AO 120 (Rev. 3/2004)

TO: Mail Stop 8 Director of the U.S. Patent and Trademark Office P.O. Box 1450 Alexandria, VA 22313-1450	**REPORT ON THE FILING OR DETERMINATION OF AN ACTION REGARDING A PATENT OR TRADEMARK**

In Compliance with 35 § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been filed in the U.S. District Court Western District of Michigan on the following ☑ Patents or ☐ Trademarks:

DOCKET NO.	DATE FILED	U.S. DISTRICT COURT
1:09-cv-01142	12/21/2009	Western District of Michigan - at Grand Rapids

PLAINTIFF	DEFENDANT
Stryker Corporation, et al	Monster Medic, Inc.

	PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1	7,398,571		
2			
3			
4			
5			

In the above—entitled case, the following patent(s) have been included:

DATE INCLUDED	INCLUDED BY ☐ Amendment ☐ Answer ☐ Cross Bill ☐ Other Pleading	
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1		
2		
3		
4		
5		

In the above—entitled case, the following decision has been rendered or judgment issued:

DECISION/JUDGMENT
Stipulated Consent Judgment entered 1/28/11

CLERK	(BY) DEPUTY CLERK	DATE
TRACEY CORDES	By /s/ G. Frayer	1/31/11

-Continued on Page 2-

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.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/172,434	07/15/2008	7398571	3007.P0315US	5270

30497 7590 06/25/2008

FLYNN, THIEL, BOUTELL & TANIS, P.C.
2026 RAMBLING ROAD
KALAMAZOO, MI 49008-1631

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 258 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 Customer Service Center of the Office of Patent Publication at (571)-272-4200.

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

Chad Souke, Kalamazoo, MI;
Dennis A. Reed, Portage, MI;
Christopher B. Way, Kalamazoo, MI;

EXHIBIT 1006 PAGE0003

USPTO JUN 06 2008 PATENT & TRADEMARK OFFICE

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)

30497 7590 03/11/2008

FLYNN, THIEL, BOUTELL & TANIS, P.C.
2026 RAMBLING ROAD
KALAMAZOO, MI 49008-1631

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.
11/172,434	06/30/2005	Clifford E. Lambarth	3007.P0315US	5270

TITLE OF INVENTION: AMBULANCE COT AND HYDRAULIC ELEVATING MECHANISM THEREFOR

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	$1440	$300	$0	$1740	06/11/2008

06/06/2008 HALI44 00000016 11172434
01 FC:1501 1440.00 OP
02 FC:1504 300.00 OP

EXAMINER	ART UNIT	CLASS-SUBCLASS
TRETTEL, MICHAEL	3673	005-611000

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 FLYNN, THIEL,
2 BOUTELL & TANIS, P.C.
3

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type) REEL/FRAME: 017341/0224

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: STRYKER CORPORATION

(B) RESIDENCE: (CITY and STATE OR COUNTRY): Kalamazoo, Michigan

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 credit any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)
☐ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27.
☐ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature _____ Date June 3, 2008

Typed or printed name David G. Boutell Registration No. 25 072

This collection of information 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.

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OIPE
JUN 06 2008
PATENT & TRADEMARK OFFICE

PATENT APPLICATION

IN THE U.S. PATENT AND TRADEMARK OFFICE

June 2, 2008

Applicant(s): Chad SOUKE et al.

Title: AMBULANCE COT AND HYDRAULIC ELEVATING MECHANISM THEREFOR

Serial No.: 11/172 434 Group: 3673

Confirmation No.: 5270

Filed: June 30, 2005 Examiner: Michael Trettel

International Application No.: -

International Filing Date: -

Atty. Docket No.: 3007.P0315US

Mail Stop Issue Fee
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

TRANSMITTAL FOR FORM PTOL-85 (PART B)

Sir:

Enclosed is Issue Fee/Publication Fee Transmittal Form PTOL-85 (Part B) and a check in the amount of $1,740.00 to cover the Issue Fee and Publication Fee (if required).

The Commissioner is hereby authorized to credit any over-payment of, or to charge any deficiency in, the patent issue fees or publication fees required under 37 CFR 1.18 to Deposit Account No. 06-1382. A duplicate copy of this sheet is enclosed.

Respectfully submitted,

IN DUPLICATE

DGB/jas

David G. Boutell

{00109499.DOC}

FLYNN, THIEL, BOUTELL
& TANIS, P.C.
2026 Rambling Road
Kalamazoo, MI 49008-1631
Phone: (269) 381-1156
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David G. Boutell Reg. No. 25 072
Terryence F. Chapman Reg. No. 32 549
Mark L. Maki Reg. No. 36 589
Liane L. Churney Reg. No. 40 694
John A. Waters Reg. No. 24 802
Brian R. Tumm Reg. No. 36 328
Donald J. Wallace Reg. No. 43 977
Stephen C. Holwerda Reg. No. 57 391
Dale H. Thiel Reg. No. 24 323
Sidney B. Williams, Jr. Reg. No. 24 949
Heon Jekal Reg. No. L0379*
*limited recognition number

Encl: Form PTOL-85 (Part B)
Check
Postal Card

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on June 3, 2008.

Respectfully submitted,

David G. Boutell

175.05/05

FERNO: IPR2024-00042
EXHBIT 1006 PAGE0005

USPTO JUN 06 2008 PATENT & TRADEMARK OFFICE

PATENT APPLICATION

IN THE U.S. PATENT AND TRADEMARK OFFICE

June 2, 2008

Applicant(s): Chad SOUKE et al.

Title: AMBULANCE COT AND HYDRAULIC ELEVATING MECHANISM THEREFOR

Serial No.: 11/172 434 Group: 3673

Confirmation No.: 5270

Filed: June 30, 2005 Examiner: Michael Trettel

International Application No.: -

International Filing Date: -

Atty. Docket No.: 3007.P0315US

Mail Stop Issue Fee
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

TRANSMITTAL FOR FORM PTOL-85 (PART B)

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Enclosed is Issue Fee/Publication Fee Transmittal Form PTOL-85 (Part B) and a check in the amount of $1,740.00 to cover the Issue Fee and Publication Fee (if required).

The Commissioner is hereby authorized to credit any over-payment of, or to charge any deficiency in, the patent issue fees or publication fees required under 37 CFR 1.18 to Deposit Account No. 06-1382. A duplicate copy of this sheet is enclosed.

Respectfully submitted,

IN DUPLICATE

DGB/jas

David G. Boutell

FLYNN, THIEL, BOUTELL
& TANIS, P.C.
2026 Rambling Road
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Dale H. Thiel Reg. No. 24 323
Sidney B. Williams, Jr. Reg. No. 24 949
Heon Jekal Reg. No. L0379*
*limited recognition number

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CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on June 3, 2008.

Respectfully submitted,

David G. Boutell

175.05/05

FERNO: IPR2024-00042
EXHBIT 1006 PAGE0007

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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NOTICE OF ALLOWANCE AND FEE(S) DUE

30497 7590 03/11/2008

FLYNN, THIEL, BOUTELL & TANIS, P.C.
2026 RAMBLING ROAD
KALAMAZOO, MI 49008-1631

EXAMINER	
TRETTEL, MICHAEL	
ART UNIT	PAPER NUMBER
3673	

DATE MAILED: 03/11/2008

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/172,434	06/30/2005	Clifford E. Lambarth	3007.P0315US	5270

TITLE OF INVENTION: AMBULANCE COT AND HYDRAULIC ELEVATING MECHANISM THEREFOR

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	$1440	$300	$0	$1740	06/11/2008

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 SMALL ENTITY status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

A. If the status is the same, pay the TOTAL FEE(S) DUE shown above.

B. If the status above is to be removed, check box 5b on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above, or

If the SMALL ENTITY is shown as NO:

A. Pay TOTAL FEE(S) DUE shown above, or

B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check box 5a on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and 1/2 the ISSUE FEE shown above.

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)

30497 7590 03/11/2008

FLYNN, THIEL, BOUTELL & TANIS, P.C.
2026 RAMBLING ROAD
KALAMAZOO, MI 49008-1631

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.
11/172,434	06/30/2005	Clifford E. Lambarth	3007.P0315US	5270

TITLE OF INVENTION: AMBULANCE COT AND HYDRAULIC ELEVATING MECHANISM THEREFOR

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	$1440	$300	$0	$1740	06/11/2008

EXAMINER	ART UNIT	CLASS-SUBCLASS
TRETTEL, MICHAEL	3673	005-611000

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 credit any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)

❑ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27.

❑ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

This collection of information 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.

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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.
11/172,434	06/30/2005	Clifford E. Lambarth	3007.P0315US	5270

30497 7590 03/11/2008

FLYNN, THIEL, BOUTELL & TANIS, P.C.
2026 RAMBLING ROAD
KALAMAZOO, MI 49008-1631

EXAMINER	
TRETTEL, MICHAEL	
ART UNIT	PAPER NUMBER
3673	

DATE MAILED: 03/11/2008

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)

(application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 258 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 258 day(s).

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).

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Interview Summary	Application No.	Applicant(s)	
	11/172,434	LAMBARTH ET AL.	
	Examiner	Art Unit	
	Michael Trettel	3673	

All participants (applicant, applicant's representative, PTO personnel):

(1) *Michael Trettel*. (3)_____.

(2) *Dale Thiel*. (4)_____.

Date of Interview: *01 March 2008*.

Type: a)☒ Telephonic b)☐ Video Conference
c)☐ Personal [copy given to: 1)☐ applicant 2)☐ applicant's representative]

Exhibit shown or demonstration conducted: d)☐ Yes e)☐ No.
If Yes, brief description: _____.

Claim(s) discussed: *108*.

Identification of prior art discussed: *N/A*.

Agreement with respect to the claims f)☒ was reached. g)☐ was not reached. h)☐ N/A.

Substance of Interview including description of the general nature of what was agreed to if an agreement was reached, or any other comments: *Applicant agreed to attached examiner's amendment to clarify content of claim 108*.

(A fuller description, if necessary, and a copy of the amendments which the examiner agreed would render the claims allowable, if available, must be attached. Also, where no copy of the amendments that would render the claims allowable is available, a summary thereof must be attached.)

THE FORMAL WRITTEN REPLY TO THE LAST OFFICE ACTION MUST INCLUDE THE SUBSTANCE OF THE INTERVIEW. (See MPEP Section 713.04). If a reply to the last Office action has already been filed, APPLICANT IS GIVEN A NON-EXTENDABLE PERIOD OF THE LONGER OF ONE MONTH OR THIRTY DAYS FROM THIS INTERVIEW DATE, OR THE MAILING DATE OF THIS INTERVIEW SUMMARY FORM, WHICHEVER IS LATER, TO FILE A STATEMENT OF THE SUBSTANCE OF THE INTERVIEW. See Summary of Record of Interview requirements on reverse side or on attached sheet.

/Michael Trettel/
Primary Examiner, Art Unit 3673
Examiner's signature, if required

Examiner Note: You must sign this form unless it is an Attachment to a signed Office action.

Notice of Allowability	Application No.	Applicant(s)	
	11/172,434	LAMBARTH ET AL.	
	Examiner	Art Unit	
	Michael Trettel	3673	

-- 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 *amendment of 01/28/08*.

2. ☒ The allowed claim(s) is/are *108,139-141 and 154-164*.

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

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
      1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
   (b) ☐ 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. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application
6. ☒ Interview Summary (PTO-413), Paper No./Mail Date _____ .
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

/Michael Trettel/
Primary Examiner, Art Unit 3673

Examiner's Amendment

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

In line 9 of claim 108 --thereby-- has been inserted before "cause".

Authorization for this examiner's amendment was given in a telephone interview with Dale Thiel on February 29, 2008.

Reasons For Allowance

The following is an examiner's statement of reasons for allowance: in addition to the arguments presented by the applicant in the amendment of 01/28/2008, the examiner notes that the change to claim 108 makes it clear that the base frame of the ambulance cot reorients into a close position relative to the litter frame in response to a change of force set forth. This clearly differs from the subject matter shown by Martin, as detailed by the applicant in his arguments.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Trettel whose telephone number is (571) 272-7052. The examiner can normally be reached on Monday, Tuesday, Thursday, or Friday from 7.30 am to 5.00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patricia Engle, can be reached on (571) 272-6660. The fax phone number for the organization where this application or proceeding is assigned is (571)-273-8300.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-1113.

/Michael Trettel/

Primary Examiner, Art Unit 3673

Issue Classification

Application/Control No.	Applicant(s)/Patent Under Reexamination
11172434	LAMBARTH ET AL.
Examiner	**Art Unit**
Michael Trettel	3673

ORIGINAL		INTERNATIONAL CLASSIFICATION									
CLASS	SUBCLASS	CLAIMED					NON-CLAIMED				
5	611	A	6	1	G	1 / 02 (2006.01.01)	A	6	1	G	15 / 06 (2006.01.01)

CROSS REFERENCE(S)					
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)				
5	86.1				
296	20				

NONE (Assistant Examiner) (Date)		Total Claims Allowed: 15	
/Michael Trettel/ (Primary Examiner)	3/2/08 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 1, 24

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	11172434	LAMBARTH ET AL.
	Examiner	**Art Unit**
	Michael Trettel	3673

SEARCHED

Class	Subclass	Date	Examiner

SEARCH NOTES

Search Notes	Date	Examiner
Updated search	3/2/08	MT
East interference search history printout	3/2/08	MT

INTERFERENCE SEARCH

Class	Subclass	Date	Examiner
5	611, 86.1, 424	3/2/08	MT
269	20	3/2/08	MT
108	20	3/2/08	MT

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	11172434	LAMBARTH ET AL.
	Examiner	**Art Unit**
	Michael Trettel	3673

✓	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	03/01/2008								
	1	-								
	2	-								
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Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	11172434	LAMBARTH ET AL.
	Examiner	**Art Unit**
	Michael Trettel	3673

✓	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

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Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	11172434	LAMBARTH ET AL.
	Examiner	**Art Unit**
	Michael Trettel	3673

✓	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

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Final	Original	03/01/2008								
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Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	11172434	LAMBARTH ET AL.
	Examiner	**Art Unit**
	Michael Trettel	3673

✓	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	03/01/2008								
	109	-								
	110	-								
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Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	11172434	LAMBARTH ET AL.
	Examiner	**Art Unit**
	Michael Trettel	3673

✓	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	03/01/2008								
	145	-								
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	164	=								

EAST Search History

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	1128	(5/611,86.1).CCLS.	US-PGPUB; USPAT; EPO	OR	OFF	2008/03/01 19:25
L2	315	(296/20).CCLS.	US-PGPUB; USPAT; EPO	OR	OFF	2008/03/01 19:25
L3	358	(108/20).CCLS.	US-PGPUB; USPAT; EPO	OR	OFF	2008/03/01 19:25
L4	354	(5/424).CCLS.	US-PGPUB; USPAT; EPO	OR	OFF	2008/03/01 19:25
L5	2085	1 or 2 or 3 or 4	US-PGPUB; USPAT; EPO	OR	OFF	2008/03/01 19:26
L6	11	(ambulance and cot).CLM.	US-PGPUB	OR	OFF	2008/03/01 19:31
L7	12	(ambulance and stretcher).CLM.	US-PGPUB	OR	OFF	2008/03/01 19:31
L8	7	(ambulance and gurney).CLM.	US-PGPUB	OR	OFF	2008/03/01 19:32

3/1/08 7:32:40 PM
C:\Documents and Settings\mtrettel\My Documents\EAST\workspaces\11172434.wsp

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Alexandria, Virginia 22313-1450
www.uspto.gov

BIB DATA SHEET

CONFIRMATION NO. 5270

SERIAL NUMBER	FILING or 371(c) DATE RULE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
11/172,434	06/30/2005	005	3673	3007.P0315US

APPLICANTS

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Brian Bartley, Westmont, IL;
Kurt Dykema, Holland, MI;
Brent Bouws, Holland, MI;

**** CONTINUING DATA ***************************

This appln claims benefit of 60/613,151 09/24/2004

**** FOREIGN APPLICATIONS ***************************

**** IF REQUIRED, FOREIGN FILING LICENSE GRANTED ****

07/21/2005

Foreign Priority claimed ☐ Yes ☑ No 35 USC 119(a-d) conditions met ☐ Yes ☑ No Verified and Acknowledged /MICHAEL TRETTEL/ Examiner's Signature	☐ Met after Allowance MT Initials	STATE OR COUNTRY	SHEETS DRAWINGS	TOTAL CLAIMS	INDEPENDENT CLAIMS
		MI	61	153	28

ADDRESS

FLYNN, THIEL, BOUTELL & TANIS, P.C.
2026 RAMBLING ROAD
KALAMAZOO, MI 49008-1631
UNITED STATES

TITLE

Ambulance cot and hydraulic elevating mechanism therefor

FILING FEE RECEIVED		
13030	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

BIB (Rev. 05/07).

EXHIBIT 1006 PAGE0024

IAP20 JAN 28 2008 PATENT & TRADEMARK OFFICE

IFW

PATENT APPLICATION

IN THE U.S. PATENT AND TRADEMARK OFFICE

January 25, 2008

Applicant(s): Chad SOUKE et al.

Title: AMBULANCE COT AND HYDRAULIC ELEVATING MECHANISM THEREFOR

Serial No.: 11/172 434 Group: 3673

Confirmation No.: 5270

Filed: June 30, 2005 Examiner: Michael Trettel

International Application No.: -

International Filing Date: -

Atty. Docket No.: 3007.P0315US

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

Sir:

Herewith is an amendment in the above-identified application.

[] Applicant claims small entity status. See 37 CFR 1.27.

[] The additional filing fee has been calculated as shown below:

For	No. Filed	No. Extra	(X) LG Entity	RATE	() SM Entity	Fee
Total Claims	(15 - 153 = 0)		x $ 50.00		x $ 25.00	
Indep. Claims	(3 - 28 = 0)		x $210.00		x $105.00	
[ ] Multiple Dep. Claim			+ $370.00		+ $185.00	
* * * TOTAL FILING FEE * * *						$ 0.00

[] Pursuant to 37 CFR 1.136(a), please extend the shortened period for response by month(s). The extension fee is: $.

