13 can simply be brought out of engagement with the coupling elements 37 of the mount 11 by displacement and can then be raised.

[0108] As already mentioned above in conjunction with Fig. 7, Figs. 14a and 14b schematically show a different removal concept for a conveyor belt unit 13 which can also be configured as a portioning belt or as a traction belt in this concept and which can each be designed either as single track or multitrack.

[0109] It is shown purely by way of example in Figs. 14a and 14b how the support bar 67 - at the left here - of the mount 11 or of the substructure 41 can be configured to not only be able to serve as a support for the base 25 of the conveyor belt unit 13, but rather also for latching the conveyor belt unit 13 to the substructure.

[0110] For this purpose, the base 25 is provided in the region of a latching section 77 of the support bar 67 with a mount 79 which is shaped in the form of a keyhole and into which the latching section 77 can only move in a rotational position of the support bar 67 corresponding to an unlatched position, as is shown in Fig. 14b.

[0111] In the latched position in accordance with Fig. 14a, the latching section 77 located in the mount 79 is oriented such that the latching section 77 cannot move out of the mount 79. The conveyor belt unit 13 is consequently latched and secured in the installation situation or operating position in the state in accordance with Fig. 14a.

[0112] To remove the conveyor belt unit 13, the support bar 67 at the left here is first rotated into the position in accordance with Fig. 14b so that the latching section 77 can

move out of the mount 79 when the conveyor belt unit 13 is pivoted about the other support bar 65.

[0113] This pivoting of the conveyor belt unit 13 effects a spacing reduction between the drive wheel 44 of the conveyor belt unit 13 and the drive shaft 51 of the motor 15, whereby the drive belt 27 is relaxed. The conveyor belt unit 13 pivoted for the purpose of this belt relaxation can then be raised from the support bar 65.

[0114] While the invention has been described in detail in connection with only a limited number of embodiments, it should be readily understood that the invention is not limited to such disclosed embodiments. Rather, the invention can be modified to incorporate any number of variations, alterations, substitutions or equivalent arrangements not heretofore described, but which are commensurate with the spirit and scope of the invention. Additionally, while various embodiments of the invention have been described, it is to be understood that aspects of the invention may include only some of the described embodiments. Accordingly, the invention is not to be seen as limited by the foregoing description, but is only limited by the scope of the appended claims.

Abstract

The invention relates to a slicing apparatus for food products, in particular to a high-performance slicer, having at least one belt conveyor which is configured as a removable conveyor belt unit.

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PATENT APPLICATION FEE DETERMINATION RECORD

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Application or Docket Number	Filing Date	☐ To be Mailed
14/094,136	12/02/2013	

ENTITY: ☒ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED – PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			
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APPLICATION AS AMENDED – PART II

AMENDMENT **02/26/2014**

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	* 25	Minus	** 25	= 0	X $80 =	0
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AMENDMENT

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =	
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Prioritätsbescheinigung
DE 10 2012 222 042.9
über die Einreichung einer Patentanmeldung



Aktenzeichen:	10 2012 222 042.9
Anmeldetag:	03. Dezember 2012
Anmelder/Inhaber:	Textor Maschinenbau GmbH, 87640 Biessenhofen, DE
Bezeichnung:	Hochleistungsaufschnittschneidemaschine mit zumindest einer entnehmbaren Bandkassette
IPC:	B26D 7/06; B26D 7/32; B65B 25/06; B65B 35/44; B65B 35/24

Die angehefteten Stücke sind eine richtige und genaue Wiedergabe der Teile der am 03. Dezember 2012 eingereichten elektronischen Dokumente dieser Patentanmeldung unabhängig von gegebenenfalls durch das Druckverfahren bedingten Farbabweichungen.

München, den 16. Dezember 2013
Deutsches Patent- und Markenamt
Die Präsidentin
Im Auftrag

Götz

Hochleistungsaufschnittschneidemaschine mit zumindest einer entnehmbaren Bandkassette

Problembeschreibung:

In Hochleistungsaufschnittschneidemaschinen müssen Produkte einer Schneidebene zugeführt werden, damit sie in Scheiben geschnitten werden können. Weiterhin müssen dann die abgeschnittenen Scheiben zu Portionen gruppiert und anschließend aus dem Schneidbereich abtransportiert werden. Zu diesem Zweck werden normalerweise aktiv angetriebene Förderbänder eingesetzt. Dies sind entweder Gurtförderer oder (Rund-)Riemenförderer.

Die Förderer, welche das Produkt der Schneidebene zuführen, reichen normalerweise bis kurz vor die Schneidebene, um eine optimale Traktion der Produkte zu gewährleisten. Diese Förderer werden oft auch als Traktionsbänder bezeichnet.

Die Förderer, welche die aufgeschnittenen Scheiben auffangen und zu Portionen aus mehreren Scheiben gruppieren, nennt man üblicherweise Portionierbänder. Es werden oft zumindest zwei nacheinander angeordnete Förderer eingesetzt, um nach Übergabe der Portion von dem ersten Förderer auf den zweiten Förderer unmittelbar wieder mit der Ablage neuer Scheiben auf dem ersten Förderer beginnen zu können.

Sowohl die Zuführbänder(Traktionsbänder) als auch die Abtransportbänder (Portionierbänder) werden während des Betriebes der Schneidemaschine stark verschmutzt. Es ist notwendig, diese Bänder täglich, oftmals sogar mehrmals täglich, zu reinigen. Dazu ist normalerweise eine Entnahme der Bandgurte oder Transportriemen zur gründlichen Reinigung notwendig.

Beim Stand der Technik wird dies dadurch ermöglicht, dass die Bandkassetten einseitig an einem Maschinengestell aufgehängt sind, um eine einfache Entnahme des Gurtes zu erreichen. Die Bandkassetten verbleiben dabei während der Reinigung in der Maschine. Der Nachteil dieser Lösung ist, dass mit zunehmender Breite des Bandförderers sehr massive Bandgestelle notwendig sind. Weiterhin wird seitlich neben der Bandkassetteneinheit viel Platz benötigt, um den Gurt bzw. das Fördermittel in der Maschine zu entnehmen.

Alternativ kennt man vom Stand der Technik entnehmbare Bandkassetten. Diese ermöglichen die einfache Entnahme der Bandkassette inkl. dem Fördermittel. Die Kopp-

lung dieser Bandkassetten an eine Antriebseinheit erfolgt üblicherweise über eine Kupplung bzw. eine Kupplungseinheit. D.h. auf der Antriebsrolle der Bandkassette sitz eine Kupplung, welche im Betrieb die Verbindung zu einem Antriebsmotor herstellt. Diese Bauart baut allerdings sehr breit. Denn entweder muss der Motor axial neben der Antriebsrolle der Bandkassette angeordnet werden, oder es muss eine Kupplungseinheit mit Lagerung axial zur Antriebsrolle der Bandkassette angeordnet werden, welche dann über eine weitere Verbindung, z.B. einen Zahnriemen, mit einem Antriebsmotor gekoppelt werden. Beide Varianten bauen in die Breite und ermöglichen es nicht, mehrere Antriebe an eine entnehmbare Bandkassette anzuschließen.

Erfindungsgedanke:

Ziel der Erfindung ist es, eine Lösung zu erarbeiten, welche die Nachteile des Standes der Technik nicht aufweist.

Ein Aspekt der dieses Ziel erreichenden Erfindung besteht darin, die Bandkassette entnehmbar auszuführen und einen Antriebsmotor für das Förderband direkt, ohne eine wie auch immer geartete Kupplung, mit der Bandkassette zu koppeln.

Gemäß einem weiteren Aspekt der Erfindung wird eine Vorrichtung vorgesehen, welche die werkzeuglose Entnahme der vorstehend genannten, insbesondere direkt angetriebenen Bandkassette ermöglicht.

Insbesondere werden der Antriebsmotor oder die Antriebsmotoren unterhalb der Bandkassette angeordnet.

Die Erfindung bietet gleich mehrere Vorteile. Sie kommt mit einer minimalen Anzahl von Bauteilen aus und ist daher kostengünstiger als heutige Lösungen. Weiterhin ermöglicht die Erfindung die Anbringung mehrerer Antriebe an einer entnehmbaren Bandkassette. Dies ermöglicht es, mehrere Produktvorschubantriebe/Produktvorschubgeschwindigkeiten zu realisieren bzw. Portionierbänder mit mehreren unabhängigen Antrieben, um einzelne Portionierspuren unabhängig antreiben und steuern zu können.

Die Funktionsweise (vgl. auch die Figuren) einer Ausführungsform ist wie folgt:

Zur Entnahme wird die noch an die (z.B. als Tisch oder Platte ausgebildete) Aufnahme 11 gekoppelte Bandkassette 13 entgegen der Förderrichtung (in den Figuren im Wesentlichen nach rechts) soweit bewegt, bis die Basis 25 der Bandkassette 13 außer Eingriff mit den Koppelelementen 37 der Aufnahme 11 gelangt ist. Dies ist allerdings erst nach einem Entriegelungsvorgang und nach Aufheben der Riemenspannung der Antriebsriemens sowie nach Abnahme des Antriebsriemens 27 vom Riemenrad 44 mög-

lich. Hierzu wird der Hebel 19 über den Zapfen 17 zunächst etwas nach außen gezogen, wodurch der formschlüssige Eingriff dieses Zapfens 17 mit der Aufnahme 11 aufgehoben wird. Der Hebel 19 kann jetzt um etwa 180° im Uhrzeigersinn verschwenkt werden. Hierdurch gibt die zunächst noch im Schlitz 23 der Basis 25 sitzende Verriegelung 21 die Basis 25 und somit die Bandkassette 13 frei. Außerdem wird hierdurch die um eine Achse 33 schwenkbar gelagerte, mit dem Antriebsmotor verbundene Schwinge 35 im Gegenuhrzeigersinn bewegt, wodurch der Antriebsriemen 27 entspannt wird und abgenommen werden kann. Die Bewegung der Schwinge 35 im Gegenuhrzeigersinn wird ermöglicht durch das Zusammenwirken der exzentrisch ausgebildeten Hebelwelle 29 des Hebels 19 und der in der Schwinge 35 ausgebildeten Aussparung 31, durch welche sich die exzentrische Hebelwelle 29 hindurch erstreckt.

Das Verschwenken des Hebels 19 hat also zweierlei zur Folge: Zum einen eine Entriegelung der Bandkassette 13 und zum anderen eine Entspannung des Antriebsriemens 27. Beides ist erforderlich, um die Bandkassette 13 und somit deren Basis 25 außer Eingriff mit den Koppelelementen 37 zu bewegen und dann entnehmen zu können.

Der Einbau der Bandkassette 13 erfolgt in umgekehrter Reihenfolge.

Ansprüche:

1. Aufschnittschneidemaschine, insbesondere Hochleistungsslicer, mit zumindest einem Bandförderer zum Fördern wenigstens eines Produktes zu der Schneidebene und/oder einem Bandförderer zum Abtransport von Portionen aus dem Schneidbereich, wobei der Bandförderer als entnehmbare Bandkassette ausgeführt ist.

2. Maschine gemäß Anspruch 1, bei welcher ein Antriebsrad der Bandkassette über die Lagerung einer Bandrolle gelagert ist.

3. Maschine gemäß einem der vorstehenden Ansprüche, bei welcher im Betriebszustand ein Antriebsmotor direkt, insbesondere über eine Zahnriemenverbindung oder eine Zahnradpaarung, mit der Bandkassette verbunden ist.

4. Maschine gemäß einem der vorstehenden Ansprüche, bei dem die Spannung eines Antriebsriemens einzig über eine Relativbewegung zweier Zahnriemenräder zueinander erfolgt, insbesondere ohne eine zusätzliche Riemenspannvorrichtung.

5. Maschine gemäß einem der vorstehenden Ansprüche, bei der die Entspannung eines Antriebriemens über einen Exzenterhebel erfolgt, welcher den an einer Wippe angebrachten Antriebsmotor anhebt und/oder den Achsabstand zwischen dem Antriebsmotor und einer Bandrolle verringert und damit den Antriebsriemen entspannt.

6. Maschine gemäß einem der vorstehenden Ansprüche, bei welcher ein Mechanismus zur Antriebsriemenspannung/Antriebsriemenentspannung gleichzeitig die Funktion der Verriegelung der Bandkassette in ihrer Arbeitsposition übernimmt.

7. Maschine gemäß einem der vorstehenden Ansprüche, bei der die Bandkassette für einen Mehrspurbetrieb ausgelegt ist, wobei insbesondere die Bandkassette zweigeteilt ist und wenigstens links und rechts jeweils zumindest ein Riemenrad aufweist, so dass zumindest zwei separate Antriebe an die Bandkassette angeschlossen werden können.

8. Maschine gemäß einem der vorstehenden Ansprüche, bei der die Entspannung bzw. Spannung des Antriebsriemens durch Verstellen, insbesondere Ver-

schwenken, der Bandkassette oder einer Baugruppe oder eines Bauteils der Bandkassette erfolgt, insbesondere durch Klappen oder Verschwenken des Bandes und/oder einer das Band umlenkenden Bandrolle, insbesondere derart, dass sich der Abstand zwischen einem Riemenrad des Antriebsmotors und einem Riemenrad der Bandkassette verändert.

9. Maschine gemäß einem der vorstehenden Ansprüche, wobei der Bandförderer eine Förderbreite im Bereich von etwa 300mm bis 700mm aufweist.

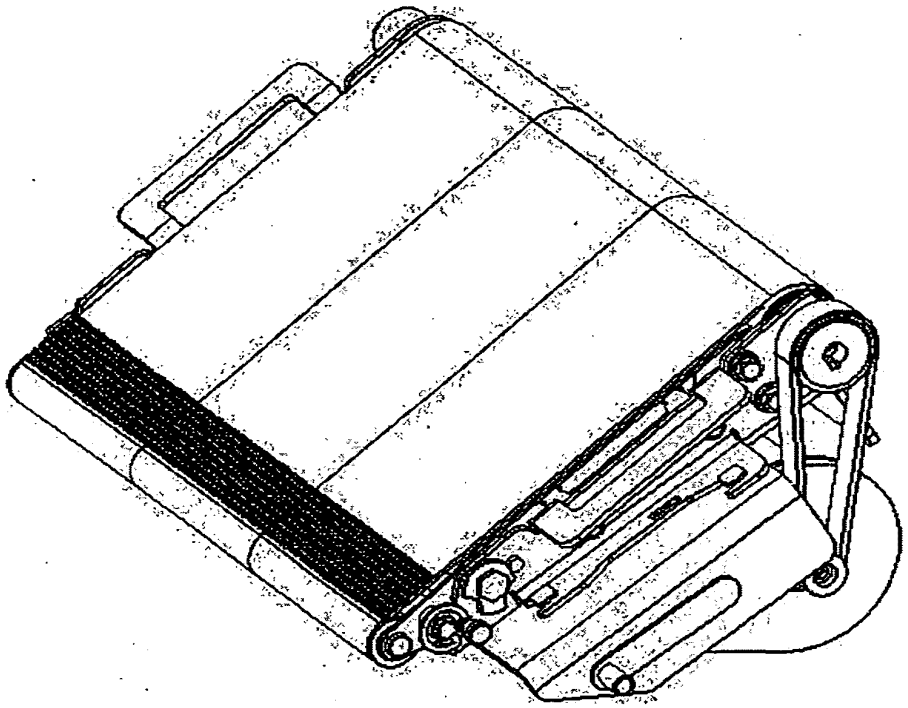
10. Maschine gemäß einem der vorstehenden Ansprüche, bei welcher der Antriebsmotor unterhalb der Bandkassette angeordnet ist.

11. Maschine gemäß einem der vorstehenden Ansprüche, bei welcher eine werkzeuglose Entnahme der zumindest einen Bandkassette vorgesehen ist.

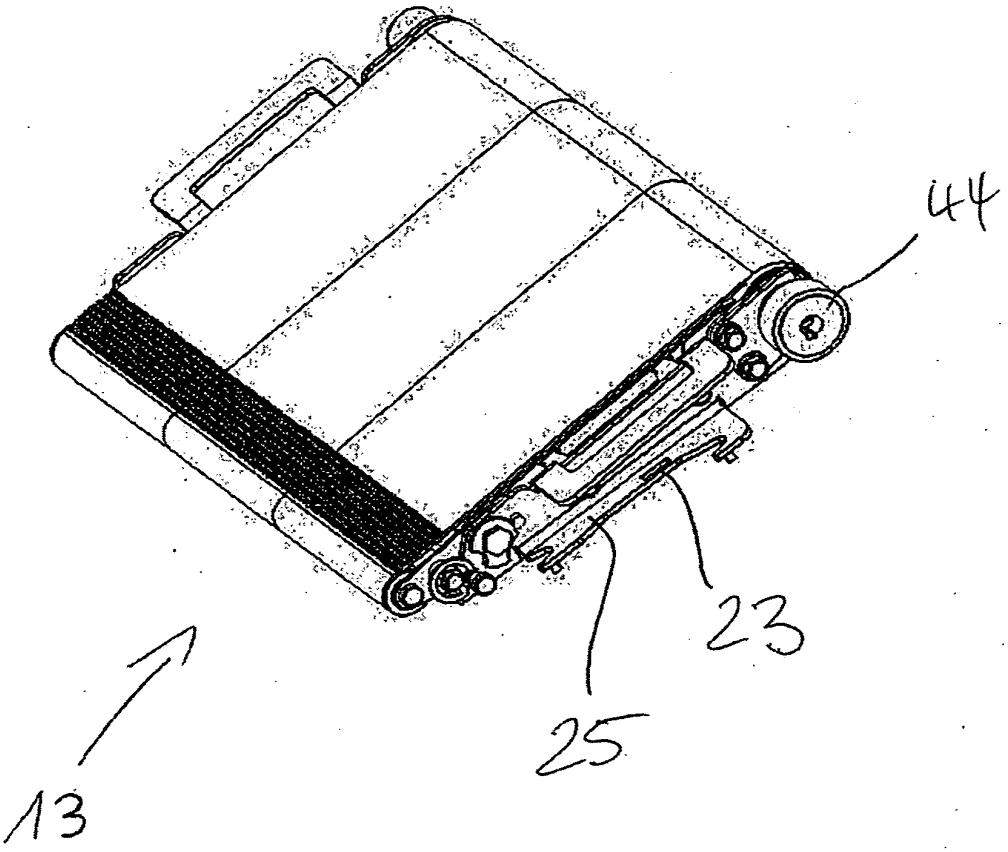
Zusammenfassung

Die Erfindung betrifft eine Aufschnittschneidemaschine, insbesondere einen Hochleistungsslicer, mit zumindest einem Bandförderer zum Fördern wenigstens eines Produktes zu der Schneidebene und/oder einem Bandförderer zum Abtransport von Portionen aus dem Schneidbereich, wobei der Bandförderer als entnehmbare Bandkassette ausgeführt ist.

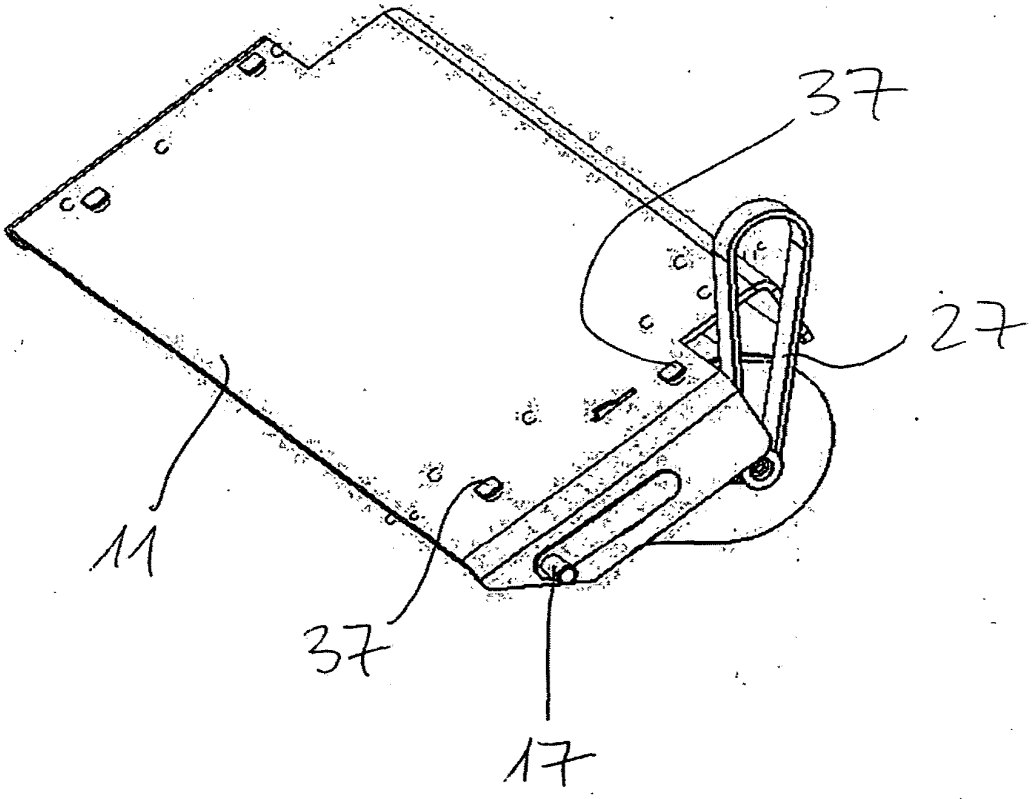
Bandkassette (Ausführungsbeispiel als 1-spurige Traktionsbandvariante) in Einbauposition im Slicer



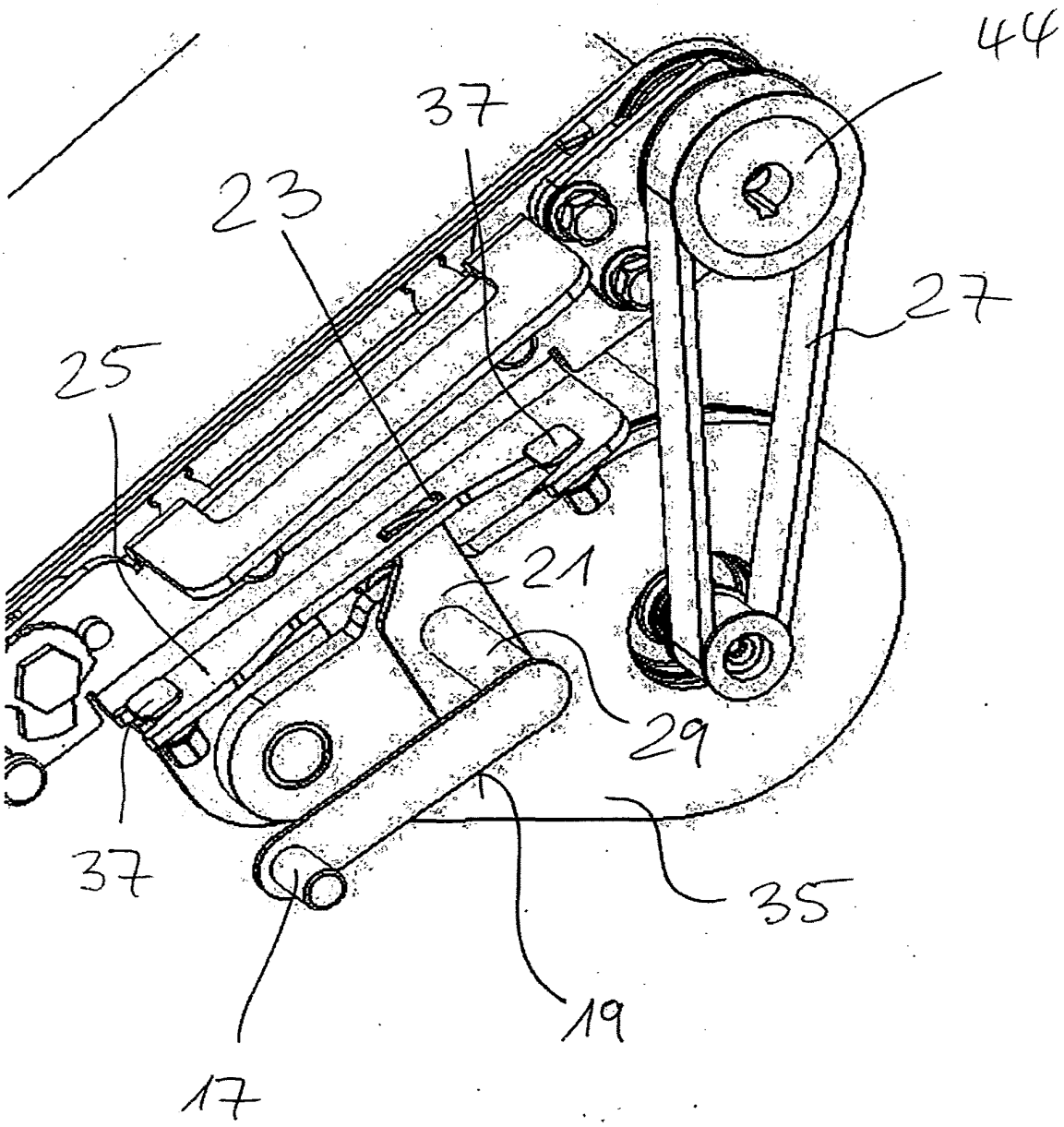
Bandkassette entnommen



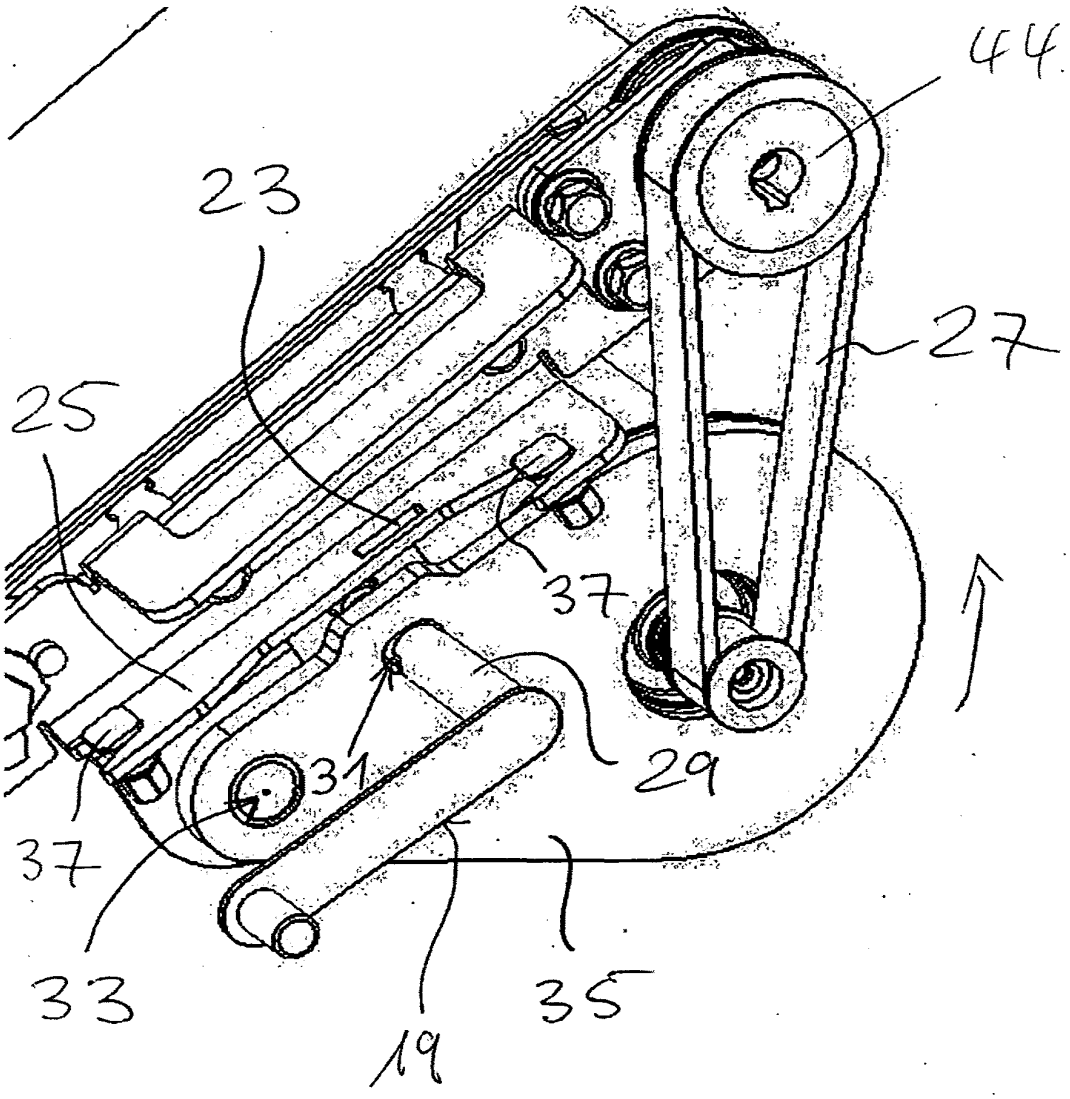
Aufnahmetisch im Slicer nach Entnahme der Bandkassette:



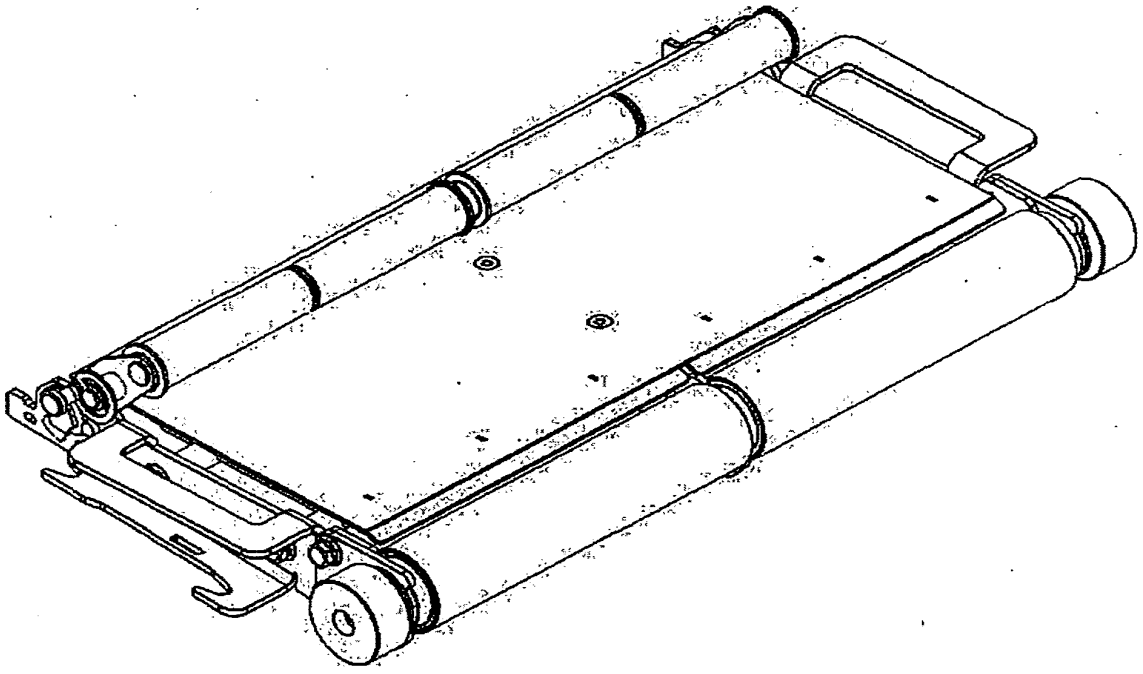
Bandkassette im montierten Zustand, wobei die Aufnahmeplatte ausgeblendet ist, damit der Verriegelungsbolzen sichtbar ist.



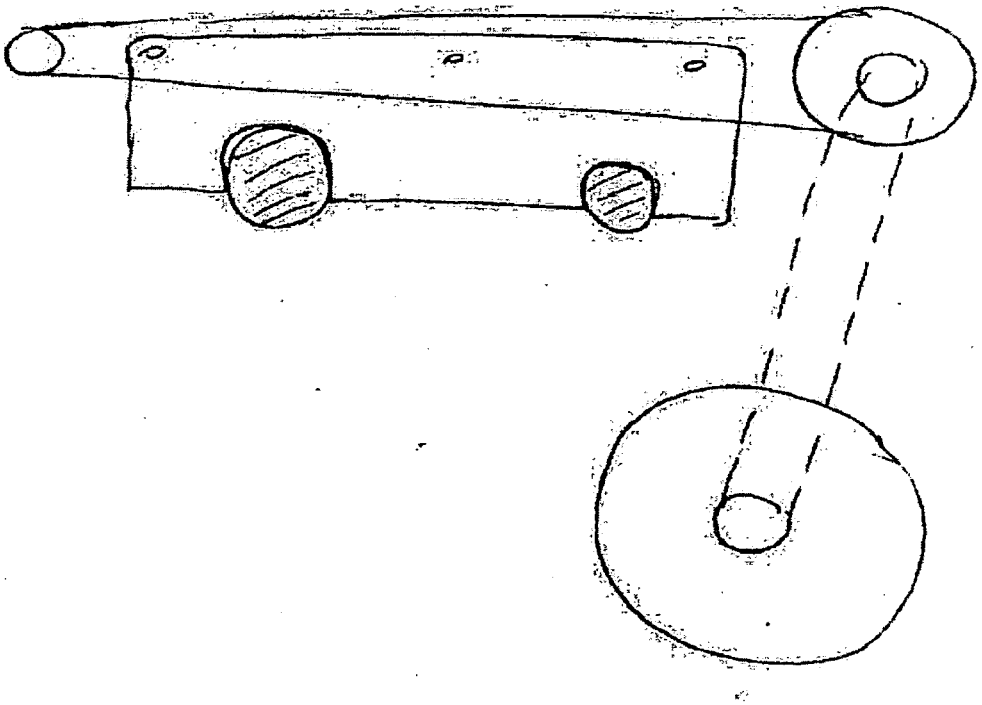
Bandkassette im montierten Zustand, wobei die Aufnahmeplatte ausgeblendet ist und der Verriegelungsbolzen ausgeblendet ist, damit die Exzenterfunktion sichtbar ist.



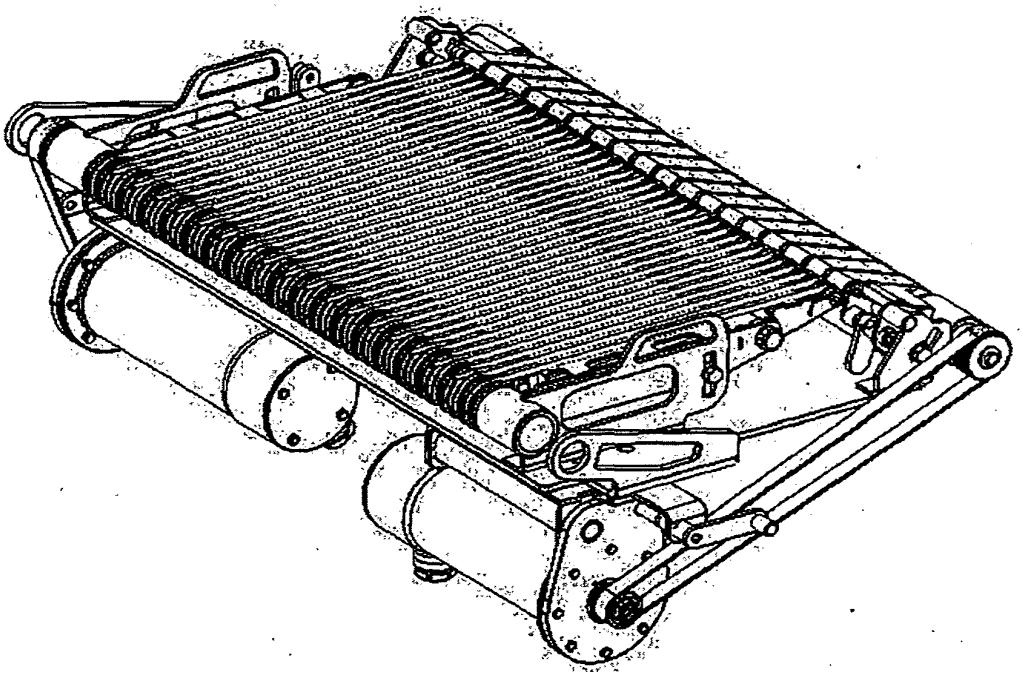
Bandkassette in 2-spuriger Ausführung mit hochgeklappter Bandumlenkung und entnommenen Bandfördergurten.



Bandkassette mit Antriebsriemenentspannung über Verlagerung des Bandes. Hier steht der Motor fest und die Entspannung des Antriebsriemens zur Entnahme des Bandes erfolgt über das Schwenken des Bandes um eine der Auflagenstangen, wobei die zweite Stange zur Verriegelung der Kassette in der Position dient.