[] A Check for $ is enclosed to cover fees.

[X] Please credit any overpayment, or charge any additional filing fee required under 37 CFR 1.16 or 1.17 by this communication, to Deposit Account No. 06-1382. A duplicate copy of this sheet is enclosed.

IN DUPLICATE

DGB/ad

David G. Boutell Reg. No. 25 072

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on January 25, 2008.

130.09/07

David G. Boutell

FERNO: IPR2024-00042
EXHBIT 1006 PAGE0024

OIPE JAP12 JAN 28 2008 PATENT & TRADEMARK OFFICE

PATENT APPLICATION

IN THE U.S. PATENT AND TRADEMARK OFFICE

January 25, 2008

Applicant(s): Chad SOUKE et al.

For: AMBULANCE COT AND HYDRAULIC ELEVATING MECHANISM THEREFOR

Serial No.: 11/172 434 Group: 3673

Confirmation No.: 5270

Filed: June 30, 2005 Examiner: Michael Trettel

International Application No.: -

International Filing Date: -

Atty. Docket No.: 3007.P0315US

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

RESPONSE TO OFFICE ACTION

Sir:

In response to the Office Action dated December 28, 2007, please amend the above-identified application as follows:

(Please see following pages.)

- -

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on January 25, 2008.

David G. Boutell

Amendments to the Specification

IN THE ABSTRACT OF THE DISCLOSURE

Attached hereto is a replacement Abstract with markings to show amendments.

IN THE WRITTEN DESCRIPTION

Please replace paragraph [0006] with the following amended paragraph:

[0006] This invention relates to an ambulance cot ~~and accessories. This invention also relates to an ambulance cot having a wheel supported base and a litter raisable and lowerable by a powered elevating mechanism oriented between the base and the litter. This invention also relates to an ambulance cot having a wireless communication capability to facilitate communication between the ambulance cot and a loading system on an ambulance as well as facilitating wireless troubleshooting via a handheld wireless unit. This invention also relates to an ambulance cot having a longitudinally extendable head section with a latching mechanism to fix it in selected locations~~ having a base frame configured for support on a surface, a litter frame configured for supporting thereon a patient and an elevating mechanism interconnecting the base frame and the litter frame and configured to interconnect the litter frame and the base frame in order to facilitate movement of the base frame and the litter frame toward and away from each other. A control mechanism is provided on the cot which is configured to facilitate the movement of the base frame and the litter frame toward each other and at differing speeds predicated on at least one of whether the base frame is supported on the surface and the litter frame is supported by an external support separate from the elevating mechanism.

Amendments to the Claims

This listing of claims will replace all prior listings of claims in the application.

Listing of Claims

Claims 1 - 107 (Cancelled).

108. (Original) An ambulance cot, comprising:

a base frame;

a litter frame; and

an elevating mechanism interconnecting said base frame and said litter frame and being configured to effect changes in elevation of said litter frame relative to said base frame, said elevating mechanism being configured to detect a presence and an absence of a force urging a change in elevation of said litter frame relative to said base frame to cause said base frame and said litter frame to become oriented closer together.

Claims 109 - 138 (Cancelled)

139. (Original) An ambulance cot comprising:

a base frame and a litter frame;

a deployment mechanism interconnecting said base frame and said litter frame and being configured to effect changes in distance between said litter frame and said base frame, said deployment mechanism having a detection device configured to detect a presence and an absence of a force urging a change in distance between said litter frame and said base frame to cause said base frame and said litter frame to become oriented closer together; and

a control mechanism on said ambulance cot, said control mechanism including a manually operable device for controlling said deployment mechanism, said control mechanism being

configured to effect a rapid movement of said deployment mechanism in response to said detection device detecting an absence of said force and in response to an operation of said manually operable device, whereby when said ambulance cot is lifted away from a support surface, causing said detection device to detect an absence of said force, and said manually operable device is operated, said base frame will be rapidly drawn toward said litter frame by said deployment mechanism.

140. (Original) The ambulance cot according to Claim 139, wherein said deployment mechanism includes a hydraulic element and said detection device is further configured to detect a change in pressure of a hydraulic fluid in the hydraulic element.

141. (Original) The ambulance cot according to Claim 139 in combination with an ambulance having a cargo area, the ambulance comprising a loading mechanism configured to couple to said ambulance cot and lift said ambulance cot away from the support surface, the movement of said base frame away from said support surface causing said detection device to detect the absence of said force.

Claims 142 - 153 (Cancelled).

154. (New) An ambulance cot, comprising:

a base frame configured for support on a surface;

a litter frame configured for supporting thereon a patient;

an elevating mechanism interconnecting said base frame and said litter frame and being configured to interconnect said litter frame and said base frame in order to facilitate movement of said base frame and said litter frame toward and away from each other; and

a control mechanism on said cot configured to facilitate said movement of said base frame and said litter frame toward each other and at differing speeds predicated on at least one

of whether said base frame is supported on said surface and said litter frame is supported by an external support separate from said elevating mechanism.

155. (New) The ambulance cot according to Claim 154, wherein said control mechanism is configured such that when said base frame is supported on said surface, said control mechanism controls said elevating mechanism to move said litter frame toward said base frame at a pre-selected speed.

156. (New) The ambulance cot according to Claim 154, wherein said control mechanism is configured such that when said litter frame is supported by the external support separate from said elevating mechanism, said control mechanism controls said elevating mechanism to move said base frame toward said litter frame at a pre-selected speed.

157. (New) The ambulance cot according to Claim 154, wherein said control mechanism is configured such that when said base frame is supported on said surface, said control mechanism controls said elevating mechanism to move said litter frame toward said base frame at a first speed; and

wherein said control mechanism is additionally configured such that when said litter frame is supported by the external support separate from said elevating mechanism, said control mechanism controls said elevating mechanism to move said base frame toward said litter frame at a second speed.

158. (New) The ambulance cot according to Claim 157, wherein said first and second speeds are each pre-selected and said second pre-selected speed is significantly different than said first pre-selected speed.

159. (New) The ambulance cot according to Claim 157, wherein said second speed is greater than said first speed.

160. (New) The ambulance cot according to Claim 154, wherein said litter frame has at least one preferred location whereat the external support is applied, said control mechanism includes at least one manually engageable member located on said litter frame adjacent said at least one preferred location.

161. (New) The ambulance cot according to Claim 160, wherein said at least one manually engageable member is a manually operated switch.

162. (New) The ambulance cot according to Claim 160, wherein hand grips configured to be manually engaged by an attendant are provided at said preferred locations.

163. (New) The ambulance cot according to Claim 154, wherein the external support is provided by an attendant lifting up on said litter frame.

164. (New) The ambulance cot according to Claim 154, in combination with an ambulance having a cargo area, the ambulance comprising a loading mechanism configured to couple to said ambulance cot and lift said ambulance cot and said base frame thereof away from the surfaces to thereby define said external support.

FERNO: IPR2024-00042
EXHBIT 1006 PAGE0030

REMARKS

Claims 108 and 139-141 remain in this application. Claim 108 has been rejected. Claims 139-141 have been allowed. Claims 154-164 have been added. Accordingly, Claims 108, 139-141 and 154-164 are now present in this application. Reconsideration of Claim 108 and consideration of Claims 154-164 is respectfully solicited.

Applicants respectfully traverse the Examiner's rejection of Claim 108. Applicants respectfully submit that Claim 108 is patentably distinguishable from the art of record and particularly Martin, US Patent No. 4 534 077, which the Examiner used to formulate a Title 35 USC 102 rejection of Claim 108. The Martin reference discloses a typical hospital bed having a feature wherein the drive for lowering the patient supporting frame toward a base is prematurely halted if an object is detected between the patient supporting frame and the base frame prior to the end of travel of the moving member (here the patient supporting frame). Under no circumstances does the Martin invention "cause the base frame and the litter frame to become oriented closer together" in response to the detection event. In fact, Martin teaches that all relative movement is to stop leaving the patient support spaced from the base. Further and favorable consideration of Claim 108 is respectfully solicited.

It is respectfully submitted that the scope of the subject matter of Claims 154-164 is within the elected group of claims, namely, "an ambulance cot with a base, a litter, an elevating mechanism with a detecting device for detecting the presence or absence of a force urging a change in elevation of the litter frame to the base". Applicants respectfully submit that the recited "control mechanism" in Claim 154 embraces the detecting device which detects differing supported conditions during normal usage of the cot to produce relative movement between the litter and the base predicated on those certain support conditions. Consideration of Claims 154-164 is therefore respectfully solicited.

None of the Examiner's cited prior art teaches the recognition of differing support conditions for the cot during normal usage thereof and the differing speeds of operation thereof based on the condition recognized. Thus, favorable consideration of Claims 154-164 is respectfully solicited.

Respectfully submitted,

David G. Boutell

DGB/ad

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Sidney B. Williams, Jr. Reg. No. 24 949
Heon Jekal Reg. No. L0379*
*limited recognition number

Encl: Marked-up ABSTRACT OF THE DISCLOSURE
Postal Card

136.07/05

Marked up Abstract of the Disclosure
U.S. Serial No. 11/172 434

AMBULANCE COT AND HYDRAULIC ELEVATING MECHANISM THEREFOR

ABSTRACT OF THE DISCLOSURE

An ambulance cot is disclosed and the ambulance cot ~~has, if desired, a wheel supported base and a litter raisable and lowerable by a powered elevating mechanism oriented between the base and the litter. The ambulance cot also has wireless communication capability to facilitate communication between the ambulance cot and a loading system on an ambulance as well as facilitating wireless troubleshooting via a handheld wireless unit. The ambulance cot also has a longitudinally extendable head section. The ambulance cot also has several accessories, such as an accessory hook mounted to the underside of the fowler, and a collapsible pouch accessory fastened to the retractable head section and the litter frame~~having a base frame configured for support on a surface, a litter frame configured for supporting thereon a patient and an elevating mechanism interconnecting the base frame and the litter frame and configured to interconnect the litter frame and the base frame in order to facilitate movement of the base frame and the litter frame toward and away from each other. A control mechanism is provided on the cot which is configured to facilitate the movement of the base frame and the litter frame toward each other and at differing speeds predicated on at least one of whether the base frame is supported on the surface and the litter frame is supported by an external support separate from the elevating mechanism.

PTO/SB/06 (07-06)
Approved for use through 1/31/2007. 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 displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number	Filing Date	☐ To be Mailed
11/172,434	06/30/2005	

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	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =		OR	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =			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 $250 ($125 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			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT 01/28/2008	(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 ($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	* 15	Minus	** 153	= 0	X $ =		OR	X $50=	0
Independent (37 CFR 1.16(h))	* 3	Minus	***28	= 0	X $ =		OR	X $210=	0
☐ 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	0

AMENDMENT	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)		RATE ($)	ADDITIONAL FEE ($)
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 number found in the appropriate box in column 1.

Legal Instrument Examiner:
/EVELYN G. NIMMONS/

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.

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.
11/172,434	06/30/2005	Clifford E. Lambarth	3007.P0315US	5270

30497 7590 12/28/2007

FLYNN, THIEL, BOUTELL & TANIS, P.C.
2026 RAMBLING ROAD
KALAMAZOO, MI 49008-1631

EXAMINER	
TRETTEL, MICHAEL	

ART UNIT	PAPER NUMBER
3673	

MAIL DATE	DELIVERY MODE
12/28/2007	PAPER

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.

Office Action Summary	Application No.	Applicant(s)	
	11/172,434	LAMBARTH ET AL.	
	Examiner	Art Unit	
	Michael Trettel	3673	

-- 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 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, 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 *10/11/07*.

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

3)☐ 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

4)☒ Claim(s) *108 and 139-141* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *139-141* is/are allowed.

6)☒ Claim(s) *108* is/are rejected.

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

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

Application Papers

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

10)☐ 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).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

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).

a)☐ All b)☐ Some * c)☐ None of:

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) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *09/23/05*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

Applicant's election without traverse of Group XI in the reply filed on October 11, 2007 is acknowledged.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 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.

Claim 108 is rejected under 35 U.S.C. 102(b) as being anticipated by Martin (US 4,534,077). Martin shows a height adjustable hospital bed 10 that comprises a base frame 12 and a movable upper frame 14. A motor 20 is used to raise and lower the upper frame 14 relative to the base frame 12 through a conventional and well known height adjustment linkage. A safety system is attached to the base frame 14 to stop lowering movement of the upper frame if an obstruction such as a person is placed under the bed. The safety system comprises a pair of air tight tubes 32, tube plugs 34, connectors 36, air lines 37, and limit switches 38 attached to the air lines 37. The switches are tripped if the tubes are pressed upon by a user's limb or the like when the upper frame 14 is lowered upon the limb. This in turn interrupts the lowering operation of the bed, by opening the control circuit for the motor 20. This system can be considered as forming a means for detecting the presence of a force urging a change in elevation (i.e., caused

by the lowering of the upper frame upon a person's limb) which operates when the motor 20 is used to lower the frames relative to one another.

Allowable Subject Matter

Claims 139-141 are allowed.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Hannant (US 5,220,698) shows a safety lockout system for a vertically movable operating table which is of particular interest. Roussy (US 7,000,828) shows a leveling system for a height adjustable hospital bed which is of general interest. Lemire (US 7,150,056) shows a height adjustable hospital bed that includes a leveling system which is also of general interest. Flynn et al (US 6,526,611) shows an ambulance stretcher with a collapsible height adjustable support linkage of interest.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Trettel whose telephone number is (571) 272-7052. The examiner can normally be reached on Monday, Tuesday, Thursday, or Friday from 7.30 am to 5.00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patricia Engle, can be reached on (571) 272-6660. The fax phone number for the organization where this application or proceeding is assigned is (571)-273-8300.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-1113.

Michael Trettel
Primary Examiner
Art Unit 3673

Express Mail Label No.: N/A

INFORMATION DISCLOSURE CITATION	Applicant: Clifford E. LAMBARTH et al
	Ser.No.: 11/172 434 Filed: June 30, 2005
	Conf. No.: 5270 Atty. Docket No.: 3007.P0315US
	Group: 3673

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.	Document Number - Kind Code	Publication Date MM-DD-YYYY	Name of Patentee or Applicant
/MT/	AA	US 2 538 993	01-23-1951	DC Travis
	AB	US 2 833 587	05-06-1958	H. B. Saunders
	AC	US 3 099 020	07-30-1963	S. R. Garfield et al
	AD	US 3 174 722	03-23-1965	E. J. Alm
	AE	US 3 815 164	06-11-1974	Smith
	AF	US 4 071 222	01-31-1978	Wright
	AG	US 4 078 269	03-14-1978	Weipert
	AH	US 4 097 941	07-04-1978	Merkel
	AI	US 4 271 545	06-09-1981	Christian, III
	AJ	US 4 556 198	12-3-1985	Tominaga
	AK	US 4 558 847	12-17-1985	Coates
	AL	US 4 613 122	09-23-1986	Manabe
	AM	US 4 675 926	06-30-1987	Lindblom et al
	AN	US 4 984 774	01-15-1991	Zupancic et al
	AO	US 5 022 105	06-11-1991	Catoe
	AP	US 5 054 141	10-08-1991	Foster et al
	AQ	US 5 074 000	12-24-1991	Soltani et al
	AR	US 5 083 331	01-28-1992	Schnelle et al
	AS	US 5 084 922	02-04-1992	Louit
	AT	US 5 135 350	08-04-1992	Eelman et al
	AU	US 5 365 622	11-22-1994	Schirmer
	AV	US 5 495 914	03-05-1996	DiMucci et al
	AW	US 5 271 113	12-21-1993	White
	AX	US 5 537 700	07-23-1996	Way et al
	AY	US 5 575 026	11-19-1996	Way et al
	AZ	US 5 697 471	12-16-1997	DiMucci et al
	BA	US 5 701 618	12-30-1997	Brugger
	BB	US 5 740 884	04-21-1998	DiMucci et al
	BC	US 5 983 425	11-16-1999	DiMucci et al
	BD	US 6 219 864 B1	04-24-2001	Ellis et al
	BE	US 6 332 638 B1	12-25-2001	Menna
	BF	US 2003/0079288 A1	05-01-2003	Cook et al
	BG	US 2004/0055087 A1	03-25-2004	Edgerton
/MT/	BH	US 2004/0088792 A1	05-13-2004	O'Krangley et al
	BI			

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.	Country Code - Document No. - Kind Code	Publication Date MM-DD-YYYY	Name of Patentee or Applicant	Trans.
/MT/	BJ	WO 2004/064698 A2	08-05-2004	Stryker Corporation	

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.	(Include Author, Title, Date, Pages, Etc.)
/MT/	BK	Co-pending U.S. patent application Serial No. 10/850 144, filed May 20, 2004, DEVICE FOR PREVENTING EMERGENCY VEHICLE BUMPER INTERFERENCE WITH COT WHEEL DEPLOYMENT

EXAMINER SIGNATURE	DATE CONSIDERED
/Michael Trettel/	12/21/2007

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

Notice of References Cited	Application/Control No. 11/172,434	Applicant(s)/Patent Under Reexamination LAMBARTH ET AL.	
	Examiner Michael Trettel	Art Unit 3673	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-5,220,698	06-1993	Hannant, Keith	5/611
*	B	US-7,000,828	02-2006	Jones, John E.	235/379
*	C	US-7,150,056	12-2006	Lemire, Guy	5/611
*	D	US-6,526,611	03-2003	Flynn et al.	5/611
*	E	US-4,534,077	08-1985	Martin, Kelly D.	5/424
	F	US-			
	G	US-			
	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					
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	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.

Index of Claims

Application/Control No.	Applicant(s)/Patent under Reexamination
11/172,434	LAMBARTH ET AL.
Examiner	**Art Unit**
Michael Trettel	3673

√	Rejected	–	(Through numeral) Cancelled	N	Non-Elected	A	Appeal
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Search Notes

Application/Control No.	Applicant(s)/Patent under Reexamination	
11/172,434	LAMBARTH ET AL.	
Examiner	**Art Unit**	
Michael Trettel	3673	

SEARCHED			
Class	Subclass	Date	Examiner
5	611,86.1,424	12/21/2007	MT
296	20	12/21/2007	MT
108	20	12/21/2007	MT

INTERFERENCE SEARCHED			
Class	Subclass	Date	Examiner

SEARCH NOTES (INCLUDING SEARCH STRATEGY)		
	DATE	EXMR

EAST Search History

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	353	(108/20).CCLS.	US-PGPUB; USPAT; EPO	OR	OFF	2007/12/21 12:48
L2	353	(5/424).CCLS.	US-PGPUB; USPAT; EPO	OR	OFF	2007/12/21 12:48
S1	1120	(5/611,86.1).CCLS.	US-PGPUB; USPAT; EPO	OR	OFF	2007/12/11 12:25
S2	313	(296/20).CCLS.	US-PGPUB; USPAT; EPO	OR	OFF	2007/12/21 12:28
S3	40	US-2538993-$.DID. OR US-2833587-$.DID. OR US-3099020-$.DID. OR US-3174722-$.DID. OR US-3815164-$.DID. OR US-4071222-$.DID. OR US-4078269-$.DID. OR US-4097941-$.DID. OR US-4271545-$.DID. OR US-4556198-$.DID. OR US-1231985-$.DID. OR US-4558847-$.DID. OR US-4613122-$.DID. OR US-4675926-$.DID. OR US-4984774-$.DID. OR US-5022105-$.DID. OR US-5054141-$.DID. OR US-5074000-$.DID. OR US-5083331-$.DID. OR US-5084922-$.DID. OR US-5135350-$.DID. OR US-5365622-$.DID. OR US-5495914-$.DID. OR US-5271113-$.DID. OR US-5537700-$.DID. OR US-5575026-$.DID. OR US-5697471-$.DID. OR US-5701618-$.DID. OR US-5740884-$.DID. OR US-5983425-$.DID. OR US-6219864-$.DID. OR US-6332638-$.DID. OR US-20030079288-$.DID. OR US-20040055087-$.DID. OR US-20040088792-$.DID. OR WO-2004064698-$.DID.	US-PGPUB; USPAT; USOCR	OR	OFF	2007/12/11 13:03



IFW

PATENT APPLICATION

IN THE U.S. PATENT AND TRADEMARK OFFICE

October 9, 2007

Applicant(s): Clifford E. LAMBARTH et al.

For: AMBULANCE COT AND HYDRAULIC ELEVATING MECHANISM THEREFOR

Serial No.: 11/172 434 Group: 3673

Confirmation No.: 5270

Filed: June 30, 2005 Examiner: Michael Trettel

International Application No.: N/A

International Filing Date: N/A

Atty. Docket No.: 3007.P0315US

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

RESPONSE TO OFFICE ACTION

Sir:

In response to the Office Action dated September 11, 2007, please amend the above-identified application as follows:

(Please see following pages.)

- -

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on October 9, 2007 .

David G. Boutell

Amendments to the Claims

This listing of claims will replace all prior listings of claims in the application.

Listing of Claims

Claims 1 - 107 (Cancelled).

108. (Original) An ambulance cot, comprising:

a base frame;

a litter frame; and

an elevating mechanism interconnecting said base frame and said litter frame and being configured to effect changes in elevation of said litter frame relative to said base frame, said elevating mechanism being configured to detect a presence and an absence of a force urging a change in elevation of said litter frame relative to said base frame to cause said base frame and said litter frame to become oriented closer together.

Claims 109 - 138 (Cancelled)

139. (Original) An ambulance cot comprising:

a base frame and a litter frame;

a deployment mechanism interconnecting said base frame and said litter frame and being configured to effect changes in distance between said litter frame and said base frame, said deployment mechanism having a detection device configured to detect a presence and an absence of a force urging a change in distance between said litter frame and said base frame to cause said base frame and said litter frame to become oriented closer together; and

a control mechanism on said ambulance cot, said control mechanism including a manually operable device for controlling said deployment mechanism, said control mechanism being

configured to effect a rapid movement of said deployment mechanism in response to said detection device detecting an absence of said force and in response to an operation of said manually operable device, whereby when said ambulance cot is lifted away from a support surface, causing said detection device to detect an absence of said force, and said manually operable device is operated, said base frame will be rapidly drawn toward said litter frame by said deployment mechanism.

140. (Original) The ambulance cot according to Claim 139, wherein said deployment mechanism includes a hydraulic element and said detection device is further configured to detect a change in pressure of a hydraulic fluid in the hydraulic element.

141. (Original) The ambulance cot according to Claim 139 in combination with an ambulance having a cargo area, the ambulance comprising a loading mechanism configured to couple to said ambulance cot and lift said ambulance cot away from the support surface, the movement of said base frame away from said support surface causing said detection device to detect the absence of said force.

Claims 142 - 153 (Cancelled).

INVENTORS

Please limit the named inventors for Claim Group XI to the following THREE inventors of record: (1) Chad Souke, (2) Dennis A. Reed and (3) Christopher B. Way.

REMARKS

Applicants provisionally elect Claim Group XI, namely, Claims 108 and 139-141. This election is made without traverse.

Please cancel Claims 1-107, 109-138 and 142-153 from this application contingent on the right to file divisional applications directed to the subject matters thereof at some future date.

Please **delete** as inventors for Claim Group XI the following twelve names: Clifford E. LAMBARTH, Todd GATTO, Joshua C. COLVIN, Kurosh NAHAVANDI, Jason KNEEN, Michael W. STEFFLER, Gary MORTON, Michael McKEE, Thomas A. PUVOGEL, Brian BARTLEY, Kurt DYKEMA and Brent BOUWS.

Further and favorable consideration of this application is respectfully solicited.

Respectfully submitted,

David G. Boutell

DGB/kc

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& TANIS, P.C.
2026 Rambling Road
Kalamazoo, MI 49008-1631
Phone: (269) 381-1156
Fax: (269) 381-5465

Dale H. Thiel Reg. No. 24 323
David G. Boutell Reg. No. 25 072
Terryence F. Chapman Reg. No. 32 549
Mark L. Maki Reg. No. 36 589
Liane L. Churney Reg. No. 40 694
Brian R. Tumm Reg. No. 36 328
Steven R. Thiel Reg. No. 53 685
Donald J. Wallace Reg. No. 43 977
Sidney B. Williams, Jr. Reg. No. 24 949
Heon Jekal Reg. No. L0379*
*limited recognition number

Encl: Postal Card

136.07/05

PTO/SB/06 (07-06)
Approved for use through 1/31/2007. 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 displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number	Filing Date	☐ To be Mailed
11/172,434	06/30/2005	

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	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =		OR	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =			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 $250 ($125 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			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT 10/11/2007	(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 ($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	* 4	Minus	** 153	= 0	X $ =		OR	X $50=	0
Independent (37 CFR 1.16(h))	* 2	Minus	***28	= 0	X $ =		OR	X $210=	0
☐ 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	0

AMENDMENT	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)		RATE ($)	ADDITIONAL FEE ($)
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 number found in the appropriate box in column 1.

Legal Instrument Examiner:
CORALIA -. BETANCOURT

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.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
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Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/172,434	06/30/2005	Clifford E. Lambarth	3007.P0315US	5270

30497 7590 09/11/2007

FLYNN, THIEL, BOUTELL & TANIS, P.C.
2026 RAMBLING ROAD
KALAMAZOO, MI 49008-1631

EXAMINER	
TRETTEL, MICHAEL	

ART UNIT	PAPER NUMBER
3673	

MAIL DATE	DELIVERY MODE
09/11/2007	PAPER

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.

Office Action Summary	Application No.	Applicant(s)	
	11/172,434	LAMBARTH ET AL.	
	Examiner	Art Unit	
	Michael Trettel	3673	

-- 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 1 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, 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.
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Status

1)☐ Responsive to communication(s) filed on _____.

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

3)☐ 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

4)☒ Claim(s) *1-153* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☐ Claim(s) _____ is/are rejected.

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

8)☒ Claim(s) *1-153* are subject to restriction and/or election requirement.

Application Papers

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

10)☐ 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).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

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).

a)☐ All b)☐ Some * c)☐ None of:

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) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☒ Interview Summary (PTO-413) Paper No(s)/Mail Date. *20070827*.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

In response the telephone interview of August 23, 2007 the examiner has decided that a new restriction requirement is appropriate in this application. The previously mailed election of species is vacated, and a new requirement follows.

Election/Restrictions

Restriction to one of the following inventions is required under 35 U.S.C. 121:

I. Claims 1-39, 69-74, and 137-138, drawn to an ambulance cot with an elevating mechanism, hydraulic lift mechanism and control system therefor, classified in class 5, subclass 611.

II. Claims 134-136, drawn to an ambulance cot system with elevating mechanism combined with an ambulance that includes a cot load system and control system for the overall combination, classified in class 296, subclass 19.

III. Claims 149-153, drawn to an ambulance cot system that includes a cot and ambulance with a docking system for the cot, classified in class 296, subclass 19.

IV. Claims 83-87 and 99-106, drawn to an ambulance cot that includes a separate tool (i.e., the wireless control system) for controlling the cot operation, classified in class 5, subclass 616.

V. Claims 142-147, drawn to an ambulance cot that includes accessories (i.e., a pouch and/or accessory hook) mounted to it, classified in class 5, subclass 503.1

VI. Claims 40-42, drawn to an ambulance cot with an elevating mechanism and a timing device for the elevating mechanism, classified in class 5, subclass 611.

VII. Claims 43-54, drawn to an ambulance cot with a base and a litter, a support mechanism between the base and the litter, and an elevation mechanism for raising and lowering the litter, classified in class 5, subclass 611.

VIII. Claims 55-68 and 75-82, drawn to an ambulance cot with a base and a litter, a support mechanism between the base and the litter, and a retractable head section and manual controls therefor, classified in class 5, subclass 617.

IX. Claims 88-98, drawn to an ambulance cot with a base, a litter, an elevating mechanism, a motor for driving the elevating mechanism, a computerized control system for monitoring the state of the cot and regulating the operation of the motor, classified in class 5, subclass 611.

X. Claim 107, drawn to an ambulance cot with a base, a litter, an X-frame interconnecting the base and the litter and mounts on the X-frame configured to engage the litter and the base, classified in class 5, subclass 611.

XI. Claims 108 and 139-141, drawn to an ambulance cot with a base, a litter, an elevating mechanism with a detecting device for detecting the presence or absence of a force urging a change in elevation of the litter relative to the base, classified in class 5, subclass 611.

XII. Claim 109, drawn to an ambulance cot with a base, a litter, an X-frame interconnecting the base and the litter and pivots with axes extending co-extensively with the X-frame members providing pivoting capability between the X-frame members and the base about the axes, classified in class 5, subclass 610.

XIII. Claims 110-113, drawn to an ambulance cot with a base, a litter, an elevating mechanism and a control system for controlling the operation of the elevating mechanism, classified in class 5, subclass 611.

XIV. Claims 114-118, drawn to an ambulance cot that includes an elevating mechanism, with a height limiting mechanism, classified in class 5, subclass 611.

XV. Claims 119-129, drawn to an ambulance cot that includes a variable speed elevating mechanism, with a height detecting mechanism initiating a variation in speed of the variable speed elevating mechanism, classified in class 5, subclass 611.

XVI. Claims 130-132, drawn to an ambulance cot system that includes a cot and ambulance with an in-ambulance device for deactivating an elevation device on the cot when the cot is in the ambulance, classified in class 296, subclass 19.

XVII. Claim 148, drawn to an ambulance cot with an elevating mechanism, hydraulic lift mechanism and a weep valve, classified in class 5, subclass 614.

Inventions I-XVII are related as subcombinations disclosed as usable together in a single combination. The subcombinations are distinct if they do not overlap in scope and are not obvious variants, and if it is shown that at least one subcombination is separately usable. In the instant case, subcombination I has separate utility such as a hospital bed with a height adjusting mechanism. Subcombination XII has use as the height adjusting mechanism in an industrial platform such as a vehicle lift. All of the ambulance cot subcombinations have utility by themselves, i.e., they are capable of use as a stand alone ambulance cot that does not require the details of the other subcombinations. See MPEP § 806.05(d).

The examiner has required restriction between subcombinations usable together. Where applicant elects a subcombination and claims thereto are subsequently found allowable, any claim(s) depending from or otherwise requiring all the limitations of the allowable subcombination will be examined for patentability in accordance with 37 CFR 1.104. See MPEP § 821.04(a). Applicant is advised that if any claim presented in a continuation or divisional application is anticipated by, or includes all the limitations of, a claim that is allowable in the present application, such claim may be subject to provisional statutory and/or nonstatutory double patenting rejections over the claims of the instant application.

A telephone call was made to David Boutell on August 23, 2007 to request an oral election to the above restriction requirement, but did not result in an election being made.

Applicant is advised that the reply to this requirement to be complete must include (i) an election of a species or invention to be examined even though the requirement be traversed (37 CFR 1.143) and (ii) identification of the claims encompassing the elected invention.

The election of an invention or species may be made with or without traverse. To reserve a right to petition, the election must be made with traverse. If the reply does not distinctly and specifically point out supposed errors in the restriction requirement, the election shall be treated as an election without traverse.

Should applicant traverse on the ground that the inventions or species are not patentably distinct, applicant should submit evidence or identify such evidence now of record showing the inventions or species to be obvious variants or clearly admit on the record that this is the case. In either instance, if the examiner finds one of the inventions unpatentable over the prior art, the evidence or admission may be used in a rejection under 35 U.S.C.103(a) of the other invention.

Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Trettel whose telephone number is (571) 272-7052. The examiner can normally be reached on Monday, Tuesday, Thursday, or Friday from 7.30 am to 5.00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patricia Engle, can be reached on (571) 272-6660. The fax phone number for the organization where this application or proceeding is assigned is (571)-273-8300.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-1113.

Michael Trettel
Primary Examiner
Art Unit 3673

Examiner-Initiated Interview Summary	Application No.	Applicant(s)	
	11/172,434	LAMBARTH ET AL.	
	Examiner	Art Unit	
	Michael Trettel	3673	

All Participants:

(1) *Michael Trettel*.

(2) *David Boutell*.

Status of Application: _____

(3) _____.

(4) _____.

Date of Interview: *23 August 2007*

Time: _____

Type of Interview:
☒ Telephonic
☐ Video Conference
☐ Personal (Copy given to: ☐ Applicant ☐ Applicant's representative)

Exhibit Shown or Demonstrated: ☐ Yes ☐ No
If Yes, provide a brief description:

Part I.

Rejection(s) discussed:
N/A

Claims discussed:
All pending

Prior art documents discussed:
N/A

Part II.

SUBSTANCE OF INTERVIEW DESCRIBING THE GENERAL NATURE OF WHAT WAS DISCUSSED:
See Continuation Sheet

Part III.

☐ It is not necessary for applicant to provide a separate record of the substance of the interview, since the interview directly resulted in the allowance of the application. The examiner will provide a written summary of the substance of the interview in the Notice of Allowability.

☒ It is not necessary for applicant to provide a separate record of the substance of the interview, since the interview did not result in resolution of all issues. A brief summary by the examiner appears in Part II above.

(Examiner/SPE Signature)

(Applicant/Applicant's Representative Signature – if appropriate)

Continuation of Substance of Interview including description of the general nature of what was discussed: Mr. Boutell argued that the election requirement was in error, and that a restriction requirement based upon subcombinations is more appropriate in the case. Upon discussion the examiner has agreed with this reasoning, and has ecided to vacate the previous requirement for election based upon species, and will issue a new requirement for restriction..

IPE
JUN 20 2007
PATENT & TRADEMARK OFFICE

PATENT APPLICATION

IN THE U.S. PATENT AND TRADEMARK OFFICE

June 14, 2007

Applicant(s): Clifford E. LAMBARTH et al

For: AMBULANCE COT AND HYDRAULIC ELEVATING MECHANISM THEREFOR

Serial No.: 11/172 434 Group: 3673

Confirmation No.: 5270

Filed: June 30, 2005 Examiner: Michael Trettel

International Application No.: N/A

International Filing Date: N/A

Atty. Docket No.: 3007.P0315US

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

RESPONSE TO OFFICE ACTION

Sir:

In response to the Office Action dated May 15, 2007, please note the following remarks:

(Please see following pages.)

- -

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on June 14, 2007.

David G. Boutell

REMARKS

The undersigned attorney of record acknowledges the receipt of the election of species requirement mailed on May 15, 2007. The undersigned is unable to elect because the species mentioned by the Examiner do not correspond to the species noted by the undersigned. Accordingly, and on behalf of the Applicants, the undersigned respectfully requests that the Examiner re-evaluate the listing of species based on the following information.

More specifically, the undersigned has determined that there are a total of 17 species (not the 7 listed by the Examiner). These 17 species are listed as follows:

1. An ambulance cot with an elevating mechanism, hydraulic lift mechanism and control system therefor:

   Claims 1-22
   Claims 22-39
   Claims 69-74
   Claims 137-138

2. An ambulance cot system with elevating mechanism combined with an ambulance that includes a cot load system and control system for the overall combination:

   Claims 134-136

3. An ambulance cot that includes an elevating mechanism, with a height limiting and speed control system for the elevating mechanism:

   [No claims found.]

4. An ambulance cot system that includes a cot and ambulance with a docking system for the cot:

   Claims 149-153

5. An ambulance cot with a head section and handles for controlling the cot operation:

   [No claims found.]