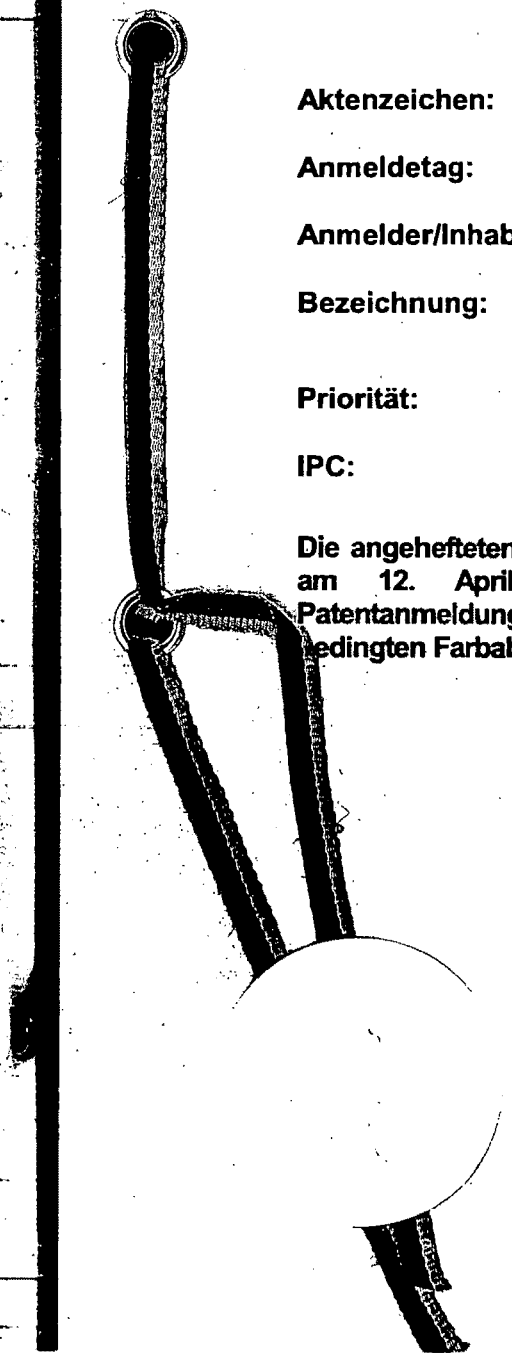


Entnehmbare Bandkassette gemäß den Ansprüchen in der Ausführungsvariante als Portionierband



BUNDESREPUBLIK DEUTSCHLAND

Prioritätsbescheinigung
DE 10 2013 206 510.8
über die Einreichung einer Patentanmeldung



Aktenzeichen:	10 2013 206 510.8
Anmeldetag:	12. April 2013
Anmelder/Inhaber:	Textor Maschinenbau GmbH, 87640 Biessenhofen, DE
Bezeichnung:	Hochleistungsaufschnittschneidemaschine mit zumindest einer entnehmbaren Bandkassette
Priorität:	03. Dezember 2012; DE; 10 2012 222 042.9
IPC:	B26D 7/06; B26D 7/32

Die angehefteten Stücke sind eine richtige und genaue Wiedergabe der Teile der am 12. April 2013 eingereichten elektronischen Dokumente dieser Patentanmeldung unabhängig von gegebenenfalls durch das Druckverfahren bedingten Farbabweichungen.

München, den 13. Dezember 2013
Deutsches Patent- und Markenamt
Die Präsidentin
Im Auftrag

Götz

HOCHLEISTUNGSAUFSCHNITTSCHNEIDEMASCHINE MIT ZUMINDEST EINER ENTNEHMBAREN BANDKASSETTE

Die Erfindung betrifft eine Aufschnittschneidemaschine für Lebensmittelprodukte, insbesondere Hochleistungs-Slicer, mit zumindest einem Bandförderer.

Insbesondere in Hochleistungsaufschnittschneidemaschinen müssen Produkte einer Schneidebene zugeführt werden, damit die Produkte in Scheiben geschnitten werden können. Weiterhin müssen dann die abgeschnittenen Scheiben zu Portionen gruppiert und anschließend aus dem Schneidebereich abtransportiert werden. Für diese Förderaufgaben werden normalerweise aktiv angetriebene Förderbänder eingesetzt. Bei diesen handelt es sich entweder um Band- oder Gurtförderer mit relativ breiten flachen Bänder bzw. Gurten oder um Riemenförderer mit einer Vielzahl von relativ schmalen Einzelriemen, die insbesondere einen kreisförmigen Querschnitt aufweisen können.

Diejenigen Förderer, welche die Produkte der Schneidebene zuführen, sollen normalerweise bis kurz vor die Schneidebene reichen, um eine optimale Traktion der Produkte zu gewährleisten. Daher werden diese Förderer oft auch als Traktionsbänder bezeichnet.

Diejenigen Förderer, welche die aufgeschnittenen Scheiben auffangen und zu Portionen aus mehreren Scheiben gruppieren, nennt man üblicherweise Portionierbänder. Es werden oft zumindest zwei nacheinander angeordnete Förderer eingesetzt, um nach Übergabe der Portion von dem ersten

Förderer auf den zweiten Förderer unmittelbar wieder mit der Ablage neuer Scheiben auf dem ersten Förderer beginnen zu können. Diese wenigstens zwei nacheinander angeordneten Förderer werden im Rahmen der vorliegenden Offenbarung auch gemeinsam als ein "Portionierband" bezeichnet, obwohl mehrere hintereinander angeordnete Einzelförderer vorgesehen sind.

Die Erfindung ist nicht auf derartige Traktionsbänder oder Portionierbänder beschränkt. Grundsätzlich kann die Erfindung an jeder Art von Bandförderer realisiert werden.

In der Praxis werden während des Betriebs einer Aufschnittschneidemaschine sowohl die Zuführbänder (insbesondere die Traktionsbänder) als auch die Abtransportbänder (insbesondere die Portionierbänder) üblicherweise stark verschmutzt. Es ist deshalb notwendig, diese Förderbänder täglich, oftmals sogar mehrmals täglich, zu reinigen. Dazu ist normalerweise eine Entnahme der Bandgurte oder Transportriemen notwendig, um eine gründliche Reinigung durchführen zu können.

Aus dem Stand der Technik ist es bekannt, eine solche Entnahme dadurch zu ermöglichen, dass die Förderer einseitig an einem Maschinengestell aufgehängt sind, um eine einfache Entnahme des Bandes oder Gurtes zu erreichen. Die Förderer verbleiben dabei während der Reinigung in der Maschine. Der Nachteil einer solchen Vorgehensweise ist, dass mit zunehmender Breite des Bandförderers sehr massive Bandgestelle notwendig sind. Weiterhin wird seitlich neben dem Förderer viel Platz benötigt, um das jeweilige Fördermittel, beispielsweise den Gurt, bei an der Maschine verbleibendem Förderer zu entnehmen.

Des Weiteren sind Förderer bekannt, die einschließlich des jeweiligen Fördermittels einfach entnommen werden können. Allerdings sind diese Förderer üblicherweise über eine Kupplung bzw. eine Kupplungseinheit an eine Antriebseinheit gekoppelt. Dies bedeutet, dass auf der Antriebsrolle des Förderers eine Kupplung sitzt, die im Betrieb die Verbindung zu einem Antriebsmotor herstellt. Durch eine solche Bauart ergibt sich allerdings eine sehr große Breite, da entweder der Antriebsmotor axial neben der Antriebsrolle des Förderers angeordnet werden muss oder es erforderlich ist, eine Kupplungseinheit mit Lagerung axial zur Antriebsrolle des Förderers anzuordnen, wobei diese Kupplungseinheit dann über eine weitere Verbindung, z.B. einen Zahnriemen, mit einem Antriebsmotor gekoppelt werden muss.

Beide Varianten resultieren in einer großen Breite und ermöglichen es zudem nicht, mehrere Antriebe an einen entnehmbaren Förderer anzuschließen.

Aufgabe der Erfindung ist es, eine Maschine der eingangs genannten Art zu schaffen, welche die erwähnten Nachteile nicht aufweist und welche insbesondere bei Platz sparender und kostengünstiger Bauweise eine möglichst einfache Reinigung ermöglicht.

Die Lösung dieser Aufgabe erfolgt durch die Merkmale des Anspruchs 1.

Erfindungsgemäß ist der Bandförderer als entnehmbare Bandkassette ausgeführt.

Bevorzugte Ausführungsformen der Erfindung sind auch in den abhängigen Ansprüchen, der Beschreibung sowie der Zeichnungen angegeben.

Gemäß einem Ausführungsbeispiel ist die Bandkassette in Förderrichtung gesehen vor der Schneidebene angeordnet und insbesondere als Traktionsband ausgebildet. Gemäß einer alternativen Ausgestaltung ist die Bandkassette in Förderrichtung gesehen hinter der Schneidebene angeordnet und insbesondere als Portionierband ausgebildet.

Die Bandkassette kann – in Förderrichtung gesehen – eine wirksame Band- oder Förderlänge aufweisen, die weniger als 500 mm, insbesondere weniger als 300 mm, insbesondere weniger als 200 mm und insbesondere zwischen 50 mm und 150 mm beträgt. Die Erfindung ermöglicht es, sehr kurze Bandförderer zu realisieren, die beispielsweise lediglich eine Länge von ungefähr 100 mm aufweisen und dabei mehrere unabhängige Antriebe aufweisen können. Von Vorteil ist dies insbesondere für die Ausgestaltung einer entnehmbaren Bandkassette als eine Portioniereinheit, bei der zumindest einer der Förderer eine sehr kurze Förderlänge aufweisen soll.

Bevorzugt weist die Bandkassette eine unterhalb der umlaufenden Förderbänder oder Förderriemen angeordnete Basis auf, mit der die Bandkassette mechanisch an einem Unterbau des Bandförderers angebracht werden kann. Die Basis stellt gewissermaßen den kassettenseitigen Teil einer mechanischen Schnittstelle zwischen Bandkassette und Unterbau dar. Der Unterbau, der bei Entnahme der Bandkassette vor Ort verbleibt, kann ein Bestandteil nur des betreffenden Bandförderers sein, zu einer übergeordneten Förderstrecke gehören oder in eine Aufschneidemaschine integriert sein. Bevorzugt weist der Unterbau eine an die Basis der Bandkassette angepasste Aufnahme auf, die gewissermaßen den stationären Teil der mechanischen Schnittstelle zwischen Bandkassette und Unterbau bildet.

Gemäß einem Ausführungsbeispiel ist zumindest ein direkter Antrieb für die Bandkassette vorgesehen. Eine solche Ausgestaltung kommt mit einer minimalen Anzahl von Bauteilen aus und ist folglich äußerst kostengünstig. Ferner ist es hierdurch möglich, mehrere Antriebe an einer einzigen entnehmbaren Bandkassette anzubringen. Ein solcher Multiantrieb eröffnet vielfältige Konfigurationsmöglichkeiten. So ist es beispielsweise möglich, einen Mehrspurbetrieb zu realisieren, bei dem die einzelnen Spuren unabhängig voneinander angetrieben und gesteuert werden können. Besonders vorteilhaft ist dies für Portioniereinheiten. Bislang war es zumindest äußerst aufwendig und schwierig, wenn nicht praktisch unmöglich, mehrspurige Portionierbänder zu realisieren, da die hygienische und funktionale Unterbringung mehrerer Antriebe nicht befriedigend bewerkstelligt werden konnte.

Gemäß einer weiteren Ausführungsform der Erfindung ist wenigstens ein Antriebsmotor für die Bandkassette vorgesehen, wobei der Antriebsmotor direkt mit der Bandkassette gekoppelt ist. Eine derartige Koppelung kann beispielsweise über eine Riemenverbindung, mit der relativ lange Strecken zwischen dem Motor und derjenigen Stelle der Bandkassette, an welcher diese angetrieben werden soll, überwunden werden können, oder über eine Zahnradanordnung erfolgen, beispielsweise über eine Zahnradpaarung.

Des Weiteren kann erfindungsgemäß vorgesehen sein, dass ein Antriebsmotor für die Bandkassette eine Antriebswelle und die Bandkassette ein Antriebsrad aufweist, wobei die Antriebswelle und das Antriebsrad direkt miteinander gekoppelt sind. Dies ermöglicht einen besonders einfachen und kostengünstigen Aufbau, der ohne Beeinträchtigung der Funktionalität wenig Platz beansprucht und hohen hygienischen Anforderungen gerecht wird.

In einer bevorzugten Ausgestaltung ist vorgesehen, dass der Antriebsmotor unterhalb der Bandkassette angeordnet ist. Hierdurch wird die Breite des Bandförderers nicht unnötig vergrößert. Unterhalb des Förderers zur Verfügung stehender Bauraum kann so genutzt werden. Insbesondere ist es möglich, mehrere Antriebe nebeneinander oder hintereinander unterhalb der Bandkassette anzuordnen.

Ein weiteres Ausführungsbeispiel der Erfindung schlägt vor, dass die Bandkassette eine gelagerte Bandrolle aufweist, wobei ein Antriebsrad der Bandkassette über die Lagerung der Bandrolle gelagert ist. Hierdurch wird der Antrieb der Bandkassette weiter vereinfacht und es werden Bauteile eingespart, indem die Lagerung der Bandrolle für die Lagerung des Antriebsrades genutzt wird.

Insbesondere ist hierbei das Antriebsrad der Bandkassette koaxial zur Bandrolle und insbesondere axial neben der Bandrolle angeordnet. Ein mit dem Antriebsrad zusammenwirkender Antriebsmotor kann so - insbesondere unterhalb der Bandkassette - grundsätzlich an jeder beliebigen Stelle angeordnet werden, die eine direkte Koppelung mit dem Antriebsrad insbesondere über eine Riemenverbindung oder eine Zahnradanordnung ermöglicht. Von besonderem Vorteil ist dabei, dass es nicht erforderlich ist, den Antriebsmotor bzw. dessen Antriebswelle in axialer Verlängerung der Bandrolle anzuordnen, so dass eine unnötige Verbreiterung des Bandförderers vermieden wird.

In einer besonders bevorzugten Ausgestaltung der Erfindung ist zum Aufheben und Herstellen einer Koppelung zwischen einem Antriebsmotor für die Bandkassette und der Bandkassette jeweils eine Relativbewegung zwischen Antriebsmotor und Bandkassette vorgesehen. Bei dieser Relativbewegung kann es sich um eine Schwenkbewegung handeln, die eine reine

Dreh- oder Rotationsbewegung umfassen, grundsätzlich aber auch eine komplexere Bewegung sein kann, welche eine Überlagerung mehrerer Einzelbewegungen ist.

So kann einfach durch Bewegen entweder des Antriebsmotors oder der Bandkassette die antriebsmäßige Koppelung zwischen Motor und Kassette aufgehoben werden, um eine Entnahme der Kassette zu ermöglichen.

Von besonderem Vorteil ist bei diesem Konzept, dass der Antriebsmotor an der Maschine bzw. an dem Unterbau der Fördereinrichtung verbleiben kann.

In einer bevorzugten Ausgestaltung wird durch die Relativbewegung zwischen Antriebsmotor und Bandkassette der Abstand zwischen einer Antriebsachse des Antriebsmotors und einer Antriebsachse der Bandkassette verändert. Der Motor und die Kassette werden folglich derart relativ zueinander bewegt, dass eine Abstandsveränderung zwischen den beiden Antriebsachsen bewirkt wird. Insbesondere kann hierdurch der Abstand zwischen einer Antriebswelle des Antriebsmotors und einem Antriebsrad der Bandkassette verändert werden. Hierdurch kann beispielsweise ein Antriebsriemen entspannt bzw. gespannt oder eine Zahnradanordnung außer Eingriff bzw. in Eingriff gebracht werden.

Gemäß einem Ausführungsbeispiel der Erfindung kann eine Koppelung zwischen einem Antrieb für die Bandkassette und der Bandkassette durch Entspannen eines Antriebsriemens aufhebbar und durch Spannen des Antriebsriemens herstellbar sein. Das Entspannen und Spannen des Antriebsriemens kann jeweils durch eine Relativbewegung zwischen Antrieb und Bandkassette erfolgen, wie vorstehend bereits erwähnt. Eine solche Relativbewegung ist grundsätzlich aber nicht zwingend.

Gemäß einem weiteren Ausführungsbeispiel der Erfindung ist für die Bandkassette eine bei entnommener Bandkassette an der Maschine verbleibende Aufnahme vorgesehen, an der die Bandkassette verriegelbar ist, wobei die Verriegelung zur Entnahme der Bandkassette aufhebbar und zum Einbau der Bandkassette herstellbar ist.

In einer Variante der Erfindung ist es möglich, dass zur Entnahme oder zum Einbau der Bandkassette eine Koppelung zwischen einem Antrieb der Bandkassette und der Bandkassette gleichzeitig mit einer Verriegelung der Bandkassette aufhebbar bzw. herstellbar ist, beispielsweise einer Verriegelung der Bandkassette an einer an der Maschine verbleibenden Aufnahme, wie vorstehend erwähnt.

Hierdurch ist es insbesondere möglich, lediglich einen einzigen Arbeits- oder Betätigungsvorgang vorzusehen, mit dem gleichzeitig die Verriegelung und die Koppelung aufgehoben werden, um die Bandkassette entnehmen zu können.

In einer alternativen Variante der Erfindung kann vorgesehen sein, dass zur Entnahme oder zum Einbau der Bandkassette gleichzeitig die Koppelung zwischen einem Antrieb für die Bandkassette und der Bandkassette einerseits und eine Entnahme- bzw. Einbaubewegung der Bandkassette andererseits durchzuführen sind, und zwar nach dem Aufheben bzw. vor dem Herstellen einer Verriegelung der Bandkassette.

Hierbei wird die Entnahme- bzw. Einbaubewegung der Bandkassette dazu genutzt, gleichzeitig die antriebsmäßige Koppelung aufzuheben bzw. herzustellen. Bei dem Aufheben bzw. Herstellen der Verriegelung der Bandkassette handelt es sich dagegen um einen separaten Vorgang.

Für eine Koppelung zwischen einem Antrieb für die Bandkassette und der Bandkassette und/oder für eine Verriegelung der Bandkassette an einer Aufnahme der Maschine kann eine Betätigungseinrichtung vorgesehen sein. Insbesondere kann es sich dabei um eine manuell zu betätigende mechanische Betätigungseinrichtung handeln. Dies stellt eine besonders zuverlässige und vor allem auch kostengünstige Variante dar.

Die Betätigungseinrichtung kann einen Hebel mit einer Welle umfassen, wobei durch Drehen der Welle ein Antrieb für die Bandkassette, insbesondere eine einen Antrieb für die Bandkassette tragende Schwinge, um eine Schwenkachse verschwenkbar und/oder ein Verriegelungsorgan für die Bandkassette zwischen einer Verriegelungsposition und einer Freigabeposition bewegbar ist.

Wenn die Betätigungseinrichtung dazu ausgebildet ist, gleichzeitig die Koppelung zwischen Antrieb und Bandkassette einerseits und die Verriegelung zwischen Bandkassette und Aufnahme andererseits aufzuheben bzw. herzustellen, dann kann bei diesem Ausführungsbeispiel die mittels des Hebels in Drehung versetzbare Welle derart ausgebildet sein, dass gleichzeitig der Antrieb bzw. die den Antrieb tragende Schwinge verschwenkt und das Verriegelungsorgan bewegt wird. Gemäß einer besonders einfachen praktischen Umsetzung kann die Welle exzentrisch ausgebildet sein bzw. einen exzentrisch ausgebildeten Abschnitt umfassen.

Wenn zum Aufheben und Herstellen einer Koppelung zwischen einem Antrieb für die Bandkassette und der Bandkassette eine Bewegung der Bandkassette relativ zu dem Antrieb erfolgt, dann ist es nicht zwingend, dass hierzu die Bandkassette als Ganzes bewegt wird. Es ist auch mög-

lich, dass lediglich eine Baugruppe oder ein Bauteil der Bandkassette relativ zu dem Antrieb bewegt wird.

In einem Ausführungsbeispiel kann die Bandkassette für einen Mehrspurbetrieb ausgelegt und insbesondere mit mehreren unabhängigen Antrieben koppelbar sein, die jeweils zumindest einer Spur zugeordnet sind.

Gemäß einer weiteren Ausgestaltung der Erfindung kann die Bandkassette mehrere in Förderrichtung gesehen hintereinander angeordnete, insbesondere unmittelbar aufeinanderfolgende, Einzelförderer umfassen, denen jeweils ein separater Antrieb zugeordnet ist. Besonders vorteilhaft ist diese Ausgestaltung dann, wenn es sich bei der Bandkassette um eine Portioniereinheit bzw. ein Portionierband handelt. Zumindest ein Einzelförderer oder jeder Einzelförderer kann dabei entweder einspurig oder für einen Mehrspurbetrieb ausgebildet sein.

Wenn die als Ganzes entnehmbare Bandkassette ein Portionierband ist, das zwei aufeinander folgende Einzelförderer umfasst, die jeweils zweispurig ausgebildet sind, dann kann für jede Spur jedes Einzelförderers ein separater Antrieb vorgesehen sein, so dass beispielsweise vier unabhängig voneinander betreibbare und ansteuerbare Antriebsmotoren mit der Bandkassette gekoppelt bzw. koppelbar sind. Die Antriebsmotoren können beispielsweise unterhalb der Bandkassette angeordnet werden und an dem Unterbau, insbesondere an der Maschine, verbleiben, wenn die Bandkassette entnommen wird.

Wenn mehrere Antriebe für die Bandkassette vorgesehen sind, dann ist es gemäß einem Ausführungsbeispiel möglich, dass in Förderrichtung gesehen wenigstens ein Antrieb linksseitig und wenigstens ein weiterer Antrieb rechtsseitig mit der Bandkassette gekoppelt ist. Vorzugweise umfassen die

Antriebe dabei jeweils einen Antriebsmotor, wobei insbesondere die Antriebsmotoren quer zur Förderrichtung gesehen nebeneinander unterhalb der Bandkassette mit zur jeweiligen Seite nach außen weisenden Antriebswellen angeordnet sind.

Besonders vorteilhaft ist dieses Konzept für einen zweispurigen Slicer, da jede der beiden zur Verfügung stehenden Seiten für den Antrieb der betreffenden Spur genutzt werden kann, d.h. ein Antrieb für die linke Spur und ein Antrieb für die rechte Spur. Gleichwohl ist dieses Konzept auch für Slicer mit mehr als zwei Spuren einsetzbar. Gegebenenfalls kann hierzu eine gestaffelte Anordnung der Antriebsmotoren in Förderrichtung gesehen hintereinander vorgesehen sein, um jeder Spur einen separaten Antrieb zuzuordnen.

Wenn die Bandkassette mehrere Antriebe aufweist, dann kann vorgesehen sein, dass die Koppelung zwischen den Antrieben und der Bandkassette zumindest für eine Mehrzahl von Antrieben - und insbesondere für alle Antriebe - gleichzeitig aufhebbar und herstellbar ist. Dies kann beispielsweise mittels einer durchgehenden Welle erfolgen, die nur von einer Seite der Bandkassette aus betätigt zu werden braucht, gleichzeitig aber mit allen insbesondere quer zur Förderrichtung gesehen nebeneinander angeordneten Antriebsmotoren verbunden ist.

Die Bandkassette kann beispielsweise eine Förderbreite aufweisen, die im Bereich von etwa 300 mm bis 700 mm liegt.

Als Fördermittel für die Bandkassette kann wenigstens ein Endlosband oder Endlosgurt vorgesehen sein, wobei alternativ eine Vielzahl paralleler Endlosriemen als Fördermittel dienen kann.

Eine besonders einfache Handhabung der Bandkassette ergibt sich, wenn gemäß einem weiteren Ausführungsbeispiel die Bandkassette werkzeuglos entnehmbar und/oder einbaubar ist.

In einer weiteren Ausgestaltung der Erfindung kann vorgesehen sein, dass zur Entnahme und/oder zum Einbau der Bandkassette bei aufgehobener Verriegelung zwischen der Bandkassette und einer am Unterbau bzw. an der Maschine verbleibenden Aufnahme die Bandkassette zunächst mit einer Komponente in oder gegen die Förderrichtung relativ zur Aufnahme bewegbar und anschließend von der Aufnahme abhebbar ist. Die Bewegung der Bandkassette in oder gegen die Förderrichtung kann für eine besonders stabile und sichere Befestigung der Bandkassette an der Maschinenaufnahme sorgen. Außerdem ist eine solche Ausgestaltung dann von Vorteil, wenn die Einbausituation ein unmittelbares Anheben oder Verschwenken aus der Einbauposition heraus nicht zulässt. Die Bandkassette kann dann zur Entnahme vor der eigentlichen Herausnahme in oder gegen die Förderrichtung verschoben werden bzw. beim Einbau der Bandkassette kann eine solche Verschiebung zum Erreichen der endgültigen Einbauposition vorgenommen werden.

In einer alternativen Ausgestaltung kann vorgesehen sein, dass zur Entnahme und/oder zum Einbau der Bandkassette bei aufgehobener Verriegelung zwischen der Bandkassette und einer am Unterbau oder an der Maschine verbleibenden Aufnahme die Bandkassette zunächst um eine von zwei Auflagen der Aufnahme verschwenkbar und anschließend von den Auflagen abhebbar ist. Dabei kann insbesondere vorgesehen sein, dass diejenige Auflage, die nicht zum Verschwenken der Bandkassette dient, dazu ausgebildet ist, für eine Verriegelung der Bandkassette zu sorgen.

Eine besonders einfache und kostengünstige Ausgestaltung ergibt sich, wenn es sich bei den Auflagen um stangenförmige Komponenten handelt. Eine solche Ausführung benötigt wenig Platz, ist ausreichend stabil und gestattet eine in konstruktiver Hinsicht einfache Umsetzung der gewünschten Verschwenkbewegung einerseits und der Aufhebung und Herstellung der gewünschten Verriegelung der Bandkassette andererseits.

In einem weiteren Ausführungsbeispiel können mehrere Bandkassetten in Förderrichtung gesehen hintereinander und/oder nebeneinander angeordnet sein. Dabei ist insbesondere vorgesehen, dass die Bandkassetten unabhängig voneinander entnehmbar und/oder einbaubar sind.

Folglich ist die Erfindung nicht auf solche Vorrichtungen, insbesondere Slicer oder Fördereinrichtungen, beschränkt, bei denen nur eine einzige entnehmbare Bandkassette vorgesehen ist.

Die Erfindung betrifft außerdem eine Fördereinrichtung für Lebensmittelprodukte, insbesondere für mittels einer Maschine nach einem der vorhergehenden Ansprüchen aufzuschneidende oder aufgeschnittene Lebensmittelprodukte, wobei die Fördereinrichtung wenigstens einen Bandförderer umfasst, der als entnehmbare Bandkassette ausgebildet ist.

Hinsichtlich vorteilhafter Weiterbildungen dieser Fördereinrichtung wird auf die vorstehenden Ausführungen Bezug genommen. Die bevorzugten Ausgestaltungen der hier offenbarten Aufschnittschneidemaschine werden hiermit auch für die Fördereinrichtung beansprucht.

Die Erfindung wird im Folgenden beispielhaft unter Bezugnahme auf die Zeichnung beschrieben. Es zeigen:

Fig. 1 bis 5 verschiedene Ansichten einer ersten Ausführungsform der Erfindung,

Fig. 6 eine zweite Ausführungsform der Erfindung,

Fig. 7 schematisch eine weitere Ausführungsform der Erfindung,

Fig. 8 bis 10 verschiedene Ansichten einer weiteren Ausführungsform der Erfindung.

Fig. 11, 12a, 12b, 13a und 13b verschiedenen Ansichten einer weiteren Ausführungsform der Erfindung, und

Fig. 14a und 14b schematische Ansichten einer weiteren Ausführungsform der Erfindung.

Bei den nachfolgend beschriebenen erfindungsgemäßen Ausführungsbeispielen von Bandförderern handelt es sich um Bestandteile von Fördereinrichtungen oder Aufschnittschneidemaschinen für Lebensmittelprodukte.

Die gezeigten Bandförderer umfassen jeweils einen einzigen oder zwei unmittelbar hintereinander angeordnete Einzelförderer und sind für einen Einspurbetrieb oder für einen Mehrspurbetrieb ausgelegt. Jeder Bandförderer umfasst eine entnehmbare Bandkassette 13 und einen Unterbau 41 mit einer Aufnahme 11 für die Bandkassette 13, wobei der Unterbau 41 des Bandförderers in eine Aufschnittschneidemaschine, insbesondere einen Hochleistungs-Slicer, oder in eine Fördereinrichtung integriert wer-

den kann, die ein Bestandteil einer Produktionslinie ist und dabei insbesondere einem Hochleistungs-Slicer zugeordnet ist.

Die hierin beschriebenen Ausführungsbeispiele unterscheiden sich hinsichtlich verschiedener Aspekte: Die Fig. 1 bis 5 beschreiben einen einspurigen Traktionsförderer, bei dem die Bandkassette 13 als Traktionsband ausgebildet ist. Ein solcher Traktionsförderer ist insbesondere Bestandteil einer Produktzuführung eines Slicers, mit der ein oder mehrere aufzuschneidende Lebensmittelprodukte gemeinsam einer Schneidebene zugeführt werden.

Die Fig. 7 sowie 14a und 14b zeigen jeweils schematisch eine Konzeptvariante, bei der die Koppelung zwischen Antrieb 15 und Bandkassette 13 durch eine Entnahme- bzw. Einbaubewegung der Bandkassette 13 bewirkt wird. Diese Koppelung bzw. Entkoppelung erfolgt dagegen bei den anderen Ausführungsbeispielen gleichzeitig mit der Herstellung bzw. der Aufhebung einer Verriegelung der Bandkassette 13 am Unterbau 41.

Das Ausführungsbeispiel der Fig. 8 bis 10 betrifft einen einspurigen Portionierförderer, bei dem eine einzige entnehmbare Bandkassette 13 zwei Einzelförderer umfasst, nämlich ein kurzes Portionierband 71 und ein langes Portionierband 73.

Das Ausführungsbeispiel der Fig. 11 bis 13 zeigt einen zweispurigen Traktionsförderer mit einer zweispurigen Bandkassette 13.

Fig. 1 zeigt die einspurige Traktionsbandkassette in ihrer Einbauposition an einem nicht dargestellten Slicer, wobei in der Einbausituation die Bandkassette 13 an einer Aufnahme 11, die hier als Tisch oder Platte ausgebildet ist (vgl. Fig. 3), angebracht und verriegelt ist.

Fig. 2 zeigt die Bandkassette 13 im entnommenen Zustand.

Fig. 3 zeigt die Aufnahme 11 nach Entnahme der Bandkassette 13. Die Aufnahme 11 ist an ihrer Oberseite mit am linken Randbereich und am rechten Randbereich angeordneten Koppelementen 37 versehen, die pilzförmig ausgebildet sind und dazu dienen, von einer Basis 25 (vgl. Fig. 2) der Bandkassette 13 hintergriffen zu werden, die hierzu mit entsprechenden Aussparungen 59 versehen ist.

Des Weiteren ist in der Aufnahme 11 an einer Seite im Bereich zwischen zwei Koppelelementen 37 ein Schlitz 39 ausgebildet, durch den sich von unten ein Verriegelungsorgan 21 hindurch erstreckt, das dazu dient, mit einem in der Basis 25 der Bandkassette 13 ausgebildeten Schlitz 23 zusammenzuwirken, um die Bandkassette 13 an der Aufnahme 11 zu verriegeln.

Das Verriegelungsorgan 21 ist Bestandteil einer Verriegelung, die außerdem unter anderem einen Hebel 19 mit einem Zapfen 17 umfasst. Diese Betätigungseinrichtung wird nachstehend näher in Verbindung mit den Fig. 4 und 5 beschrieben.

Der Unterbau 41, zu welcher die Aufnahme 11 gehört, ist des Weiteren mit einem unterhalb der Auflage 11 angeordneten Antriebsmotor für die Bandkassette 13 versehen, von dem lediglich eine Antriebswelle 51 dargestellt ist. Bei eingebauter Bandkassette 13 treibt die Antriebswelle 51 mittels eines Antriebsriemens 27 ein Antriebsrad 44 (vgl. Fig. 1) der Bandkassette 13 an. Das Antriebsrad 44 ist koaxial und seitlich neben einer Bandrolle 53 der Bandkassette 13 angeordnet, um welche als Fördermittel

dienende und eine Produktauflagefläche definierende Endlosbänder 55 geführt sind.

Im eingebauten Zustand gemäß Fig. 1, in welchem die Bandkassette 13 mit ihrer Basis 25 die Koppelelemente 37 hintergreift und durch die Verriegelung 21 gesichert und somit in einer definierten Betriebsposition am Unterbau 41 angebracht ist, besteht folglich eine direkte Antriebsverbindung zwischen Antriebsmotor und Bandkassette 13 über den Antriebsriemen 27, der um die Antriebswelle 51 des Motors und das Antriebsrad 44 der Bandkassette 13 umläuft.

Das Zusammenspiel zwischen Bandkassette 13 und Unterbau 41 zeichnet sich insbesondere durch drei Vorgänge aus, nämlich (i) die zur Entnahme und zum Einbau der Bandkassette 13 erforderlichen Bewegungen der Bandkassette 13, (ii) die Entriegelung und die Verriegelung der Bandkassette 13 sowie (iii) das Aufheben und das Herstellen der Koppelung zwischen dem Antrieb 15 und der Bandkassette 13.

Hierzu wird im Folgenden auch auf die Fig. 4 und 5 Bezug genommen. Fig. 4 zeigt die Bandkassette 13 im eingebauten Zustand, wobei zur besseren Veranschaulichung die Aufnahmeplatte 11 weggelassen wurde, um die Betätigungseinrichtung besser darstellen zu können. Fig. 5 entspricht der Darstellung in Fig. 4, wobei hier zusätzlich das Verriegelungsorgan 21 weggelassen wurde, um eine Welle 29 des Hebels 19 besser darstellen zu können.

Um die Bandkassette 13 von dem Unterbau 41 und somit vom Aufnahmetisch 11 abnehmen zu können, muss die Bandkassette 13 mit ihrer Basis 25 außer Eingriff mit den Koppelelementen 37 gebracht werden, und zwar

durch eine Verschiebebewegung entgegen der Förderrichtung F (vgl. Fig. 1).

Diese Entnahmebewegung ist nur möglich, wenn zuvor sowohl der Verriegelungszustand als auch der Koppelungszustand des Antriebs 15 aufgehoben wurden, d.h. eine Entnahme der Bandkassette 13 ist nur nach vorheriger Entriegelung der Basis 25 und Entspannung des Riemens 27 möglich.

Diese beiden Vorgänge werden gleichzeitig mit Hilfe der manuellen Betätigungseinrichtung durchgeführt. Hierzu wird zunächst von einem Benutzer der Hebel 19 über den Zapfen 17 etwas nach außen gezogen, wodurch ein formschlüssiger Eingriff (vgl. Fig. 1) des Zapfens 17 mit der Aufnahme 11, der eine unbeabsichtigte Entriegelung verhindert, aufgehoben wird. Der Hebel 19 kann dann vom Benutzer etwa um 180° im Uhrzeigersinn verschwenkt werden. Hierdurch gibt das zunächst noch im Schlitz 23 der Basis 25 sitzende Verriegelungsorgan 21 die Basis 25 und somit die Bandkassette 13 frei. Außerdem wird durch das Verschwenken des Hebels 19 gleichzeitig eine um eine Achse 33 schwenkbar gelagerte, mit dem Antriebsmotor verbundene Schwinge 35 im Gegenuhrzeigersinn bewegt, wodurch der Antriebsriemen 27 entspannt und vom Antriebsrad 44 der Bandkassette 13 abgenommen werden kann.

Die Schwenkbewegung der Schwinge 35 wird durch die exzentrisch ausgebildete Welle 29 des Hebels 19 bewirkt, die sich durch eine in der Schwinge 35 ausgebildete Aussparung 31 hindurch erstreckt. Folglich sind die Aussparung 31 der Schwinge 35 und die Hebelwelle 29 im Bereich dieser Aussparung 31 derart ausgebildet, dass die Welle 29 gewissermaßen nach Art einer Kurbelwelle bei Drehung aufgrund ihrer Exzentrizität die Schwinge 35 in einer definierten Weise je nach Drehrichtung

gegen den Uhrzeigersinn (zum Entspannen des Riemens 27) oder im Uhrzeigersinn (zum Spannen des Riemens 27) verschwenkt.

Das Verschwenken des Hebels 19 im Uhrzeigersinn hat also zweierlei zur Folge: Zum einen erfolgt eine Entriegelung der Bandkassette 13 und zum anderen erfolgt eine Entspannung des Antriebsriemens 27. Beides ist erforderlich, um die Bandkassette 13 und somit deren Basis 25 außer Eingriff mit den Koppelelementen 37 der Aufnahme 11 zu bewegen und dann entnehmen zu können.