6. An ambulance cot that includes a separate tool (i.e., the wireless control system) for controlling the cot operation:

   Claims 83-84;
   Claims 85-87;
   Claims 99-106;

7. An ambulance cot that includes accessories (i.e., a pouch and/or accessory hook) mounted to it:

   Claims 142-143 (pouch)
   Claims 144-147 (accessory hook)

8. An ambulance cot with an elevating mechanism and a timing device for the elevating mechanism:

   Claims 40-42

9. An ambulance cot with a base and a litter, a support mechanism between the base and the litter, and an elevation mechanism for raising and lowering the litter:

   Claims 43-54

10. An ambulance cot with a base and a litter, a support mechanism between the base and the litter, and a retractable head section and manual controls therefor:

    Claims 55-68;
    Claims 75-82;

11. An ambulance cot with a base, a litter, an elevating mechanism, a motor for driving the elevating mechanism, a computerized control system for monitoring the state of the cot and regulating the operation of the motor:

    Claims 88-98;

12. An ambulance cot with a base, a litter, an X-frame interconnecting the base and the litter and mounts on the X-frame configured to engage the litter and the base:

    Claim 107

13. An ambulance cot with a base, a litter, an elevating mechanism with a detecting device for detecting the presence or absence of a force urging a change in elevation of the litter relative to the base:

    Claim 108
    Claims 139-141

14. An ambulance cot with a base, a litter, an X-frame interconnecting the base and the litter and pivots with axes extending co-extensively with the X-frame members providing pivoting capability between the X-frame members and the base about the axes:

    Claim 109

15. An ambulance cot with a base, a litter, an elevating mechanism and a control system for controlling the operation of the elevating mechanism:

    Claim 110-111 (redundant switches)
    Claim 112-113 (usurping means)

16. An ambulance cot that includes an elevating mechanism, with a height limiting mechanism:

    Claims 114-118

17. An ambulance cot that includes a variable speed elevating mechanism, with a height detecting mechanism initiating a variation in speed of the variable speed elevating mechanism:

    Claims 119-120
    Claims 121-128
    Claims 129

18. An ambulance cot system that includes a cot and ambulance with an in-ambulance device for deactivating an elevation device on the cot when the cot is in the ambulance:

    Claims 130-132

19. An ambulance cot with an elevating mechanism, hydraulic lift mechanism and a weep valve:

    Claim 148

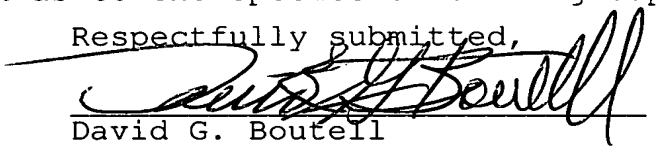
The Examiner will note that species numbers 1 through 7 correlate to the Examiner's listing.

While there are 19 species listed above, please note that the undersigned could not locate any claims for the Examiner's species nos. 3 and 5 (thus, the total species determined by the undersigned is 17). The Examiner's species no. 3 now appears to correspond to the undersigned's listing at nos. 16 and 17 although no claims are directed to the combination of a "height limiting" and a "speed control system" as stated in no. 3. There are, however, claims directed to a "height detecting" and "speed control system" as appears in the undersigned's no. 17. As to the Examiner's no. 5, the undersigned could not locate claims directed to a "head section" and "handles for controlling the cot operation". The undersigned believe that the Examiner's no. 5 correlates to the undersigned's no. 10.

Accordingly, and as requested above, Applicants respectfully request that the Examiner re-list the species. If the Examiner determines that the undersigned's listing can be further refined (or reduced in number) for search purposes, the Examiner is encouraged to do so.

The undersigned respectfully requests that the Examiner set forth a "final" listing of species or, instead, set forth a restriction requirement, so that the Applicants can review it and make their selection as to the species or claim group.

Respectfully submitted,



David G. Boutell

DGB/kc

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Dale H. Thiel Reg. No. 24 323
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Terryence F. Chapman Reg. No. 32 549
Mark L. Maki Reg. No. 36 589
Liane L. Churney Reg. No. 40 694
Brian R. Tumm Reg. No. 36 328
Steven R. Thiel Reg. No. 53 685
Donald J. Wallace Reg. No. 43 977
Sidney B. Williams, Jr. Reg. No. 24 949

Encl: Postal Card

136.07/05

HD

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/172,434	06/30/2005	Clifford E. Lambarth	3007.P0315US	5270

30497 7590 05/15/2007
FLYNN, THIEL, BOUTELL & TANIS, P.C.
2026 RAMBLING ROAD
KALAMAZOO, MI 49008-1631

EXAMINER	
TRETTEL, MICHAEL	

ART UNIT	PAPER NUMBER
3673	

MAIL DATE	DELIVERY MODE
05/15/2007	PAPER

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

Office Action Summary	Application No.	Applicant(s)	
	11/172,434	LAMBARTH ET AL.	
	Examiner	Art Unit	
	Michael Trettel	3673	

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

3)☐ 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.

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4)☒ Claim(s) *1-153* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☐ Claim(s) _____ is/are rejected.

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

8)☒ Claim(s) *1-153* are subject to restriction and/or election requirement.

Application Papers

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

10)☒ The drawing(s) filed on *30 June 2005* 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).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

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).

a)☐ All b)☐ Some * c)☐ None of:

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)).

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5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

This application contains claims directed to the following patentably distinct species: an ambulance cot with an elevating mechanism, hydraulic lift mechanism and control system therefore, an ambulance cot system with elevating mechanism combined with an ambulance that includes a cot load system and control system for the overall combination, an ambulance cot that includes an elevating mechanism with a height limiting and speed control system for the elevating mechanism, an ambulance cot system that includes a cot and ambulance with a docking system for the cot, an ambulance cot with a head section and handles for controlling the cot operation, an ambulance cot that includes a separate tool (i.e., the wireless control system) for controlling the cot operation, and an ambulance cot that includes accessories (i.e., a pouch and/or accessory hook) mounted to it. The species are independent or distinct because they are related as subcombinations usable together in a single overall combination. Each species is capable of use by itself or combined with any other single species listed above

Applicant is required under 35 U.S.C. 121 to elect a single disclosed species for prosecution on the merits to which the claims shall be restricted if no generic claim is finally held to be allowable. Currently, no claims are generic.

Applicant is advised that a reply to this requirement must include an identification of the species that is elected consonant with this requirement, and a listing of all claims readable thereon, including any claims subsequently added. An argument that a claim is allowable or that all claims are generic is considered nonresponsive unless accompanied by an election.

Upon the allowance of a generic claim, applicant will be entitled to consideration of claims to additional species which depend from or otherwise require all the limitations of an allowable generic claim as provided by 37 CFR 1.141. If claims are added after the election, applicant must indicate which are readable upon the elected species. MPEP § 809.02(a).

Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Trettel whose telephone number is (571) 272-7052. The examiner can normally be reached on Monday, Tuesday, Thursday, or Friday from 7.30 am to 5.00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patricia Engle, can be reached on (571) 272-6660. The fax phone number for the organization where this application or proceeding is assigned is (571)-273-8300.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-1113.

Michael Trettel
Primary Examiner
Art Unit 3673

Index of Claims

Application/Control No.	Applicant(s)/Patent under Reexamination
11/172,434	LAMBARTH ET AL.
Examiner	**Art Unit**
Michael Trettel	3673

√	Rejected	–	(Through numeral) Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

Claim		Date
Final	Original	5/11/07
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Claim		Date
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Claim		Date
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Index of Claims (continued)

Application/Control No.	Applicant(s)/Patent under Reexamination
11/172,434	LAMBARTH ET AL.
Examiner	**Art Unit**
Michael Trettel	3673

√	Rejected	–	(Through numeral) Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

Claim		Date
Final	Original	5/11/07
	151	+
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Claim		Date
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OIPE IAP72 SEP 28 2005 PATENT & TRADEMARK OFFICE

#5 IFW

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	ATTORNEY DOCKET NUMBER
11/172,434	06/30/2005	Clifford E. Lambarth	3007.P0315US

CONFIRMATION NO. 5270

30497
FLYNN, THIEL, BOUTELL & TANIS, P.C.
2026 RAMBLING ROAD
KALAMAZOO, MI 49008-1631

FORMALITIES LETTER

OC000000016582208

Date Mailed: 07/21/2005

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 and pay any fees required 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 statutory basic filing fee is missing.
  Applicant must submit $ **300** *to complete the basic filing fee for a non-small entity. If appropriate, applicant may make a written assertion of entitlement to small entity status and pay the small entity filing fee (37 CFR 1.27).*
- The oath or declaration is missing. *A properly signed oath or declaration in compliance with 37 CFR 1.63, identifying the application by the above Application Number and Filing Date, is required.*
  Note: If a petition under 37 CFR 1.47 is being filed, an oath or declaration in compliance with 37 CFR 1.63 signed by all available joint inventors, or if no inventor is available by a party with sufficient proprietary interest, is required.
- To avoid abandonment, a late filing fee or oath or declaration surcharge as set forth in 37 CFR 1.16(f) of $130 for a non-small entity, must be submitted with the missing items identified in this letter.

The applicant needs to satisfy supplemental fees problems indicated below.

The required item(s) identified below must be timely submitted to avoid abandonment:

- Additional claim fees of **$11650** as a non-small entity, including any required multiple dependent claim fee, are required. Applicant must submit the additional claim fees or cancel the additional claims for which fees are due.

09/26/2005 MAHMED1 00000108 11172434

01 FC:1011 300.00 OP
02 FC:1111 500.00 OP
03 FC:1311 200.00 OP
04 FC:1051 130.00 OP
05 FC:1202 6650.00 OP
06 FC:1201 5000.00 OP
07 FC:1081 250.00 OP

SUMMARY OF FEES DUE:

Total additional fee(s) required for this application is **$13030** for a Large Entity

- **$300** Statutory basic filing fee.

- **$130** Late oath or declaration Surcharge.

- The application search fee has not been paid. Applicant must submit **$500** to complete the search fee.
- The application examination fee has not been paid. Applicant must submit **$200** to complete the examination fee for a large entity
- The specification and drawings contain more than 100 pages. Applicant owes **$250** for **48** pages in excess of **100** pages for a non-small entity.

- Total additional claim fee(s) for this application is **$11650**

  - **$5000** for **25** independent claims over 3.
  - **$6650** for **133** total claims over 20.

Replies should be mailed to: Mail Stop Missing Parts
Commissioner for Patents
P.O. Box 1450
Alexandria VA 22313-1450

A copy of this notice MUST be returned with the reply.

Office of Initial Patent Examination (703) 308-1202
PART 2 - COPY TO BE RETURNED WITH RESPONSE

PATENT APPLICATION



IN THE U.S. PATENT AND TRADEMARK OFFICE

September 20, 2005

Applicant(s) : Clifford E. LAMBARTH et al

Title : AMBULANCE COT AND HYDRAULIC ELEVATING MECHANISM THEREFOR

Serial No. : 11/172 434 Group: 3673

Confirmation No.: 5270

Filed : June 30, 2005 Examiner: Unknown

Atty. Docket No.: 3007.P0315US

Mail Stop Missing Parts
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

RESPONSE TO NOTICE TO FILE MISSING PARTS

Sir:

This is a response to the Patent Office communication mailed July 21, 2005, a copy of which is enclosed.

(Please see following pages.)

- -

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on **September 21, 2005**.

Respectfully submitted,

David G. Boutell

Pursuant to 37 CFR 1.52, 1.53 and/or 1.63, this application was filed without at least one of the filing fee, the English language text and/or the oath or declaration, and was granted the serial number and filing date set forth in the caption of this response. Accordingly, the items listed below are being submitted herewith:

[X] Copy of PTO communication mailed July 21, 2005.

[X] Declaration or Oath (in three parts)

[X] Attached to the Declaration or Oath is a copy of the specification which was filed in the Patent Office in order to obtain a filing date for this application.

[] Verified English translation of originally-filed foreign language text.

[] Preliminary Amendment Cancelling Claims (Please enter before calculating the filing fee.)

[] Amendment Before First Office Action

[X] Information Disclosure Statement

[] Small entity status is claimed. See 37 CFR 1.27.

[] Statement(s) re small entity is/are enclosed.

[X] Acknowledgment Postal Card

[] Priority is claimed under 35 USC 119 based on Application No. , filed .

[] A certified copy of the priority application is enclosed.

[X] The filing fees are as follows:

[] Design Application - [] $200.00 (large entity)
[] $100.00 (small entity)

[X] Utility Application - as calculated below:

For	No. Filed	No. Extra	(X) RATE LG Entity	() SM Entity	Fee
Basic Fee			$300.00	$150.00	$300.00
Total Claims	(153 - 20 = 133)		x $ 50.00	x $ 25.00	6,650.00
Indep. Claims	(28 - 3 = 25)		x $200.00	x $100.00	5,000.00
[ ] Multiple Dep. Claim			+ $360.00	+ $180.00	0.00
[X] Application Size Fee			+ $250.00	+ $125.00	250.00
* * * TOTAL FILING FEE * * *					$12,200.00

[X] Patent Search Fee $500.00.

[X] Patent Examination Fee $200.00.

[X] The surcharge under 37 CFR 1.16(e) for late filing of the basic filing fee and/or the oath or declaration is as follows:

[X] $130.00 (large entity)

[] $ 65.00 (small entity)

[] The fee under 37 CFR 1.17(i) for filing a foreign language text is $130.00 and is included in an enclosed check.

[X] A check for $13,030.00 is enclosed to cover fees.

[ ] Please charge my Deposit Account No. 06-1382 in the amount of $_____. A duplicate copy of this sheet is enclosed.

[X] The Commissioner is hereby authorized to charge payment of the following fees associated with this communication or credit any overpayment to Deposit Account No. 06-1382. A duplicate copy of this sheet is enclosed.

[X] Any additional filing fees required under 37 CFR 1.16

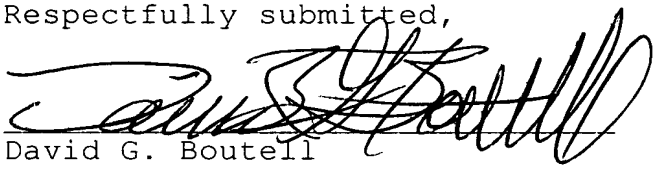
[X] Any patent application processing fees under 37 CFR 1.17

[ ] The Commissioner is hereby authorized to charge payment of the following fees during the pendency of this application or credit any overpayment to Deposit Account No. 06-1382. A duplicate copy of this sheet is enclosed.

[ ] Any patent application processing fees under 37 CFR 1.17

[ ] Any filing fees under 37 CFR 1.16 for presentation of extra claims.

Respectfully submitted,



David G. Boutell

IN DUPLICATE

DGB/DJW/jas

FLYNN, THIEL, BOUTELL & TANIS, P.C.
2026 Rambling Road
Kalamazoo, MI 49008-1631
Phone: (269) 381-1156
Fax: (269) 381-5465

Dale H. Thiel	Reg. No. 24 323
David G. Boutell	Reg. No. 25 072
Ronald J. Tanis	Reg. No. 22 724
Terryence F. Chapman	Reg. No. 32 549
Mark L. Maki	Reg. No. 36 589
Liane L. Churney	Reg. No. 40 694
Brian R. Tumm	Reg. No. 36 328
Steven R. Thiel	Reg. No. 53 685
Donald J. Wallace	Reg. No. 43 977
Kevin L. Pontius	Reg. No. 37 512
Sidney B. Williams, Jr.	Reg. No. 24 949

Encl: Listed above

Attorney Docket No.: S*S Case 315

DECLARATION FOR UTILITY OR DESIGN PATENT APPLICATION (37 CFR 1.63)
POWER OF ATTORNEY
AND CORRESPONDENCE ADDRESS INDICATION FORM

I hereby declare that:

Each inventor's residence, mailing address, and citizenship are as stated below next to their name.

I believe the inventor(s) named below to be the original and first inventor(s) of the subject matter which is claimed and for which a patent is sought on the invention entitled: AMBULANCE COT AND HYDRAULIC ELEVATING MECHANISM THEREFOR, the specification of which

☒ is attached hereto

or

☐ was filed on _____ as United States Application No. or PCT International Application No._____ and was amended on _____ (if applicable).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment specifically referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the national or PCT international filing date of the continuation-in-part application.

I hereby claim foreign priority benefits under 35 USC 119(a)-(d) or (f), or 365(b) of any foreign application(s) for patent, inventor's or plant breeder's rights certificate(s), or 365(a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below, by checking the box, any foreign application for patent, inventor's or plant breeder's rights certificate(s), or any PCT international application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application(s)			Priority Not Claimed	Cert. Copy Attached	
(Number)	(Country)	(MM/DD/YYYY)	☐	☐ Yes	☐ No
(Number)	(Country)	(MM/DD/YYYY)	☐	☐ Yes	☐ No
(Number)	(Country)	(MM/DD/YYYY)	☐	☐ Yes	☐ No

I hereby appoint the Practitioners associated with the Customer Number: **30497**

as my/our attorney(s) or agent(s) to prosecute the application identified above, and to transact all business in the United States Patent and Trademark Office connected therewith.

Please recognize the correspondence address associated with the above-mentioned Customer Number.

I hereby 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 18 U.S.C. 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full name of sole or first inventor Clifford E. LAMBARTH

Inventor's signature _____ 6/24/05 Date

Residence Portage, Michigan

Citizenship United States

Mailing Address 10613 S. Westnedge Ave., Portage, MI 49002

Full name of second joint inventor, if any Chad SOUKE

Inventor's signature _____ 6/24/05 Date

Residence Kalamazoo, Michigan

Citizenship United States

Mailing Address 8112 Land O Lakes Drive, Kalamazoo, MI 49048

Full name of third joint inventor, if any Todd GATTO

Inventor's signature _____ 6/28/05 Date

Residence Portage, Michigan

Citizenship United States

Mailing Address 5160 Chasemoor Court, Portage, MI 49024

☒ Additional inventors are being named on the THREE supplemental additional inventor(s) sheet(s).

☐ This declaration ends with this page.