Der Einbau der Bandkassette 13 erfolgt in umgekehrter Reihenfolge. Zunächst wird die Bandkassette 13 mit ihrer Basis 25 auf die Auflageplatte 11 aufgesetzt und dann durch eine Verschiebebewegung in Förderrichtung F in Eingriff mit den Koppelelementen 37 gebracht, um die Koppelelemente 37 im Bereich der Aussparungen 59 mittels der Basis 25 zu hintergreifen. Anschließend wird der Antriebsriemen 27 um das Antriebsrad 44 der Bandkassette 13 gelegt, was in dieser Situation möglich ist, da der Antriebsriemen 27 noch nicht gespannt ist. Daraufhin wird der Hebel 19 um etwa 180° gegen den Uhrzeigersinn zurück in die Ausgangsstellung gemäß Fig. 4 und 5 geschwenkt. Hierdurch wird die Schwinge 35 im Uhrzeigersinn verschwenkt, wodurch der Riemen 27 gespannt wird. Gleichzeitig wird durch das Verschwenken des Hebels 19 das drehfest mit der Hebelwelle 29 verbundene Verriegelungsorgan 21 mit seinem hakenförmigen freien Eingriffsende von unten durch den in der Basis 25 der Bandkassette 13 ausgebildeten Schlitz 23 hindurch geschwenkt und in verriegelnden Eingriff mit der Schlitzbegrenzung gebracht.

Die Bandkassette 13 ist dann betriebsbereit und kann durch entsprechende Ansteuerung des Antriebsmotors 23 in der gewünschten Weise betrieben werden.

Hinsichtlich dieses Zusammenspiels wird auch auf die anderen hier beschriebenen Ausführungsbeispiele (mit Ausnahme des anhand der Fig. 7 sowie 14a und 14b erläuterten Prinzips) verwiesen, die auf dem gleichen Grundkonzept beruhen.

Die im Ausführungsbeispiel der Fig. 6 dargestellte Bandkassette 13 ist für einen zweispurigen Betrieb ausgelegt. Die Bandkassette 13 ist hier im entnommenen Zustand und mit abgenommenen Bandfördergurten dargestellt. Des Weiteren ist eine vordere Bandumlenkung 61 der Bandkassette 13 in einem hochgeklappten Zustand dargestellt.

Im hinteren Antriebsbereich der Bandkassette 13 sind zwei Bandrollen 53 axial nebeneinander und somit auf einer gemeinsamen Achse liegend nebeneinander angeordnet. Jeder Bandrolle 53 ist axial außen entsprechend dem Ausführungsbeispiel der Fig. 1 bis 5 ein Antriebsrad 44 zugeordnet, mit dem ein Antriebsmotor über einen Antriebsriemen 27 gekoppelt werden kann, wie es ebenfalls in Verbindung mit dem Ausführungsbeispiel der Fig. 1 bis 5 beschrieben wurde.

Außerdem ist wie beim Ausführungsbeispiel der Fig. 1 bis 5 an jeder Seite der Bandkassette 13 eine Basis 25 mit Aussparungen 59 und einem Schlitz 23 angeordnet, um an einer entsprechend ausgebildeten Aufnahme verriegelt werden zu können.

Die Einbausituation sowie die Entnahme und der Einbau einer solchen zweispurigen Bandkassette werden nachstehend näher in Verbindung mit den Fig. 11, 12a, 12b, 13a und 13b beschrieben.

Während bei den bisher anhand der Figuren beschriebenen Ausführungsformen eine Betätigungseinrichtung vorgesehen ist, um gleichzeitig die Bandkassette zu entriegeln bzw. zu verriegeln und den Antriebsriemen zu entspannen bzw. zu spannen, ist bei dem schematisch in Fig. 7 dargestellten Ausführungsbeispiel vorgesehen, dass bei Entnahme der Bandkassette 13 zunächst eine Entriegelung einer Basis 25 der Bandkassette 13 erfolgt und erst danach gleichzeitig eine Entnahmebewegung der Bandkassette 13 durchgeführt und der Antriebsriemen 27 entspannt wird.

Die Aufnahme 11 des Unterbaus umfasst hier zwei Auflagestangen 65, 67. Um die hier rechte Auflagestange 65 bzw. deren eine Schwenkachse 63 definierende Mittelachse ist die Bandkassette 13 mit ihrer Basis 25 zur Entnahme bzw. zum Einbau schwenkbar gelagert.

In der dargestellten Einbauposition liegt die Bandkassette 13 mit ihrer Basis 25 auf beiden Auflagestangen 65, 67 auf, wobei die hier linke, vordere Auflagestange 67 außerdem dazu ausgebildet ist, die Basis 25 in der Einbausituation zu verriegeln. Hierauf wird näher in Verbindung mit dem Ausführungsbeispiel der Fig. 14a, 14b eingegangen, das ebenfalls auf dem vorstehend erläuterten Prinzip beruht.

Die relative Anordnung von Antriebsmotor 15 mit Antriebswelle 51 einerseits und Antriebsrad 44 sowie Bandrolle 53 der Bandkassette 13 andererseits entspricht den bisher beschriebenen Ausführungsbeispielen. Im vorliegenden Ausführungsbeispiel der Fig. 7 ist es jedoch eine Bewegung der Bandkassette 13 selbst, die für eine Reduzierung des Abstandes zwischen der Achse der Antriebswelle 51 und der Achse des Antriebsrades 44 und somit für eine Entspannung des Riemens 27 zur Entnahme der Bandkassette 13 sorgt. Im Gegensatz zu den vorstehend beschriebenen Ausführungsbeispielen, bei denen zur Entspannung und Spannung des

Riemens der Antriebsmotor 15 samt Antriebswelle 51 bewegt wird, ist im Ausführungsbeispiel der Fig. 7 vorgesehen, dass der Motor 15 feststehend angeordnet und die Abstandsänderung zwischen stationärer Antriebswelle 51 und Antriebsrad 44 durch die erläuterte Bewegung der Bandkassette 13 bewirkt wird.

Das Ausführungsbeispiel der Fig. 8 bis 10 zeigt die Umsetzung der Erfindung an einem Portionierförderer.

Die Bandkassette 13 ist als Portionierband mit zwei in Förderrichtung gesehen unmittelbar hintereinander angeordneten Einzelförderern 71, 73 ausgebildet. Das in Förderrichtung F gesehen hintere Portionierband 71, auf welches während des Schneidebetriebs die abgeschnittenen Produktscheiben zur Bildung von Portionen fallen, ist sehr kurz ausgeführt und um ein Vielfaches kürzer als das nachfolgende zweite Portionierband 73, bei dem als Fördermittel eine Vielzahl von parallel verlaufenden Endlosrundriemen vorgesehen ist. Das erste Portionierband 71 weist als Fördermittel eine Vielzahl paralleler schmaler Bandgurte auf.

Der Unterbau 41 dieses Portionierförderers ist anders ausgebildet als beispielsweise der Unterbau 41 des im Ausführungsbeispiel der Fig. 1 bis 5 beschriebenen Traktionsbandes. Gleichwohl können die Entriegelung und Verriegelung sowie die Entnahme und der Einbau der Bandkassette 13 an diesem Unterbau 41 zumindest hinsichtlich des Grundkonzepts so erfolgen, wie bei dem zuvor beschriebenen Traktionsband. In den Fig. 8 bis 10 ist eine entsprechende Betätigungseinrichtung mit einem Hebel 19 und einer durchgehenden Welle 29, die Verriegelungsorgane 21 trägt, dargestellt. Hierauf wird nachstehend näher eingegangen.

Eine Besonderheit der Portioniereinheit gemäß den Fig. 8 bis 10 besteht darin, dass eine einzige, als Ganzes handhabbare und somit als Ganzes entnehmbare und einbaubare Bandkassette 13 mehr als einen Bandförderer aufweist, wobei die mehreren - hier die zwei - Bandförderer 71, 73 unabhängig voneinander betreibbar sind, da am Unterbau 41 dieser Portioniereinheit zwei separate Antriebsmotoren 15 angeordnet sind, die jeweils einem der Portionierbänder 71, 73 zugeordnet und unabhängig voneinander ansteuerbar sind, so dass die beiden Portionierbänder 71, 73 vollkommen unabhängig voneinander betrieben werden können.

Die beiden Antriebsmotoren 15 sind Platz sparend in den Unterbau 41 integriert und somit unterhalb der Bandkassette 13 angeordnet, wobei die beiden Motoren 15 in Förderrichtung gesehen auf gleicher Höhe und in Querrichtung nebeneinander angeordnet sind und die Antriebswellen 51 jeweils nach außen weisen.

Die beiden Portionierbänder 71, 73 weisen jeweils zum Antreiben der jeweiligen Fördermittel eine Bandrolle 53 auf, der jeweils entsprechend dem Ausführungsbeispiel der Fig. 1 bis 5 ein koaxiales Antriebsrad 44 zugeordnet ist. Die beiden Antriebsräder 44 sind jeweils mit einem der Antriebsmotoren 15 direkt verbunden, und zwar über einen Antriebsriemen 27, der um das jeweilige Antriebsrad 44 und die jeweilige Antriebswelle 51 umläuft.

Diese erfindungsgemäße Portioniereinheit verwirklicht folglich bei sehr einfachem und äußerst kompaktem Grundaufbau einen hohen Funktionalitätsgrad.

In der Darstellung der Fig. 9 sind insbesondere die beiden Antriebsmotoren 15 zu erkennen, von denen der eine das kurze Portionierband 71 und

der andere das lange Portionierband 73 über einen jeweiligen Antriebsriemen 27 antreibt. Die direkte Koppelung mittels der Antriebsriemen 27 ermöglicht es, in Förderrichtung versetzt angeordnete Bandrollen 53 bzw. Antriebsräder 44 bei in Förderrichtung gesehen auf gleicher Höhe befindlichen Antriebsmotoren 15 bzw. Antriebswellen 51 anzutreiben. Dieses Konzept nutzt folglich den Umstand aus, dass die beiden Antriebsriemen 27 auf den beiden einander gegenüberliegenden Seiten der Portioniereinheit und somit ohne gegenseitige Störung oder Beeinflussung verlaufen können.

Die beiden Motoren 15 sind jeweils an einer Schwinge 35 befestigt, die um eine Achse 33 schwenkbar gelagert ist. Die Schwingen 35 sind jeweils mittels einer gemeinsamen Hebelwelle 29 verschwenkbar, die auf einer Seite der Portioniereinheit mit einem Hebel 19 verbunden ist. Im Bereich der Schwingen 35 ist die Welle 29 jeweils derart exzentrisch ausgebildet, dass durch Verdrehen der Welle 29 um etwa 180° mittels des Hebels 19 eine solche Schwenkbewegung gleichzeitig beider Schwingen 35 bewirkt wird, dass beide Riemen 27 gleichzeitig entspannt oder gespannt werden.

Durch eine einzige manuelle Betätigung über den Hebel 19 kann folglich ein Benutzer beide Motoren 15 gleichzeitig verschwenken und somit beide Portionsbänder 71, 73 gleichzeitig von ihrem jeweiligen Antrieb entkoppeln bzw. mit ihrem jeweiligen Antrieb koppeln. Eine Entnahme bzw. ein Einbau dieser Portionierkassette ist folglich schnell und einfach möglich.

Die vergrößerte Darstellung eines Teils der Fig. 9 in Fig. 10 zeigt insbesondere im Bereich des in Fig. 9 linken Antriebsmotors 15 die Wirkungsweise der Hebelwelle 19. Die Exzentrizität der Welle 29 im Bereich der Schwinge 35 sorgt für die vorstehend erläuterte Verschwenkung des an der Schwinge 35 angebrachten Motors 15 beim Verdrehen der Welle 29.

Ferner ist die Welle 29 drehfest mit zwei Verriegelungsorganen 21 verbunden, von denen in Fig. 10 lediglich eines dargestellt ist. Im dargestellten Einbauzustand greift das Verriegelungsorgan 21 durch einen in der Basis 25 der Bandkassette 13 ausgebildeten Schlitz 23 hindurch, um die Basis 25 und somit die Bandkassette 13 am Unterbau 41 zu verriegeln. Durch Verdrehen der Welle 29 und somit Verschwenken des Verriegelungsorgans 21 wird diese Verriegelung aufgehoben, während gleichzeitig durch Verschwenken der Schwinge 35 der Riemen 27 entspannt wird.

Den Fig. 8 bis 10 ist außerdem zu entnehmen, dass die Antriebsriemen 27 jeweils als Zahnriemen ausgebildet und die jeweils stirnseitig der betreffenden Bandrolle 53 angeordneten Riemenräder 44 jeweils in Form eines Zahnrades vorgesehen sind.

Bei dem zweispurigen Traktionsband gemäß den Fig. 11, 12a, 12b, 13a und 13b (vgl. auch die vorstehenden Ausführungen zu Fig. 6) ist für jede der beiden Spuren, zwischen denen hier eine Trennwand 69 angeordnet ist, ein Antriebsmotor 15 vorgesehen, der die betreffende Bandrolle 53 bzw. das stirnseitige Antriebsrad 44 über einen Riemen 27 antreibt.

Diese Traktionsbandeinheit ist folglich bezüglich einer senkrecht zu den Produktauflageflächen der Endlosbänder 55 verlaufenden Mittelebene zwischen den beiden Spuren spiegelbildlich ausgeführt, wobei aber beide Spuren an einer einzigen, als Ganzes handhabbaren Bandkassette 13 ausgebildet sind.

Die Entnahme und der Einbau dieser Bandkassette 13 einschließlich der Verriegelung am Unterbau 41 sowie des Entspannens und des Spannens der Antriebsriemen 27 erfolgen wie beim Ausführungsbeispiel der Fig. 1 bis 5, was nachstehend näher erläutert wird.

Die Fig. 12a und 13a zeigen jeweils die Betriebsposition mit gespanntem Antriebsriemen 27, während die Fig. 12b und 13b jeweils eine Situation zeigen, in der die Antriebsriemen 27 entspannt sind und die Bandkassette 13 entriegelt ist, wobei die Basis 25 der Bandkassette 13 noch in Eingriff mit den Koppelelementen 37 der Aufnahme 11 steht.

Der Vergleich der Fig. 12a und 12b zeigt insbesondere, dass der Hebel 19 um etwa 180° im Uhrzeigersinn zu verschwenken ist, um das Verriegelungsorgan 21 außer Eingriff mit dem Schlitz 23 in der Basis 25 der Bandkassette 13 zu bringen, und die Schwinge 35 gegen den Uhrzeigersinn zu verschwenken, um den Riemen 27 zu entspannen.

Die Fig. 13a und 13b zeigen jeweils einen Schnitt senkrecht zur Förderrichtung durch die Welle 29 des Hebels 19. Zu erkennen sind insbesondere die exzentrische Ausgestaltung der Welle 29 im Bereich der Schwinge 35 und das Zusammenwirken der Welle 29 mit dem Verriegelungsorgan 21, das in der Einbausituation gemäß Fig. 13a in verriegelndem Eingriff mit der Basis 25 der Bandkassette 13 im Bereich des Schlitzes 23 steht und sich im entriegelten Zustand gemäß Fig. 13b außer Eingriff mit der Basis 25 der Bandkassette 13 befindet.

Den Fig. 12b und 13b ist außerdem zu entnehmen, dass durch das Verschwenken der Schwinge 35 und somit der Antriebswelle 51 des Motors in Richtung des Antriebsrades 44 der Bandkassette 13 und die dadurch bewirkte Abstandsreduzierung zwischen Antriebswelle 51 und Antriebsrad 44 der Riemen 27 entspannt wird und somit außer Eingriff mit dem Antriebsrad 44 gelangt bzw. nur noch locker um das Antriebsrad 44 gelegt ist, so dass der Riemen 27 mühelos vom Antriebsrad 44 abgenommen und

die Bandkassette 13 einfach durch Verschieben außer Eingriff mit den Koppelelementen 37 der Aufnahme 11 gebracht und dann abgehoben werden kann.

Wie bereits vorstehend in Verbindung mit Fig. 7 erwähnt, zeigen die Fig. 14a und 14b schematisch ein anderes Entnahmekonzept für eine Bandkassette 13, die auch bei diesem Konzept beispielsweise als Portionierband oder Traktionsband ausgebildet und jeweils entweder einspurig oder mehrspurig ausgeführt sein kann.

In Fig. 14a und 14b ist rein beispielhaft dargestellt, wie die hier linke Auflagestange 67 der Aufnahme 11 bzw. des Unterbaus 41 ausgebildet sein kann, um nicht nur als Auflage für die Basis 25 der Bandkassette 13, sondern außerdem zur Verriegelung der Bandkassette 13 am Unterbau dienen zu können.

Hierzu ist die Basis 25 im Bereich eines Verriegelungsabschnitts 77 der Auflagestange 67 mit einer schlüssellochartig geformten Aufnahme 79 versehen, in welche der Verriegelungsabschnitt 77 nur in einer einer Entriegelungsposition entsprechenden Drehstellung der Auflagestange 67 gelangen kann, wie dies in Fig. 14b dargestellt ist.

In der Verriegelungsstellung gemäß Fig. 14a ist der in der Aufnahme 79 befindliche Verriegelungsabschnitt 77 derart orientiert, dass der Verriegelungsabschnitt 77 nicht aus der Aufnahme 79 herausgelangen kann. Die Bandkassette 13 ist folglich in dem Zustand gemäß Fig. 14a in der Einbausituation bzw. Betriebsstellung verriegelt und gesichert.

Zur Entnahme der Bandkassette 13 wird zunächst die hier linke Auflagestange 67 in die Stellung gemäß Fig. 14b gedreht, so dass der Verriege-

lungsabschnitt 77 aus der Ausnahme 79 herausgelangen kann, wenn die Bandkassette 13 um die andere Auflagestange 65 verschwenkt wird.

Dieses Verschwenken der Bandkassette 13 bewirkt eine Abstandsverringerung zwischen dem Antriebsrad 44 der Bandkassette 13 und der Antriebswelle 51 des Motors 15, wodurch der Antriebsriemen 27 entspannt wird. Die zum Zwecke dieser Riemenentspannung verschwenkte Bandkassette 13 kann dann von der Auflagestange 65 abgehoben werden.

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Bezugszeichenliste

11	Aufnahme
13	Bandkassette
15	Antriebsmotor
17	Zapfen
19	Hebel
21	Verriegelungsorgan, Verriegelung
23	Schlitz
25	Basis
27	Antriebsriemen
29	Hebelwelle
31	Aussparung der Schwinge
33	Schwenkachse der Schwinge
35	Schwinge
37	Koppelelement der Aufnahme
39	Schlitz
41	Unterbau
44	Antriebsrad, Riemenrad
51	Antriebswelle des Antriebsmotors
53	Bandrolle der Bandkassette
55	Endlosband, Endlosgurt
57	Endlosriemen, Rundriemen
59	Aussparung der Basis der Bandkassette
61	Bandumlenkung
63	Schwenkachse der Auflagestange
65	Auflagestange
67	Auflagestange
69	Trennwand
71	erster Förderer, kurzes Portionierband
73	zweiter Förderer, langes Portionierband
77	Verriegelungsabschnitt
79	Aufnahme
F	Förderrichtung

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Patentansprüche

1. Aufschnittschneidemaschine für Lebensmittelprodukte, insbesondere Hochleistungs-Slicer, mit zumindest einem Bandförderer, der als entnehmbare Bandkassette (13) ausgeführt ist.

2. Maschine nach Anspruch 1,
dadurch gekennzeichnet,
dass die Bandkassette (13) in Förderrichtung gesehen vor der Schneidebene angeordnet und insbesondere als Traktionsband ausgebildet ist.

3. Maschine nach Anspruch 1,
dadurch gekennzeichnet,
dass die Bandkassette (13) in Förderrichtung gesehen hinter der Schneidebene angeordnet und insbesondere als Portionierband ausgebildet ist.

4. Maschine nach einem der vorhergehenden Ansprüche,
dadurch gekennzeichnet,
dass die Bandkassette (13) in Förderrichtung gesehen eine Band- oder Förderlänge aufweist, die weniger als 500mm, insbesondere weniger als 300mm, insbesondere weniger als 200mm und insbesondere zwischen 50mm und 150mm beträgt.

5. Maschine nach einem der vorhergehenden Ansprüche,

dadurch gekennzeichnet,
dass zumindest ein direkter Antrieb (15) für die Bandkassette (13) vorgesehen ist.

6. Maschine nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, dass wenigstens ein Antriebsmotor (15) für die Bandkassette (13) vorgesehen ist, wobei der Antriebsmotor (15) direkt mit der Bandkassette (13) gekoppelt ist, insbesondere über eine Riemenverbindung oder über eine Zahnradanordnung, bevorzugt eine Zahnradpaarung.

7. Maschine nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, dass ein Antriebsmotor (15) für die Bandkassette (13) eine Antriebswelle (51) und die Bandkassette (13) ein Antriebsrad (44) aufweist, wobei die Antriebswelle (51) und das Antriebsrad (44) direkt miteinander gekoppelt sind.

8. Maschine nach Anspruch 6 oder 7, dadurch gekennzeichnet, dass der Antriebsmotor (15) unterhalb der Bandkassette (13) angeordnet ist.

9. Maschine nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, dass die Bandkassette (13) eine gelagerte Bandrolle (53) aufweist, wobei ein Antriebsrad (44) der Bandkassette (13) über die Lagerung der Bandrolle (53) gelagert ist.

10. Maschine nach Anspruch 9,
dadurch gekennzeichnet,
dass das Antriebsrad (44) koaxial zur Bandrolle (53) und insbesondere axial neben der Bandrolle (53) angeordnet ist.

11. Maschine nach einem der vorhergehenden Ansprüche,
dadurch gekennzeichnet,
dass zum Aufheben und Herstellen einer Koppelung zwischen einem Antriebsmotor (15) für die Bandkassette (13) und der Bandkassette (13) jeweils eine Relativbewegung zwischen Antriebsmotor (15) und Bandkassette (13) vorgesehen ist, insbesondere eine Schwenkbewegung.

12. Maschine nach Anspruch 11,
dass durch die Relativbewegung der Abstand zwischen einer Antriebsachse, bevorzugt einer Antriebswelle (51), des Antriebsmotors (15) und einer Antriebsachse, bevorzugt einem Antriebsrad (44), der Bandkassette (13) veränderbar ist.

13. Maschine nach einem der vorhergehenden Ansprüche,
dadurch gekennzeichnet,
dass eine Koppelung zwischen einem Antrieb (15) für die Bandkassette (13) und der Bandkassette (13) durch Entspannen eines Antriebsriemens (27) aufhebbar und durch Spannen des Antriebsriemens (27) herstellbar ist, wobei das Entspannen und Spannen des Antriebsriemens (27) jeweils durch eine Relativbewegung zwischen Antrieb (15) und Bandkassette (13) vorgesehen ist.

14. Maschine nach einem der vorhergehenden Ansprüche,
dadurch gekennzeichnet,

dass für die Bandkassette (13) eine bei entnommener Bandkassette (13) an der Maschine verbleibende Aufnahme (11) vorgesehen ist, an der die Bandkassette (13) verriegelbar ist, wobei die Verriegelung zur Entnahme der Bandkassette (13) aufhebbar und zum Einbau der Bandkassette (13) herstellbar ist.

15. Maschine nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, dass zur Entnahme oder zum Einbau der Bandkassette (13) eine Koppelung zwischen einem Antrieb (15) für die Bandkassette (13) und der Bandkassette (13) gleichzeitig mit einer Verriegelung der Bandkassette (13) aufhebbar bzw. herstellbar ist.

16. Maschine nach einem der Ansprüche 1 bis 14, dadurch gekennzeichnet, dass zur Entnahme oder zum Einbau der Bandkassette (13) die Koppelung zwischen einem Antrieb (15) für die Bandkassette (13) und der Bandkassette (13) gleichzeitig mit einer Entnahme- bzw. Einbaubewegung der Bandkassette (13) nach dem Aufheben bzw. vor dem Herstellen einer Verriegelung der Bandkassette (13) durchführbar ist.

17. Maschine nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, dass für eine Koppelung zwischen einem Antrieb (15) für die Bandkassette (13) und der Bandkassette (13) und/oder für eine Verriegelung der Bandkassette (13) an einer Aufnahme (11) der Maschine eine Betätigungseinrichtung (19) vorgesehen ist, insbesondere eine manuell zu betätigende mechanische Betätigungseinrichtung (19).

18. Maschine nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, dass eine Betätigungseinrichtung (19) vorgesehen ist, mit der eine Koppelung zwischen einem Antrieb (15) für die Bandkassette (13) und der Bandkassette (13) einerseits und eine Verriegelung der Bandkassette (13) an einer Aufnahme (11) der Maschine andererseits gleichzeitig aufhebbar und herstellbar sind.

19. Maschine nach Anspruch 17 oder 18, dadurch gekennzeichnet, dass die Betätigungseinrichtung einen Hebel (19) mit einer, insbesondere exzentrischen, Welle (29) umfasst, wobei durch Drehen der Welle (29) eine einen Antrieb (15) für die Bandkassette (13) tragende Schwinge (35) um eine Schwenkachse (33) verschwenkbar und/oder ein Verrieglungsorgan (21) für die Bandkassette (13) zwischen einer Verriegelungsposition (21) und einer Freigabeposition bewegbar ist.

20. Maschine nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, dass zum Aufheben und Herstellen einer Koppelung zwischen einem Antrieb (15) für die Bandkassette (13) und der Bandkassette (13) die Bandkassette (13) oder eine Baugruppe oder ein Bauteil der Bandkassette relativ zu dem Antrieb (15) bewegbar ist, insbesondere durch Umklappen oder Verschwenken.

21. Maschine nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, dass die Bandkassette (13) für einen Mehrspurbetrieb ausgelegt und insbesondere mit mehreren unabhängigen Antrieben (15) koppelbar ist, die jeweils zumindest einer Spur zugeordnet sind.

22. Maschine nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, dass die, insbesondere als Portionierband ausgebildete, Bandkassette (13) mehrere in Förderrichtung gesehen hintereinander angeordnete, insbesondere unmittelbar aufeinanderfolgende, Einzelförderer (71, 73) umfasst, denen jeweils ein separater Antrieb (15) zugeordnet ist.

23. Maschine nach Anspruch 21 oder 22, dadurch gekennzeichnet, dass in Förderrichtung gesehen wenigstens ein Antrieb (15) linksseitig und wenigstens ein weiterer Antrieb (15) rechtsseitig mit der Bandkassette (13) gekoppelt ist, wobei insbesondere die Antriebe jeweils einen Antriebsmotor (15) umfassen und bevorzugt die Antriebsmotoren (15) quer zur Förderrichtung gesehen nebeneinander unterhalb der Bandkassette (13) mit zur jeweiligen Seite nach außen weisenden Antriebswellen (51) angeordnet sind.

24. Maschine nach einem der Ansprüche 21 bis 23, dadurch gekennzeichnet, dass die Koppelung zwischen den Antrieben (15) und der Bandkassette (13) zumindest für eine Mehrzahl von Antrieben (15), insbesondere für alle Antriebe (15), gleichzeitig aufhebbar und herstellbar ist.

25. Maschine nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, dass die Bandkassette (13) eine Förderbreite im Bereich von etwa 300mm bis 700mm aufweist.

26. Maschine nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, dass als Fördermittel der Bandkassette (13) wenigstens ein Endlosband oder Endlosgurt (55) oder eine Vielzahl paralleler Endlosriemen (57) vorgesehen ist.

27. Maschine nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, dass die Bandkassette (13) werkzeuglos entnehmbar und/oder einbaubar ist.

28. Maschine nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, dass zur Entnahme und/oder zum Einbau der Bandkassette (13) bei aufgehobener Verriegelung zwischen der Bandkassette (13) und einer an der Maschine verbleibenden Aufnahme (11) die Bandkassette (13) zunächst mit einer Komponente in oder gegen die Förderrichtung relativ zur Aufnahme (11) bewegbar und anschließend von der Aufnahme (11) abhebbar ist.

29. Maschine nach einem der Ansprüche 1 bis 27, dadurch gekennzeichnet, dass zur Entnahme und/oder zum Einbau der Bandkassette (13) bei aufgehobener Verriegelung zwischen der Bandkassette (13) und einer an der Maschine verbleibenden Aufnahme (11) die Bandkassette (13) zunächst um die eine von zwei, insbesondere stangenförmigen, Auflagen (65, 67) der Aufnahme (11) verschwenkbar und anschließend von den Auflagen (65, 67) abhebbar ist, wobei insbeson-

dere die andere der Auflagen (65, 67) zur Verriegelung der Bandkassette (13) ausgebildet ist.

30. Maschine nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, dass mehrere Bandkassetten (13) in Förderrichtung gesehen hintereinander und/oder nebeneinander angeordnet sind, wobei insbesondere die Bandkassetten (13) unabhängig voneinander entnehmbar und/oder einbaubar sind.

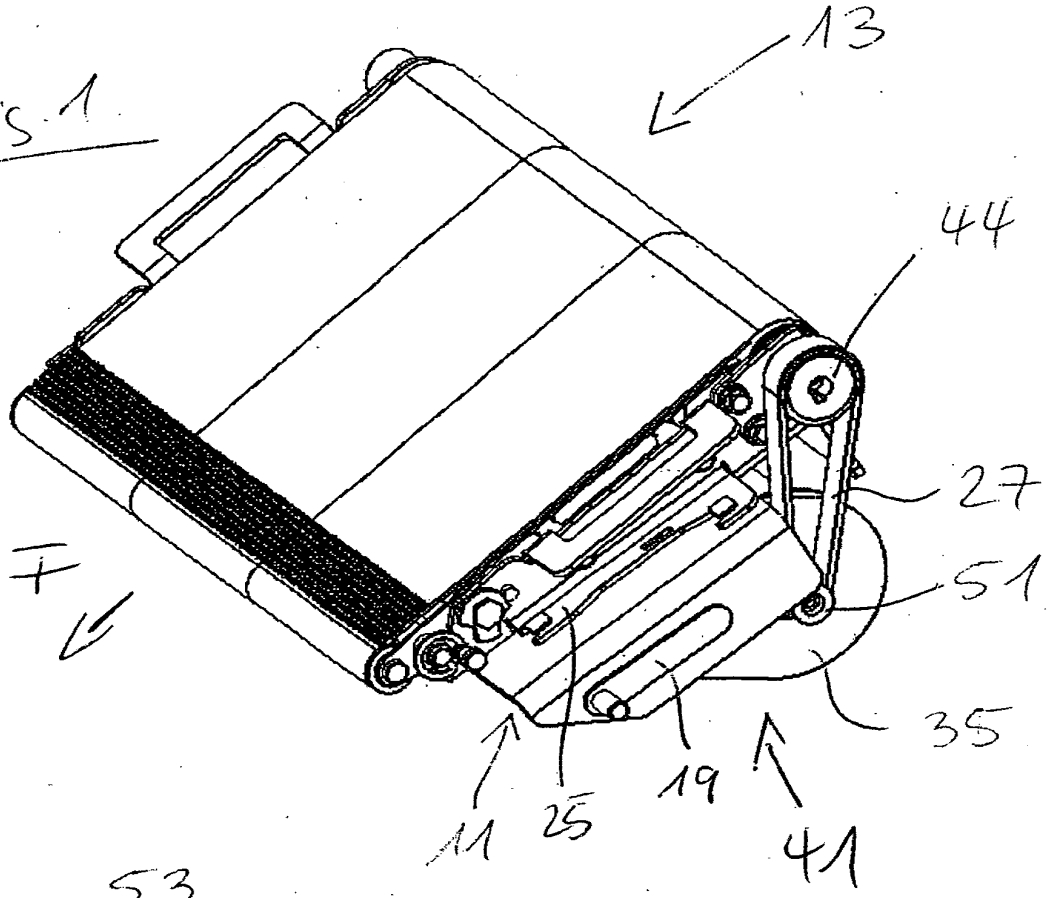
31. Fördereinrichtung für aufzuschneidende oder aufgeschnittene Lebensmittelprodukte, die zumindest einen Bandförderer umfasst, der als entnehmbare Bandkassette (13) ausgeführt ist.

32. Fördereinrichtung nach Anspruch 31, mit den kennzeichnenden Merkmalen zumindest eines der Ansprüche 1 bis 30.

Zusammenfassung

Die Erfindung betrifft eine Aufschnittschneidemaschine für Lebensmittelprodukte, insbesondere Hochleistungs-Slicer, mit zumindest einem Bandförderer, der als entnehmbare Bandkassette ausgebildet ist.