Full name of fourth joint inventor, if any Joshua C. COLVIN

Inventor's signature _____ 6-24-05 Date

Residence Paw Paw, Michigan

Citizenship United States

Mailing Address 54101 Ridgeview Circle, Paw Paw, MI 49079

Full name of fifth joint inventor, if any Kurosh NAHAVANDI

Inventor's signature _____ 6.24.05 Date

Residence Portage, ~~Michigan~~

Citizenship United States

Mailing Address 10613 S. Westnedge Ave., Portage, MI 49002

Full name of sixth joint inventor, if any Jason KNEEN

Inventor's signature _____ 6/24/05 Date

Residence Mattawan, Michigan

Citizenship United States

Mailing Address 24552 Wren Avenue, Mattawan, MI 49071

Full name of seventh joint inventor, if any Michael W. STEFFLER

Inventor's signature _____ 6-24-05 Date

Residence Kalamazoo, Michigan

Citizenship United States

Mailing Address 2508 Glenwood Drive, Kalamazoo, MI 49008

☒ Additional inventors are being named on the TWO supplemental additional inventor(s) sheet(s).

☐ This declaration ends with this page.

Full name of eighth joint inventor, if any Christopher B. WAY

Inventor's signature _____ 1/24/05 Date

Residence Kalamazoo, Michigan

Citizenship United States

Mailing Address 184 W. Crooked Lake Drive, Kalamazoo, MI 49009

Full name of ninth joint inventor, if any Gary MORTON

Inventor's signature _____ 6/24/05 Date

Residence Kalamazoo, Michigan

Citizenship United States

Mailing Address 5933 Rolling Pines Court, Kalamazoo, MI 49009

Full name of tenth joint inventor, if any DENNIS A. REED

Inventor's signature _____ 6/24/05 Date

Residence Portage, Michigan

Citizenship United States

Mailing Address: 9631 South Westnedge, Portage, MI 49002

Full name of eleventh joint inventor, if any Michael McKEE

Inventor's signature _____ _____ Date

Residence Aurora, Illinois

Citizenship United States

Mailing Address 1195 Radford Drive, Aurora, IL 60504

Full name of twelfth joint inventor, if any Thomas A. PUVOGEL

Inventor's signature _____ _____ Date

Residence Naperville, Illinois

Citizenship United States

Mailing Address 111 Rieser Circle, Naperville, IL 60565

☒ Additional inventors are being named on the ONE supplemental additional inventor(s) sheet(s).

☐ This declaration ends with this page.

Full name of thirteenth joint inventor, if any Brian BARTLEY

Inventor's signature _____ _____
Date

Residence Westmont, Illinois

Citizenship United States
Mailing Address 115 S. Wilmette Avenue, Westmont, IL 60559

Full name of fourteenth joint inventor, if any Kurt DYKEMA

Inventor's signature _____ _____
Date

Residence Holland, Michigan

Citizenship United States
Mailing Address 1230 Heather Drive, Holland, MI 49423

Full name of fifteenth joint inventor, if any Brent BOUWS

Inventor's signature _____ _____
Date

Residence Holland, Michigan

Citizenship United States
Mailing Address 11326 Stonehedge Dr., Holland, MI 49424

☐ Additional inventors are being named on the __ supplemental additional inventor(s) sheet(s).

☒ This declaration ends with this page.

Attorney Docket No.: S*S Case 315

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☒ is attached hereto

or

☐ was filed on _____ as United States Application No. or PCT International Application No._____ and was amended on _____ (if applicable).

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Prior Foreign Application(s)			Priority Not Claimed	Cert. Copy Attached	
(Number)	(Country)	(MM/DD/YYYY)	☐	☐ Yes	☐ No
(Number)	(Country)	(MM/DD/YYYY)	☐	☐ Yes	☐ No
(Number)	(Country)	(MM/DD/YYYY)	☐	☐ Yes	☐ No

I hereby appoint the Practitioners associated with the Customer Number: **30497**

as my/our attorney(s) or agent(s) to prosecute the application identified above, and to transact all business in the United States Patent and Trademark Office connected therewith.

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Full name of sole or first inventor Clifford E. LAMBARTH

Inventor's signature _____ _____
Date

Residence Portage, Michigan

Citizenship United States

Mailing Address 10613 S. Westnedge Ave., Portage, MI 49002

Full name of second joint inventor, if any Chad SOUKE

Inventor's signature _____ _____
Date

Residence Kalamazoo, Michigan

Citizenship United States

Mailing Address 8112 Land O Lakes Drive, Kalamazoo, MI 49048

Full name of third joint inventor, if any Todd GATTO

Inventor's signature _____ _____
Date

Residence Portage, Michigan

Citizenship United States

Mailing Address 5160 Chasemoor Court, Portage, MI 49024

☒ Additional inventors are being named on the THREE supplemental additional inventor(s) sheet(s).

☐ This declaration ends with this page.

(00002791.DOC)

Full name of fourth joint inventor, if any Joshua C. COLVIN

Inventor's signature _____ _____
Date

Residence Paw Paw, Michigan

Citizenship United States
Mailing Address 54101 Ridgeview Circle, Paw Paw, MI 49079

Full name of fifth joint inventor, if any Kurosh NAHAVANDI

Inventor's signature _____ _____
Date

Residence Portage, Michigan

Citizenship United States
Mailing Address 10613 S. Westnedge Ave., Portage, MI 49002

Full name of sixth joint inventor, if any Jason KNEEN

Inventor's signature _____ _____
Date

Residence Mattawan, Michigan

Citizenship United States
Mailing Address 24552 Wren Avenue, Mattawan, MI 49071

Full name of seventh joint inventor, if any Michael W. STEFFLER

Inventor's signature _____ _____
Date

Residence Kalamazoo, Michigan

Citizenship United States
Mailing Address 2508 Glenwood Drive, Kalamazoo, MI 49008

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Full name of eighth joint inventor, if any Christopher B. WAY

Inventor's signature _____ _____ Date

Residence Kalamazoo, Michigan

Citizenship United States
Mailing Address 184 W. Crooked Lake Drive, Kalamazoo, MI 49009

Full name of ninth joint inventor, if any Gary MORTON

Inventor's signature _____ _____ Date

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Attorney Docket No.: S*S Case 315

DECLARATION FOR UTILITY OR DESIGN PATENT APPLICATION (37 CFR 1.63)
POWER OF ATTORNEY
AND CORRESPONDENCE ADDRESS INDICATION FORM

I hereby declare that:

Each inventor's residence, mailing address, and citizenship are as stated below next to their name.

I believe the inventor(s) named below to be the original and first inventor(s) of the subject matter which is claimed and for which a patent is sought on the invention entitled:
AMBULANCE COT AND HYDRAULIC ELEVATING MECHANISM THEREFOR, the specification of which

☒ is attached hereto

or

☐ was filed on _____ as United States Application No. or PCT International Application No._____ and was amended on _____ (if applicable).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment specifically referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the national or PCT international filing date of the continuation-in-part application.

I hereby claim foreign priority benefits under 35 USC 119(a)-(d) or (f), or 365(b) of any foreign application(s) for patent, inventor's or plant breeder's rights certificate(s), or 365(a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below, by checking the box, any foreign application for patent, inventor's or plant breeder's rights certificate(s), or any PCT international application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application(s)			Priority Not Claimed	Cert. Copy Attached	
(Number)	(Country)	(MM/DD/YYYY)	☐	☐ Yes	☐ No
(Number)	(Country)	(MM/DD/YYYY)	☐	☐ Yes	☐ No
(Number)	(Country)	(MM/DD/YYYY)	☐	☐ Yes	☐ No

I hereby appoint the Practitioners associated with the Customer Number: **30497**

as my/our attorney(s) or agent(s) to prosecute the application identified above, and to transact all business in the United States Patent and Trademark Office connected therewith.

Please recognize the correspondence address associated with the above-mentioned Customer Number.

I hereby 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 18 U.S.C. 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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AMBULANCE COT AND HYDRAULIC ELEVATING MECHANISM THEREFOR

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of U.S. Provisional Application No. 60/613 151, filed September 24, 2004.

FIELD OF THE INVENTION

[0002] This invention relates to an ambulance cot and accessories. This invention also relates to an ambulance cot having a wheel supported base and a litter raisable and lowerable by a powered elevating mechanism oriented between the base and the litter. This invention also relates to an ambulance cot having a wireless communication capability to facilitate communication between the ambulance cot and a loading system on an ambulance as well as facilitating wireless troubleshooting via a handheld wireless unit. This invention also relates to an ambulance cot having a longitudinally extendable head section with a latching mechanism to fix it in selected locations.

BACKGROUND OF THE INVENTION

[0003] Emergency Medical Service (EMS) personnel are required to handle the combined weight of a patient and the ambulance cot during various stages of maneuvering of the ambulance cot while separated from the ambulance. This cot manipulation often requires that the patient supported on the litter be lifted to various elevated heights above the floor. In some instances, the weight factor can cause EMS personnel injury that requires medical treatment.

[0004] As the inclusion of more and more sophisticated technology onto ambulance cots continues to occur, there is an increasing need to be able to quickly and

accurately diagnose the complex equipment without requiring the ambulance cot to be removed from service.

[0005] Accordingly, it is advantageous to provide an ambulance cot equipped with an elevating mechanism to facilitate a lifting and lowering of the litter as well as an ability of the ambulance cot to communicate diagnostic issues in a convenient way without requiring removal of the ambulance cot from a field of use for a prolonged period of time.

SUMMARY OF THE INVENTION

[0006] This invention relates to an ambulance cot and accessories. This invention also relates to an ambulance cot having a wheel supported base and a litter raisable and lowerable by a powered elevating mechanism oriented between the base and the litter. This invention also relates to an ambulance cot having a wireless communication capability to facilitate communication between the ambulance cot and a loading system on an ambulance as well as facilitating wireless troubleshooting via a handheld wireless unit. This invention also relates to an ambulance cot having a longitudinally extendable head section with a latching mechanism to fix it in selected locations.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] Various objects and purposes of the invention will become apparent based upon a review of the following specification and upon a review of the several drawings, in which:

[0008] Figure 1 is an isometric view of an ambulance cot embodying the invention, which ambulance cot is in the fully raised position;

[0009] Figure 2 is an isometric view of an ambulance cot similar to Figure 1, except that the ambulance cot is in a mid-height position;

[0010] Figure 3 is an isometric view of an ambulance cot similar to Figure 1, except that the ambulance cot is in the fully collapsed and lowered position;

[0011] Figure 4 is an isometric view of a fragment of the hydraulic elevating mechanism on the ambulance cot;

[0012] Figure 5 is a fragmentary isometric view of the base, elevating mechanism and a fragment of the litter on the ambulance cot;

[0013] Figure 6 is an isometric view of a fragment of the litter frame;

[0014] Figure 7 is a side view of a collapsed base and elevating mechanism on the ambulance cot;

[0015] Figure 8 is an isometric view of a foot end lift handle assembly on the ambulance cot;

[0016] Figure 9 is a side elevational sectional view of the foot end lift handle assembly sectioned through the switches;

[0017] Figure 10 is an isometric view of a switch housing that is mounted on the foot end lift handle assembly;

[0018] Figure 11 is an electrical schematic of a switch mounted on the switch housing illustrated in Figure 10;

[0019] Figure 12 is a bottom view of a release handle mechanism mounted on the foot end lift handle assembly, which handle is in the stowed position;

[0020] Figure 13 is a view similar to Figure 12, except that the handle has been shifted to an operative position;

[0021] Figure 14 is a view similar to Figure 13, except that the handle has been moved to an operated position;

[0022] Figure 15 is an isometric view of a mounting assembly on the ambulance cot for the hydraulic circuit;

[0023] Figure 16 is a fragmentary sectional view of a portion of the base whereat the base connects to an X frame member;

[0024] Figure 17 is a hydraulic circuit diagram embodied on the ambulance cot;

[0025] Figures 18-23 are additional illustrations of the hydraulic circuit diagram illustrated in Figure 17, except that various valves have been shifted to demonstrate operation of the hydraulic circuit;

[0026] Figure 24 is a schematic representation of a control for the hydraulic circuit;

[0027] Figure 25 is a decision tree diagram representative of the operational characteristics of the control illustrated in Figure 24 and the hydraulic circuit of Figures 17-23;

[0028] Figure 26 is an isometric view of the litter and similar to the illustration in Figure 1;

[0029] Figure 27 is an isometric view of a fragment of the ambulance cot in the collapsed and lowered position inside a cargo area of an ambulance;

[0030] Figure 28 is a bottom view of the hydraulic assembly illustrated in Figure 15 (minus the mounting assembly);

[0031] Figure 29 is a view similar to Figure 28, except that one of the valves has been actuated;

[0032] Figure 30 is a view similar to Figure 29, except that both of the valves have been actuated;

[0033] Figure 31 is a sectional view of one of the valves illustrated in Figures 28-30;

[0034] Figure 32 is a decision tree diagram for the logic employed on a handheld diagnostics tool;

[0035] Figure 33 is a decision tree diagram for the general logic employed on the cot and load system in an ambulance to facilitate wireless diagnostics;

[0036] Figure 33A is a modified decision tree diagram for the logic employed on a handheld tool used for wireless programming, remote control and diagnostics.

[0037] Figure 34 is a fragmentary isometric view of an antenna system on the ambulance cot as well as an antenna system on a load arm provided on the ambulance;

[0038] Figure 35 is a side elevational view of the ambulance cot in the fully collapsed position with the head section retracted;

[0039] Figure 36 is a view similar to Figure 35, except that the head section on the ambulance cot has been moved to the fully deployed position;

[0040] Figure 37 is a fragmentary isometric view of the head section on the ambulance cot;

[0041] Figure 38 is a view similar to Figure 37, except that a handle has been shifted to a fully operated position;

[0042] Figure 39 is a side view of the head section with the handle in a first position;

[0043] Figure 40 is a view similar to Figure 39, except that the handle has been moved to the fully operated second position;

[0044] Figure 41 is a view similar to Figure 40, except that the handle has been shifted back to its first position illustrated in Figure 39;

[0045] Figure 42 is a sectional view of a latch mechanism on the head section;

[0046] Figure 43 is a view similar to Figure 42, except that the latch mechanism has been shifted to its fully operated position;

[0047] Figure 44 is an isometric view of a fully folded foldable safety bar on the head section;

[0048] Figure 45 is a side elevational view of the safety bar in the fully folded position as illustrated in Figure 44;

[0049] Figure 46 is a view of the safety bar in the unfolded position;

[0050] Figure 47 is a bottom isometric view of the foot end lift handle assembly with a battery locked into an operating position;

[0051] Figure 48 is a view similar to Figure 47 except that the battery has been moved to an inoperative position;

[0052] Figure 49 is a fragmentary isometric view of a non-circular X frame member receiving therein a circular further X frame member;

[0053] Figure 50 is an isometric view of the head end of the cot and showing on the underside of the fowler an accessory hook;

[0054] Figure 51 is an enlarged view of a fragment of Figure 50;

[0055] Figure 52 is an isometric view of the cot having a collapsible pouch accessory thereon, which pouch is in the extended position of use in response to an extension of the head section;

[0056] Figure 53 is an enlarged view of a fragment of Figure 52;

[0057] Figure 54 is a plan view of the pouch accessory;

[0058] Figure 55 is a view similar to Figure 52 but with the pouch in the collapsed condition in response to a retraction of the head section;

[0059] Figure 56 is an enlarged view of a fragment of Figure 55;

[0060] Figure 57 is a partial cross-sectional view of a retractable head section latch disabler in a disengaged position;

[0061] Figure 58 is a partial cross-sectional view according to Figure 57 of the latch disabler in an engaged position;

[0062] Figure 59 is a decision tree diagram for the logic employed in environments utilizing a Radio Frequency Identification tag;

[0063] Figure 60 is an enhanced decision tree diagram for Figure 59 presenting the general logic employed during a normal drive mode;

[0064] Figure 61 is a decision tree diagram for the logic employed in the Figure 59 environment, particularly during a loading of the ambulance cot onto the load mechanism on the ambulance;

[0065] Figure 62 is an exploded perspective view of the retractable head section and latch disabler of Figures 57-58;

[0066] Figure 63 is a perspective view of the head section of the ambulance cot aligned with an antler system for an ambulance cargo area; and

[0067] Figure 64 is a perspective view of the head section engaged with the antler system of Figure 63.

DETAILED DESCRIPTION

AMBULANCE COT

[0068] An ambulance cot 10 embodying the invention is illustrated in the drawings. The ambulance cot 10 is similar to the ambulance cots disclosed in U.S. Patent No. 5 537 700 and WO 2004/064698, the subject matters thereof being incorporated herein by reference. The ambulance cot 10 includes a base frame 11 composed of longitudinally extending side rails 12 and crosswise extending rails 13 interconnected at the ends thereof to the side rails 12 to form a rectangle. Castered wheels 14 are operatively connected to each corner of the rectangle base frame formed by the rails 12 and 13.

[0069] The ambulance cot 10 includes a litter 16 comprising a litter frame 17. An elevating mechanism 18 is provided between the base frame 11 and the litter frame 17 in order to facilitate a lifting and lowering of

the litter 16 relative to the ground. More specifically, the elevating mechanism 18 includes a pair of side-by-side oriented "X" frames 19 and 21. The X frame 19 includes a pair of X frame members 22 and 23 connected together adjacent their midlength portions by means of a pivot axle 24. Each of the X frame members 22 and 23 is hollow and telescopingly receives therein a further X frame member 26 and an X frame member 27, respectively. The further X frame members 26 and 27 are supported for movement into and out of the respective X frame members 22 and 23. The distal end of the further X frame member 26 is secured via a connection 28 to the cross rail 13 at the left end (foot end) of the base frame illustrated in Figure 1 whereas the distal end of the further X frame member 27 is connected via a connection 29 to the cross rail 13 at the right end of the base frame 11.