Fig. 1



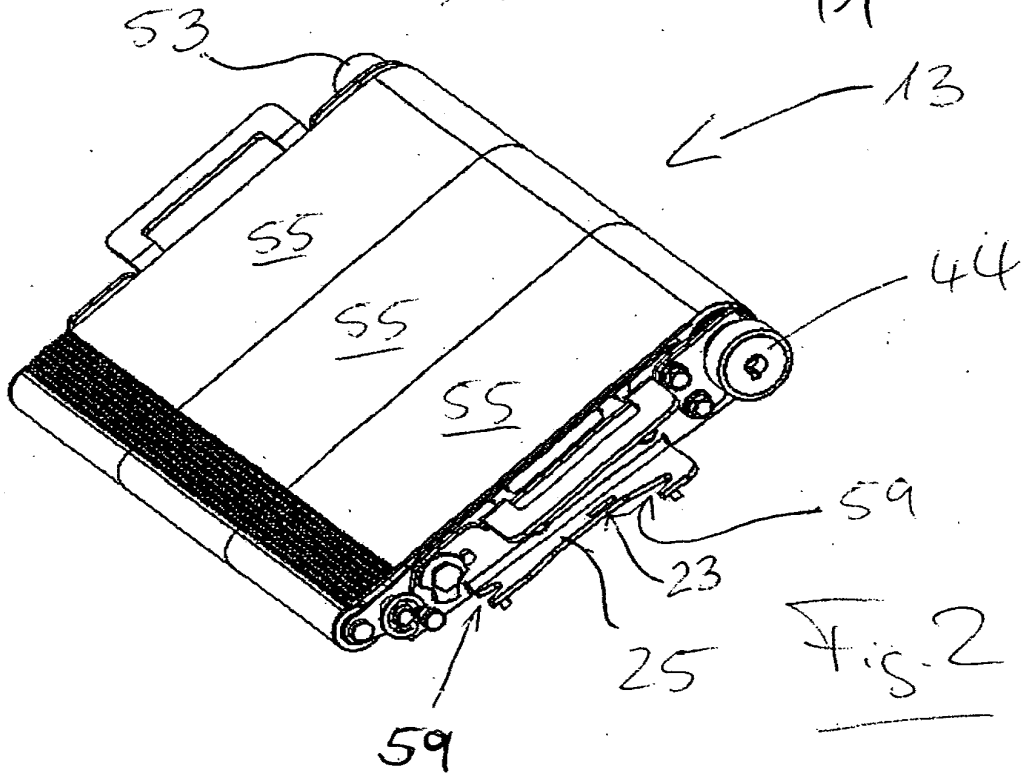


Fig. 2

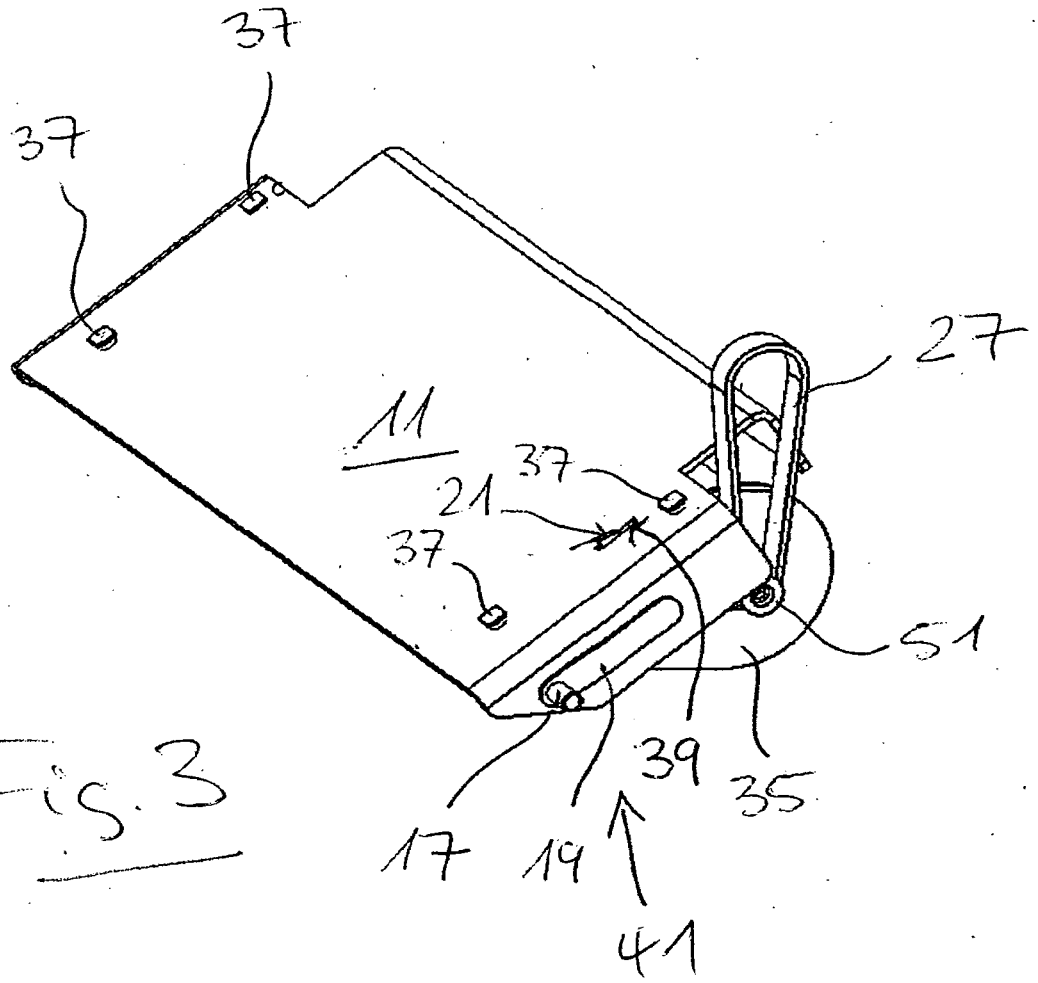


Fig. 3

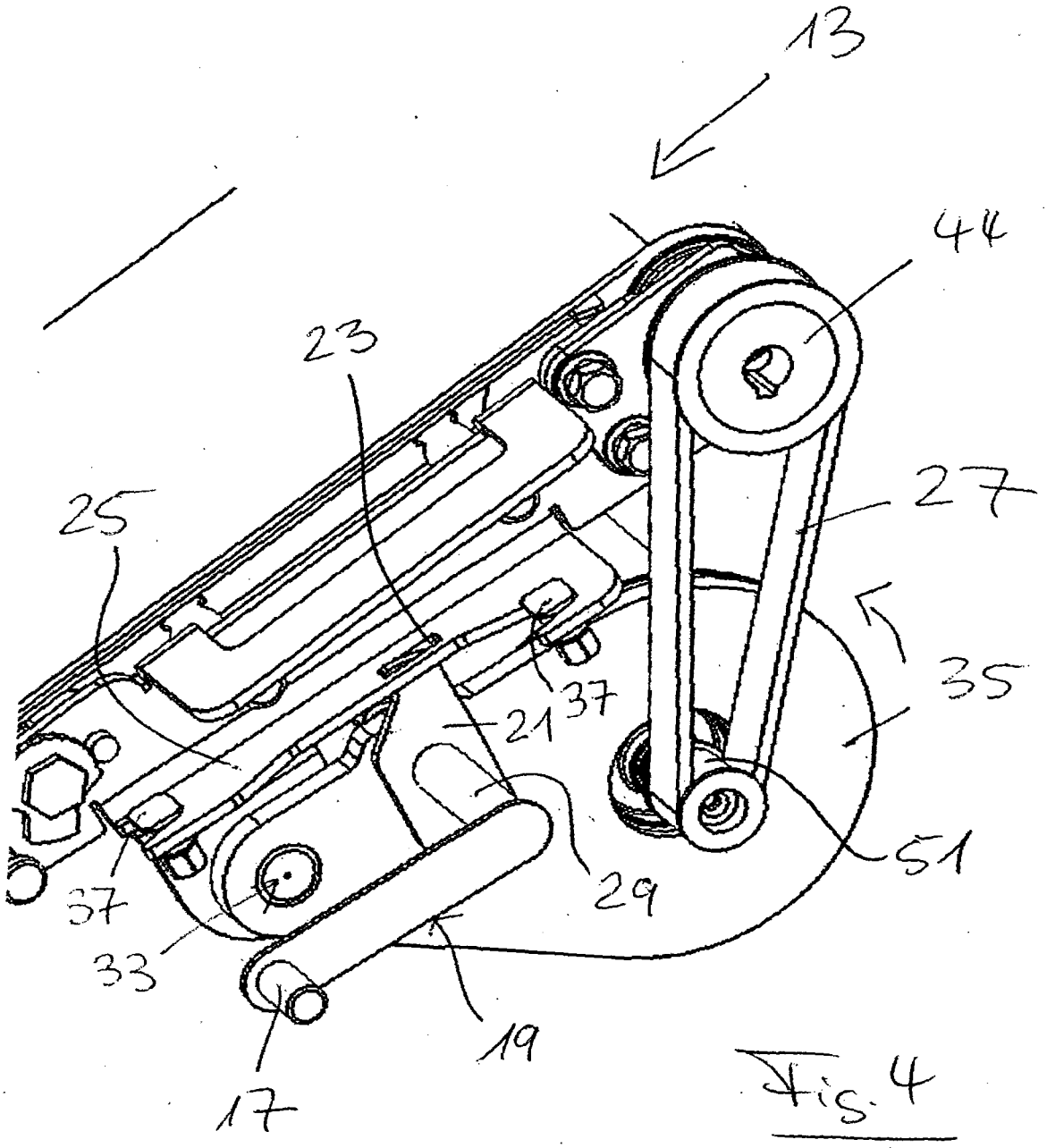


Fig. 4

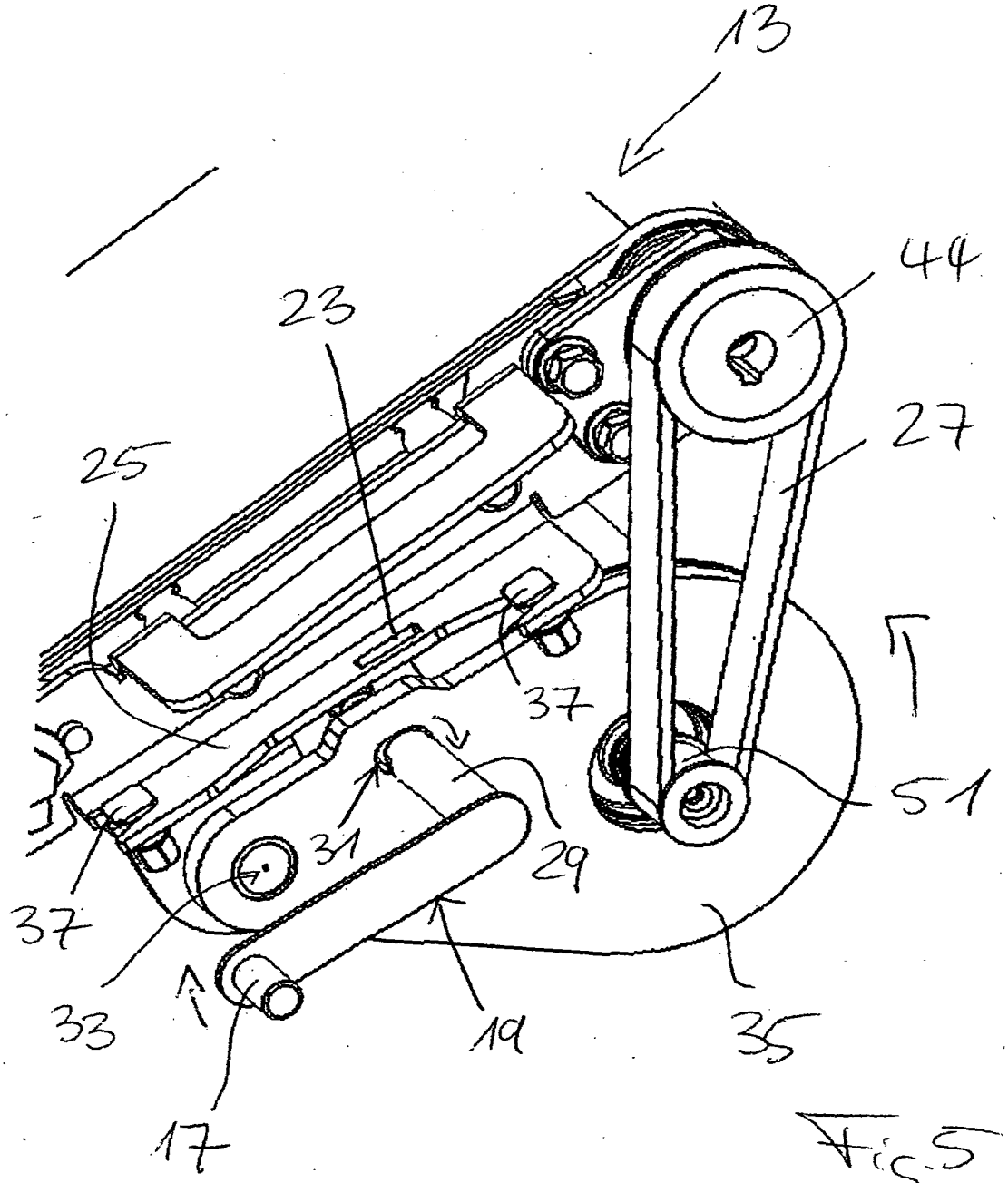


Fig.5

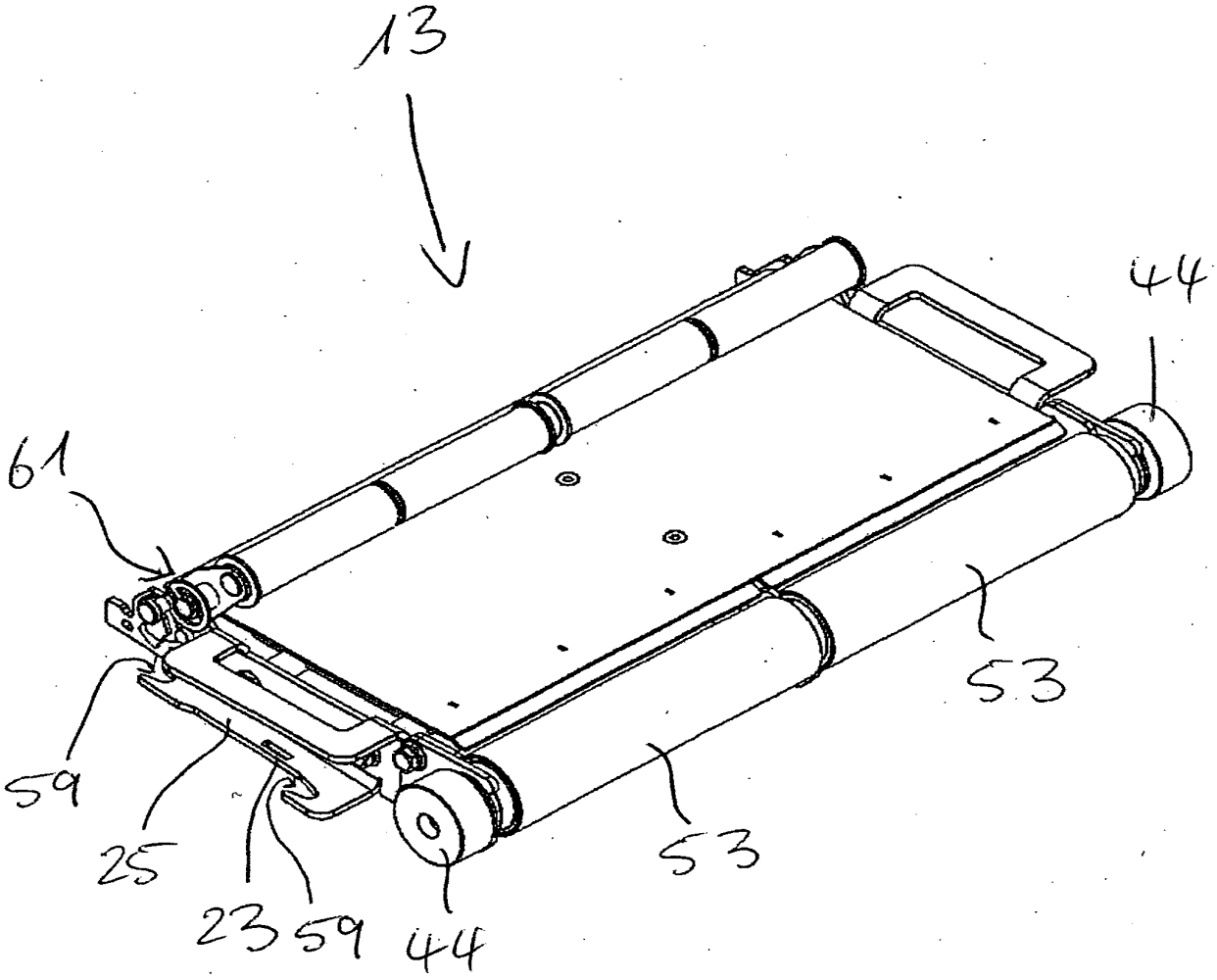


Fig. 6

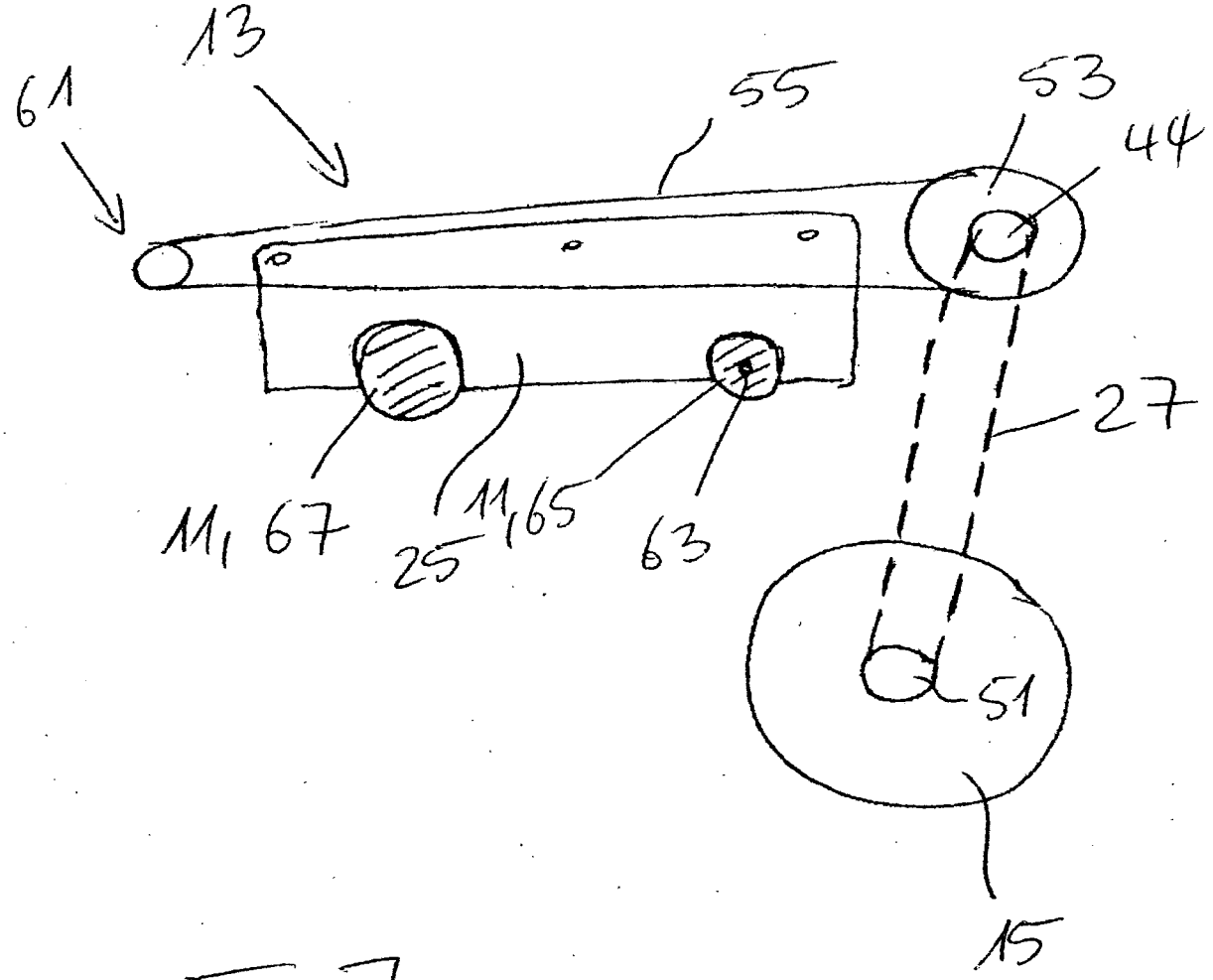


Fig. 7

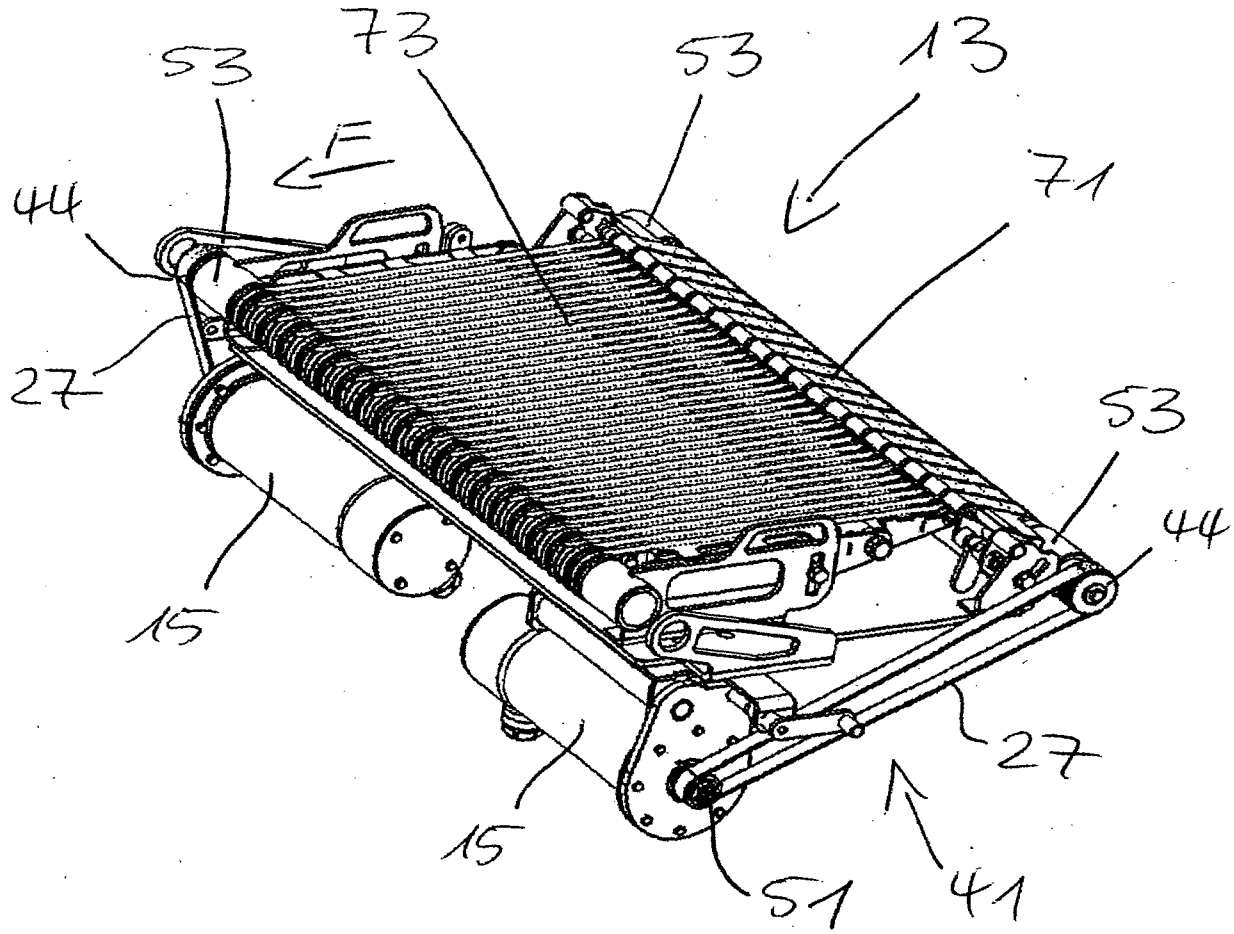


Fig. 8

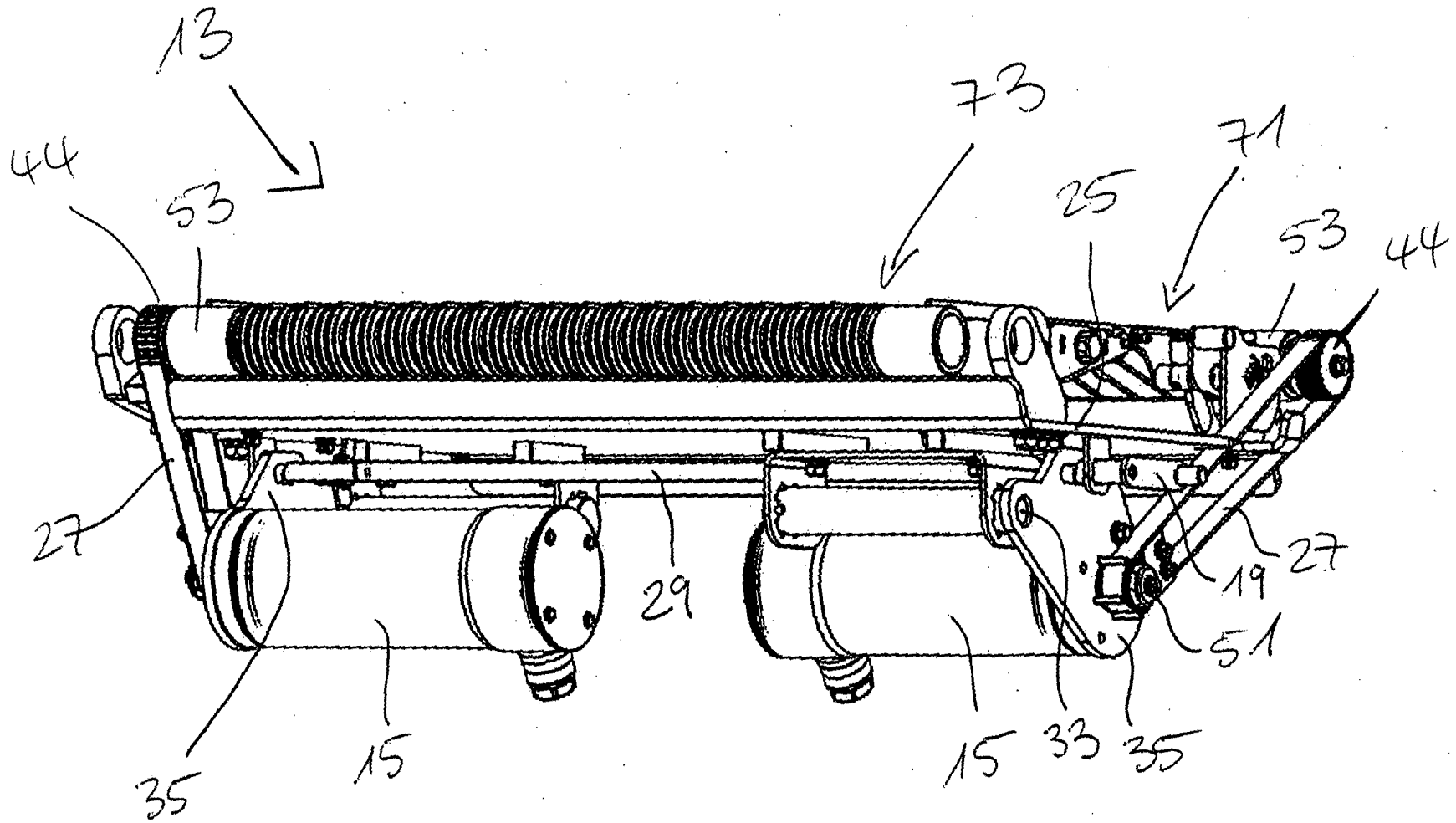


Fig. 9

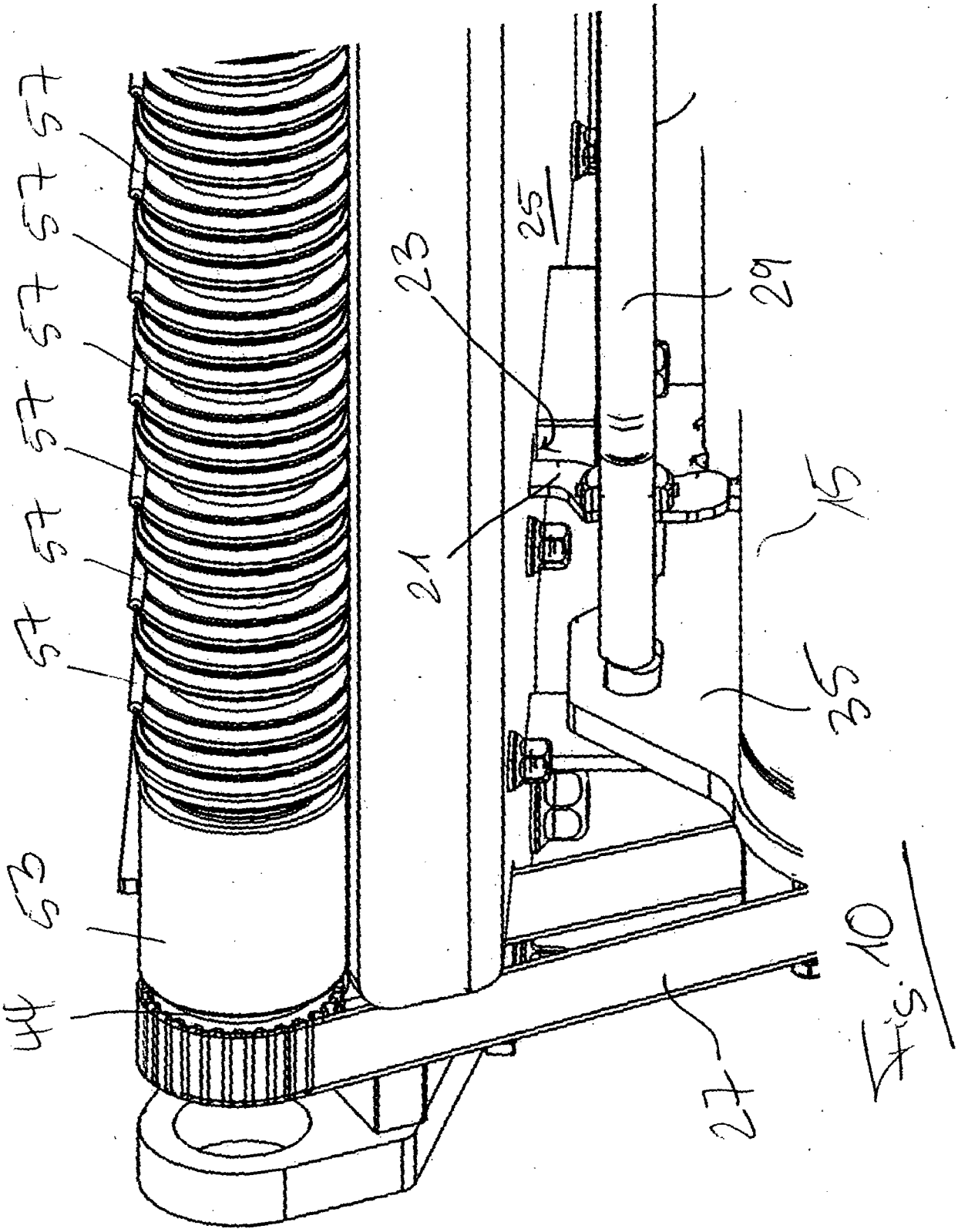


Fig. 1

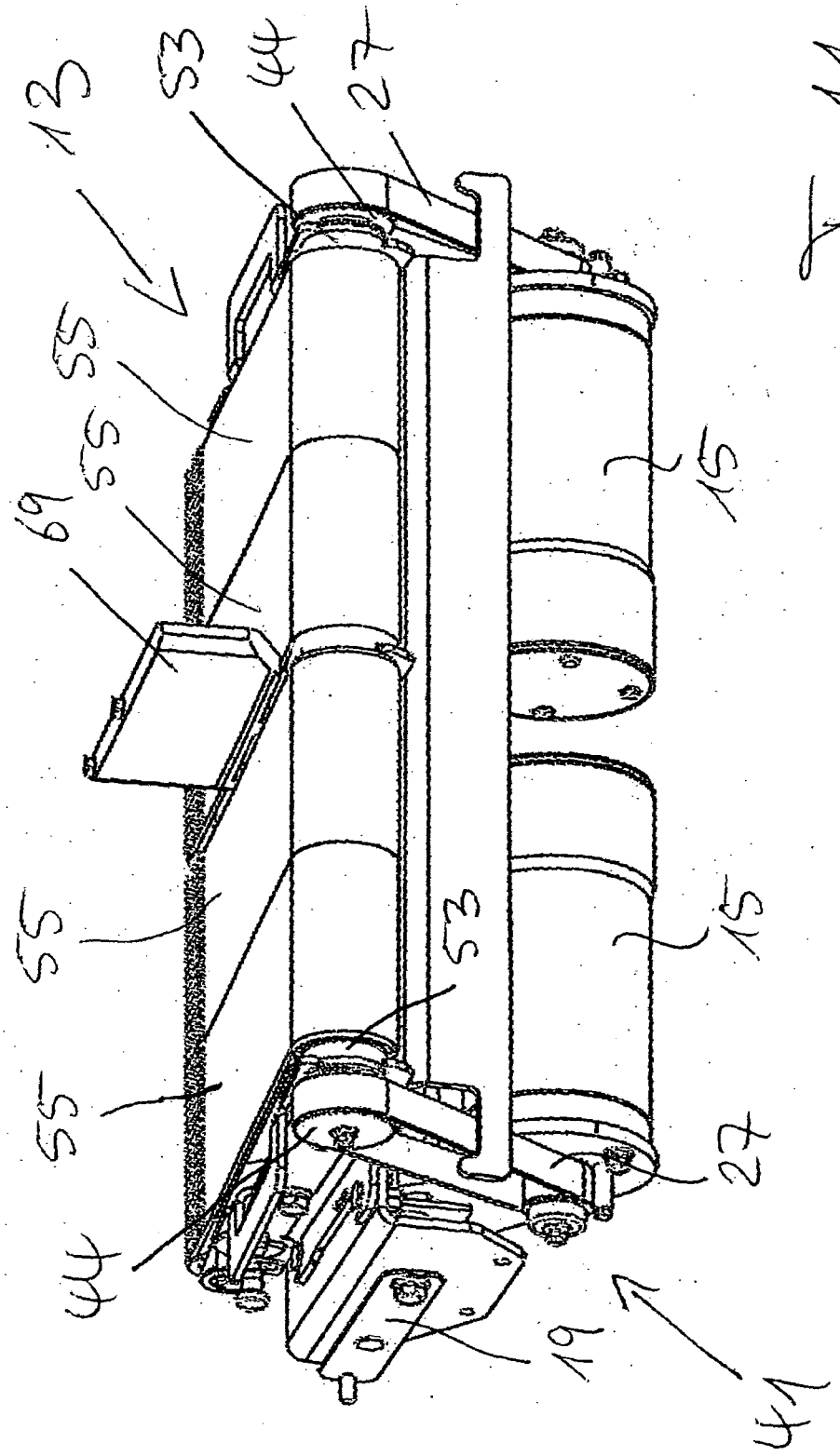


Fig. 11

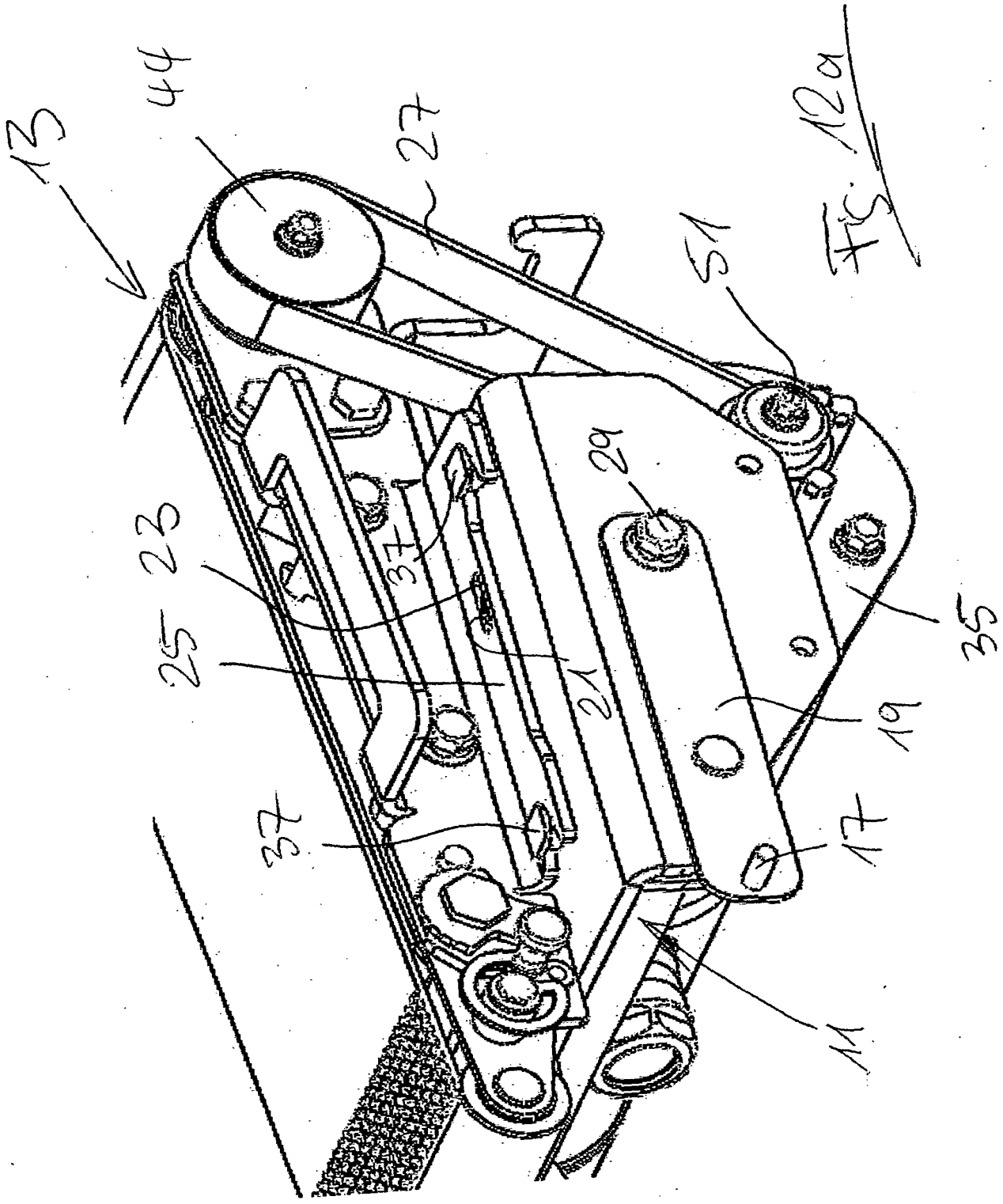


Fig. 12a

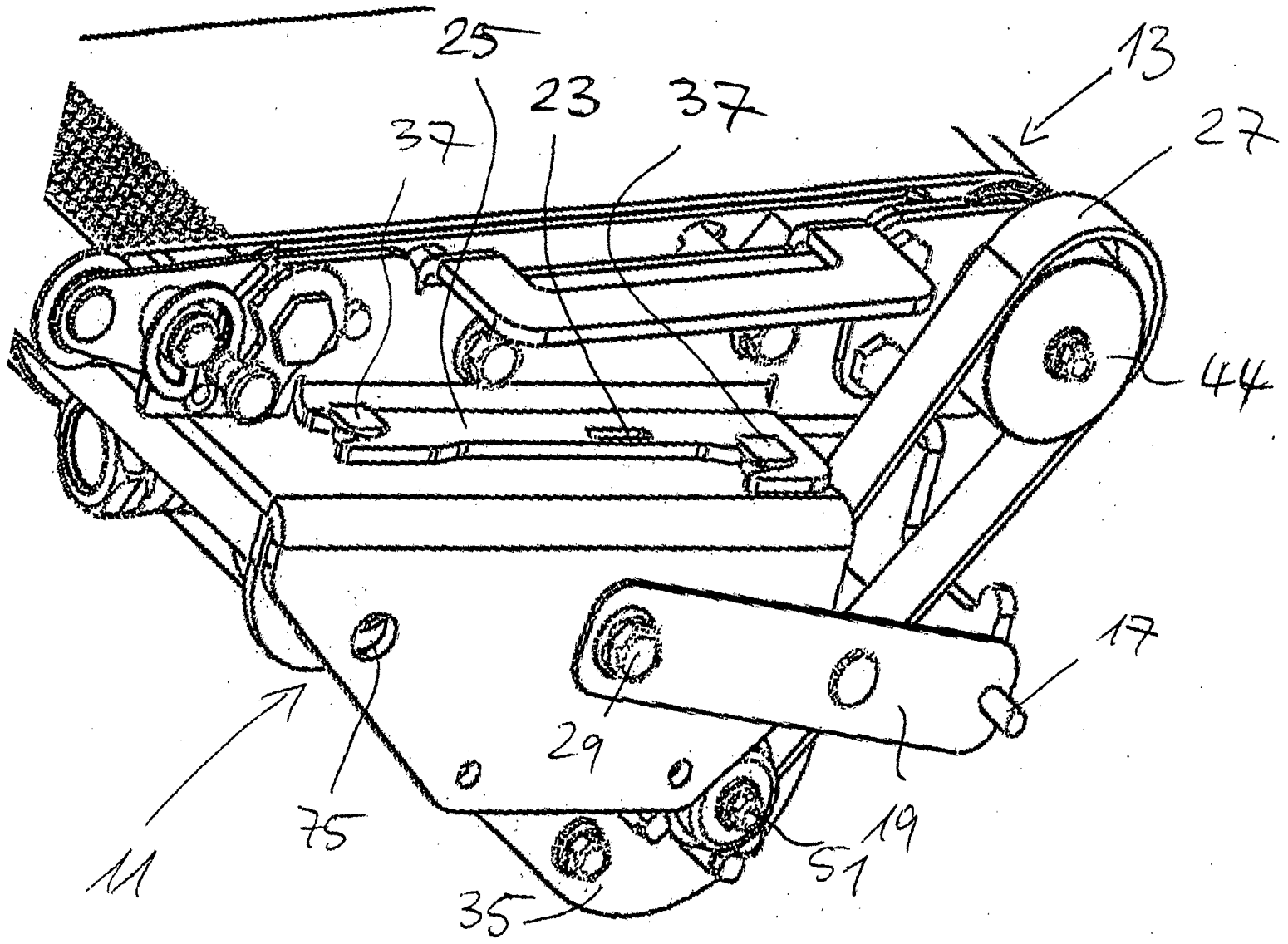


Fig 12b

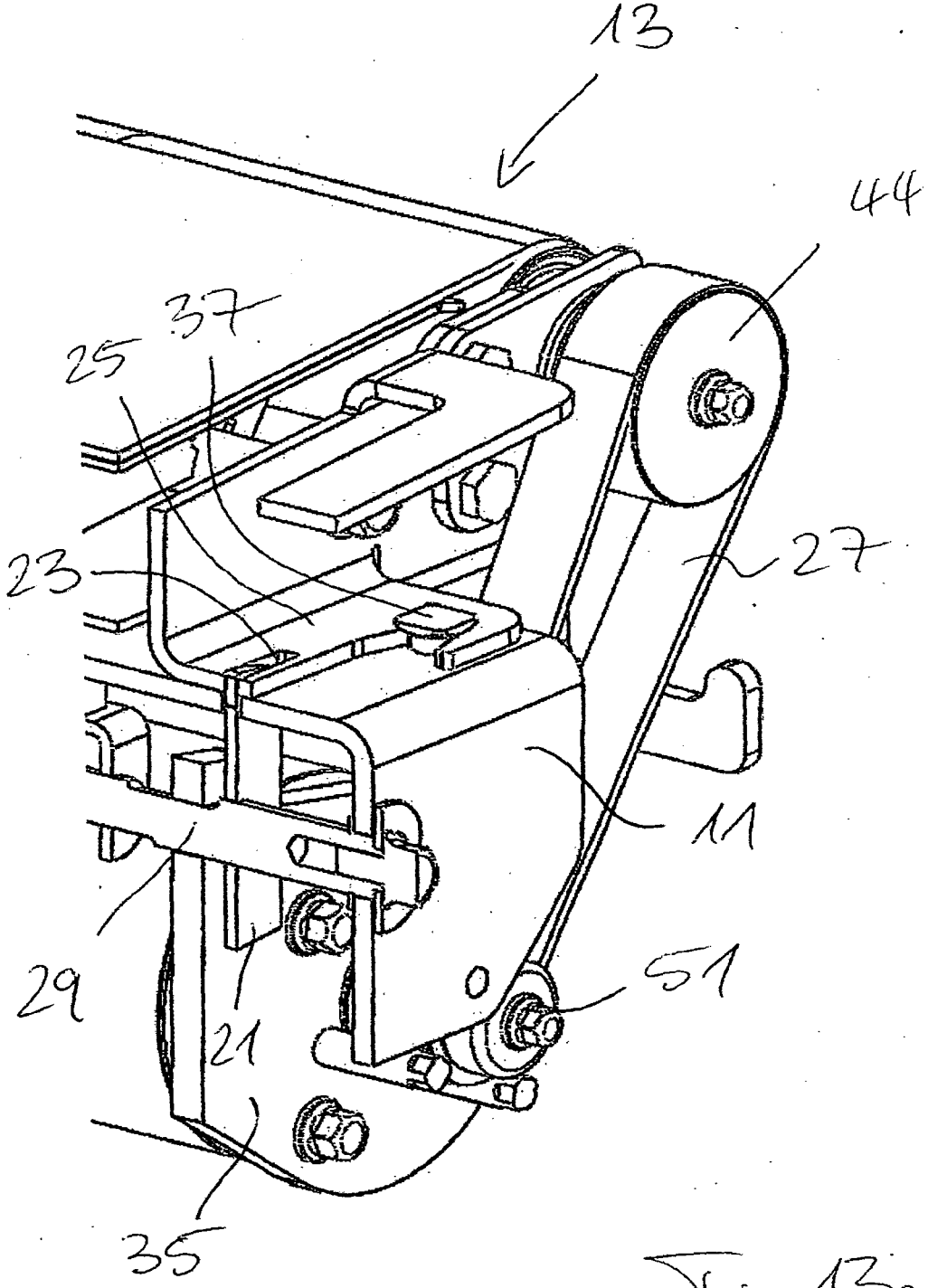


Fig. 13a

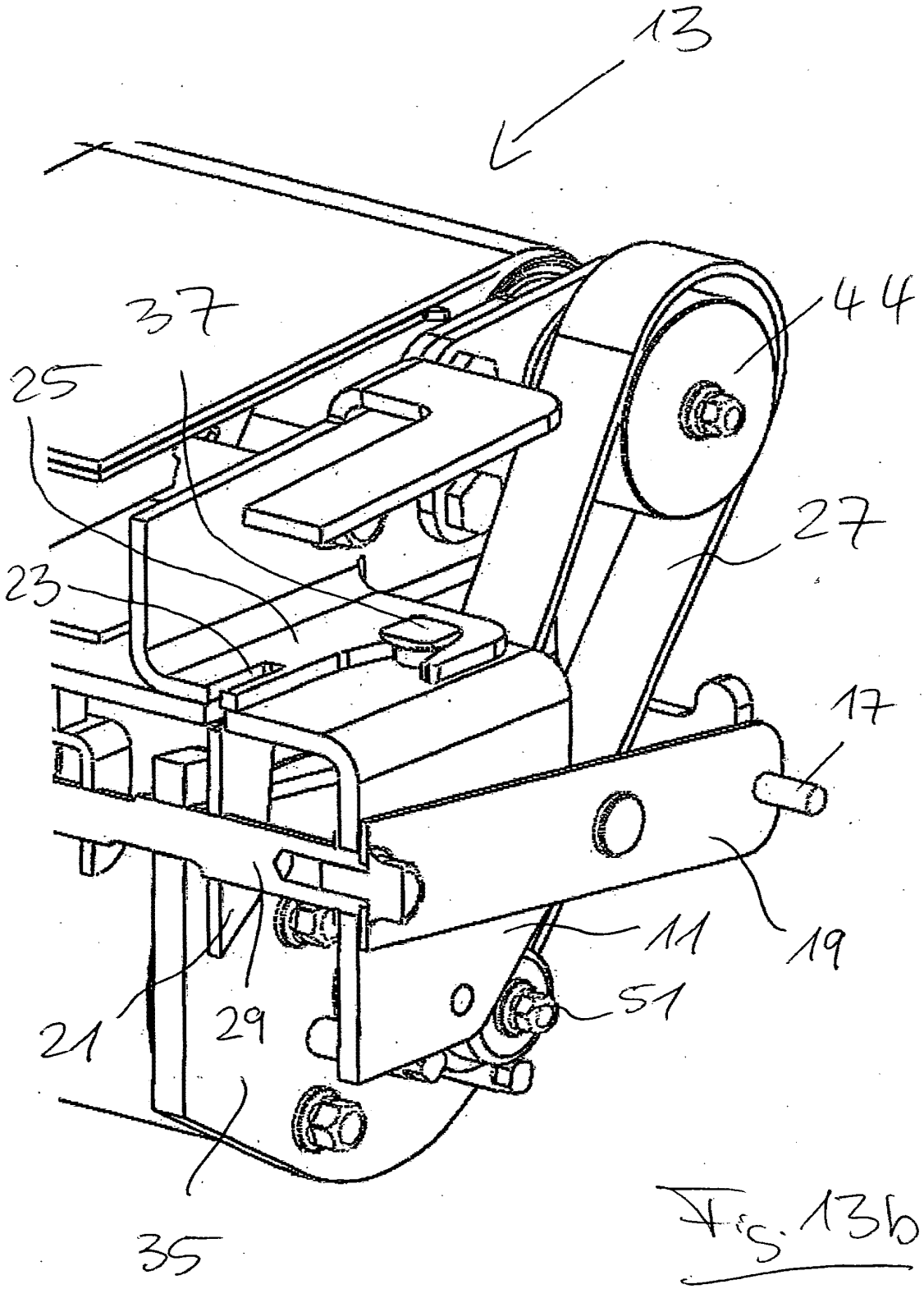


Fig. 13b

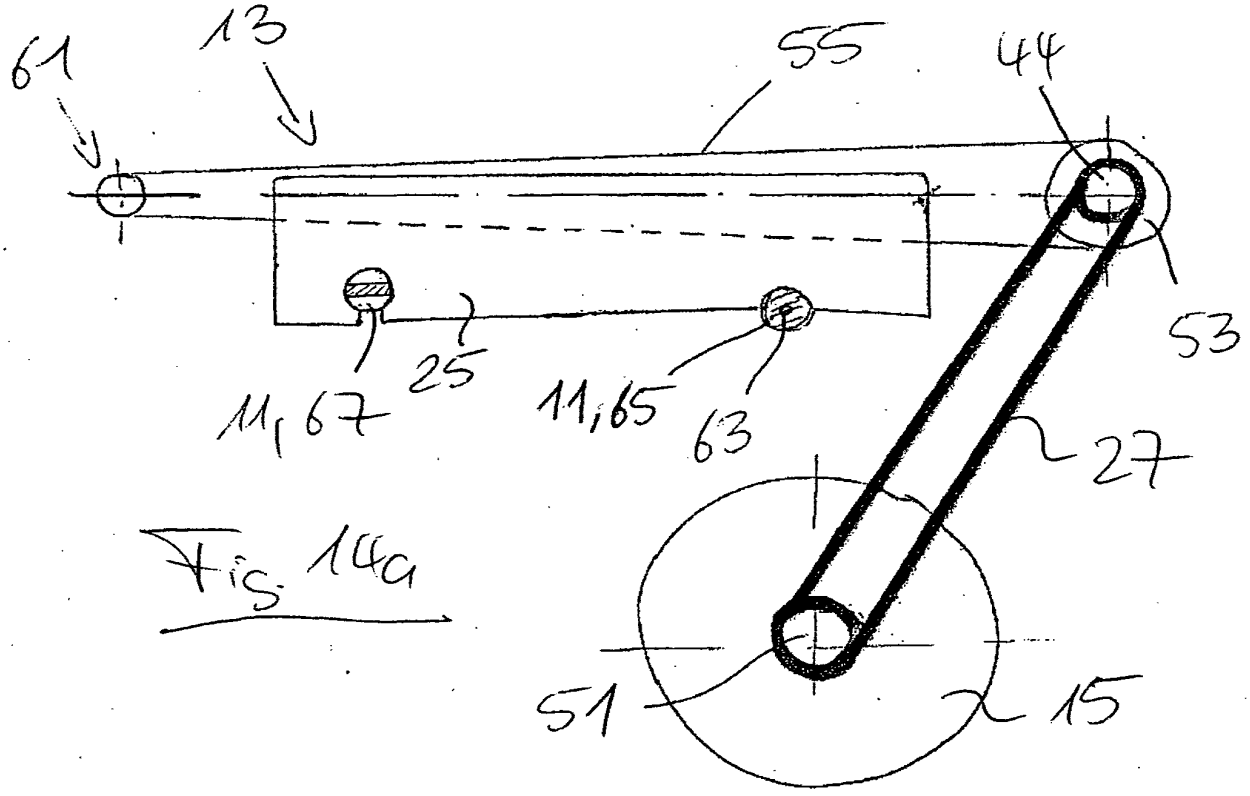


Fig. 14a

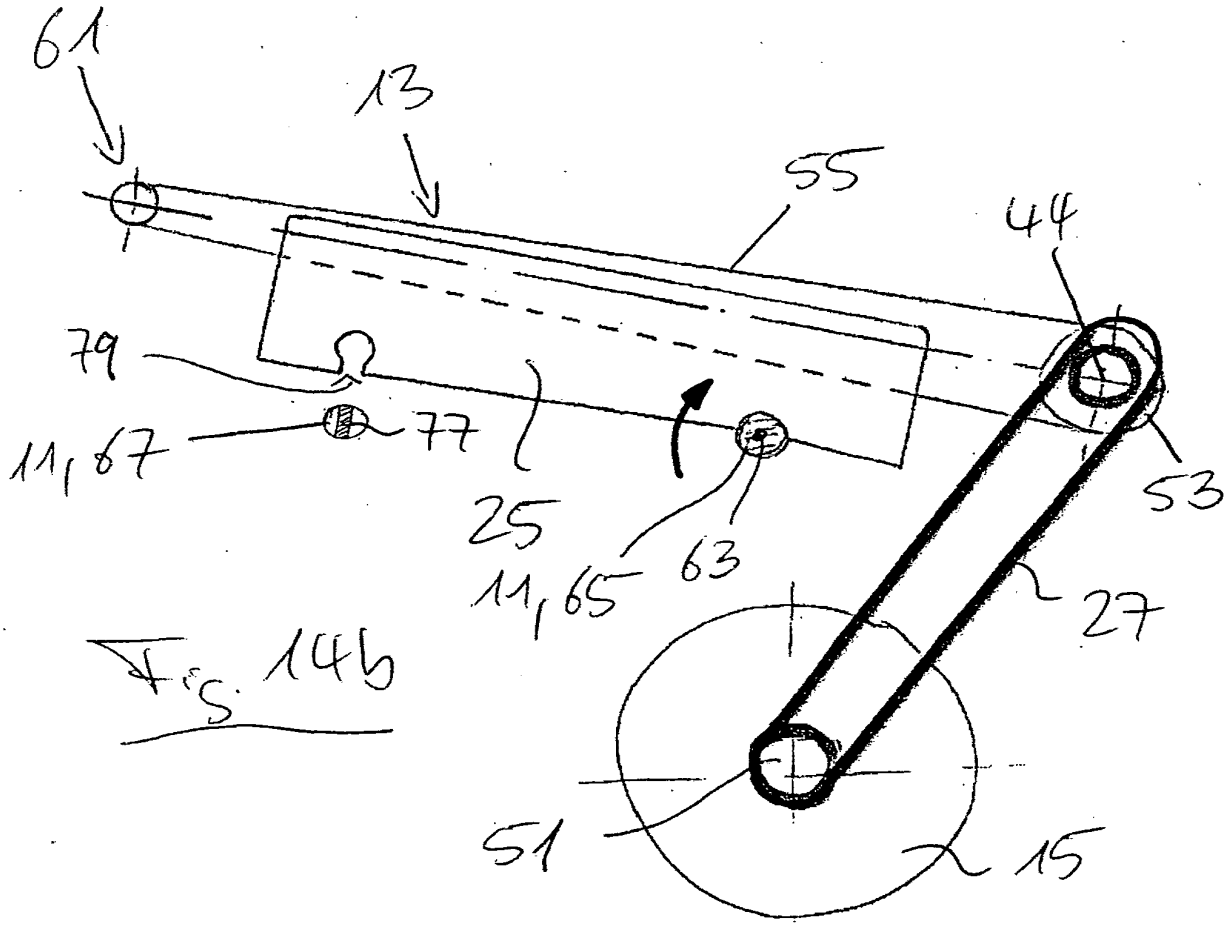


Fig. 14b

MFP-0031US



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANTS:	Textor Maschinenbau GmbH	) Group Art Unit: N/A
SERIAL NUMBER:	14/094,136	) Examiner: N/A
FILED:	December 2, 2013	) Confirmation No. 1104

FOR: HIGH PERFORMANCE SLICING APPARATUS WITH AT LEAST ONE REMOVABLE CONVEYOR BELT UNIT

SUBMISSION OF PRIORITY DOCUMENTS

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Dear Sir:

In accordance with the requirements of 37 CFR 1.55, Applicants hereby provide certified copies of the following priority documents:

German Application DE 10 2012 222 042.9, filed December 3, 2012.

German Application DE 10 2013 206 510.8, filed April 12, 2013.

Respectfully submitted,

Scott A. McBain

Reg. No. 37,181
Cantor Colburn LLP
(248) 524-2300

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 14/094,136

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	280
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	600
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	720
TOTAL CLAIMS (37 CFR 1.16(i))	1 minus 20 =	*			OR	x 80 =	0.00
INDEPENDENT CLAIMS (37 CFR 1.16(h))	1 minus 3 =	*				x 420 =	0.00
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						0.00
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							0.00
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	1600

APPLICATION AS AMENDED - PART II

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT A	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT B	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
14/094,136	12/02/2013	Josef Mayer	MFP0031US (T10212PUS)

CONFIRMATION NO. 1104

23413
CANTOR COLBURN LLP
20 Church Street
22nd Floor
Hartford, CT 06103

FORMALITIES LETTER

OC000000065677429

Date Mailed: 12/30/2013

NOTICE TO FILE MISSING PARTS OF NONPROVISIONAL APPLICATION

FILED UNDER 37 CFR 1.53(b)

Filing Date Granted

Items Required To Avoid Abandonment:

An application number and filing date have been accorded to this application. The item(s) indicated below, however, are missing. Applicant is given **TWO MONTHS** from the date of this Notice within which to file all required items below to avoid abandonment. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a).

- The application was filed in a language other than English. Applicant is required to provide an English translation of the specification, a statement that the translation is accurate, and the processing fee set forth in 37 CFR 1.17(i). (See 37 CFR 1.52(d)).

  Applicant is cautioned that correction of the above items may cause the specification and drawings page count to exceed 100 pages. If the specification and drawings exceed 100 pages, applicant will need to submit the required application size fee.
- Applicant must file an English translation of the application, the $ 140 fee set forth in 37 CFR 1.17(i), unless previously submitted, and a statement that the translation is accurate (37 CFR 1.52(d)).
- Because the specification was filed in a language other than English, the Office was unable to determine the number of claims submitted. Additional claims fees may be due once the number of claims can be determined.

The applicant needs to satisfy supplemental fees problems indicated below.

The required item(s) identified below must be timely submitted to avoid abandonment:

- A surcharge as set forth in 37 CFR 1.16(f) was not received.
  The surcharge is due for any one of:
  - late submission of the basic filing fee, search fee, or examination fee,
  - late submission of inventor's oath or declaration,
  - filing an application that does not contain at least one claim on filing, or
  - submission of an application filed by reference to a previously filed application.

SUMMARY OF FEES DUE:

The fee(s) required within **TWO MONTHS** from the date of this Notice to avoid abandonment is/are:

- $ **140** surcharge.
- $ **140** English translation surcharge.
- $(**0.00**) Previous Payment Amount.
- $ **280** TOTAL FEE BALANCE DUE.

Items Required To Avoid Processing Delays:

Applicant is notified that the above-identified application contains the deficiencies noted below. No period for reply is set forth in this notice for correction of these deficiencies. However, if a deficiency relates to the inventor's oath or declaration, the applicant must file an oath or declaration in compliance with 37 CFR 1.63, or a substitute statement in compliance with 37 CFR 1.64, executed by or with respect to each actual inventor no later than the expiration of the time period set in the "Notice of Allowability" to avoid abandonment. See 37 CFR 1.53(f).

- A properly executed inventor's oath or declaration has not been received for the following inventor(s):
  Josef Mayer

Replies must be received in the USPTO within the set time period or must include a proper Certificate of Mailing or Transmission under 37 CFR 1.8 with a mailing or transmission date within the set time period. For more information and a suggested format, see Form PTO/SB/92 and MPEP 512.

Replies should be mailed to:

Mail Stop Missing Parts
Commissioner for Patents
P.O. Box 1450
Alexandria VA 22313-1450

Registered users of EFS-Web may alternatively submit their reply to this notice via EFS-Web, including a copy of this Notice and selecting the document description "Applicant response to Pre-Exam Formalities Notice". https://sportal.uspto.gov/authenticate/AuthenticateUserLocalEPF.html

For more information about EFS-Web please call the USPTO Electronic Business Center at **1-866-217-9197** or visit our website at http://www.uspto.gov/ebc.

If you are not using EFS-Web to submit your reply, you must include a copy of this notice.

/tnguyen/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
14/094,136	12/02/2013		1600	MFP0031US (T10212PUS)	1	1

CONFIRMATION NO. 1104

23413
CANTOR COLBURN LLP
20 Church Street
22nd Floor
Hartford, CT 06103

FILING RECEIPT

OC000000065677428

Date Mailed: 12/30/2013

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)
Josef Mayer, Memmingerberg, GERMANY;

Applicant(s)
Textor Maschinenbau GmbH, Wolfertschwenden, GERMANY

Assignment For Published Patent Application
Textor Maschinenbau GmbH, Wolfertschwenden, GERMANY

Power of Attorney: None

Domestic Applications for which benefit is claimed - None.
A proper domestic benefit claim must be provided in an Application Data Sheet in order to constitute a claim for domestic benefit. See 37 CFR 1.76 and 1.78.

Foreign Applications (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.)
GERMANY 102012222042.9 12/03/2012
GERMANY 102013206510.8 04/12/2013

Permission to Access - A proper **Authorization to Permit Access to Application by Participating Offices** (PTO/SB/39 or its equivalent) has been received by the USPTO.

If Required, Foreign Filing License Granted: 12/20/2013
The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 14/094,136**
Projected Publication Date: To Be Determined - pending completion of Missing Parts
Non-Publication Request: No

Early Publication Request: No
Title

High Performance Slicing Apparatus With At Least One Removable Conveyor Belt Unit

Preliminary Class

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

SelectUSA

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop technology, manufacture products, deliver services, and grow your business, visit http://www.SelectUSA.gov or call +1-202-482-6800.

PTO/AIA/14 (11-13)
Approved for use through 01/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	MFP0031US (T10212PUS)
	Application Number	
Title of Invention	High Performance Slicing Apparatus With At Least One Removable Conveyor Belt Unit	

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Inventor Information:

Inventor 1 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Josef		Mayer	

Residence Information (Select One) ○ US Residency ◉ Non US Residency ○ Active US Military Service

City	Memmingerberg	Country of Residence i	DE

Mailing Address of Inventor:

Address 1	Wiesenstr. 14		
Address 2			
City	Memmingerberg	**State/Province**	
Postal Code	D-87766	**Country** i	DE

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. Add

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below.
For further information see 37 CFR 1.33(a).

☐ **An Address is being provided for the correspondence Information of this application.**

Customer Number	23413		
Email Address		Add Email	Remove Email

Application Information:

Title of the Invention	High Performance Slicing Apparatus With At Least One Removable Conveyor Belt Unit		
Attorney Docket Number	MFP0031US (T10212PUS)	**Small Entity Status Claimed**	☐
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	15	**Suggested Figure for Publication (if any)**	

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	MFP0031US (T10212PUS)
	Application Number	
Title of Invention	High Performance Slicing Apparatus With At Least One Removable Conveyor Belt Unit	

Publication Information:

☐	Request Early Publication (Fee required at time of Request 37 CFR 1.219)
☐	**Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32).
Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	◉ Customer Number	○ US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)
Customer Number	23413		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c) or indicate National Stage entry from a PCT application. Providing this information in the application data sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.
When referring to the current application, please leave the application number blank.

Prior Application Status			Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button. Add

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55(d). When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX) [i] the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(h)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

			Remove
Application Number	Country [i]	Filing Date (YYYY-MM-DD)	Access Code [i] (if applicable)
102012222042.9	DE	2012-12-03	

PTO/AIA/14 (11-13)
Approved for use through 01/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	MFP0031US (T10212PUS)
	Application Number	
Title of Invention	High Performance Slicing Apparatus With At Least One Removable Conveyor Belt Unit	

Remove

Application Number	Country [i]	Filing Date (YYYY-MM-DD)	Access Code [i] (if applicable)
102013206510.8	DE	2013-04-12	

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button. Add

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.
NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

Authorization to Permit Access:

☒ Authorization to Permit Access to the Instant Application by the Participating Offices