[0070] The X frame 21 is similarly constructed and includes a pair of X frame members 32 and 33 which are connected together at about their midlength portions by the aforesaid axle 24. While the axle 24 is illustrated to extend laterally between the X frames 19 and 21, it is to be understood that separate axles 24 can, if desired, be employed (as shown in Figure 50). The X frame members 32 and 33 are hollow and telescopingly receive therein a further X frame member 36 telescopingly received in the X frame member 32 whereas a further X frame member 37 is telescopingly received in the X frame member 33. The distal end of the further X frame member 36 is connected via a connector 38 to the cross rail 13 at the foot end of the base frame 11 and the distal end of the further X frame member 37 is connected via a connector 39 to the cross rail 13 at the head end of the base frame 11. The X frame members 22, 26 extend parallel to the X frame members 32, 36 whereas the X frame members 23, 27 extend parallel to the X frame members 33, 37.

[0071] Referring to Figure 4, the cross rail 13 at the foot end of the base frame 11 is illustrated. To the cross rail 13 there is pivotally connected a pair of laterally spaced linkage members 41. In this particular embodiment, each of the linkage members 41 includes at the end thereof adjacent the cross rail 13 a bore 42 which encircles the cross rail 13 to facilitate the pivotal connection of each of the linkages 41 about the longitudinal axis of the cross rail 13. The ends of each of the linkages 41 remote from the cross rail 13 are connected to respective laterally spaced brackets 43 by means of a fastener 44. In this particular embodiment, a sleeve 46 extends between the respective brackets 43 and receives therein the respective fastener 44 to facilitate the connection of the linkages 41 to the brackets 43. The axle 24 also facilitates a connection of the respective brackets 43. Each of the brackets 43 includes a receptacle 47 into which is received a respective X frame member 23 and 33 as illustrated in Figure 1. In this particular embodiment, the axle 24 passes through an opening provided in each of the respective X frame members 23 and 33.

[0072] A first bracket 48 (Figure 4) is fixedly secured to the cross rail 13. A second bracket 49 is secured to a rod 51 that is connected to and extends between the respective brackets 43. In this particular embodiment, the rod 51 is connected to each bracket by a respective fastener 52. It is to be noted that there is a spacing between the axle 24 and the respective rods 46 and 51. The purpose of this spacing will become apparent below.

[0073] At least one linear actuator 53 (two, if desired to provide improved stability) is connected to and extends between the respective brackets 48 and 49. In this particular embodiment, the linear actuator 53

includes a hydraulic cylinder housing 54 fastened to the bracket 49, which cylinder housing 54 includes a reciprocal rod 56 having a piston (not illustrated) at one end thereof located within the cylinder housing 54. The distal end of the reciprocal rod 56 is connected in a conventional manner by a universal-like joint 55 to the bracket 48. That is, the universal joint allows pivotal movement about two orthogonally related axes. As will be evident from Figure 4, extension and retraction of the reciprocal rod 56 will facilitate movement of the brackets 43 about the axis of the rod 46. The end of the rod is lengthwise adjustable to accommodate tolerances encountered during production.

[0074] As is illustrated in Figure 5, the ends of the X frame members 22 and 32 remote from the base frame 11 are each pivotally secured to a cross rail 59 adjacent the head end of the litter frame 17 as at 57 and by respective connectors 58. The connectors 58 are each relatively movable with respect to the cross rail 59. In one embodiment (Figure 6), on the other hand, the ends of the X frame members 23 and 33 remote from the base frame 11 are connected by a hollow pivot tube 61 via connectors 62. Only one of the connectors 62 is illustrated in Figure 6, it being understood that the end of the X frame member 23 remote from the base frame 11 also has a connector 62 thereon. A slide bearing (not shown) can, if desired, be provided to allow longitudinal movement of the X frame member 33 along the litter rail 66. Alternatively, a timing rod 63 can be relatively rotatably received inside the pivot tube 61. Opposite ends of the timing rod 63 have a pinion gear 64 fastened thereto and rotatable therewith. The purpose of the timing rod and the pinion gear 64 oriented at the opposite ends thereof will become apparent below. If desired, the X frame members 23, 33 and the pivot tube 61

can be welded together to enhance the overall strength and resistance to twisting characteristics.

[0075] As is shown in Figure 5, the litter 16 comprises a litter frame 17 which consists of a pair of lengthwise extending side rails that are laterally spaced from one another, which side rails 66 are connected at the head end by the aforesaid cross rail 59, further cross rails 67 and other cross rails not illustrated. A housing 68 (see also Figure 6) is secured to the underside of each of the side rails 66 at a location spaced from the head ends thereof. Each housing 68 has an inwardly opening recess 69 therein, the openings in each of the housings 68 opposing one another. In one embodiment, the openings 69 each have a downwardly facing upper wall 71 to which is secured a toothed rack 72 extending lengthwise of each of the respective side rails 66. The teeth of each of the pinion gears 64 are configured to mesh with the teeth of the toothed rack 72. Since the pinion gears 64 are fixedly secured to the timing rod 63, the mating teeth on the pinion gear 64 and the rack 72 will prevent twisting of the elevating mechanism 18 as it raises and lowers the litter 16 relative to the base frame 11.

[0076] In this particular embodiment, the longitudinally extending side rails 66 of the litter frame 17 are hollow. Thus, the cross rails 59 and 67 as well as others not specifically described are secured by brackets to the exterior surface of each of the side rails 66. Several of the brackets 71 are illustrated in Figure 5.

[0077] A foot end lift handle mechanism 72 is illustrated in Figure 8 and consists of a pair of vertically spaced U shaped frame members 73 and 74. The legs of each of the U shaped frame members 73 and 74 are joined together by a bracket 76 (only one bracket being

illustrated in Figure 8), which bracket 76 is fastened to the respective legs by fasteners not illustrated. Each bracket 76 is telescoped inside of the foot end of the respective side rail 66 as illustrated in Figure 1. Further, the legs of the lower frame member 74 diverge away from the legs of the frame member 73 so that there is provided pairs of vertically spaced hand grip areas as at 77 and 78 on the respective frame members 73 and 74, respectively. Plural spacer brackets 79 are connected to the bight portions of each of the frame members 73 and 74 to maintain the vertical spacing between the grip areas 77 and 78. Fasteners (not illustrated) facilitate a connection of the brackets 76 to the interior of each of the respective side rails 66.

[0078] A battery mount 89 is secured to the foot end lift handle assembly 72, preferably to the underside of the assembly as show in Figures 47 and 48. The battery mount 89 includes a downwardly opening bayonet socket 90 having electrical contacts 94 exposed therein for connection to a properly configured battery 160 shown in broken lines. The manner in which the battery 160 connects to the electrical contacts 94 when the battery is in the broken line position shown in Figure 48 is conventional and, therefore, further discussion about this connection is believed unnecessary. The electrical contacts 94 on the battery mount 89 are connected to the control 158 as schematically shown in Figure 24. In order to connect the battery 160 into place in the battery mount 89, the battery is moved leftwardly from the Figure 47 disconnected inactive position to the Figure 48 connected and active position. The battery 160 in the installed position of Figure 48 is releasably locked in place and is capable of withstanding excessive acceleration forces that will occur during an accident to remain locked in place in the Figure 48 position.

[0079] One leg 81 of the frame member 73 includes a switch housing 82 fastened thereto by at least one fastener 83 (Figure 9). The switch housing 82 is located in an ergonomically advantageous position to the obvious grasping point of the user. An enlarged isometric view of the switch housing 82 is illustrated in Figure 10. The switch housing has a pair of manually engageable buttons 84 and 86 thereon. The manually engageable buttons 84 and 86 are shielded from above by a shroud 87 and are of a low profile membrane design so as to prevent inadvertent actuation of the buttons 84 and 86 by a patient lying on the upper surface of the litter 16. That is, the shroud 87 is oriented at the head end of the switch housing 82. The switch housing 82 includes an opening 88 extending therethrough and through which the leg 81 of the frame 73 extends. The fastener 83 extends through a hole in the leg 81 to facilitate a connection of the housing 82 to the leg 81 extending through the opening 88.

[0080] Similarly, the leg 91 of the frame member 74 includes a further switch housing 92, located in an ergonomically advantageous position to the obvious grasping point for the user, having an opening 98 extending therethrough and through which the leg 91 extends. A fastener 93 facilitates a connection of the switch housing 92 to the leg 91 that extends through the opening 98. The switch housing 92 includes a construction identical to the switch housing 82 illustrated in Figure 10 and it includes a pair of manually engageable buttons 84 and 86 which, as will be explained in more detail below, provide a redundant operation with respect to the buttons in the switch housing 82. The switch housing 92 also includes a shroud 97 similar to the shroud 87 and it is provided for the same purpose, namely, to shield the buttons 84, 86 from

inadvertent actuation by a patient lying on the litter 16. In addition to the safety shrouds 87 and 97 preventing inadvertent actuation of the push buttons 84 and 86, each of the push button switches 84, 86 have a dual switch closing feature requiring both switch contacts to be closed (see Figure 11) in order to effect the desired operation as will be explained in more detail below.

[0081] The bight section 99 of the frame member 74, particularly at the base of one of the spacers 79, there is provided a bracket 101 secured to the bight section by a fastener 102 (Figure 12). A manually engageable handle 103 is pivotally secured to the bracket 102 by a pivot axle 104. The handle includes a pair of arcuately spaced shoulders 106 and 107. A cable support member 108 is pivotally secured to the bracket 101 by a pivot axle 109. A cable, here a Bowden cable 111, is fastened as at 112 to the cable support 108 (at one end) while the other end is fastened to a valve actuation device which will be explained in more detail below. The cable 111 extends into and through the hollow interior of the frame member 74. The cable support member 108 has a pair of arcuately spaced shoulders 113 and 114 that operatively cooperate with the arcuate shoulders 106 and 107, respectively, as will be explained in more detail below. The handle 103 as illustrated in Figure 12, is in a stowed out of the way position. When it is desired to move the handle and use it for operation of the ambulance cot, it is shifted clockwise in its position from the position illustrated in Figure 12 to the position illustrated in Figure 13 at which time the shoulder 107 engages the shoulder 114 on the cable support member 108. When the handle 103 is further pivoted clockwise about the axle 104 to the position illustrated in Figure 14, the cable support member 108 will pivot about the axle 109 to effect a

pulling of the cable 111 to effect actuation of a valve structure that will be described in more detail below. A torsional spring 116 (only the ends of which are illustrated in Figures 12-14) serves to continually urge the handle 103 counterclockwise to the stowed position so that the shoulders 106 and 113 will engage one another.

[0082] Referring to Figure 5, and as stated above, there is provided a pair of longitudinally spaced brackets 71 on each of the side rails 66. Between laterally spaced ones of the brackets 71, there extends a respective cross rail 67. Referring to Figure 15, these cross rails 67 support a hydraulic assembly bracket 121. More specifically, the hydraulic assembly bracket 121 includes several ears 117 which operatively engage the respective cross rails 67 and from which ears is suspended the hydraulic assembly bracket 121. The hydraulic assembly bracket 121 is generally U shaped with the bight section forming a base upon which is mounted a variable speed electric motor 122, a hydraulic manifold plate 123 and a hydraulic pump 124. The hydraulic pump 124 has two outlets 126 and 127. The hydraulic outlets 126 and 127 are connected through hydraulic conduits 128, 129, respectively (Figure 4), to respective opposite ends of the hydraulic cylinder housing 54. In this particular embodiment, the cross rails 67 also provide a support for a seat section 130 (Figure 1) on the litter 16.

[0083] Referring to Figures 1 and 16, the further X frame members 26, 27, 36 and 37 are all connected through respective connectors 28, 29, 38 and 39 to a cross rail 13. Figure 16 illustrates a representative example of the connectors 28, 29, 38 and 39. That is, each connector includes a sleeve 118 that encircles the cross rail 13 and includes a stem 119 that is telescoped inside the interior of each of the respective further X frame members 26, 27, 36, 37. A bearing assembly 131 is

provided between the stem 119 and the interior surface of the further X frame members 26, 27, 36, 37. Thus during normal use, off center loads and flex in the aluminum frame members may cause some twisting in the geometry of the frame members which will cause a binding of the mechanism. In order to accommodate this twist, the bearing assembly 131 will facilitate a relative rotation between the sleeve 118 and the further X frame members 26, 27, 36, 37. The bearing assembly 131 becomes particularly important when the X frame members 22, 23, 32, 33 are not circular in cross section and the further X frame members 26, 27, 36, 37 are circular in cross section (as depicted in Figure 49). That is, a bushing 236 is fixedly positioned inside the non-circular X frame members 22, 23, 32, 33, which bushing 236 has a circular opening therethrough through which the further X frame members 26, 27, 36, 37 slidably extend. The end of the further X frame members 26, 27, 36, 37 remote from the base 11 have a further bushing 237 longitudinally slidably disposed in the X frame members 22, 23, 32, 33. The bushing 237 is relatively moveably secured to the respective further X frame members 26, 27, 36, 37, such as through the use of a rivet and washer mechanism 238 being secured to the further X frame members 26, 27, 36, 37 on opposite sides of the bushing 237 so as to prevent a relative longitudinal movement of the bushing 237 along the length of the further X frame members and so that the further X frame members can rotate about their respective longitudinal axes relative to the bushing 237.

HYDRAULIC CIRCUIT

[0084] A hydraulic circuit 132, illustrated in Figures 17-23, is included in the manifold plate 123 (Figure 15). It is to be understood that the pump 124 and the linear actuator 53 and the conduits carrying hydraulic fluid to the linear actuator 53 are preferably always filled with

hydraulic fluid. Further, the pump 124 is reversible and the electric motor 122 driving same is also reversible. As a result, there will be no delay in actuation of the linear actuator in response to an operation of the pump 124 by the electric motor 122. The output of the pump 124, in one direction of operation, will supply hydraulic fluid through a pilot operated check valve 133 to the outlet 126 connected through the hydraulic conduit 128 to the end of the cylinder housing 54 remote from the reciprocal rod 56. Operation of the pump 124 in the opposite direction will direct fluid through a poppet valve 134 having in parallel therewith an orifice or fluid throttle 136 and a two way poppet valve 137 to the outlet 127 which in turn is connected through a conduit 129 to the end of the cylinder housing 54 adjacent the reciprocal rod 56. The fluid controlling the pilot operated check valve 133 is delivered to it through a conduit 138 connected to the fluid path intermediate the poppet valve 134 and the pump 124. There is also provided a pressure relief operated check valve 139 connected at one end between the pilot operated check valve 133 and the pump 124 and, at the other end, to a tank or reservoir for the hydraulic fluid. Intermediate the pilot operated check valve 133 and the outlet 126, there is provided a fluid passageway 142 extending to a series connected pressure compensated flow controller 143, a spring controlled check valve 144 and a two way poppet valve 146 connected to the tank 141. The spring is sized in this check valve so as to provide a dampening against a surge of fluid when passively lowering. This prevents a lurch in the lowering action providing increased comfort to the patient during lowering. The passageway 142 includes a further passageway 147 connected through a spring biased check valve 148 to tank 141, on the one hand and through a passageway 149 to a

manual release valve 151 also connected to tank 141. The outlet 127 is connected through a passageway 152 to a spring biased check valve 153 connected to the tank 141, on the one hand, and through a passageway 154 to a series connected fluid throttle 156 and thence to a further manual release valve 157 connected to the tank 141.

[0085] The hydraulic circuit 132 is controlled by a control mechanism 158, which control mechanism is also schematically represented in Figures 24 and 25. A hydraulic fluid pressure monitoring mechanism 159 is connected to the outlet 126 and provides a signal indicative of the magnitude of the fluid pressure to the control mechanism 158. The battery 160 (Figures 47 and 48) on board the ambulance cot provides power to the control mechanism 158. The charged status of the battery 160 is linked to a display 161 on a user interface 162 mounted on the foot end lift handle assembly 72 near the battery mount 89, particularly between the spacer members 79. The user interface 162 also includes a mode switch (not illustrated) for allowing the user interface to display a multitude of different functions, one of which can be an hour meter indicative of the total elapsed time that the electrical motor 122 has been operated, such as "HH:MM", where H is hour and M is minute or in tenths of an hour such as "HH.H hours". Any other indication of total elapsed time from a set point is contemplated. In addition, it is also possible for the user interface to display the elapsed amount of time that the control 158 has been on, the elapsed amount of time a certain switch is activated, the elapsed amount of time certain valves have been actuated or the elapsed amount of time a certain pressure has been maintained on the system. These values may be combined to a suitable display to accurately determine the amount of wear that can be expected on the system. As a result, ambulance

attendants can more accurately determine what preventative maintenance is required based upon the aforesaid displays. Additionally, a symbol (preferably iconic) can be provided at pre-programmed interval(s) to indicate when service may be necessary.

[0086] The control mechanism 158 also receives signals from position sensors provided on the ambulance cot. More specifically, and referring to Figure 26, a cover 163 has been removed from the housing 68 to reveal the opening 69 inside the housing. A first transducer 164 is provided inside the opening 69, particularly at the foot end of the opening 69 whereas a second transducer 166 is oriented at the head end of the opening 69. These transducers 164 and 166 are, in this embodiment, Hall effect sensors which are used to indicate the low and high heights of the ambulance cot. Alternatively, proximity sensors or reed switches can be employed in place of the Hall effect sensors. These transducers are adjustably positioned in the opening 69 such that they detect a magnetic field of a magnet mounted, for example, on one end of the pivot tube 61 (Figure 5) or on the slide bearing thereat (not shown) and oriented on the outboard side of the pinion gear 64 or slide bearing located thereat. Thus, as the pinion gear 64 approaches either one of the transducers 164 or 166, the magnetic field of the magnet will saturate the respective transducer to create an appropriate signal to the control mechanism 158 that is indicative of the height position of the cot. The position of the transducers 164, 166 are variable lengthwise of the opening 69 so as to provide an ability to effect a height adjustment for the ambulance cot in both its collapsed and its uppermost position. A specific advantage of having a movable second transducer 166 is that the high height of the ambulance cot can be adjusted to provide a stopping point custom adjusted to a

specific ambulance for ease of loading the cot into the ambulance. A further transducer 167 is provided adjacent the second transducer 166 so as to cause an additional signal to be sent to the control mechanism 158. This additional signal is supplied as feedback to the control mechanism 158 to subsequently control motor speed to effect a smooth stop of the litter 16 in the uppermost position. Similarly, a further transducer 168 can be provided adjacent the first transducer 164 so as to cause a further signal in the form of feedback to be sent to the control mechanism 158 to effect a subsequent controlling of motor speed to effect a smooth stop of the litter 16 in the lowered position. This smooth stopping operation is provided for patient comfort.

[0087] The control mechanism 158 also receives signals indicative of the presence of the ambulance cot inside the ambulance. In the preferred embodiment and referring to Figure 27, an ambulance cot latching mechanism inside the ambulance includes a rod 169 that extends along one side of the ambulance cot and has adjacent its distal end 171 a bracket 172 which has a magnet 173 provided thereon. The magnet 173 becomes positioned adjacent a transducer (not shown) to send a signal to the control mechanism 158 to effect a total and complete deactivation of the hydraulic lift or lower operation capabilities of the hydraulic circuit. This transducer may optionally be the position transducer 164.

[0088] Figures 28-30 are a bottom view of the manifold plate 123 having mounted thereon the reversible electric motor 122 and the reversible pump 124. If desired, the motor 122 could be driven in one direction and a transmission utilized to effect a reverse operation of the pump 124. The release valves 151 and 157 are mounted on the manifold plate 123. The release valve 151 includes a reciprocal stem 174 which, when moved to the

right in the aforesaid figures, effects an opening of the valve to allow fluid flow to pass therethrough. Similarly, the release valve 157 has a stem 176 which, when moved to the right in the aforesaid drawing figures, also effects an opening of the valve 157 to allow hydraulic fluid to pass therethrough. Incrementally opening the valve will effect a variable flow through the valve, allowing variable drop rates of the litter. Additionally, the orifice 156 may be sized to control the drop rate of the base 11 when the litter 16 is supported by an attendant or plural attendants. A plate 177 is provided and has holes therethrough which receive the respective stems 174 and 176 therethrough so that an appropriate fastener 178 can effect a fastening of the respective stems 174 and 176 to the plate 177. The cable 111 is connected to the plate as at 179. The opposite end of the cable 111 is connected to the release handle mechanism illustrated in Figures 12-14.

[0089] In this particular embodiment, and referring to Figure 31, the release valves 151 and 157 each have a fluid chamber 181 therein into which hydraulic fluid directly from the outlet port 126 is fed through an inlet port 183. The valves 151 and 157 each have a reciprocal spool 184 therein, the movement of which is controlled by the tension applied to the stems 174, 176 by the cable 111. The spool 184 includes a land 186 having a valve seat surface 187 thereon which mates with a valve seat surface 188 provided on the body 189 of the release valve 151. A spring (not illustrated) serves to urge the valve seat surface 187 against the valve seat surface 188, especially when no fluid pressure is applied to the chamber 181. Once the fluid pressure inside the chamber 181 has been reduced to a desired level, tension applied to the cable 111 urging the spool 184 to the right (Figure 31) against the urging of the return spring, the

seat surface 187 will be separated from the seat surface 188 to allow fluid to flow from the inlet port 183 to an outlet port 191 and thence to tank 141. The purpose of the aforesaid construction of the valves 151 and 157 will facilitate it being necessary that the ambulance cot attendants lift the cot prior to activation of the manual release valves 151 and 157 so that the fluid pressure in the chamber 181 will be reduced to facilitate a rightward movement of the spool 184.

[0090] A conventional velocity fuse 192 (Figure 17) is provided in the inlet port to the end of the cylinder housing 54 of the linear actuator 53, particularly at the end thereof remote from the reciprocal rod 56. The velocity fuse can also be an integral component of the cylinder housing 54. This conventional velocity fuse is Model No. 8506 available from Vonberg Valve, Inc. of Rolling Meadows, Illinois. The purpose of the velocity fuse is to prevent a rapid lowering of the cot when there is a sudden loss of hydraulic pressure as in the case of a severed hydraulic hose, or accidental manual release with a patient on the cot. A check-valve 195 is provided in parallel to the velocity fuse in order to affect an increased speed of extending of the base. This allows the same or similar speed in powered, and manual mode such that the manual mode may be used in normal use to extend the base when unloading the cot from the ambulance.

WIRELESS DIAGNOSIS

[0091] The ambulance cot and load system electronics for facilitating a loading of the cot into an ambulance (see also WO 2004/064698, the subject matter of which is to be incorporated herein) contain the capability to interact with a handheld diagnostics tool over a wireless communication link. This tool allows manufacturing and maintenance personnel to perform basic configuration,

troubleshooting and complex diagnostic operations on both the cot and load system, while remaining free from physical cable attachment to either unit. An example of the functional descriptions for each of the elements involved in wireless diagnostics are set forth below.

WIRELESS DIAGNOSTIC TOOL

[0092] The handheld device or tool 300 (Figure 34) is self contained, and includes an antenna 301, a wireless transmitter and receiver that operate under the same basic protocol as the wireless link connecting the cot and load system during normal operation. Operations such as collecting and configuring control parameters and initiating simple or complex diagnostics tests are supported through this interface. By design, this handheld device is capable of four main modes of operation:

- Two-way active communication mode: The handheld device interacts with one other wireless-capable unit;
- Multi-way active communication mode: The handheld device interacts with two or more wireless-capable units;
- Passive "listen only" mode: The handheld device observes the communication activity which exists near one or more wireless-capable units without disrupting it; and
- Power and at least one of read from and write to an RFID tag described below (can also be included in two-way communication).

[0093] Two-way active communication allows the handheld device to interact directly and exclusively with one cot (or one load system) in order to provide streamlined communication during programming or troubleshooting phases. Multi-way communication allows the handheld device to participate in communications with

multiple other parties, and allows for more complex troubleshooting and diagnostics operations. For example, when a cot is docked in the load system and a handheld device is brought into proximity of the wireless communication field, it will be able to interact with both units to gather information or allow the user to invoke special tests to verify operation of the loading algorithm. For two-way and multi-way modes, the wireless diagnostic tool is capable of auto-detecting the proper mode in which to operate, which is based on the number of active participants it senses in the wireless communication field. The "listen only" mode is entered at the prompting of the user of the handheld device. This mode is passive in nature, and can be used to analyze communications coming from one unit (cot or load system), or multiple units which are in dialog with one another.

COT

[0094] The ambulance cot's electronic controller contains software components to support wireless diagnostics capabilities. This software functionality is capable of detecting the difference between a load system that is trying to communicate and a wireless handheld device that is trying to initiate a diagnostic session. As this determination is made, the cot is able to enter into either a normal session with the load system, a dedicated session with the handheld device (if no load system is present), or a three-way session that involves both the handheld device and the load system. In the latter case, the cot software allows normal operation of the loading sequence, while simultaneously supporting a specific set of diagnostics that are useful in troubleshooting the overall system.

LOAD SYSTEM

[0095] The load system's electronic controller is also capable of distinguishing between a basic communication session for loading and unloading, and a session which involves diagnostics operations. Using similar software components, the load system will participate in dedicated two-way communication with a handheld device, or allow the device to coexist during a load or unload operation with the cot being present. It is capable of detecting the difference between these various modes of operation, and react accordingly to provide the necessary functional behavior.

[0096] Figures 32 and 33 provide a further description of the software functionality used in the wireless control and diagnostics features. In Figure 33, the blocks entitled "Execute Configure Option" and "Transmit Wireless Response Message" include a read/write command to the RFID tag 302 (described below) when applicable in order to change the user statistics which may be coded on the RFID tag (Count of times programmer accessed, revision of software (if updated) etc).

[0097] Referring to Figure 34, beneath the seat section 130 there is provided a cot antenna 193. The load arm on the ambulance (see WO 2004/064698, here in Figure 34 the load arm 194) includes a load arm antenna 196. The two antennas 193 and 196 provide communication between the cot and the load system as well as communication with the handheld unit. The antennas also provide a controlled communication envelope to allow any cot to communicate with any load system or handheld trouble shooting device while not interfering with other load systems/cots in the area. In the preferred embodiment, the cot antenna 193 (Figure 34) consists of a loop of wire, as does the load antenna 196, and the tool antenna 301. It has been demonstrated that by passing a

modulated current through a loop of wire, an electro-magnetic field is produced that can be received by other loops of wire in the environment. It is further known that this modulated "carrier" can be added to a digital signal, allowing the transmission of the digital signal on the modulated carrier. This type of communication is commonly referred to as an active inductive link.

[0098] The cot antenna 193, when configured as described, can additionally be used to remotely power and read a Radio Frequency Identification, or RFID tag 302 (Figure 34) mounted on the load arm 194 or a trolley 190 to which the load arm 194 is mounted. Thus, the cot can be configured to selectively communicate with one of the load system and the tool through an active, inductive link; and power and one of read from and write to the RFID tag 302. The RFID tag 302 is useful in implementing the in-ambulance/in fastener shut-off feature (shown and described in more detail below) as well as for identifying the device for use with other specific RFID readers specifically as follows:

code (1 byte)	product code (2 bytes)	CRC (1 byte)	Product specific RFID tag.....

More specifically:

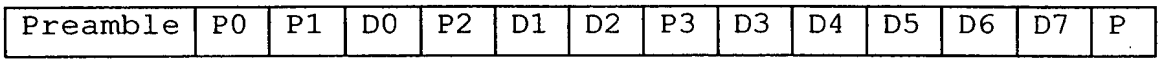
Product name	Group name	Group (1 byte)	Product (2 bytes)	CRC
EMS_COT_LOADING_SYS	**Medical_Beds**	**2**	**1**	**0x11**

This information may be used to configure the hand-held tool, or provide contact information for service.

[0099] Additionally, other information may be at least one of written to and read from the RFID tag 302 including at least one of the following: Model, Serial number of the unit, Software revision, and Usage

statistics (which may include at least one of a count of different powered cots used with the system, and a count of times diagnostic tools accessed or changed the cot or load system(s)).

[00100] One exemplary way of establishing communication between the cot and the fastener system or between the cot or load system and the troubleshooting handheld device, as well as communication therebetween, is set forth below.



	Preamble for signal detection
Px	Parity bits for error detection (Hamming Code)
P	Parity bit for extra check of data integrity
Dx	Data bits

PREAMBLE

[00101] The preamble is a special sequence to separate real data from the random noise. The preamble will contain special characters that are of 'illegal' length. This will cue the processor for a start of packet.

ERROR CORRECTION BITS

[00102] The packet uses four bits for error correction (P0, P1, P2, P3). The error correction technique employs a Hamming code algorithm that will allow the processor to correct one bit that has been misinterpreted. Assuming a moderate bit error rate, the odds of a single bit being corrupted are relatively high while the odds of multiple bits being corrupted is relatively very low. Allowing for 1 bit to be corrected will result in an overall

greater throughput at a relatively low cost of extra bits.

PARITY BIT

[00103] The parity bit is an extra check to ensure data integrity. The parity bit is calculated using basic even parity checking; the parity bit is set so that the number of 1s in the packet will always be an even number. The parity bit will allow detection of a second bit error; however, it will not be able to correct it.

DATA BITS

[00104] There are 8 data bits. The data bits communicate information about the cot status, an action request or diagnostic information. The most significant bit (D7) indicates whether the data is in diagnostic mode or not. If in diagnostic mode, remaining 7 bits indicate a diagnostic code or response. Otherwise each bit acts as an independent flag for a certain condition. If the transmission gets a response, the value is passed to the master controller; if no response is found, a value of '0'.

Table 1 - Example of possible Ambulance to Cot Data Bits

Bit	Name	Value = 1	Value = 0
7	Normal/Diagnostic	In Normal Mode	In Diagnostic Mode
6	Arm Load	Detect load on arm	No load detected
5	Arm Up	Load arm is fully up	Load arm not fully up
4	Arm Down	Load arm is fully down	Load arm not fully down
3	Proximity Switch	Prox switch closed	Prox switch open
2	TBD		
1	TBD		
0	Comm present	Comm is active	No Comm

Table 2 - Example of possible Cot to Ambulance Data Bits

Bit	Name	Value = 1	Value = 0
7	Normal/Diagnostic	In Normal Mode	In Diagnostic Mode
6	Cot load	Detect load on cot legs	No load detected
5	Cot legs up	Cot legs are fully up/not extended	legs not fully up
4	Cot legs down	Cot legs are fully down/extended	legs not fully down
3	Plus button	"+" button is pressed	"+" button not pressed
2	Minus button	"-" button is pressed	"-" button is not pressed
1	TBD		
0	Comm present	Comm is active	No Comm

Table 3 - Example

Event	A→C	C→A	Comment
Cot "-" button pressed, turns on	----	111001xx	Patient on Cot, Ambulance not yet in range No response from Ambulance, a value of zero is passed to the cot controller
Cot moved within range of Ambulance	10010xxx	111001xx	"-" button is still pressed Prox switch is not set, Arm not bearing load
Cot docked to prox switch	10011xxx	111001xx	"-" button is still pressed Prox switch is set, Arm not bearing load
Cot legs folding up, Cot drop slightly	11011xxx	110001xx	Arm starts to take weight, still down

Cot legs continue folding up	11001xxx	100001xx	Arm starts lifting up
Cot legs completely up	11001xxx	101001xx	Arm still lifting
Arm is all the Way up	11101xxx	101001xx	
Button is released Arm still up	11101xxx	101000xx	Waiting for cot to be pushed on

[00105] Further software may be provided for the in-ambulance/in-ambulance shut-off feature when used with an RFID tag 302. When used with the load system (to detect the RFID tag), the upper-level software diagram may look like that illustrated in Figure 59.

[00106] In operation, and referring to Figure 59, upon power-up, the cot attempts communication with the load system in order to detect if it is present. If communication (com) is present, it executes function according to a specific and separate load protocol. If not, the cot communication will switch to check for the RFID tag. If it is not present, the cot drives according to the normal cot protocol. If the cot sees the RFID tag, it will then check for the low Hall Effect (HE) sensor (to determine if the cot legs are retracted). Once fully retracted, the cot inhibits driving (up), and thus activates the in-ambulance/in fastener shut-off feature. The advantages of looking for the Low HE sensor is allowing function of the cot while docked, but not fully loaded. It is reasonably assumed that once the cot is fully retracted, it is locked into the load system, and will be pushed into the ambulance. A further advantage is that normal drive function is returned by simply manually dropping the base such that the low HE sensor is no longer activated, thus allowing normal

driving of the cot in the specific instance of a loss of load communication.

[00107] Driving normally is described in Figure 25, but Figures 60 and 61 illustrate the decision tree for the software when the RFID tag 302 is present in the overall system.

RETRACTABLE HEAD SECTION AND LATCH

[00108] By comparing Figures 35 and 36, it will be noted that the ambulance cot 10 includes a retractable head section 197. This feature can be provided on a manual lift cot or a power lift cot. In the power lift environment, and as is illustrated in Figure 37, the retractable head section 197 is generally U shaped, namely, having a pair of parallel legs 198 and 199 connected by a pair of brackets 202 to a head rail 203. A cross brace 200 (Figure 62) also connects the brackets 202. A tubular cross rail 201 is rotatably mounted to the cross brace 200. The legs 198 and 199 are configured to be slidably received by, into the interior of (shown), next to, or below the respective longitudinally extending side rails 66 on the cot 10. The handles 210 are fixed to the cross rail 201 for pivotal movement with the cross rail 201 about an axis corresponding to or parallel to the axis of the cross rail 201 in order to facilitate the movement of a pin 204 projecting from each handle 210 about an axis of rotation defined by or parallel to the axis of the cross rail 201. The pin 204 extends through an arcuate slot 215 in the bracket 202. The handles 210 are affixed such that actuation of one handle 210 effects a rotation of cross rail 201 and subsequent actuation of the other handle 210 so that the head section may be released by the actuation of a single handle 210. The pin 204 is connected by a linkage 206 to a latch mechanism 207 on each leg 198 and 199. The latch mechanism 207 is illustrated in more detail in Figures 42

and 43. More specifically, the latch mechanism 207 includes a housing 208 in which a ramp mechanism 209 is slidably disposed lengthwise of the housing 208. The ramp mechanism 209 includes a ramp surface 211 against which a pin 212 rests. The pin 212 includes a latch pin 213 that is configured to move laterally into and out of the housing 208. The position located outside the housing is illustrated in Figures 37 and 42. A spring (not illustrated) urges the pin 212 against the ramp surface 211. When the handle 210 is rotated about the axis of rotation corresponding to or parallel to the longitudinal axis of the cross rail 201, the pin 204 is moved from the position illustrated in Figure 39 to the position illustrated in Figure 40 to cause a leftward movement of the linkage 206 in each leg 198 and 199 to cause the pin 212 to shift in its position illustrated in Figure 42 to the position illustrated in Figure 43, namely, a position wherein the latch pin 212 has been retracted laterally into the housing 208 of the latch mechanism 207. A slot 205 in the link 206 is provided which allows independent, passive engagement of the latch pins 213 when the handles 210 are released. This is illustrated in Figure 41. A plurality of holes 214 are provided along the length of the side rails 66 and are configured to receive therein the latch pin 213 when in the extended position thereof as shown in Figure 37. These holes are located such that access to them is not possible, i.e., under a bumper provided on the exterior of the litter rail 66. This is done for protection against inadvertent release, foreign matter, or potential pinching point. When the latch pin is received in an associated hole 214 provided in the side rail 66, the retractable head section will be physically locked to the cot in either the retracted position (Figure 35) or the extended position (Figure 36).

[00109] In a further embodiment of the retractable head section 197, shown in Figures 57-58 and 62, the handles 210 are capable of being locked against rotation about the cross rail 201 to prevent release of the latch mechanism 207. Referring to Figure 57, the safety bar 218 is fixed to a mounting bracket 260 that is pivotally mounted to the cross brace 200. The mounting bracket 260 is biased into an at rest position by a torsion spring 261 mounted on the cross brace 200 and engaging the mounting bracket 260 and the bracket 202. Reference is made to pending patent application serial no. 10/850 144, wherein the safety bar 218 can be rotated upwardly in a counterclockwise fashion, by an attendant, toward the head end of the ambulance cot to clear a hook mounted at the mouth of an ambulance cargo area. In the instant invention, the mounting bracket 260 is configured so that the safety bar 218 can also be rotated upwardly in a clockwise fashion toward the interior of the cot, and function as a "latch disabler" to prevent release of the latch mechanism 207.