If checked, the undersigned hereby grants the USPTO authority to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the World Intellectual Property Office (WIPO), and any other intellectual property offices in which a foreign application claiming priority to the instant patent application is filed access to the instant patent application. See 37 CFR 1.14(c) and (h). This box should not be checked if the applicant does not wish the EPO, JPO, KIPO, WIPO, or other intellectual property office in which a foreign application claiming priority to the instant patent application is filed to have access to the instant patent application.

In accordance with 37 CFR 1.14(h)(3), access will be provided to a copy of the instant patent application with respect to: 1) the instant patent application-as-filed; 2) any foreign application to which the instant patent application claims priority under 35 U.S.C. 119(a)-(d) if a copy of the foreign application that satisfies the certified copy requirement of 37 CFR 1.55 has been filed in the instant patent application; and 3) any U.S. application-as-filed from which benefit is sought in the instant patent application.

In accordance with 37 CFR 1.14(c), access may be provided to information concerning the date of filing this Authorization.

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

PTO/AIA/14 (11-13)
Approved for use through 01/31/2014. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	MFP0031US (T10212PUS)
	Application Number	
Title of Invention	High Performance Slicing Apparatus With At Least One Removable Conveyor Belt Unit	

Applicant 1 Remove

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

Clear

(•) Assignee	( ) Legal Representative under 35 U.S.C. 117	( ) Joint Inventor
( ) Person to whom the inventor is obligated to assign.	( ) Person who shows sufficient proprietary interest	

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor :

If the Applicant is an Organization check here. [X]

Organization Name	Textor Maschinenbau GmbH		
Mailing Address Information:			
Address 1	Gewerbestrabe 2		
Address 2			
City	Wolfertschwenden	**State/Province**	
Country i DE		Postal Code	D-87787
Phone Number		Fax Number	
Email Address			

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Assignee Information including Non-Applicant Assignee Information:

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	MFP0031US (T10212PUS)
	Application Number	
Title of Invention	High Performance Slicing Apparatus With At Least One Removable Conveyor Belt Unit	

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HOCHLEISTUNGSAUFSCHNITTSCHNEIDEMASCHINE MIT ZUMINDEST EINER ENTNEHMBAREN BANDKASSETTE

Die Erfindung betrifft eine Aufschnittschneidemaschine für Lebensmittelprodukte, insbesondere Hochleistungs-Slicer, mit zumindest einem Bandförderer.

Insbesondere in Hochleistungsaufschnittschneidemaschinen müssen Produkte einer Schneidebene zugeführt werden, damit die Produkte in Scheiben geschnitten werden können. Weiterhin müssen dann die abgeschnittenen Scheiben zu Portionen gruppiert und anschließend aus dem Schneidebereich abtransportiert werden. Für diese Förderaufgaben werden normalerweise aktiv angetriebene Förderbänder eingesetzt. Bei diesen handelt es sich entweder um Band- oder Gurtförderer mit relativ breiten flachen Bänder bzw. Gurten oder um Riemenförderer mit einer Vielzahl von relativ schmalen Einzelriemen, die insbesondere einen kreisförmigen Querschnitt aufweisen können.

Diejenigen Förderer, welche die Produkte der Schneidebene zuführen, sollen normalerweise bis kurz vor die Schneidebene reichen, um eine optimale Traktion der Produkte zu gewährleisten. Daher werden diese Förderer oft auch als Traktionsbänder bezeichnet.

Diejenigen Förderer, welche die aufgeschnittenen Scheiben auffangen und zu Portionen aus mehreren Scheiben gruppieren, nennt man üblicherweise Portionierbänder. Es werden oft zumindest zwei nacheinander angeordnete Förderer eingesetzt, um nach Übergabe der Portion von dem ersten

Förderer auf den zweiten Förderer unmittelbar wieder mit der Ablage neuer Scheiben auf dem ersten Förderer beginnen zu können. Diese wenigstens zwei nacheinander angeordneten Förderer werden im Rahmen der vorliegenden Offenbarung auch gemeinsam als ein "Portionierband" bezeichnet, obwohl mehrere hintereinander angeordnete Einzelförderer vorgesehen sind.

Die Erfindung ist nicht auf derartige Traktionsbänder oder Portionierbänder beschränkt. Grundsätzlich kann die Erfindung an jeder Art von Bandförderer realisiert werden.

In der Praxis werden während des Betriebs einer Aufschnittschneidemaschine sowohl die Zuführbänder (insbesondere die Traktionsbänder) als auch die Abtransportbänder (insbesondere die Portionierbänder) üblicherweise stark verschmutzt. Es ist deshalb notwendig, diese Förderbänder täglich, oftmals sogar mehrmals täglich, zu reinigen. Dazu ist normalerweise eine Entnahme der Bandgurte oder Transportriemen notwendig, um eine gründliche Reinigung durchführen zu können.

Aus dem Stand der Technik ist es bekannt, eine solche Entnahme dadurch zu ermöglichen, dass die Förderer einseitig an einem Maschinengestell aufgehängt sind, um eine einfache Entnahme des Bandes oder Gurtes zu erreichen. Die Förderer verbleiben dabei während der Reinigung in der Maschine. Der Nachteil einer solchen Vorgehensweise ist, dass mit zunehmender Breite des Bandförderers sehr massive Bandgestelle notwendig sind. Weiterhin wird seitlich neben dem Förderer viel Platz benötigt, um das jeweilige Fördermittel, beispielsweise den Gurt, bei an der Maschine verbleibendem Förderer zu entnehmen.

Des Weiteren sind Förderer bekannt, die einschließlich des jeweiligen Fördermittels einfach entnommen werden können. Allerdings sind diese Förderer üblicherweise über eine Kupplung bzw. eine Kupplungseinheit an eine Antriebseinheit gekoppelt. Dies bedeutet, dass auf der Antriebsrolle des Förderers eine Kupplung sitzt, die im Betrieb die Verbindung zu einem Antriebsmotor herstellt. Durch eine solche Bauart ergibt sich allerdings eine sehr große Breite, da entweder der Antriebsmotor axial neben der Antriebsrolle des Förderers angeordnet werden muss oder es erforderlich ist, eine Kupplungseinheit mit Lagerung axial zur Antriebsrolle des Förderers anzuordnen, wobei diese Kupplungseinheit dann über eine weitere Verbindung, z.B. einen Zahnriemen, mit einem Antriebsmotor gekoppelt werden muss.

Beide Varianten resultieren in einer großen Breite und ermöglichen es zudem nicht, mehrere Antriebe an einen entnehmbaren Förderer anzuschließen.

Aufgabe der Erfindung ist es, eine Maschine der eingangs genannten Art zu schaffen, welche die erwähnten Nachteile nicht aufweist und welche insbesondere bei Platz sparender und kostengünstiger Bauweise eine möglichst einfache Reinigung ermöglicht.

Die Lösung dieser Aufgabe erfolgt durch die Merkmale des Anspruchs 1.

Erfindungsgemäß ist der Bandförderer als entnehmbare Bandkassette ausgeführt.

Bevorzugte Ausführungsformen der Erfindung sind auch in den abhängigen Ansprüchen, der Beschreibung sowie der Zeichnungen angegeben.

Gemäß einem Ausführungsbeispiel ist die Bandkassette in Förderrichtung gesehen vor der Schneidebene angeordnet und insbesondere als Traktionsband ausgebildet. Gemäß einer alternativen Ausgestaltung ist die Bandkassette in Förderrichtung gesehen hinter der Schneidebene angeordnet und insbesondere als Portionierband ausgebildet.

Die Bandkassette kann – in Förderrichtung gesehen – eine wirksame Band- oder Förderlänge aufweisen, die weniger als 500 mm, insbesondere weniger als 300 mm, insbesondere weniger als 200 mm und insbesondere zwischen 50 mm und 150 mm beträgt. Die Erfindung ermöglicht es, sehr kurze Bandförderer zu realisieren, die beispielsweise lediglich eine Länge von ungefähr 100 mm aufweisen und dabei mehrere unabhängige Antriebe aufweisen können. Von Vorteil ist dies insbesondere für die Ausgestaltung einer entnehmbaren Bandkassette als eine Portioniereinheit, bei der zumindest einer der Förderer eine sehr kurze Förderlänge aufweisen soll.

Bevorzugt weist die Bandkassette eine unterhalb der umlaufenden Förderbänder oder Förderriemen angeordnete Basis auf, mit der die Bandkassette mechanisch an einem Unterbau des Bandförderers angebracht werden kann. Die Basis stellt gewissermaßen den kassettenseitigen Teil einer mechanischen Schnittstelle zwischen Bandkassette und Unterbau dar. Der Unterbau, der bei Entnahme der Bandkassette vor Ort verbleibt, kann ein Bestandteil nur des betreffenden Bandförderers sein, zu einer übergeordneten Förderstrecke gehören oder in eine Aufschneidemaschine integriert sein. Bevorzugt weist der Unterbau eine an die Basis der Bandkassette angepasste Aufnahme auf, die gewissermaßen den stationären Teil der mechanischen Schnittstelle zwischen Bandkassette und Unterbau bildet.

Gemäß einem Ausführungsbeispiel ist zumindest ein direkter Antrieb für die Bandkassette vorgesehen. Eine solche Ausgestaltung kommt mit einer minimalen Anzahl von Bauteilen aus und ist folglich äußerst kostengünstig. Ferner ist es hierdurch möglich, mehrere Antriebe an einer einzigen entnehmbaren Bandkassette anzubringen. Ein solcher Multiantrieb eröffnet vielfältige Konfigurationsmöglichkeiten. So ist es beispielsweise möglich, einen Mehrspurbetrieb zu realisieren, bei dem die einzelnen Spuren unabhängig voneinander angetrieben und gesteuert werden können. Besonders vorteilhaft ist dies für Portioniereinheiten. Bislang war es zumindest äußerst aufwendig und schwierig, wenn nicht praktisch unmöglich, mehrspurige Portionierbänder zu realisieren, da die hygienische und funktionale Unterbringung mehrerer Antriebe nicht befriedigend bewerkstelligt werden konnte.

Gemäß einer weiteren Ausführungsform der Erfindung ist wenigstens ein Antriebsmotor für die Bandkassette vorgesehen, wobei der Antriebsmotor direkt mit der Bandkassette gekoppelt ist. Eine derartige Koppelung kann beispielsweise über eine Riemenverbindung, mit der relativ lange Strecken zwischen dem Motor und derjenigen Stelle der Bandkassette, an welcher diese angetrieben werden soll, überwunden werden können, oder über eine Zahnradanordnung erfolgen, beispielsweise über eine Zahnradpaarung.

Des Weiteren kann erfindungsgemäß vorgesehen sein, dass ein Antriebsmotor für die Bandkassette eine Antriebswelle und die Bandkassette ein Antriebsrad aufweist, wobei die Antriebswelle und das Antriebsrad direkt miteinander gekoppelt sind. Dies ermöglicht einen besonders einfachen und kostengünstigen Aufbau, der ohne Beeinträchtigung der Funktionalität wenig Platz beansprucht und hohen hygienischen Anforderungen gerecht wird.

In einer bevorzugten Ausgestaltung ist vorgesehen, dass der Antriebsmotor unterhalb der Bandkassette angeordnet ist. Hierdurch wird die Breite des Bandförderers nicht unnötig vergrößert. Unterhalb des Förderers zur Verfügung stehender Bauraum kann so genutzt werden. Insbesondere ist es möglich, mehrere Antriebe nebeneinander oder hintereinander unterhalb der Bandkassette anzuordnen.

Ein weiteres Ausführungsbeispiel der Erfindung schlägt vor, dass die Bandkassette eine gelagerte Bandrolle aufweist, wobei ein Antriebsrad der Bandkassette über die Lagerung der Bandrolle gelagert ist. Hierdurch wird der Antrieb der Bandkassette weiter vereinfacht und es werden Bauteile eingespart, indem die Lagerung der Bandrolle für die Lagerung des Antriebsrades genutzt wird.

Insbesondere ist hierbei das Antriebsrad der Bandkassette koaxial zur Bandrolle und insbesondere axial neben der Bandrolle angeordnet. Ein mit dem Antriebsrad zusammenwirkender Antriebsmotor kann so - insbesondere unterhalb der Bandkassette - grundsätzlich an jeder beliebigen Stelle angeordnet werden, die eine direkte Koppelung mit dem Antriebsrad insbesondere über eine Riemenverbindung oder eine Zahnradanordnung ermöglicht. Von besonderem Vorteil ist dabei, dass es nicht erforderlich ist, den Antriebsmotor bzw. dessen Antriebswelle in axialer Verlängerung der Bandrolle anzuordnen, so dass eine unnötige Verbreiterung des Bandförderers vermieden wird.

In einer besonders bevorzugten Ausgestaltung der Erfindung ist zum Aufheben und Herstellen einer Koppelung zwischen einem Antriebsmotor für die Bandkassette und der Bandkassette jeweils eine Relativbewegung zwischen Antriebsmotor und Bandkassette vorgesehen. Bei dieser Relativbewegung kann es sich um eine Schwenkbewegung handeln, die eine reine

Dreh- oder Rotationsbewegung umfassen, grundsätzlich aber auch eine komplexere Bewegung sein kann, welche eine Überlagerung mehrerer Einzelbewegungen ist.

So kann einfach durch Bewegen entweder des Antriebsmotors oder der Bandkassette die antriebsmäßige Koppelung zwischen Motor und Kassette aufgehoben werden, um eine Entnahme der Kassette zu ermöglichen.

Von besonderem Vorteil ist bei diesem Konzept, dass der Antriebsmotor an der Maschine bzw. an dem Unterbau der Fördereinrichtung verbleiben kann.

In einer bevorzugten Ausgestaltung wird durch die Relativbewegung zwischen Antriebsmotor und Bandkassette der Abstand zwischen einer Antriebsachse des Antriebsmotors und einer Antriebsachse der Bandkassette verändert. Der Motor und die Kassette werden folglich derart relativ zueinander bewegt, dass eine Abstandsveränderung zwischen den beiden Antriebsachsen bewirkt wird. Insbesondere kann hierdurch der Abstand zwischen einer Antriebswelle des Antriebsmotors und einem Antriebsrad der Bandkassette verändert werden. Hierdurch kann beispielsweise ein Antriebsriemen entspannt bzw. gespannt oder eine Zahnradanordnung außer Eingriff bzw. in Eingriff gebracht werden.

Gemäß einem Ausführungsbeispiel der Erfindung kann eine Koppelung zwischen einem Antrieb für die Bandkassette und der Bandkassette durch Entspannen eines Antriebsriemens aufhebbar und durch Spannen des Antriebsriemens herstellbar sein. Das Entspannen und Spannen des Antriebsriemens kann jeweils durch eine Relativbewegung zwischen Antrieb und Bandkassette erfolgen, wie vorstehend bereits erwähnt. Eine solche Relativbewegung ist grundsätzlich aber nicht zwingend.

Gemäß einem weiteren Ausführungsbeispiel der Erfindung ist für die Bandkassette eine bei entnommener Bandkassette an der Maschine verbleibende Aufnahme vorgesehen, an der die Bandkassette verriegelbar ist, wobei die Verriegelung zur Entnahme der Bandkassette aufhebbar und zum Einbau der Bandkassette herstellbar ist.

In einer Variante der Erfindung ist es möglich, dass zur Entnahme oder zum Einbau der Bandkassette eine Koppelung zwischen einem Antrieb der Bandkassette und der Bandkassette gleichzeitig mit einer Verriegelung der Bandkassette aufhebbar bzw. herstellbar ist, beispielsweise einer Verriegelung der Bandkassette an einer an der Maschine verbleibenden Aufnahme, wie vorstehend erwähnt.

Hierdurch ist es insbesondere möglich, lediglich einen einzigen Arbeits- oder Betätigungsvorgang vorzusehen, mit dem gleichzeitig die Verriegelung und die Koppelung aufgehoben werden, um die Bandkassette entnehmen zu können.

In einer alternativen Variante der Erfindung kann vorgesehen sein, dass zur Entnahme oder zum Einbau der Bandkassette gleichzeitig die Koppelung zwischen einem Antrieb für die Bandkassette und der Bandkassette einerseits und eine Entnahme- bzw. Einbaubewegung der Bandkassette andererseits durchzuführen sind, und zwar nach dem Aufheben bzw. vor dem Herstellen einer Verriegelung der Bandkassette.

Hierbei wird die Entnahme- bzw. Einbaubewegung der Bandkassette dazu genutzt, gleichzeitig die antriebsmäßige Koppelung aufzuheben bzw. herzustellen. Bei dem Aufheben bzw. Herstellen der Verriegelung der Bandkassette handelt es sich dagegen um einen separaten Vorgang.

Für eine Koppelung zwischen einem Antrieb für die Bandkassette und der Bandkassette und/oder für eine Verriegelung der Bandkassette an einer Aufnahme der Maschine kann eine Betätigungseinrichtung vorgesehen sein. Insbesondere kann es sich dabei um eine manuell zu betätigende mechanische Betätigungseinrichtung handeln. Dies stellt eine besonders zuverlässige und vor allem auch kostengünstige Variante dar.

Die Betätigungseinrichtung kann einen Hebel mit einer Welle umfassen, wobei durch Drehen der Welle ein Antrieb für die Bandkassette, insbesondere eine einen Antrieb für die Bandkassette tragende Schwinge, um eine Schwenkachse verschwenkbar und/oder ein Verriegelungsorgan für die Bandkassette zwischen einer Verriegelungsposition und einer Freigabeposition bewegbar ist.

Wenn die Betätigungseinrichtung dazu ausgebildet ist, gleichzeitig die Koppelung zwischen Antrieb und Bandkassette einerseits und die Verriegelung zwischen Bandkassette und Aufnahme andererseits aufzuheben bzw. herzustellen, dann kann bei diesem Ausführungsbeispiel die mittels des Hebels in Drehung versetzbare Welle derart ausgebildet sein, dass gleichzeitig der Antrieb bzw. die den Antrieb tragende Schwinge verschwenkt und das Verriegelungsorgan bewegt wird. Gemäß einer besonders einfachen praktischen Umsetzung kann die Welle exzentrisch ausgebildet sein bzw. einen exzentrisch ausgebildeten Abschnitt umfassen.

Wenn zum Aufheben und Herstellen einer Koppelung zwischen einem Antrieb für die Bandkassette und der Bandkassette eine Bewegung der Bandkassette relativ zu dem Antrieb erfolgt, dann ist es nicht zwingend, dass hierzu die Bandkassette als Ganzes bewegt wird. Es ist auch mög-

lich, dass lediglich eine Baugruppe oder ein Bauteil der Bandkassette relativ zu dem Antrieb bewegt wird.

In einem Ausführungsbeispiel kann die Bandkassette für einen Mehrspurbetrieb ausgelegt und insbesondere mit mehreren unabhängigen Antrieben koppelbar sein, die jeweils zumindest einer Spur zugeordnet sind.

Gemäß einer weiteren Ausgestaltung der Erfindung kann die Bandkassette mehrere in Förderrichtung gesehen hintereinander angeordnete, insbesondere unmittelbar aufeinanderfolgende, Einzelförderer umfassen, denen jeweils ein separater Antrieb zugeordnet ist. Besonders vorteilhaft ist diese Ausgestaltung dann, wenn es sich bei der Bandkassette um eine Portioniereinheit bzw. ein Portionierband handelt. Zumindest ein Einzelförderer oder jeder Einzelförderer kann dabei entweder einspurig oder für einen Mehrspurbetrieb ausgebildet sein.

Wenn die als Ganzes entnehmbare Bandkassette ein Portionierband ist, das zwei aufeinander folgende Einzelförderer umfasst, die jeweils zweispurig ausgebildet sind, dann kann für jede Spur jedes Einzelförderers ein separater Antrieb vorgesehen sein, so dass beispielsweise vier unabhängig voneinander betreibbare und ansteuerbare Antriebsmotoren mit der Bandkassette gekoppelt bzw. koppelbar sind. Die Antriebsmotoren können beispielsweise unterhalb der Bandkassette angeordnet werden und an dem Unterbau, insbesondere an der Maschine, verbleiben, wenn die Bandkassette entnommen wird.

Wenn mehrere Antriebe für die Bandkassette vorgesehen sind, dann ist es gemäß einem Ausführungsbeispiel möglich, dass in Förderrichtung gesehen wenigstens ein Antrieb linksseitig und wenigstens ein weiterer Antrieb rechtsseitig mit der Bandkassette gekoppelt ist. Vorzugweise umfassen die

Antriebe dabei jeweils einen Antriebsmotor, wobei insbesondere die Antriebsmotoren quer zur Förderrichtung gesehen nebeneinander unterhalb der Bandkassette mit zur jeweiligen Seite nach außen weisenden Antriebswellen angeordnet sind.

Besonders vorteilhaft ist dieses Konzept für einen zweispurigen Slicer, da jede der beiden zur Verfügung stehenden Seiten für den Antrieb der betreffenden Spur genutzt werden kann, d.h. ein Antrieb für die linke Spur und ein Antrieb für die rechte Spur. Gleichwohl ist dieses Konzept auch für Slicer mit mehr als zwei Spuren einsetzbar. Gegebenenfalls kann hierzu eine gestaffelte Anordnung der Antriebsmotoren in Förderrichtung gesehen hintereinander vorgesehen sein, um jeder Spur einen separaten Antrieb zuzuordnen.

Wenn die Bandkassette mehrere Antriebe aufweist, dann kann vorgesehen sein, dass die Koppelung zwischen den Antrieben und der Bandkassette zumindest für eine Mehrzahl von Antrieben - und insbesondere für alle Antriebe - gleichzeitig aufhebbar und herstellbar ist. Dies kann beispielsweise mittels einer durchgehenden Welle erfolgen, die nur von einer Seite der Bandkassette aus betätigt zu werden braucht, gleichzeitig aber mit allen insbesondere quer zur Förderrichtung gesehen nebeneinander angeordneten Antriebsmotoren verbunden ist.

Die Bandkassette kann beispielsweise eine Förderbreite aufweisen, die im Bereich von etwa 300 mm bis 700 mm liegt.

Als Fördermittel für die Bandkassette kann wenigstens ein Endlosband oder Endlosgurt vorgesehen sein, wobei alternativ eine Vielzahl paralleler Endlosriemen als Fördermittel dienen kann.

Eine besonders einfache Handhabung der Bandkassette ergibt sich, wenn gemäß einem weiteren Ausführungsbeispiel die Bandkassette werkzeuglos entnehmbar und/oder einbaubar ist.

In einer weiteren Ausgestaltung der Erfindung kann vorgesehen sein, dass zur Entnahme und/oder zum Einbau der Bandkassette bei aufgehobener Verriegelung zwischen der Bandkassette und einer am Unterbau bzw. an der Maschine verbleibenden Aufnahme die Bandkassette zunächst mit einer Komponente in oder gegen die Förderrichtung relativ zur Aufnahme bewegbar und anschließend von der Aufnahme abhebbar ist. Die Bewegung der Bandkassette in oder gegen die Förderrichtung kann für eine besonders stabile und sichere Befestigung der Bandkassette an der Maschinenaufnahme sorgen. Außerdem ist eine solche Ausgestaltung dann von Vorteil, wenn die Einbausituation ein unmittelbares Anheben oder Verschwenken aus der Einbauposition heraus nicht zulässt. Die Bandkassette kann dann zur Entnahme vor der eigentlichen Herausnahme in oder gegen die Förderrichtung verschoben werden bzw. beim Einbau der Bandkassette kann eine solche Verschiebung zum Erreichen der endgültigen Einbauposition vorgenommen werden.

In einer alternativen Ausgestaltung kann vorgesehen sein, dass zur Entnahme und/oder zum Einbau der Bandkassette bei aufgehobener Verriegelung zwischen der Bandkassette und einer am Unterbau oder an der Maschine verbleibenden Aufnahme die Bandkassette zunächst um eine von zwei Auflagen der Aufnahme verschwenkbar und anschließend von den Auflagen abhebbar ist. Dabei kann insbesondere vorgesehen sein, dass diejenige Auflage, die nicht zum Verschwenken der Bandkassette dient, dazu ausgebildet ist, für eine Verriegelung der Bandkassette zu sorgen.

Eine besonders einfache und kostengünstige Ausgestaltung ergibt sich, wenn es sich bei den Auflagen um stangenförmige Komponenten handelt. Eine solche Ausführung benötigt wenig Platz, ist ausreichend stabil und gestattet eine in konstruktiver Hinsicht einfache Umsetzung der gewünschten Verschwenkbewegung einerseits und der Aufhebung und Herstellung der gewünschten Verriegelung der Bandkassette andererseits.

In einem weiteren Ausführungsbeispiel können mehrere Bandkassetten in Förderrichtung gesehen hintereinander und/oder nebeneinander angeordnet sein. Dabei ist insbesondere vorgesehen, dass die Bandkassetten unabhängig voneinander entnehmbar und/oder einbaubar sind.

Folglich ist die Erfindung nicht auf solche Vorrichtungen, insbesondere Slicer oder Fördereinrichtungen, beschränkt, bei denen nur eine einzige entnehmbare Bandkassette vorgesehen ist.

Die Erfindung betrifft außerdem eine Fördereinrichtung für Lebensmittelprodukte, insbesondere für mittels einer Maschine nach einem der vorhergehenden Ansprüchen aufzuschneidende oder aufgeschnittene Lebensmittelprodukte, wobei die Fördereinrichtung wenigstens einen Bandförderer umfasst, der als entnehmbare Bandkassette ausgebildet ist.

Hinsichtlich vorteilhafter Weiterbildungen dieser Fördereinrichtung wird auf die vorstehenden Ausführungen Bezug genommen. Die bevorzugten Ausgestaltungen der hier offenbarten Aufschnittschneidemaschine werden hiermit auch für die Fördereinrichtung beansprucht.

Die Erfindung wird im Folgenden beispielhaft unter Bezugnahme auf die Zeichnung beschrieben. Es zeigen:

Fig. 1 bis 5	verschiedene Ansichten einer ersten Ausführungsform der Erfindung,
Fig. 6	eine zweite Ausführungsform der Erfindung,
Fig. 7	schematisch eine weitere Ausführungsform der Erfindung,
Fig. 8 bis 10	verschiedene Ansichten einer weiteren Ausführungsform der Erfindung.
Fig. 11, 12a, 12b, 13a und 13b	verschiedenen Ansichten einer weiteren Ausführungsform der Erfindung, und
Fig. 14a und 14b	schematische Ansichten einer weiteren Ausführungsform der Erfindung.

Bei den nachfolgend beschriebenen erfindungsgemäßen Ausführungsbeispielen von Bandförderern handelt es sich um Bestandteile von Fördereinrichtungen oder Aufschnittschneidemaschinen für Lebensmittelprodukte.

Die gezeigten Bandförderer umfassen jeweils einen einzigen oder zwei unmittelbar hintereinander angeordnete Einzelförderer und sind für einen Einspurbetrieb oder für einen Mehrspurbetrieb ausgelegt. Jeder Bandförderer umfasst eine entnehmbare Bandkassette 13 und einen Unterbau 41 mit einer Aufnahme 11 für die Bandkassette 13, wobei der Unterbau 41 des Bandförderers in eine Aufschnittschneidemaschine, insbesondere einen Hochleistungs-Slicer, oder in eine Fördereinrichtung integriert wer-

den kann, die ein Bestandteil einer Produktionslinie ist und dabei insbesondere einem Hochleistungs-Slicer zugeordnet ist.

Die hierin beschriebenen Ausführungsbeispiele unterscheiden sich hinsichtlich verschiedener Aspekte: Die Fig. 1 bis 5 beschreiben einen einspurigen Traktionsförderer, bei dem die Bandkassette 13 als Traktionsband ausgebildet ist. Ein solcher Traktionsförderer ist insbesondere Bestandteil einer Produktzuführung eines Slicers, mit der ein oder mehrere aufzuschneidende Lebensmittelprodukte gemeinsam einer Schneidebene zugeführt werden.

Die Fig. 7 sowie 14a und 14b zeigen jeweils schematisch eine Konzeptvariante, bei der die Koppelung zwischen Antrieb 15 und Bandkassette 13 durch eine Entnahme- bzw. Einbaubewegung der Bandkassette 13 bewirkt wird. Diese Koppelung bzw. Entkoppelung erfolgt dagegen bei den anderen Ausführungsbeispielen gleichzeitig mit der Herstellung bzw. der Aufhebung einer Verriegelung der Bandkassette 13 am Unterbau 41.

Das Ausführungsbeispiel der Fig. 8 bis 10 betrifft einen einspurigen Portionierförderer, bei dem eine einzige entnehmbare Bandkassette 13 zwei Einzelförderer umfasst, nämlich ein kurzes Portionierband 71 und ein langes Portionierband 73.

Das Ausführungsbeispiel der Fig. 11 bis 13 zeigt einen zweispurigen Traktionsförderer mit einer zweispurigen Bandkassette 13.

Fig. 1 zeigt die einspurige Traktionsbandkassette in ihrer Einbauposition an einem nicht dargestellten Slicer, wobei in der Einbausituation die Bandkassette 13 an einer Aufnahme 11, die hier als Tisch oder Platte ausgebildet ist (vgl. Fig. 3), angebracht und verriegelt ist.

Fig. 2 zeigt die Bandkassette 13 im entnommenen Zustand.

Fig. 3 zeigt die Aufnahme 11 nach Entnahme der Bandkassette 13. Die Aufnahme 11 ist an ihrer Oberseite mit am linken Randbereich und am rechten Randbereich angeordneten Koppelementen 37 versehen, die pilzförmig ausgebildet sind und dazu dienen, von einer Basis 25 (vgl. Fig. 2) der Bandkassette 13 hintergriffen zu werden, die hierzu mit entsprechenden Aussparungen 59 versehen ist.

Des Weiteren ist in der Aufnahme 11 an einer Seite im Bereich zwischen zwei Koppelelementen 37 ein Schlitz 39 ausgebildet, durch den sich von unten ein Verriegelungsorgan 21 hindurch erstreckt, das dazu dient, mit einem in der Basis 25 der Bandkassette 13 ausgebildeten Schlitz 23 zusammenzuwirken, um die Bandkassette 13 an der Aufnahme 11 zu verriegeln.

Das Verriegelungsorgan 21 ist Bestandteil einer Verriegelung, die außerdem unter anderem einen Hebel 19 mit einem Zapfen 17 umfasst. Diese Betätigungseinrichtung wird nachstehend näher in Verbindung mit den Fig. 4 und 5 beschrieben.

Der Unterbau 41, zu welcher die Aufnahme 11 gehört, ist des Weiteren mit einem unterhalb der Auflage 11 angeordneten Antriebsmotor für die Bandkassette 13 versehen, von dem lediglich eine Antriebswelle 51 dargestellt ist. Bei eingebauter Bandkassette 13 treibt die Antriebswelle 51 mittels eines Antriebsriemens 27 ein Antriebsrad 44 (vgl. Fig. 1) der Bandkassette 13 an. Das Antriebsrad 44 ist koaxial und seitlich neben einer Bandrolle 53 der Bandkassette 13 angeordnet, um welche als Fördermittel

dienende und eine Produktauflagefläche definierende Endlosbänder 55 geführt sind.

Im eingebauten Zustand gemäß Fig. 1, in welchem die Bandkassette 13 mit ihrer Basis 25 die Koppelelemente 37 hintergreift und durch die Verriegelung 21 gesichert und somit in einer definierten Betriebsposition am Unterbau 41 angebracht ist, besteht folglich eine direkte Antriebsverbindung zwischen Antriebsmotor und Bandkassette 13 über den Antriebsriemen 27, der um die Antriebswelle 51 des Motors und das Antriebsrad 44 der Bandkassette 13 umläuft.

Das Zusammenspiel zwischen Bandkassette 13 und Unterbau 41 zeichnet sich insbesondere durch drei Vorgänge aus, nämlich (i) die zur Entnahme und zum Einbau der Bandkassette 13 erforderlichen Bewegungen der Bandkassette 13, (ii) die Entriegelung und die Verriegelung der Bandkassette 13 sowie (iii) das Aufheben und das Herstellen der Koppelung zwischen dem Antrieb 15 und der Bandkassette 13.

Hierzu wird im Folgenden auch auf die Fig. 4 und 5 Bezug genommen. Fig. 4 zeigt die Bandkassette 13 im eingebauten Zustand, wobei zur besseren Veranschaulichung die Aufnahmeplatte 11 weggelassen wurde, um die Betätigungseinrichtung besser darstellen zu können. Fig. 5 entspricht der Darstellung in Fig. 4, wobei hier zusätzlich das Verriegelungsorgan 21 weggelassen wurde, um eine Welle 29 des Hebels 19 besser darstellen zu können.

Um die Bandkassette 13 von dem Unterbau 41 und somit vom Aufnahmetisch 11 abnehmen zu können, muss die Bandkassette 13 mit ihrer Basis 25 außer Eingriff mit den Koppelelementen 37 gebracht werden, und zwar

durch eine Verschiebebewegung entgegen der Förderrichtung F (vgl. Fig. 1).

Diese Entnahmebewegung ist nur möglich, wenn zuvor sowohl der Verriegelungszustand als auch der Koppelungszustand des Antriebs 15 aufgehoben wurden, d.h. eine Entnahme der Bandkassette 13 ist nur nach vorheriger Entriegelung der Basis 25 und Entspannung des Riemens 27 möglich.

Diese beiden Vorgänge werden gleichzeitig mit Hilfe der manuellen Betätigungseinrichtung durchgeführt. Hierzu wird zunächst von einem Benutzer der Hebel 19 über den Zapfen 17 etwas nach außen gezogen, wodurch ein formschlüssiger Eingriff (vgl. Fig. 1) des Zapfens 17 mit der Aufnahme 11, der eine unbeabsichtigte Entriegelung verhindert, aufgehoben wird. Der Hebel 19 kann dann vom Benutzer etwa um 180° im Uhrzeigersinn verschwenkt werden. Hierdurch gibt das zunächst noch im Schlitz 23 der Basis 25 sitzende Verriegelungsorgan 21 die Basis 25 und somit die Bandkassette 13 frei. Außerdem wird durch das Verschwenken des Hebels 19 gleichzeitig eine um eine Achse 33 schwenkbar gelagerte, mit dem Antriebsmotor verbundene Schwinge 35 im Gegenuhrzeigersinn bewegt, wodurch der Antriebsriemen 27 entspannt und vom Antriebsrad 44 der Bandkassette 13 abgenommen werden kann.

Die Schwenkbewegung der Schwinge 35 wird durch die exzentrisch ausgebildete Welle 29 des Hebels 19 bewirkt, die sich durch eine in der Schwinge 35 ausgebildete Aussparung 31 hindurch erstreckt. Folglich sind die Aussparung 31 der Schwinge 35 und die Hebelwelle 29 im Bereich dieser Aussparung 31 derart ausgebildet, dass die Welle 29 gewissermaßen nach Art einer Kurbelwelle bei Drehung aufgrund ihrer Exzentrizität die Schwinge 35 in einer definierten Weise je nach Drehrichtung

gegen den Uhrzeigersinn (zum Entspannen des Riemens 27) oder im Uhrzeigersinn (zum Spannen des Riemens 27) verschwenkt.

Das Verschwenken des Hebels 19 im Uhrzeigersinn hat also zweierlei zur Folge: Zum einen erfolgt eine Entriegelung der Bandkassette 13 und zum anderen erfolgt eine Entspannung des Antriebsriemens 27. Beides ist erforderlich, um die Bandkassette 13 und somit deren Basis 25 außer Eingriff mit den Koppelelementen 37 der Aufnahme 11 zu bewegen und dann entnehmen zu können.

Der Einbau der Bandkassette 13 erfolgt in umgekehrter Reihenfolge. Zunächst wird die Bandkassette 13 mit ihrer Basis 25 auf die Auflageplatte 11 aufgesetzt und dann durch eine Verschiebebewegung in Förderrichtung F in Eingriff mit den Koppelelementen 37 gebracht, um die Koppelelemente 37 im Bereich der Aussparungen 59 mittels der Basis 25 zu hintergreifen. Anschließend wird der Antriebsriemen 27 um das Antriebsrad 44 der Bandkassette 13 gelegt, was in dieser Situation möglich ist, da der Antriebsriemen 27 noch nicht gespannt ist. Daraufhin wird der Hebel 19 um etwa 180° gegen den Uhrzeigersinn zurück in die Ausgangsstellung gemäß Fig. 4 und 5 geschwenkt. Hierdurch wird die Schwinge 35 im Uhrzeigersinn verschwenkt, wodurch der Riemen 27 gespannt wird. Gleichzeitig wird durch das Verschwenken des Hebels 19 das drehfest mit der Hebelwelle 29 verbundene Verriegelungsorgan 21 mit seinem hakenförmigen freien Eingriffsende von unten durch den in der Basis 25 der Bandkassette 13 ausgebildeten Schlitz 23 hindurch geschwenkt und in verriegelnden Eingriff mit der Schlitzbegrenzung gebracht.

Die Bandkassette 13 ist dann betriebsbereit und kann durch entsprechende Ansteuerung des Antriebsmotors 23 in der gewünschten Weise betrieben werden.

Hinsichtlich dieses Zusammenspiels wird auch auf die anderen hier beschriebenen Ausführungsbeispiele (mit Ausnahme des anhand der Fig. 7 sowie 14a und 14b erläuterten Prinzips) verwiesen, die auf dem gleichen Grundkonzept beruhen.

Die im Ausführungsbeispiel der Fig. 6 dargestellte Bandkassette 13 ist für einen zweispurigen Betrieb ausgelegt. Die Bandkassette 13 ist hier im entnommenen Zustand und mit abgenommenen Bandfördergurten dargestellt. Des Weiteren ist eine vordere Bandumlenkung 61 der Bandkassette 13 in einem hochgeklappten Zustand dargestellt.

Im hinteren Antriebsbereich der Bandkassette 13 sind zwei Bandrollen 53 axial nebeneinander und somit auf einer gemeinsamen Achse liegend nebeneinander angeordnet. Jeder Bandrolle 53 ist axial außen entsprechend dem Ausführungsbeispiel der Fig. 1 bis 5 ein Antriebsrad 44 zugeordnet, mit dem ein Antriebsmotor über einen Antriebsriemen 27 gekoppelt werden kann, wie es ebenfalls in Verbindung mit dem Ausführungsbeispiel der Fig. 1 bis 5 beschrieben wurde.

Außerdem ist wie beim Ausführungsbeispiel der Fig. 1 bis 5 an jeder Seite der Bandkassette 13 eine Basis 25 mit Aussparungen 59 und einem Schlitz 23 angeordnet, um an einer entsprechend ausgebildeten Aufnahme verriegelt werden zu können.

Die Einbausituation sowie die Entnahme und der Einbau einer solchen zweispurigen Bandkassette werden nachstehend näher in Verbindung mit den Fig. 11, 12a, 12b, 13a und 13b beschrieben.

Während bei den bisher anhand der Figuren beschriebenen Ausführungsformen eine Betätigungseinrichtung vorgesehen ist, um gleichzeitig die Bandkassette zu entriegeln bzw. zu verriegeln und den Antriebsriemen zu entspannen bzw. zu spannen, ist bei dem schematisch in Fig. 7 dargestellten Ausführungsbeispiel vorgesehen, dass bei Entnahme der Bandkassette 13 zunächst eine Entriegelung einer Basis 25 der Bandkassette 13 erfolgt und erst danach gleichzeitig eine Entnahmebewegung der Bandkassette 13 durchgeführt und der Antriebsriemen 27 entspannt wird.

Die Aufnahme 11 des Unterbaus umfasst hier zwei Auflagestangen 65, 67. Um die hier rechte Auflagestange 65 bzw. deren eine Schwenkachse 63 definierende Mittelachse ist die Bandkassette 13 mit ihrer Basis 25 zur Entnahme bzw. zum Einbau schwenkbar gelagert.

In der dargestellten Einbauposition liegt die Bandkassette 13 mit ihrer Basis 25 auf beiden Auflagestangen 65, 67 auf, wobei die hier linke, vordere Auflagestange 67 außerdem dazu ausgebildet ist, die Basis 25 in der Einbausituation zu verriegeln. Hierauf wird näher in Verbindung mit dem Ausführungsbeispiel der Fig. 14a, 14b eingegangen, das ebenfalls auf dem vorstehend erläuterten Prinzip beruht.

Die relative Anordnung von Antriebsmotor 15 mit Antriebswelle 51 einerseits und Antriebsrad 44 sowie Bandrolle 53 der Bandkassette 13 andererseits entspricht den bisher beschriebenen Ausführungsbeispielen. Im vorliegenden Ausführungsbeispiel der Fig. 7 ist es jedoch eine Bewegung der Bandkassette 13 selbst, die für eine Reduzierung des Abstandes zwischen der Achse der Antriebswelle 51 und der Achse des Antriebsrades 44 und somit für eine Entspannung des Riemens 27 zur Entnahme der Bandkassette 13 sorgt. Im Gegensatz zu den vorstehend beschriebenen Ausführungsbeispielen, bei denen zur Entspannung und Spannung des

Riemens der Antriebsmotor 15 samt Antriebswelle 51 bewegt wird, ist im Ausführungsbeispiel der Fig. 7 vorgesehen, dass der Motor 15 feststehend angeordnet und die Abstandsänderung zwischen stationärer Antriebswelle 51 und Antriebsrad 44 durch die erläuterte Bewegung der Bandkassette 13 bewirkt wird.

Das Ausführungsbeispiel der Fig. 8 bis 10 zeigt die Umsetzung der Erfindung an einem Portionierförderer.

Die Bandkassette 13 ist als Portionierband mit zwei in Förderrichtung gesehen unmittelbar hintereinander angeordneten Einzelförderern 71, 73 ausgebildet. Das in Förderrichtung F gesehen hintere Portionierband 71, auf welches während des Schneidebetriebs die abgeschnittenen Produktscheiben zur Bildung von Portionen fallen, ist sehr kurz ausgeführt und um ein Vielfaches kürzer als das nachfolgende zweite Portionierband 73, bei dem als Fördermittel eine Vielzahl von parallel verlaufenden Endlosrundriemen vorgesehen ist. Das erste Portionierband 71 weist als Fördermittel eine Vielzahl paralleler schmaler Bandgurte auf.

Der Unterbau 41 dieses Portionierförderers ist anders ausgebildet als beispielsweise der Unterbau 41 des im Ausführungsbeispiel der Fig. 1 bis 5 beschriebenen Traktionsbandes. Gleichwohl können die Entriegelung und Verriegelung sowie die Entnahme und der Einbau der Bandkassette 13 an diesem Unterbau 41 zumindest hinsichtlich des Grundkonzepts so erfolgen, wie bei dem zuvor beschriebenen Traktionsband. In den Fig. 8 bis 10 ist eine entsprechende Betätigungseinrichtung mit einem Hebel 19 und einer durchgehenden Welle 29, die Verriegelungsorgane 21 trägt, dargestellt. Hierauf wird nachstehend näher eingegangen.

Eine Besonderheit der Portioniereinheit gemäß den Fig. 8 bis 10 besteht darin, dass eine einzige, als Ganzes handhabbare und somit als Ganzes entnehmbare und einbaubare Bandkassette 13 mehr als einen Bandförderer aufweist, wobei die mehreren - hier die zwei - Bandförderer 71, 73 unabhängig voneinander betreibbar sind, da am Unterbau 41 dieser Portioniereinheit zwei separate Antriebsmotoren 15 angeordnet sind, die jeweils einem der Portionierbänder 71, 73 zugeordnet und unabhängig voneinander ansteuerbar sind, so dass die beiden Portionierbänder 71, 73 vollkommen unabhängig voneinander betrieben werden können.

Die beiden Antriebsmotoren 15 sind Platz sparend in den Unterbau 41 integriert und somit unterhalb der Bandkassette 13 angeordnet, wobei die beiden Motoren 15 in Förderrichtung gesehen auf gleicher Höhe und in Querrichtung nebeneinander angeordnet sind und die Antriebswellen 51 jeweils nach außen weisen.

Die beiden Portionierbänder 71, 73 weisen jeweils zum Antreiben der jeweiligen Fördermittel eine Bandrolle 53 auf, der jeweils entsprechend dem Ausführungsbeispiel der Fig. 1 bis 5 ein koaxiales Antriebsrad 44 zugeordnet ist. Die beiden Antriebsräder 44 sind jeweils mit einem der Antriebsmotoren 15 direkt verbunden, und zwar über einen Antriebsriemen 27, der um das jeweilige Antriebsrad 44 und die jeweilige Antriebswelle 51 umläuft.

Diese erfindungsgemäße Portioniereinheit verwirklicht folglich bei sehr einfachem und äußerst kompaktem Grundaufbau einen hohen Funktionalitätsgrad.

In der Darstellung der Fig. 9 sind insbesondere die beiden Antriebsmotoren 15 zu erkennen, von denen der eine das kurze Portionierband 71 und

der andere das lange Portionierband 73 über einen jeweiligen Antriebsriemen 27 antreibt. Die direkte Koppelung mittels der Antriebsriemen 27 ermöglicht es, in Förderrichtung versetzt angeordnete Bandrollen 53 bzw. Antriebsräder 44 bei in Förderrichtung gesehen auf gleicher Höhe befindlichen Antriebsmotoren 15 bzw. Antriebswellen 51 anzutreiben. Dieses Konzept nutzt folglich den Umstand aus, dass die beiden Antriebsriemen 27 auf den beiden einander gegenüberliegenden Seiten der Portioniereinheit und somit ohne gegenseitige Störung oder Beeinflussung verlaufen können.

Die beiden Motoren 15 sind jeweils an einer Schwinge 35 befestigt, die um eine Achse 33 schwenkbar gelagert ist. Die Schwingen 35 sind jeweils mittels einer gemeinsamen Hebelwelle 29 verschwenkbar, die auf einer Seite der Portioniereinheit mit einem Hebel 19 verbunden ist. Im Bereich der Schwingen 35 ist die Welle 29 jeweils derart exzentrisch ausgebildet, dass durch Verdrehen der Welle 29 um etwa 180° mittels des Hebels 19 eine solche Schwenkbewegung gleichzeitig beider Schwingen 35 bewirkt wird, dass beide Riemen 27 gleichzeitig entspannt oder gespannt werden.

Durch eine einzige manuelle Betätigung über den Hebel 19 kann folglich ein Benutzer beide Motoren 15 gleichzeitig verschwenken und somit beide Portionsbänder 71, 73 gleichzeitig von ihrem jeweiligen Antrieb entkoppeln bzw. mit ihrem jeweiligen Antrieb koppeln. Eine Entnahme bzw. ein Einbau dieser Portionierkassette ist folglich schnell und einfach möglich.

Die vergrößerte Darstellung eines Teils der Fig. 9 in Fig. 10 zeigt insbesondere im Bereich des in Fig. 9 linken Antriebsmotors 15 die Wirkungsweise der Hebelwelle 19. Die Exzentrizität der Welle 29 im Bereich der Schwinge 35 sorgt für die vorstehend erläuterte Verschwenkung des an der Schwinge 35 angebrachten Motors 15 beim Verdrehen der Welle 29.

Ferner ist die Welle 29 drehfest mit zwei Verriegelungsorganen 21 verbunden, von denen in Fig. 10 lediglich eines dargestellt ist. Im dargestellten Einbauzustand greift das Verriegelungsorgan 21 durch einen in der Basis 25 der Bandkassette 13 ausgebildeten Schlitz 23 hindurch, um die Basis 25 und somit die Bandkassette 13 am Unterbau 41 zu verriegeln. Durch Verdrehen der Welle 29 und somit Verschwenken des Verriegelungsorgans 21 wird diese Verriegelung aufgehoben, während gleichzeitig durch Verschwenken der Schwinge 35 der Riemen 27 entspannt wird.

Den Fig. 8 bis 10 ist außerdem zu entnehmen, dass die Antriebsriemen 27 jeweils als Zahnriemen ausgebildet und die jeweils stirnseitig der betreffenden Bandrolle 53 angeordneten Riemenräder 44 jeweils in Form eines Zahnrades vorgesehen sind.

Bei dem zweispurigen Traktionsband gemäß den Fig. 11, 12a, 12b, 13a und 13b (vgl. auch die vorstehenden Ausführungen zu Fig. 6) ist für jede der beiden Spuren, zwischen denen hier eine Trennwand 69 angeordnet ist, ein Antriebsmotor 15 vorgesehen, der die betreffende Bandrolle 53 bzw. das stirnseitige Antriebsrad 44 über einen Riemen 27 antreibt.

Diese Traktionsbandeinheit ist folglich bezüglich einer senkrecht zu den Produktauflageflächen der Endlosbänder 55 verlaufenden Mittelebene zwischen den beiden Spuren spiegelbildlich ausgeführt, wobei aber beide Spuren an einer einzigen, als Ganzes handhabbaren Bandkassette 13 ausgebildet sind.

Die Entnahme und der Einbau dieser Bandkassette 13 einschließlich der Verriegelung am Unterbau 41 sowie des Entspannens und des Spannens der Antriebsriemen 27 erfolgen wie beim Ausführungsbeispiel der Fig. 1 bis 5, was nachstehend näher erläutert wird.

Die Fig. 12a und 13a zeigen jeweils die Betriebsposition mit gespanntem Antriebsriemen 27, während die Fig. 12b und 13b jeweils eine Situation zeigen, in der die Antriebsriemen 27 entspannt sind und die Bandkassette 13 entriegelt ist, wobei die Basis 25 der Bandkassette 13 noch in Eingriff mit den Koppelelementen 37 der Aufnahme 11 steht.

Der Vergleich der Fig. 12a und 12b zeigt insbesondere, dass der Hebel 19 um etwa 180° im Uhrzeigersinn zu verschwenken ist, um das Verriegelungsorgan 21 außer Eingriff mit dem Schlitz 23 in der Basis 25 der Bandkassette 13 zu bringen, und die Schwinge 35 gegen den Uhrzeigersinn zu verschwenken, um den Riemen 27 zu entspannen.

Die Fig. 13a und 13b zeigen jeweils einen Schnitt senkrecht zur Förderrichtung durch die Welle 29 des Hebels 19. Zu erkennen sind insbesondere die exzentrische Ausgestaltung der Welle 29 im Bereich der Schwinge 35 und das Zusammenwirken der Welle 29 mit dem Verriegelungsorgan 21, das in der Einbausituation gemäß Fig. 13a in verriegelndem Eingriff mit der Basis 25 der Bandkassette 13 im Bereich des Schlitzes 23 steht und sich im entriegelten Zustand gemäß Fig. 13b außer Eingriff mit der Basis 25 der Bandkassette 13 befindet.

Den Fig. 12b und 13b ist außerdem zu entnehmen, dass durch das Verschwenken der Schwinge 35 und somit der Antriebswelle 51 des Motors in Richtung des Antriebsrades 44 der Bandkassette 13 und die dadurch bewirkte Abstandsreduzierung zwischen Antriebswelle 51 und Antriebsrad 44 der Riemen 27 entspannt wird und somit außer Eingriff mit dem Antriebsrad 44 gelangt bzw. nur noch locker um das Antriebsrad 44 gelegt ist, so dass der Riemen 27 mühelos vom Antriebsrad 44 abgenommen und

die Bandkassette 13 einfach durch Verschieben außer Eingriff mit den Koppelelementen 37 der Aufnahme 11 gebracht und dann abgehoben werden kann.

Wie bereits vorstehend in Verbindung mit Fig. 7 erwähnt, zeigen die Fig. 14a und 14b schematisch ein anderes Entnahmekonzept für eine Bandkassette 13, die auch bei diesem Konzept beispielsweise als Portionierband oder Traktionsband ausgebildet und jeweils entweder einspurig oder mehrspurig ausgeführt sein kann.

In Fig. 14a und 14b ist rein beispielhaft dargestellt, wie die hier linke Auflagestange 67 der Aufnahme 11 bzw. des Unterbaus 41 ausgebildet sein kann, um nicht nur als Auflage für die Basis 25 der Bandkassette 13, sondern außerdem zur Verriegelung der Bandkassette 13 am Unterbau dienen zu können.

Hierzu ist die Basis 25 im Bereich eines Verriegelungsabschnitts 77 der Auflagestange 67 mit einer schlüssellochartig geformten Aufnahme 79 versehen, in welche der Verriegelungsabschnitt 77 nur in einer einer Entriegelungsposition entsprechenden Drehstellung der Auflagestange 67 gelangen kann, wie dies in Fig. 14b dargestellt ist.

In der Verriegelungsstellung gemäß Fig. 14a ist der in der Aufnahme 79 befindliche Verriegelungsabschnitt 77 derart orientiert, dass der Verriegelungsabschnitt 77 nicht aus der Aufnahme 79 herausgelangen kann. Die Bandkassette 13 ist folglich in dem Zustand gemäß Fig. 14a in der Einbausituation bzw. Betriebsstellung verriegelt und gesichert.

Zur Entnahme der Bandkassette 13 wird zunächst die hier linke Auflagestange 67 in die Stellung gemäß Fig. 14b gedreht, so dass der Verriege-

lungsabschnitt 77 aus der Ausnahme 79 herausgelangen kann, wenn die Bandkassette 13 um die andere Auflagestange 65 verschwenkt wird.

Dieses Verschwenken der Bandkassette 13 bewirkt eine Abstandsverringerung zwischen dem Antriebsrad 44 der Bandkassette 13 und der Antriebswelle 51 des Motors 15, wodurch der Antriebsriemen 27 entspannt wird. Die zum Zwecke dieser Riemenentspannung verschwenkte Bandkassette 13 kann dann von der Auflagestange 65 abgehoben werden.

-.-.-.

Bezugszeichenliste

11	Aufnahme
13	Bandkassette
15	Antriebsmotor
17	Zapfen
19	Hebel
21	Verriegelungsorgan, Verriegelung
23	Schlitz
25	Basis
27	Antriebsriemen
29	Hebelwelle
31	Aussparung der Schwinge
33	Schwenkachse der Schwinge
35	Schwinge
37	Koppelelement der Aufnahme
39	Schlitz
41	Unterbau
44	Antriebsrad, Riemenrad
51	Antriebswelle des Antriebsmotors
53	Bandrolle der Bandkassette
55	Endlosband, Endlosgurt
57	Endlosriemen, Rundriemen
59	Aussparung der Basis der Bandkassette
61	Bandumlenkung
63	Schwenkachse der Auflagestange
65	Auflagestange
67	Auflagestange
69	Trennwand
71	erster Förderer, kurzes Portionierband
73	zweiter Förderer, langes Portionierband
77	Verriegelungsabschnitt
79	Aufnahme
F	Förderrichtung

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Patentansprüche

1. Aufschnittschneidemaschine für Lebensmittelprodukte, insbesondere Hochleistungs-Slicer, mit zumindest einem Bandförderer, der als entnehmbare Bandkassette (13) ausgeführt ist.

2. Maschine nach Anspruch 1,
dadurch gekennzeichnet,
dass die Bandkassette (13) in Förderrichtung gesehen vor der Schneidebene angeordnet und insbesondere als Traktionsband ausgebildet ist.

3. Maschine nach Anspruch 1,
dadurch gekennzeichnet,
dass die Bandkassette (13) in Förderrichtung gesehen hinter der Schneidebene angeordnet und insbesondere als Portionierband ausgebildet ist.

4. Maschine nach einem der vorhergehenden Ansprüche,
dadurch gekennzeichnet,
dass die Bandkassette (13) in Förderrichtung gesehen eine Band- oder Förderlänge aufweist, die weniger als 500mm, insbesondere weniger als 300mm, insbesondere weniger als 200mm und insbesondere zwischen 50mm und 150mm beträgt.

5. Maschine nach einem der vorhergehenden Ansprüche,

dadurch gekennzeichnet,
dass zumindest ein direkter Antrieb (15) für die Bandkassette (13) vorgesehen ist.

6. Maschine nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, dass wenigstens ein Antriebsmotor (15) für die Bandkassette (13) vorgesehen ist, wobei der Antriebsmotor (15) direkt mit der Bandkassette (13) gekoppelt ist, insbesondere über eine Riemenverbindung oder über eine Zahnradanordnung, bevorzugt eine Zahnradpaarung.

7. Maschine nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, dass ein Antriebsmotor (15) für die Bandkassette (13) eine Antriebswelle (51) und die Bandkassette (13) ein Antriebsrad (44) aufweist, wobei die Antriebswelle (51) und das Antriebsrad (44) direkt miteinander gekoppelt sind.

8. Maschine nach Anspruch 6 oder 7, dadurch gekennzeichnet, dass der Antriebsmotor (15) unterhalb der Bandkassette (13) angeordnet ist.

9. Maschine nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, dass die Bandkassette (13) eine gelagerte Bandrolle (53) aufweist, wobei ein Antriebsrad (44) der Bandkassette (13) über die Lagerung der Bandrolle (53) gelagert ist.

10. Maschine nach Anspruch 9,
dadurch gekennzeichnet,
dass das Antriebsrad (44) koaxial zur Bandrolle (53) und insbesondere axial neben der Bandrolle (53) angeordnet ist.

11. Maschine nach einem der vorhergehenden Ansprüche,
dadurch gekennzeichnet,
dass zum Aufheben und Herstellen einer Koppelung zwischen einem Antriebsmotor (15) für die Bandkassette (13) und der Bandkassette (13) jeweils eine Relativbewegung zwischen Antriebsmotor (15) und Bandkassette (13) vorgesehen ist, insbesondere eine Schwenkbewegung.

12. Maschine nach Anspruch 11,
dass durch die Relativbewegung der Abstand zwischen einer Antriebsachse, bevorzugt einer Antriebswelle (51), des Antriebsmotors (15) und einer Antriebsachse, bevorzugt einem Antriebsrad (44), der Bandkassette (13) veränderbar ist.

13. Maschine nach einem der vorhergehenden Ansprüche,
dadurch gekennzeichnet,
dass eine Koppelung zwischen einem Antrieb (15) für die Bandkassette (13) und der Bandkassette (13) durch Entspannen eines Antriebsriemens (27) aufhebbar und durch Spannen des Antriebsriemens (27) herstellbar ist, wobei das Entspannen und Spannen des Antriebsriemens (27) jeweils durch eine Relativbewegung zwischen Antrieb (15) und Bandkassette (13) vorgesehen ist.

14. Maschine nach einem der vorhergehenden Ansprüche,
dadurch gekennzeichnet,

dass für die Bandkassette (13) eine bei entnommener Bandkassette (13) an der Maschine verbleibende Aufnahme (11) vorgesehen ist, an der die Bandkassette (13) verriegelbar ist, wobei die Verriegelung zur Entnahme der Bandkassette (13) aufhebbar und zum Einbau der Bandkassette (13) herstellbar ist.

15. Maschine nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, dass zur Entnahme oder zum Einbau der Bandkassette (13) eine Koppelung zwischen einem Antrieb (15) für die Bandkassette (13) und der Bandkassette (13) gleichzeitig mit einer Verriegelung der Bandkassette (13) aufhebbar bzw. herstellbar ist.

16. Maschine nach einem der Ansprüche 1 bis 14, dadurch gekennzeichnet, dass zur Entnahme oder zum Einbau der Bandkassette (13) die Koppelung zwischen einem Antrieb (15) für die Bandkassette (13) und der Bandkassette (13) gleichzeitig mit einer Entnahme- bzw. Einbaubewegung der Bandkassette (13) nach dem Aufheben bzw. vor dem Herstellen einer Verriegelung der Bandkassette (13) durchführbar ist.

17. Maschine nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, dass für eine Koppelung zwischen einem Antrieb (15) für die Bandkassette (13) und der Bandkassette (13) und/oder für eine Verriegelung der Bandkassette (13) an einer Aufnahme (11) der Maschine eine Betätigungseinrichtung (19) vorgesehen ist, insbesondere eine manuell zu betätigende mechanische Betätigungseinrichtung (19).

18. Maschine nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, dass eine Betätigungseinrichtung (19) vorgesehen ist, mit der eine Koppelung zwischen einem Antrieb (15) für die Bandkassette (13) und der Bandkassette (13) einerseits und eine Verriegelung der Bandkassette (13) an einer Aufnahme (11) der Maschine andererseits gleichzeitig aufhebbar und herstellbar sind.

19. Maschine nach Anspruch 17 oder 18, dadurch gekennzeichnet, dass die Betätigungseinrichtung einen Hebel (19) mit einer, insbesondere exzentrischen, Welle (29) umfasst, wobei durch Drehen der Welle (29) eine einen Antrieb (15) für die Bandkassette (13) tragende Schwinge (35) um eine Schwenkachse (33) verschwenkbar und/oder ein Verrieglungsorgan (21) für die Bandkassette (13) zwischen einer Verriegelungsposition (21) und einer Freigabeposition bewegbar ist.

20. Maschine nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, dass zum Aufheben und Herstellen einer Koppelung zwischen einem Antrieb (15) für die Bandkassette (13) und der Bandkassette (13) die Bandkassette (13) oder eine Baugruppe oder ein Bauteil der Bandkassette relativ zu dem Antrieb (15) bewegbar ist, insbesondere durch Umklappen oder Verschwenken.

21. Maschine nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, dass die Bandkassette (13) für einen Mehrspurbetrieb ausgelegt und insbesondere mit mehreren unabhängigen Antrieben (15) koppelbar ist, die jeweils zumindest einer Spur zugeordnet sind.

22. Maschine nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, dass die, insbesondere als Portionierband ausgebildete, Bandkassette (13) mehrere in Förderrichtung gesehen hintereinander angeordnete, insbesondere unmittelbar aufeinanderfolgende, Einzelförderer (71, 73) umfasst, denen jeweils ein separater Antrieb (15) zugeordnet ist.

23. Maschine nach Anspruch 21 oder 22, dadurch gekennzeichnet, dass in Förderrichtung gesehen wenigstens ein Antrieb (15) linksseitig und wenigstens ein weiterer Antrieb (15) rechtsseitig mit der Bandkassette (13) gekoppelt ist, wobei insbesondere die Antriebe jeweils einen Antriebsmotor (15) umfassen und bevorzugt die Antriebsmotoren (15) quer zur Förderrichtung gesehen nebeneinander unterhalb der Bandkassette (13) mit zur jeweiligen Seite nach außen weisenden Antriebswellen (51) angeordnet sind.

24. Maschine nach einem der Ansprüche 21 bis 23, dadurch gekennzeichnet, dass die Koppelung zwischen den Antrieben (15) und der Bandkassette (13) zumindest für eine Mehrzahl von Antrieben (15), insbesondere für alle Antriebe (15), gleichzeitig aufhebbar und herstellbar ist.

25. Maschine nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, dass die Bandkassette (13) eine Förderbreite im Bereich von etwa 300mm bis 700mm aufweist.

26. Maschine nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, dass als Fördermittel der Bandkassette (13) wenigstens ein Endlosband oder Endlosgurt (55) oder eine Vielzahl paralleler Endlosriemen (57) vorgesehen ist.

27. Maschine nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, dass die Bandkassette (13) werkzeuglos entnehmbar und/oder einbaubar ist.

28. Maschine nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, dass zur Entnahme und/oder zum Einbau der Bandkassette (13) bei aufgehobener Verriegelung zwischen der Bandkassette (13) und einer an der Maschine verbleibenden Aufnahme (11) die Bandkassette (13) zunächst mit einer Komponente in oder gegen die Förderrichtung relativ zur Aufnahme (11) bewegbar und anschließend von der Aufnahme (11) abhebbar ist.

29. Maschine nach einem der Ansprüche 1 bis 27, dadurch gekennzeichnet, dass zur Entnahme und/oder zum Einbau der Bandkassette (13) bei aufgehobener Verriegelung zwischen der Bandkassette (13) und einer an der Maschine verbleibenden Aufnahme (11) die Bandkassette (13) zunächst um die eine von zwei, insbesondere stangenförmigen, Auflagen (65, 67) der Aufnahme (11) verschwenkbar und anschließend von den Auflagen (65, 67) abhebbar ist, wobei insbeson-

dere die andere der Auflagen (65, 67) zur Verriegelung der Bandkassette (13) ausgebildet ist.

30. Maschine nach einem der vorhergehenden Ansprüche,
dadurch gekennzeichnet,
dass mehrere Bandkassetten (13) in Förderrichtung gesehen hintereinander und/oder nebeneinander angeordnet sind, wobei insbesondere die Bandkassetten (13) unabhängig voneinander entnehmbar und/oder einbaubar sind.

31. Fördereinrichtung für aufzuschneidende oder aufgeschnittene Lebensmittelprodukte, die zumindest einen Bandförderer umfasst, der als entnehmbare Bandkassette (13) ausgeführt ist.

32. Fördereinrichtung nach Anspruch 31, mit den kennzeichnenden Merkmalen zumindest eines der Ansprüche 1 bis 30.

Zusammenfassung

Die Erfindung betrifft eine Aufschnittschneidemaschine für Lebensmittelprodukte, insbesondere Hochleistungs-Slicer, mit zumindest einem Bandförderer, der als entnehmbare Bandkassette ausgebildet ist.

Fig.1

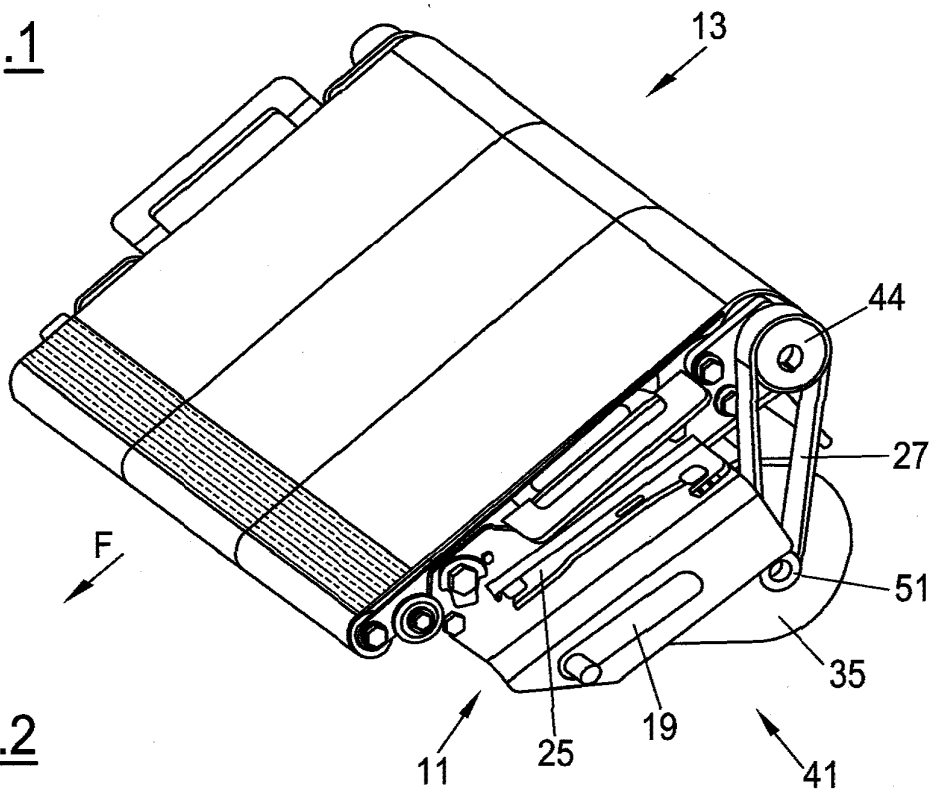


Fig.2

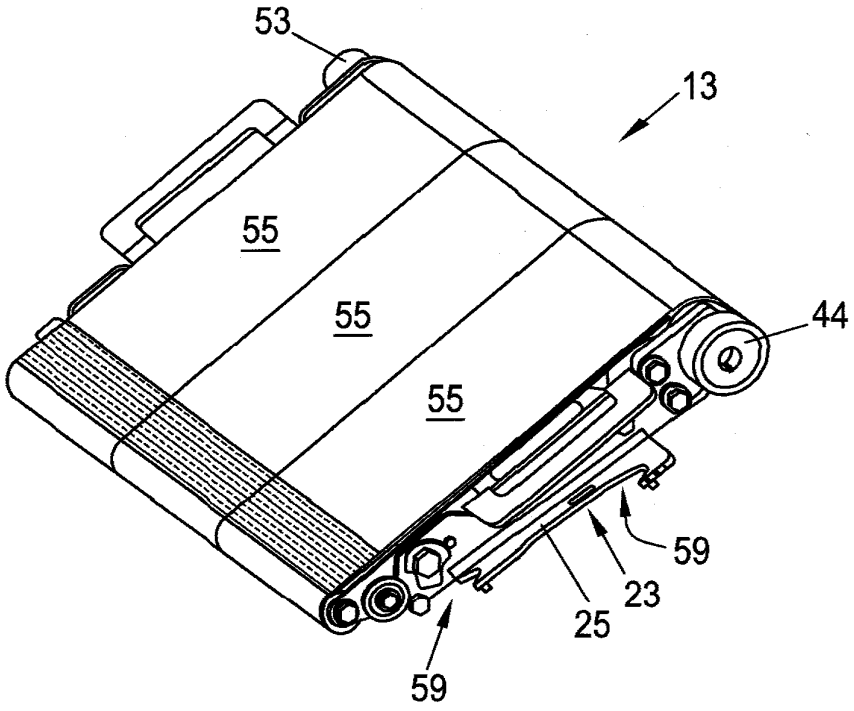


Fig.3

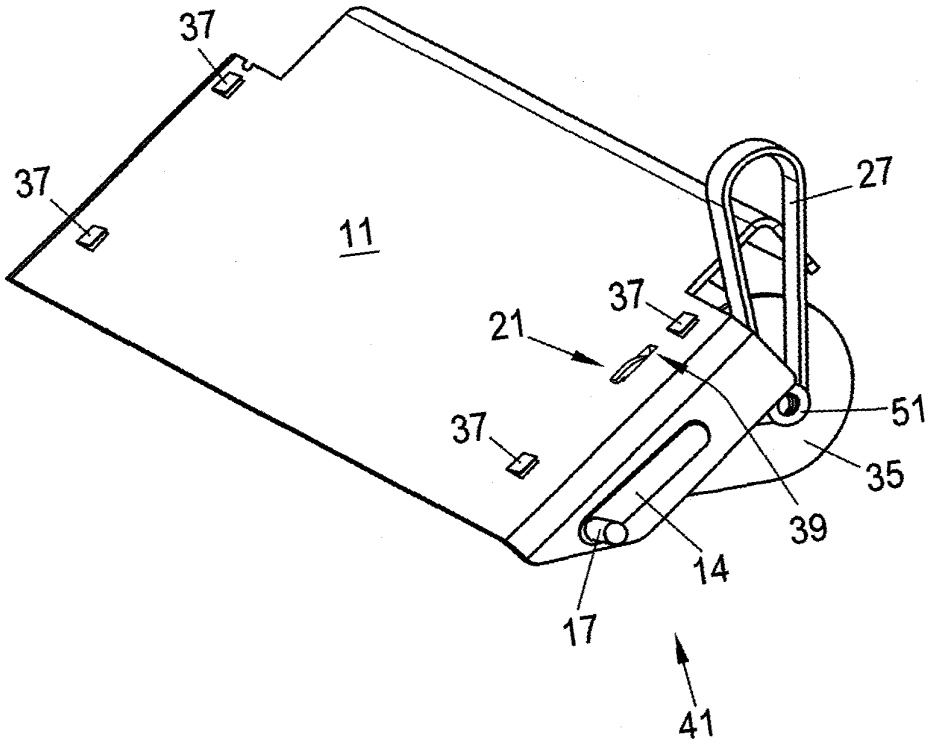


Fig.4

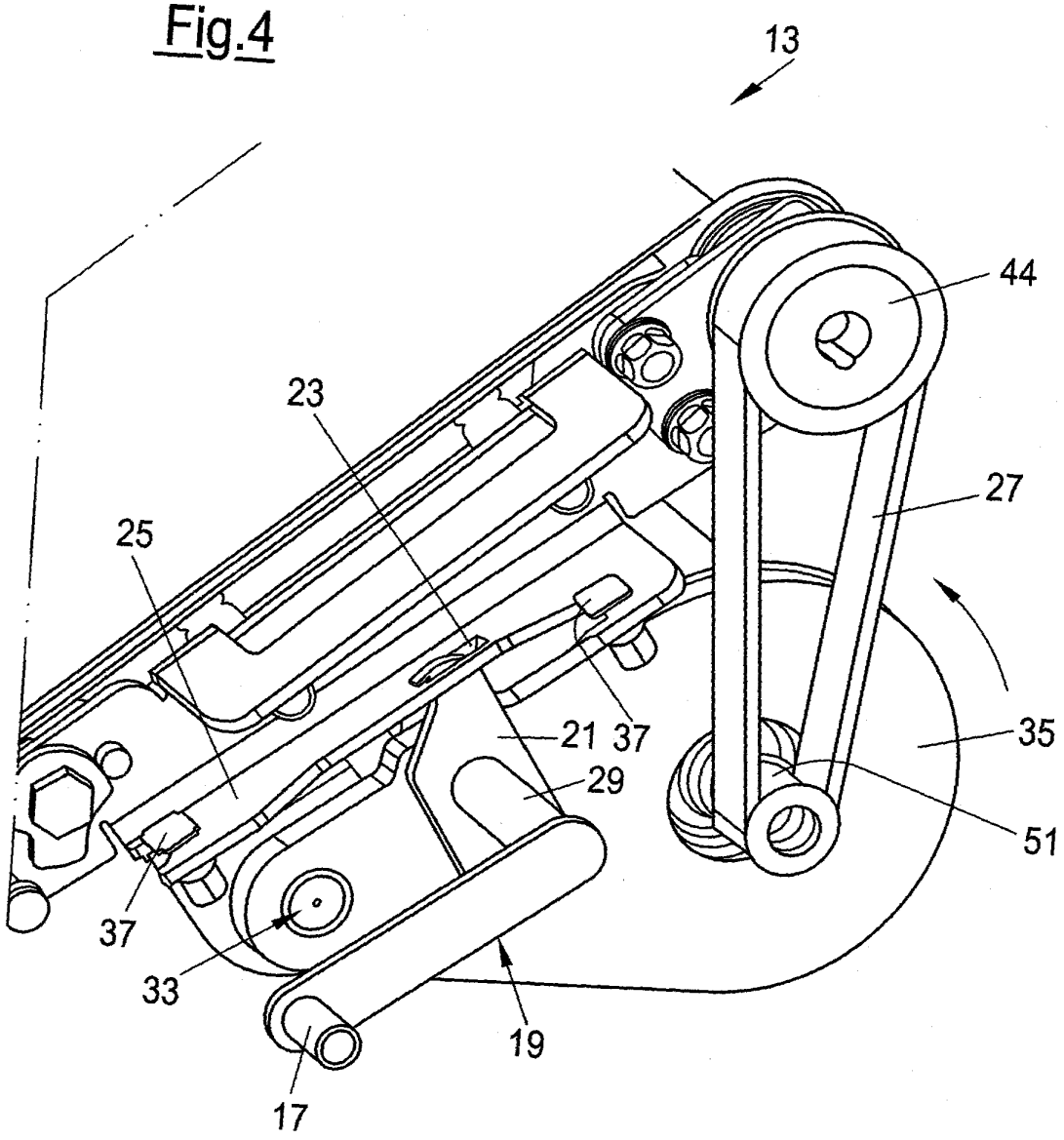


Fig.5

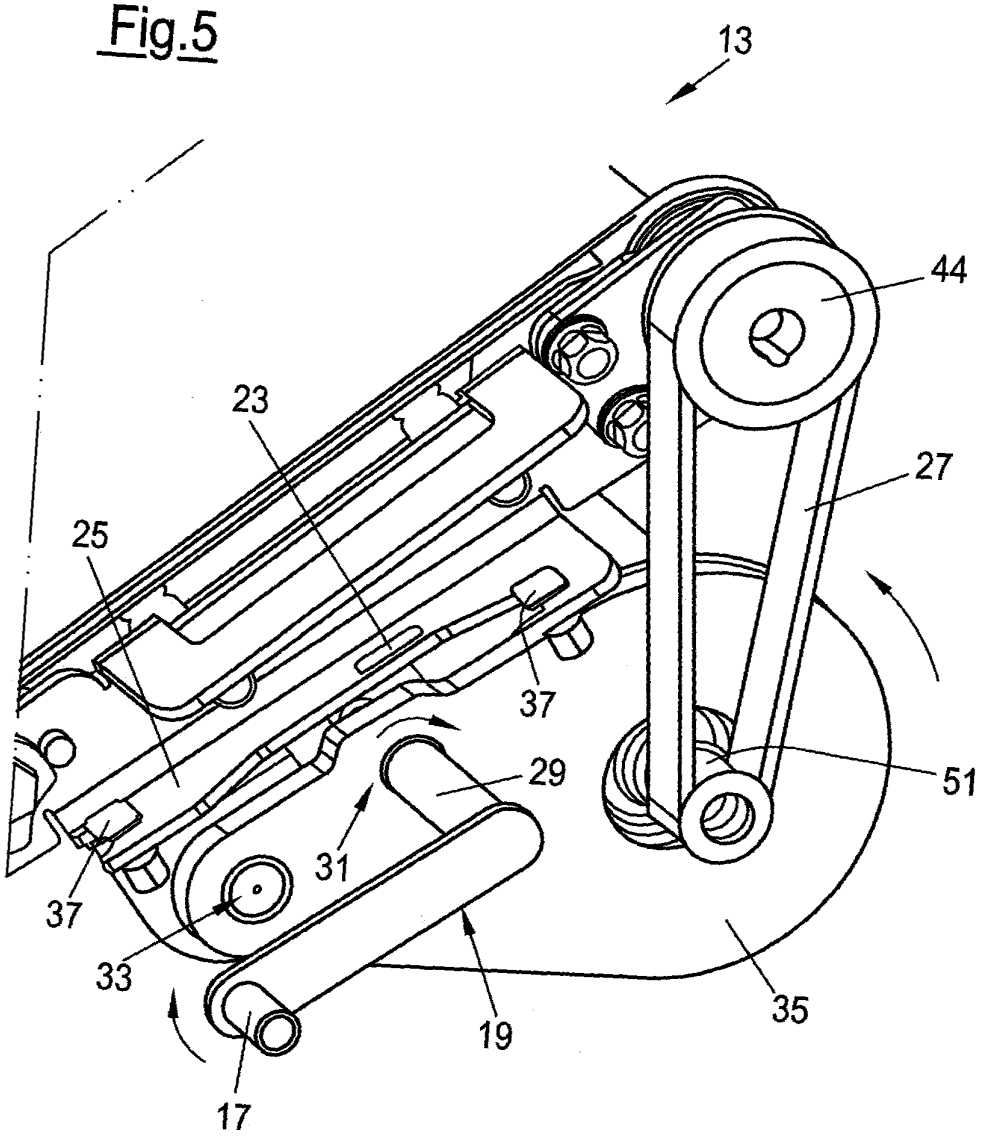


Fig.6

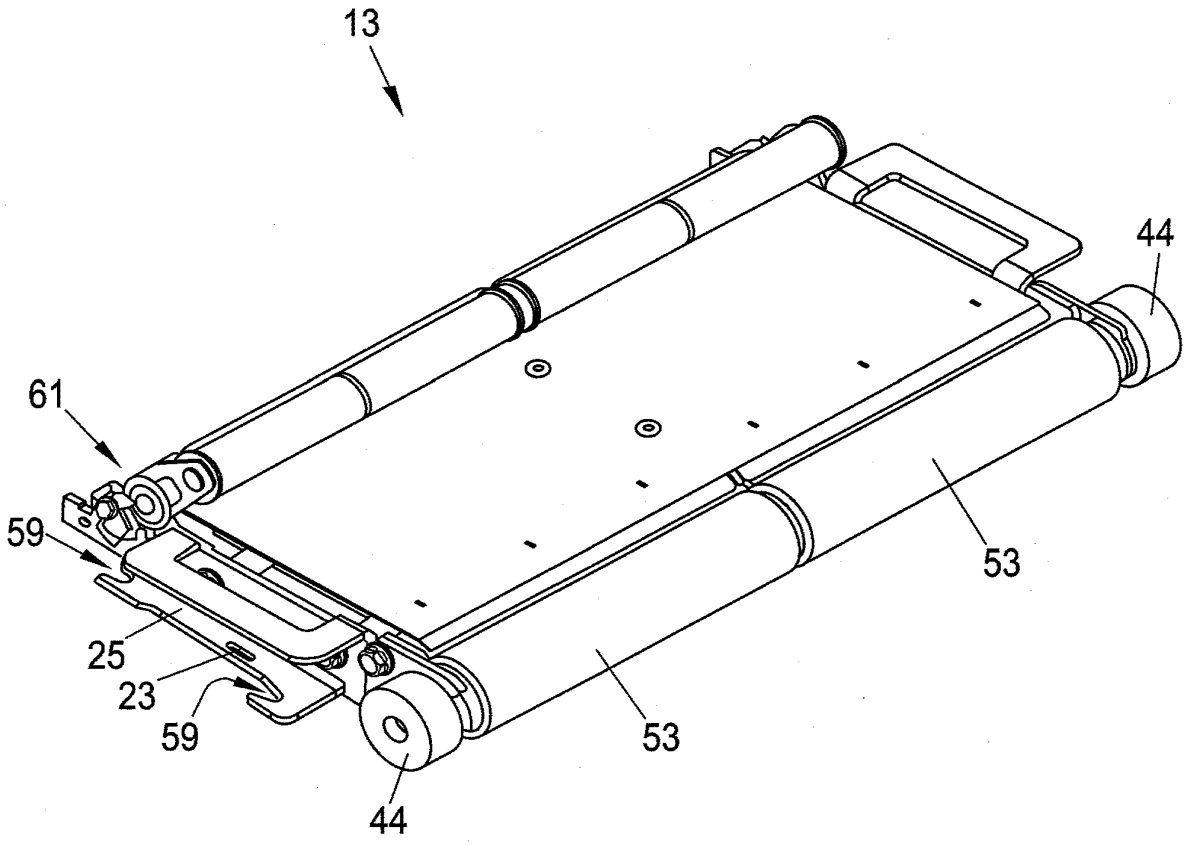


Fig.7

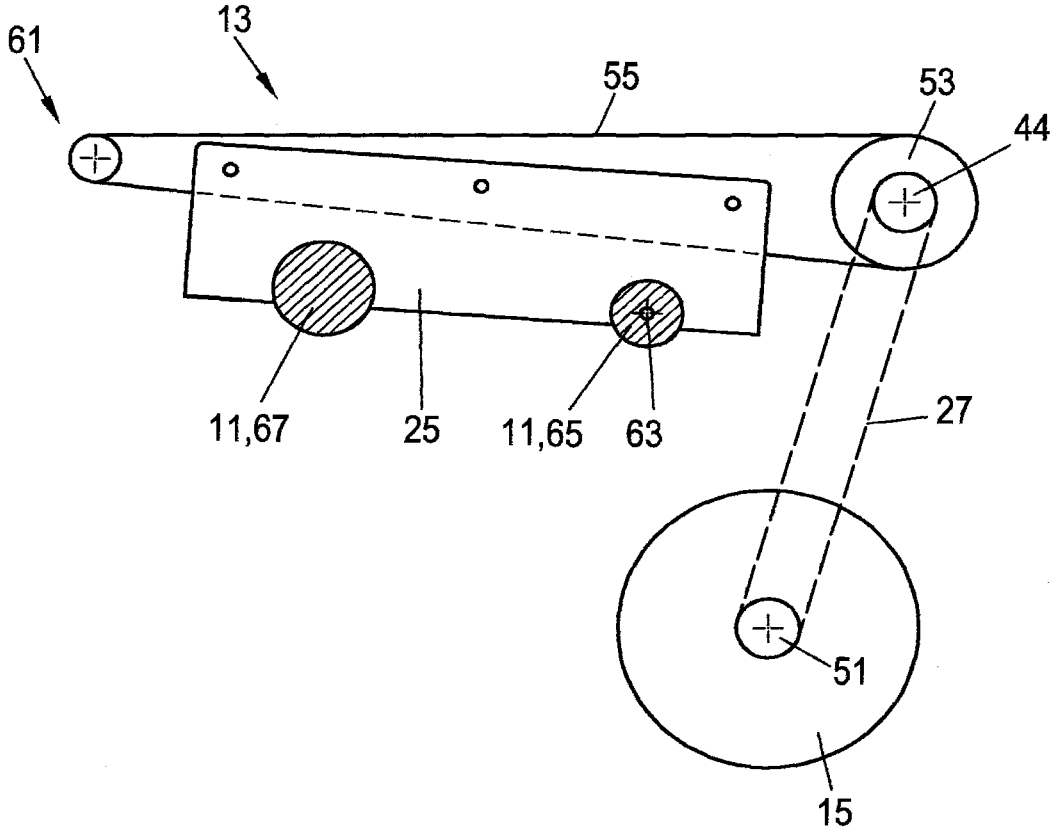


Fig.8

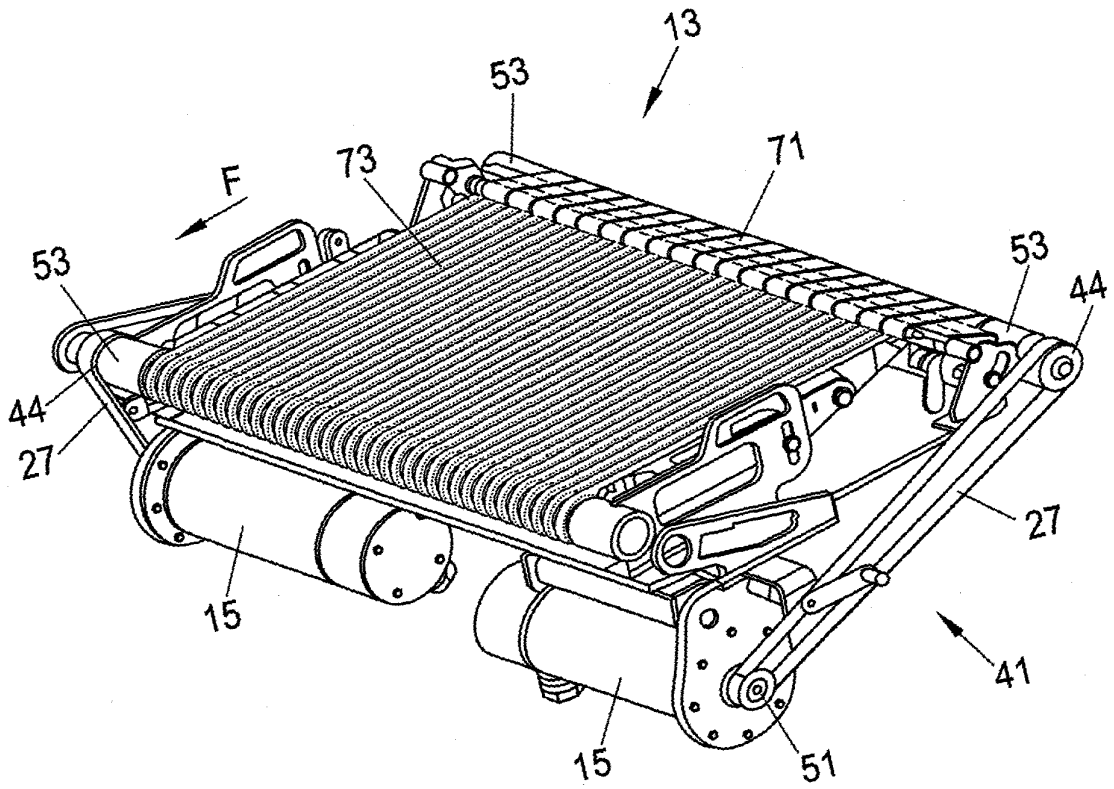
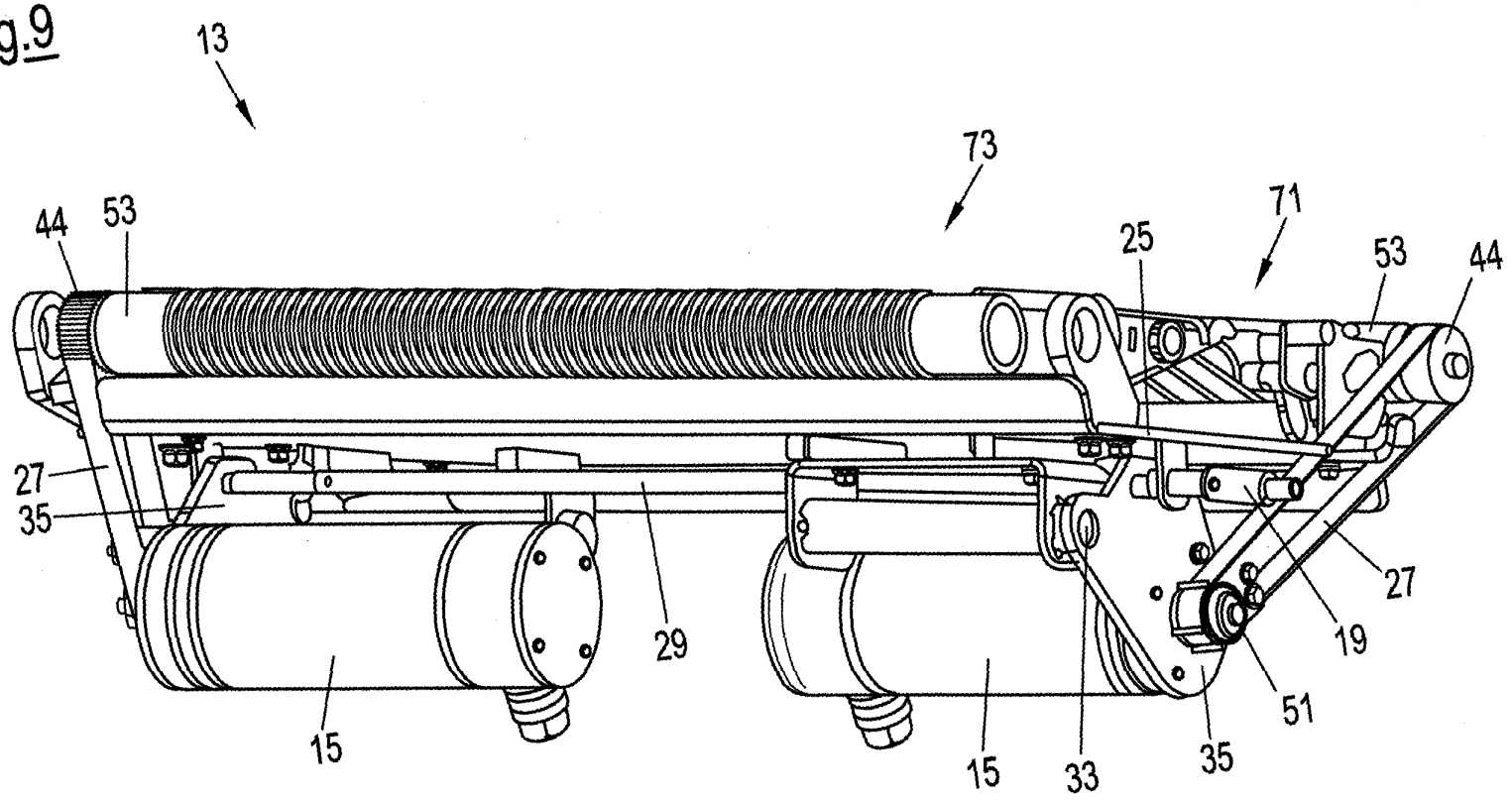


Fig.9



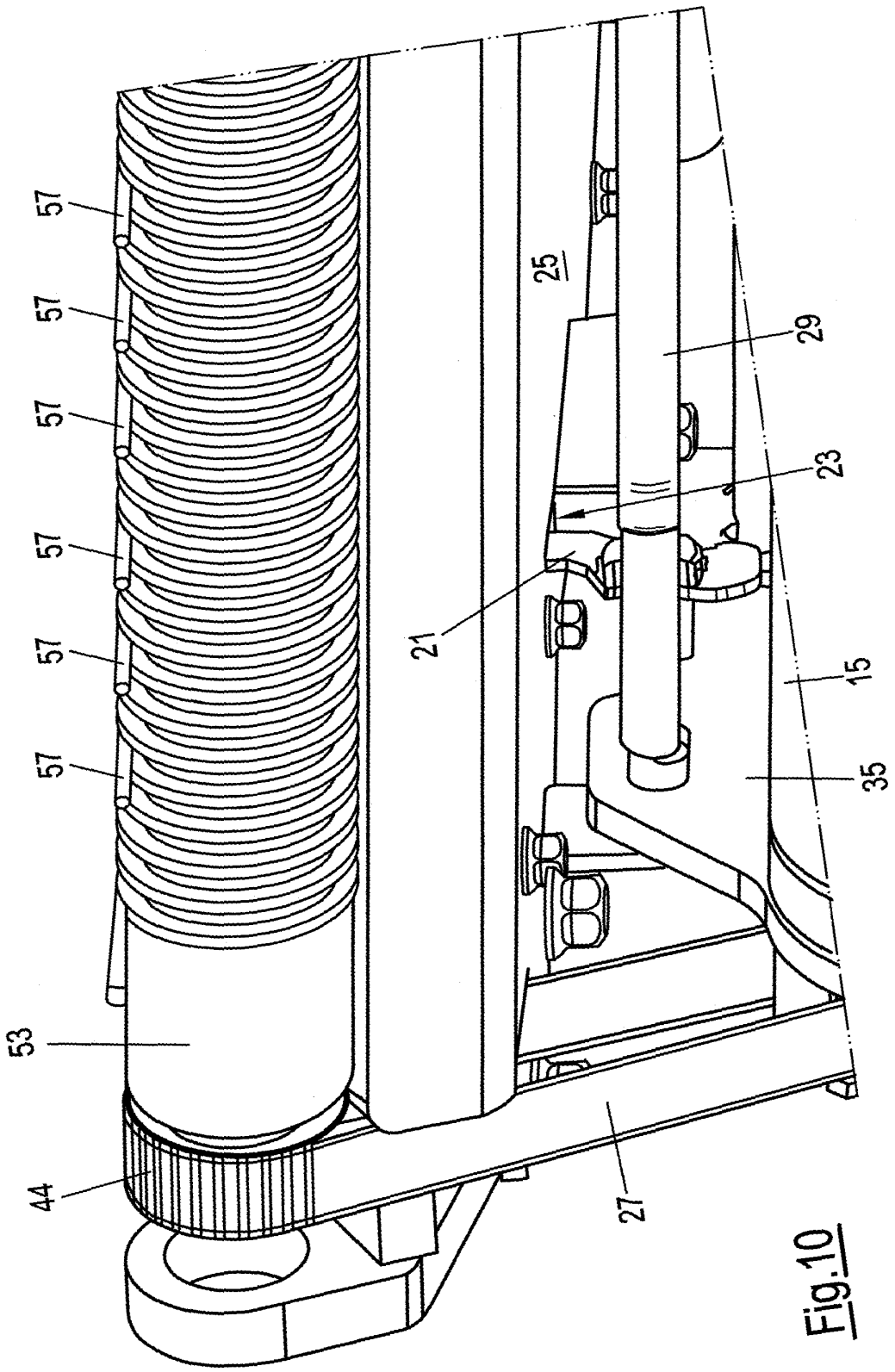


Fig.10

Fig.11

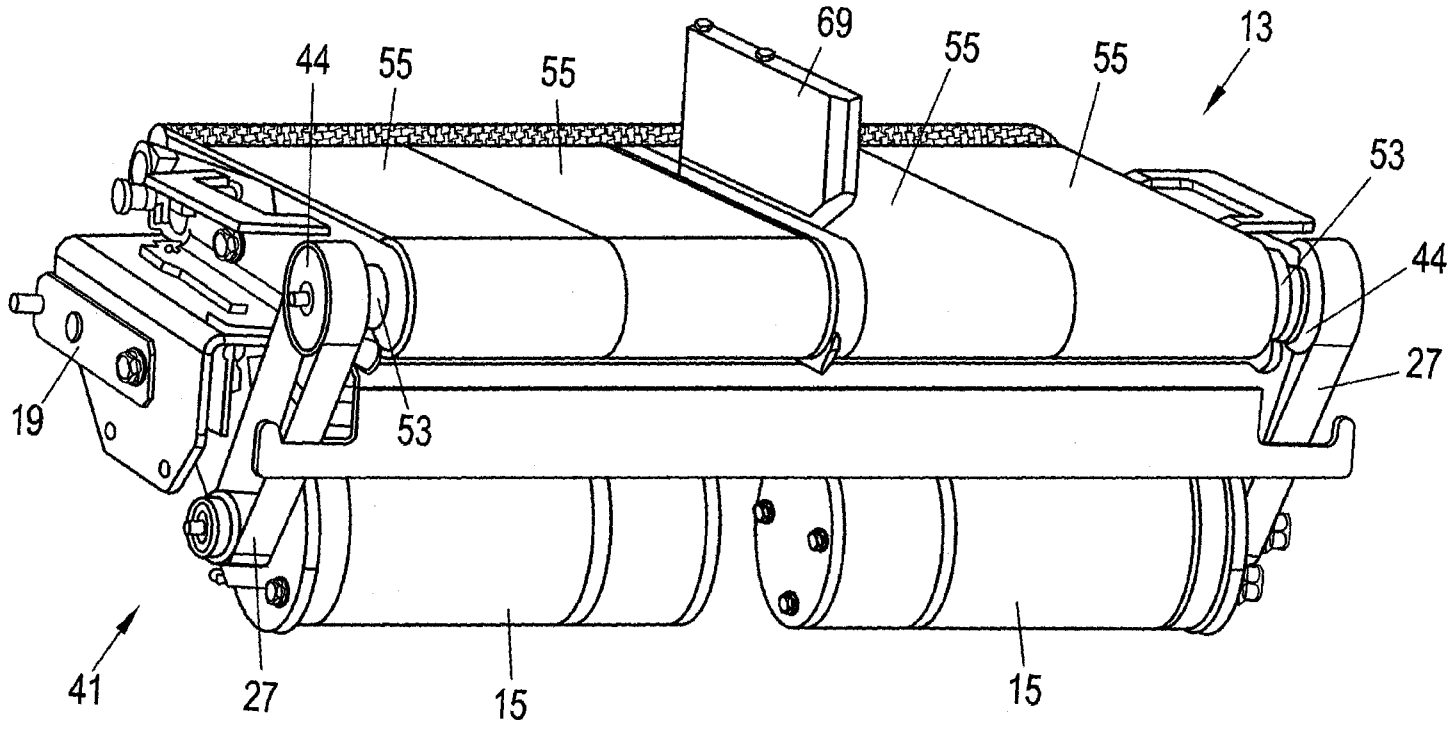


Fig.12a

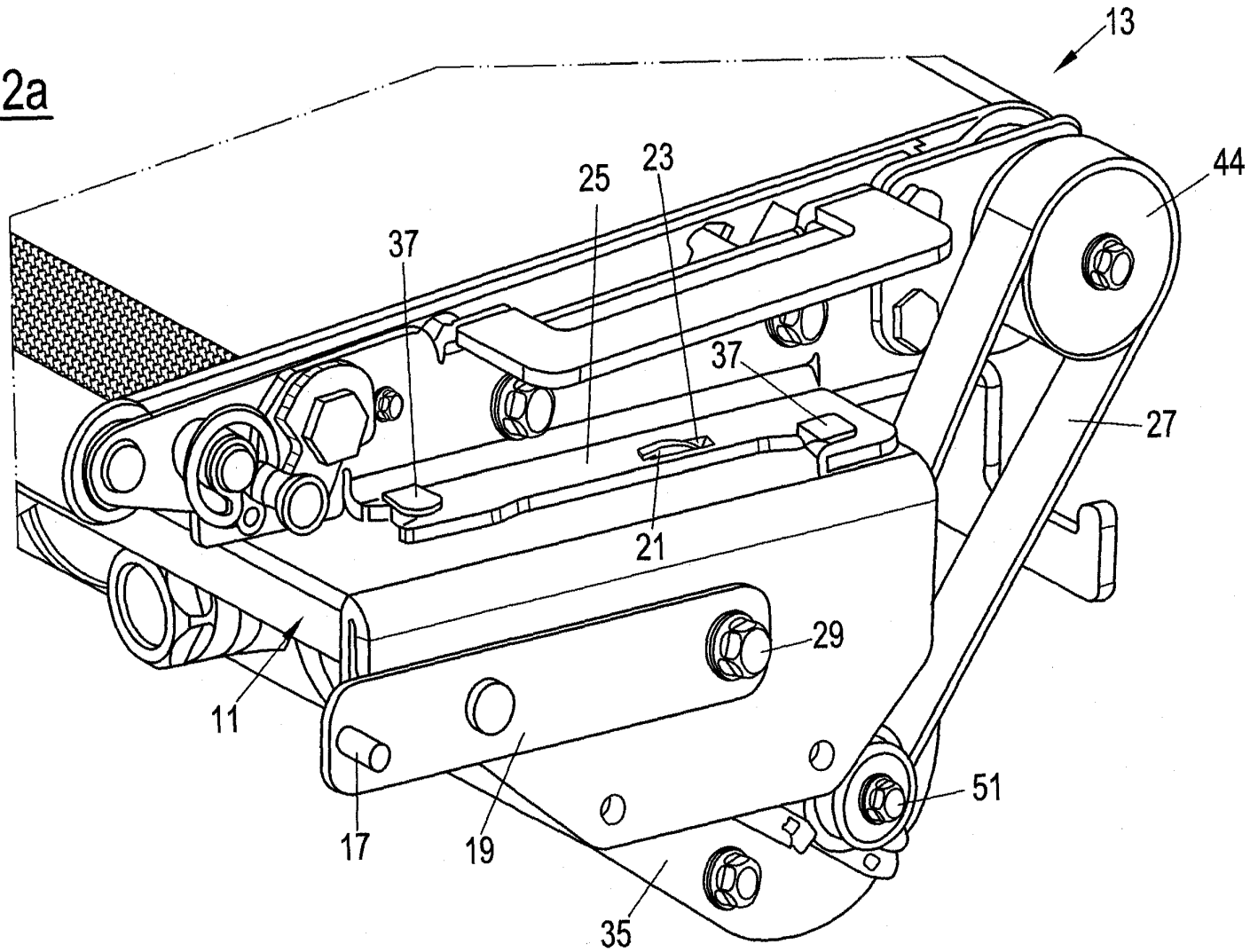


Fig.12b

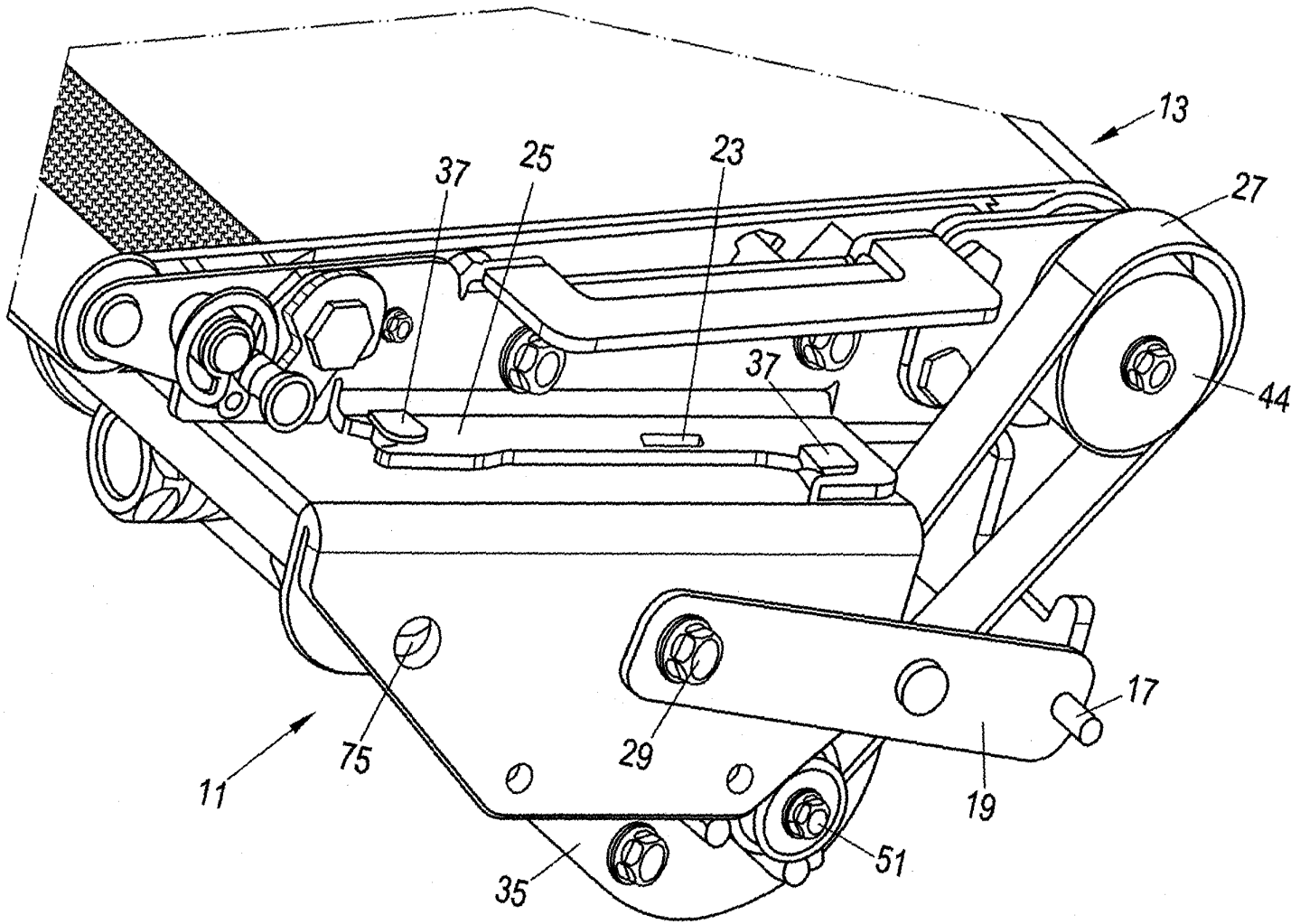


Fig.13a

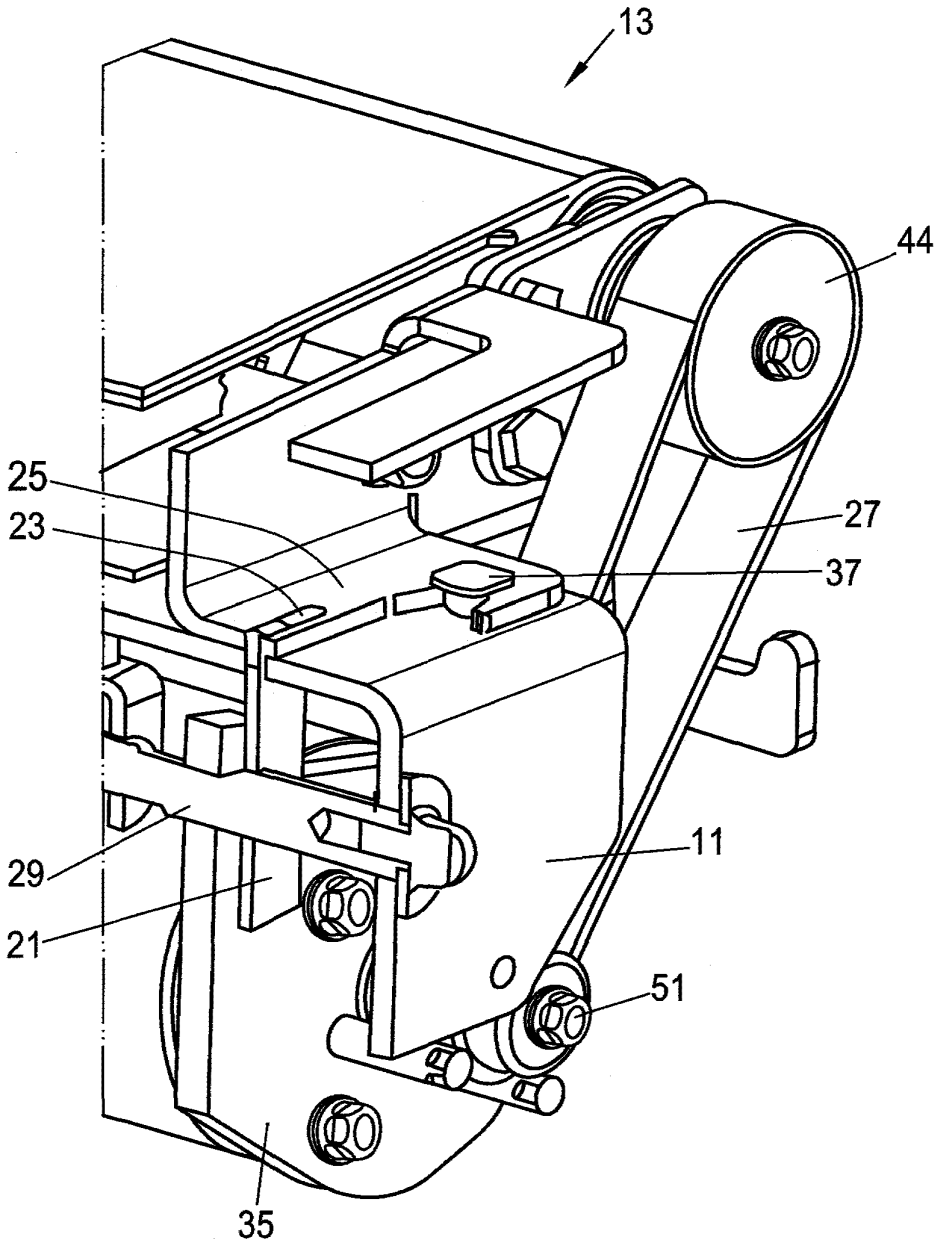
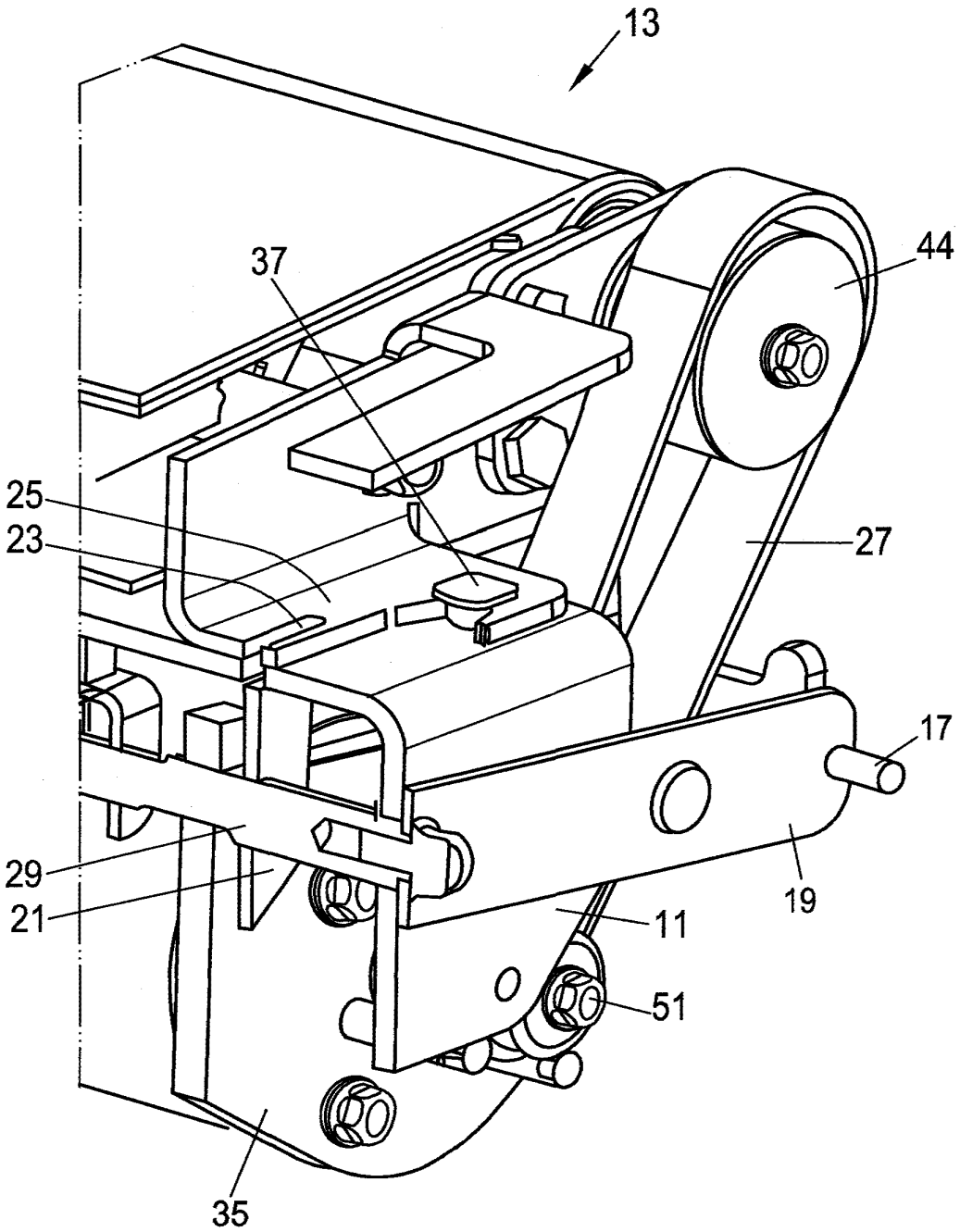


Fig.13b



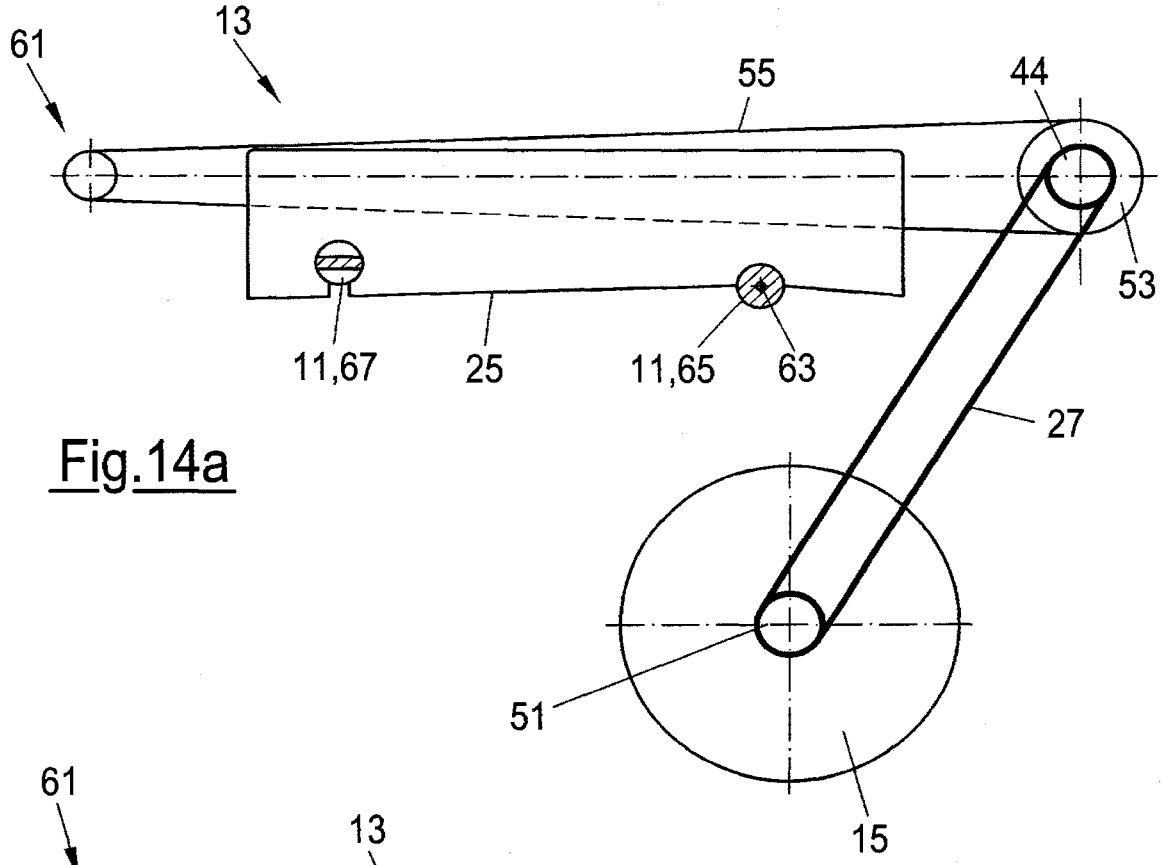


Fig.14a

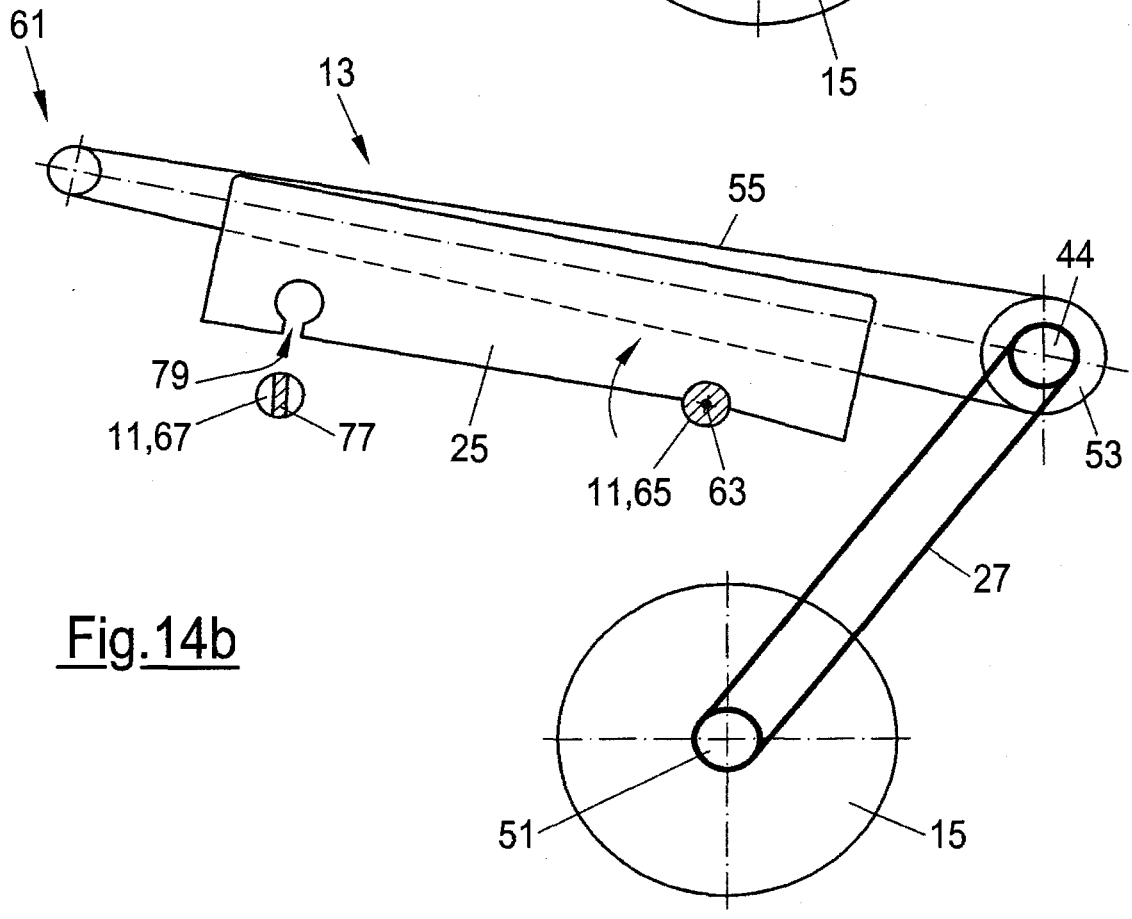


Fig.14b

Electronic Patent Application Fee Transmittal

Application Number:	
Filing Date:	
Title of Invention:	High Performance Slicing Apparatus With At Least One Removable Conveyor Belt Unit
First Named Inventor/Applicant Name:	Josef Mayer
Filer:	Scott A. McBain/Denise Bentley
Attorney Docket Number:	MFP0031US (T10212PUS)

Filed as Large Entity

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Utility application filing	1011	1	280	280
Utility Search Fee	1111	1	600	600
Utility Examination Fee	1311	1	720	720
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	**1600**

Electronic Acknowledgement Receipt

EFS ID:	17541373
Application Number:	14094136
International Application Number:	
Confirmation Number:	1104
Title of Invention:	High Performance Slicing Apparatus With At Least One Removable Conveyor Belt Unit
First Named Inventor/Applicant Name:	Josef Mayer
Customer Number:	23413
Filer:	Scott A. McBain/Denise Bentley
Filer Authorized By:	Scott A. McBain
Attorney Docket Number:	MFP0031US (T10212PUS)
Receipt Date:	02-DEC-2013
Filing Date:	
Time Stamp:	16:38:37
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$1600
RAM confirmation Number	4141
Deposit Account	061130
Authorized User	CASS, WILLIAM J.

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File Listing:					
Document Number	**Document Description**	**File Name**	**File Size(Bytes)/ Message Digest**	**Multi Part /.zip**	**Pages (if appl.)**
1	Application Data Sheet	6XM7283.PDF	1264998 81b816b1bddc0ba1c838fe75d74d230492d86f51	no	6
Warnings:					
Information:					
2		6XM7181.PDF	125365 05f1e6fc2c84858f3fcc557ccd145ad3b8695df3	yes	38

	Multipart Description/PDF files in .zip description		
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	Specification - Not in English	1	29
	Claims	30	37
	Abstract	38	38

Warnings:					
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3	Drawings-only black and white line drawings	6XM7177.PDF	809183 9739bcdda172ddfbbf3e6902f93310d46b14487f	no	15
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National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.