[00110] A head portion 262 of the mounting bracket 260 is received on the cross brace 200. The head portion 262 is eccentrically configured about the cross brace 200 such that it includes a ramp portion 264 that extends toward the bracket 202 joining the leg 198 to the head rail 203. The mounting bracket 260 is arranged underneath a shaft 266 formed in the bracket 202. The shaft 266 is formed to extend into a central portion of the arcuate slot 215 that receives the pin 204 when the handle 210 is actuated. The shaft 266 is configured to received a pin 268 surrounded by a compression spring 270. The pin 268 and spring 270 are arranged in the shaft 266 so that the pin is biased out of the arcuate slot 215 by the spring 270. The pin 268 is held within

the shaft 266 by the head portion 262 of the mounting bracket 260.

[00111] In Figures 57-58, the pin 204 is shown in the at rest position, that is wherein the handles 210 are not actuated. In order for the handles 210 to be actuated, the pin 204 must travel along the arcuate slot 215. During certain stages of transport, it is desirable to prevent the retractable head section 197 from changing its status from extended to retracted or vice versa. Therefore, it would be advantageous to prevent the inadvertent actuation of the handles 210. This can be accomplished by preventing the travel of the pin 204 through the arcuate slot 215, such as by pushing the pin 268 into the slot 215 to block the travel of the pin 204.

[00112] Referring to Figure 58, the safety bar 218 has been rotated clockwise about the cross brace 200. As the safety bar 218 rotates from the position shown in Figure 57, the pin 268 rides along the ramp portion 264 of the mounting bracket 260. The ramp portion 264 is eccentrically configured, so that as the mounting bracket 260 rotates about the cross brace 200, the radius of the head portion 262 increases, forcing the pin 268 through the shaft 266 and into a blocking position in the arcuate slot 215 as when the safety bar slides over an existing cot fastening mechanism in an ambulance. The safety bar 218 can rotate so that the pin 268 blocks the arcuate slot 215, preventing the handles 210 from being actuated. Full engagement of the pin 268 occurs when the pin 268 reaches an end 269 of the ramp 264. This occurs prior to a stop 272 of the mounting bracket 260 abutting the shaft 266, which prevents further rotation of the safety bar 218. The torsion springs 261 are mounted one on each side of the safety bar 218, and act in torsion in opposing directions about cross brace 200, urging the brackets 260 and the safety bar 218 to a downward,

neutral position, whereby the latch disabler is disengaged.

[00113] Referring now to Figures 63-64, the retractable head section 197 is configured to engage a portion of a cot fastening mechanism or "antler" system 276 configured for mounting to the floor of the cargo area of an ambulance. The antler system 276 includes a center yoke 278 and a forward yoke 280. Both yokes 278, 280 are mounted to the ambulance cargo area floor, with a centerline of the antler system 276 aligned in the fore-aft direction of the ambulance.

[00114] The center yoke 278 is formed of two rods 282, 283 arranged as mirror images about the centerline of the antler system 276. Each rod 282, 283 includes a longitudinal segment 284, 285 and an outwardly divergent segment 286, 287, each outwardly divergent segment rising to a rearwardly directed hook or "ear" 288, 289.

[00115] The forward yoke 280 includes a central segment 290 secured to the ambulance cargo floor and two outwardly divergent arms 291, 292. The arms each terminate in an "ear" 293, 294 that is joined with a respective ear 288, 289 of the center yoke 278.

[00116] As the ambulance cot 10 is rolled into the ambulance cargo area head end first, as shown by the arrow in Figure 63, the safety bar 218 contacts the center yoke 278. As the cot 10 is rolled further, the center yoke 278 forces the safety bar 218 rearwardly until the safety bar 218 rides on top of the longitudinal segments 284, 285 of the rods 282, 283 of the center yoke 278. Again referring to Figure 58, the latch disabler is activated prior to the stop 272 reaching the shaft 266. This enables use of the cot 10 with an antler system having a lower profile, while still activating the latch disabler. With the safety bar 218 in the rotated position of Figure 64, the latch disabler is activated,

thereby locking the retractable head section 197 in the extended position. The latch disabler will remain activated until the ambulance cot 10 is removed from the antler system 276. As the ambulance cot 10 is pushed further forward, the fixed wheels 216 roll between the ears 288, 289 and 293, 294 of the center and forward yokes 278, 280 and the into the antler system 276.

[00117] It is to be noted that the longitudinal axis of the side rails 66 are inclined to the horizontal at an angle α (see Figure 35) that is in the range of 1 to 10°. In this embodiment, the preferred angle is in the range of 2 to 3°. Thus, when the retractable head section 197 is retracted, the load wheels 216 on the retractable frame of the head section 197 are lifted from the ground surface 217 thereby enabling the cot to roll in any direction on the four castered wheels 14. This is referred to as the "no steer" condition. When the retractable head section 197 is extended to the position illustrated in Figure 36, the load wheels 216 will engage the support surface 217 to provide a steering effect for the cot as it is moved over the surface 217 (a "steer" condition). In this particular embodiment, the load wheels 216 are each rotatable about a fixed horizontal axis of rotation. That is, the wheels 216 are not supported in a castered manner. The head section 197 must be in the extended position of Figure 36 in order to be steered into the ambulance for engagement with the antler system 276.

FOLDED SAFETY BAR

[00118] As is illustrated in Figure 37, the retractable head section 197 includes a safety bar 218. The safety bar is configured to operatively engage a safety hook provided on the floor surface of a cargo area of an ambulance to prevent the cot from rolling completely out of the ambulance without an attendant being there to

handle the head end of the cot. Reference is to be made to pending U.S. Patent Application Serial No. 10/850 144, filed May 20, 2004, the subject matter of which is to be incorporated herein by reference. As is illustrated in Figures 44-46, a modified safety bar 218A can be provided which is foldable between the folded position illustrated in Figure 45 and an unfolded position illustrated in Figure 46. That is, the safety bar 218A includes two sections 219 and 221 interconnected by a pivot axle 222. The safety bar sections 219 and 221 are approximately of the same length so that the pivot axle 222 is oriented at the midlength portion of the extended handle as is illustrated in Figure 46. Releasable locking pins 223 are provided to lock the handle sections 219 and 221 in the respective folded position (Figure 45) and the unfolded position (Figure 46). A push button release or removable pin or other means of release (not illustrated) is provided for facilitating an activation of the locking pins to unlock them and facilitate relative movement between the handle sections 219 and 221.

ACCESSORIES

[00119] Figures 50-56 illustrate two accessories that can, if desired, be incorporated on the ambulance cot 10. The first accessory is depicted in Figures 50-51 and is a hook 239 oriented within the cot perimeter and which, specifically, is secured to the underside of the raisable and lowerable fowler 241 on the ambulance cot 10. The hook 239 consists of a sheet of material formed into a J with the stem of the J being secured to a cross rail 242 on the underside of the fowler 241 and the hook part 243 of the J facing toward the head end (left end) of the cot as depicted in Figures 50-51. The hook 239 facilitates the hanging of various articles therefrom while the cot is in use.

[00120] The second accessory is depicted in Figures 52-56 and is a collapsible pouch 244 secured to and extending between the legs 198, 199 of the head section 197 as well as to and extending between the cross rail 201 on the head section and the cross rail 59 (Figure 5) on the litter frame 17. As is shown in Figure 54, the pouch 244 consists of a planar sheet of fabric 237 to which are sewn plural fasteners 247 and 248 at spaced locations around the perimeter of the fabric sheet 246. The fasteners 247 are looped around the cross rails 59 and 201 while the fasteners 248 are looped around the laterally space legs 198 on the head section. When the head section 197 is in the extended position shown in Figure 52 and 53, the fabric sheet 246 is stretched between the longitudinally spaced cross rails 59 and 201 and laterally spaced legs 198 so as to provide a support surface 249. When the head section 197 is retracted to the position illustrated in Figures 55 and 56, the cross rails 59 and 201 become closely adjacent one another and the fabric sheet 246 is collapsed in an accordion style therebetween.

OPERATION

[00121] While the operative characteristics of the ambulance cot will be apparent to those skilled in the art upon reading the above set forth description and referring to the accompanying drawings, a discussion of the operational characteristics of the ambulance cot are set forth below for convenience.

[00122] When the ambulance cot is in the fully collapsed position, and referring to Figures 4 and 7, an extension of the linear actuator 53 will cause a clockwise (Figure 7) rotation of the bracket 43 about the axis of the fastener 44, the linear actuator being extended in the direction of the arrow 224. The position of the fastener 44 (Figure 4) is determined by the fixed

length linkage members 41. As a result of this geometry, the amount of force in the direction of the arrow 224 is optimal and effects a rapid lifting of the litter 16 from the positions illustrated in Figures 3 and 4 through the mid-height position illustrated in Figure 2 to the full height position of the litter illustrated in Figure 1. As the brackets 43 are lifted with continued extension of the linear actuator 53, the further X frame members 32, 33, 36 and 37 will telescope outwardly to accommodate the changing height of the frame members 22 and 23 from the base 11. In this particular embodiment, the pivot axle 24 for the two brackets 43 extend through the respective X frame members 22, 23 and 32, 33. As a result, it is necessary to provide an elongate slot in each of the further X frame members 26, 27 and 36, 37 in order to accommodate the presence of the pivot axle 24. It is to be recognized that a placement of the pivot axle 24 can be oriented at a location on the bracket 43 which will make it unnecessary to provide an axle receiving hole in each of the X frame members 23 and 33 as well as the elongate slots in the further X frame members 27 and 37. This provides an advantage of increased strength and stiffness of the base. When the litter 16 is lowered to the position illustrated in Figures 3 and 4, mounts 226 (Figure 1) will operatively engage a cross rail provided on the underside of the litter 16 and additional mounts 227 will rest on the cross rail 13 on the base. The mounts 226 and 227 are oriented so that they are not readily accessible by attendants in the region of the ambulance cot and, therefore, pinching issues are avoided.

[00123] Referring to Figure 11, each push button switch 84, 86 on the foot end lift handle assembly 72 requires two sets of switch contacts to be engaged in order to effect the desired command. That is, the set of contacts

228, 229 must both be closed in order to effect, for example, a retraction of the reciprocal rod 56 into the cylinder housing 54. Similarly, the two sets of contacts 231 and 232 of the switch 86 will effect an extension of the reciprocal rod 56 from the cylinder housing 54.

[00124] Turning now to Figures 17-25, the hydraulic circuit operation will now be described. Assuming the ambulance cot is in an ambulance and is now in the process of being removed from the ambulance, it is necessary to deploy the base from the position illustrated in Figure 3 to the position illustrated in Figure 1 and as taught in WO 2004/064698. Normally, the control 158 is in what is referred to as the "sleep" mode. Once a command is presented, such as by depressing the switch 86 to close the contacts 231 and 232, such action is noted by the control 158 to effect a powering up of the circuit to effect an opening of the valve 137 (Valve A) to shift the valve from its Figure 17 position to the Figure 18 position. The control will also make inquiry concerning whether the high top sensors 166 and 167 have been detected (see Figure 25) and, if not, the electric motor 122 is ramped in to effect a driving of the hydraulic pump 124. As soon as the motor reaches its maximum speed, the motor is continued to operate driving the pump at maximum speed until the sensor 167 is detected at which time the speed of the motor is ramped down or gradually slowed until the high top sensor 166 is detected, at which time the motor is brought to a stop. If the contacts 231 and 232 remain closed, the motor will remain stopped until the button 86 has been released by the attendant. Rapid uncontrolled deployment of the base from the Figure 3 position to the Figure 1 position is prevented by the orifice 136 in the valve 134 (Valve F). The attendant can thereafter "jog" the litter further upwardly by pressing the switch. In this case, the

controller will activate the motor for a short interval of time, allowing incremental upward movement of the litter.

[00125] Figure 19 illustrates a lowering of the litter from the Figure 1 position toward the Figure 3 position. In this instance, the switch 84 is actuated to close the contacts 228 and 229 to cause an opening of the valve 146 (Valve B). It will be noted that fluid flows out of the closed end of the linear actuator 53 through the pressure compensated flow control valve 143, through the check valve 144, through the opened Valve B to tank 141. The hydraulic fluid enters the rod end of the linear actuator 53 by sucking same out of the tank 141 through a check valve 153. In this particular situation, operation of the motor 122 is not required and hence is not activated. If the litter of the ambulance cot is lifted (no weight on the base of the ambulance cot), the pressure switch 159 will detect the lifting by reason of a reduced pressure and as long as the switch 84 and the contacts 228 and 229 thereof remain closed, the motor 122 will be activated and driven in the opposite direction of rotation to effect a rapid driving of fluid into the rod end of the linear actuator 53 to rapidly collapse the cot. Prior to this occurring, however, the Valve B will be returned to its initial position illustrated in Figure 17 as will Valve A. Alternatively, a separate switch (not shown) can be provided for effecting the same rapid collapse of the cot. Since less hydraulic fluid is required in the rod end of the linear actuator 53 by reason of the presence of the reciprocal rod 56 than is required at the opposite end of the cylinder housing 54, excess fluid will need to be bled from the closed end of the cylinder housing and this is accomplished through the high pressure side of the pump feeding a pressurized signal to open the check valve 133 and the check valve

139 to facilitate a bleeding of some of the hydraulic fluid to tank during the time that the base frame 11 is rapidly raised by the hydraulic circuit. Once the low position sensor is detected, the speed of the motor is gradually reduced until the lowermost sensor 164 is detected at which time the motor is brought to a halt. If the push button switch 84 remains activated, the motor will remain stopped until the attendant releases the manual engagement of the button 84. The attendant can thereafter "jog" the litter further downwardly by pressing the switch. In this case, the controller will activate the motor for a short interval of time, allowing incremental downward movement of the litter.

[00126] The operative characteristics illustrated in Figure 21 are similar to those depicted in Figure 18. Even when the motor 122 is activated to drive the pump 124, the orifice or throttle 136 limits the amount of fluid that can be driven so that the base unit does not uncontrollably fall away from the litter when it is being lifted by the ambulance attendants.

[00127] In the situation where there is a loss of electrical function, it must be possible to operate the ambulance cot manually. In addition, a weep valve 233 is provided at the rod end of the cylinder housing 54 to cause a pressure relief to occur when the rod is fully extended. That is, hydraulic fluid inside the cylinder housing 54 will communicate with the outlet 127 to limit the pressure buildup inside the cylinder housing 54. In view of the construction of the valves 151 and 157, with weight on the cot 10, the handle 103 and the valve 157 are allowed to operate, as Figure 12-14 and Figure 29 indicate. Since the pressure is high in the chamber 181 of the valve 151, the valve 151 will not shift (as shown in Figure 29) in response to an operative movement of the handle 103 and the litter 16 of the cot 10 will not

lower. On the other hand, when weight on the litter 16 is removed by the attendant or plural attendants lifting the litter 16 away from the base frame 11, the hydraulic pressure in the chamber 181 of the valve 151 is reduced to facilitate an easy movement of the land 186 and the valve seat surface 187 thereon (Figure 31) away from the valve seat surface 188 in order to facilitate the operation of the valve 151 simultaneously with the valve 157 (Figures 28-30, particularly Figure 30). That is, fluid flows from the closed end of the linear actuator 53 to tank through the valve 151 whereas hydraulic fluid is siphoned from the tank 141 into the rod end of the linear actuator 53 to effect a lowering of the litter 16 relative to the base frame 11. Similarly, and assuming that electrical function has still been disrupted and it is desired to deploy the base from the Figure 3 position to the Figure 1 position, the attendants will need to lift the cot while simultaneously operating the handle 103 causing the weight of the base frame 11 to effect a drawing of fluid from the tank into the closed end of the linear actuator 53 while the hydraulic fluid in the rod end of the linear actuator 53 extends through the open valve 157 to tank.

[00128] Although particular preferred embodiments of the invention have been disclosed in detail for illustrative purposes, it will be recognized that variations or modifications of the disclosed apparatus, including the rearrangement of parts, lie within the scope of the present invention.

What is claimed is:

1. An ambulance cot, comprising:

a base frame;

a litter frame;

an elevating mechanism interconnecting said base frame and said litter frame and being configured to effect changes in elevation of said litter frame relative to said base frame, said elevating mechanism comprising a hydraulic circuit having an extendable and retractable hydraulic actuator, said elevating mechanism being connected to and extending between said base frame and said litter frame, a pump and a motor for driving said pump to effect a pumping of hydraulic fluid to said hydraulic actuator, said motor being energized from an electrical energy source; and

a control mechanism, said control mechanism including a first set of manually operable electric controls for controlling a direction of hydraulic fluid flow to said hydraulic actuator to thereby facilitate movement of said litter frame at least one of toward said base frame and away from said base frame.

2. The ambulance cot according to Claim 1, wherein said control mechanism includes a second set of manually operable non-electric controls for overriding said first set of manually operable electric controls at least during a time interval wherein said electrical energy source is incapable of supplying electrical energy to said motor and said electric controls and for facilitating movement of said litter frame at least one of toward said base frame and away from said base frame in response to operation of said manually operable non-electric controls.

3. The ambulance cot according to Claim 2, wherein said non-electric controls include at least one manually operable hydraulic valve having a reciprocal spool therein, said hydraulic valve being oriented in a conduit connecting one end of said hydraulic actuator through said manually operable hydraulic valve to a tank, a weight of said cot and any load thereon causing a fluid pressure to exist at said one end of said hydraulic actuator and act through said conduit on said spool in said hydraulic valve to urge said spool in said hydraulic valve to a closed position.

4. The ambulance cot according to Claim 3, wherein said manually operable hydraulic valve is configured to necessitate a removal of said fluid pressure before said spool can be manually moved through operation of said non-electric controls to open the connection through said conduit of said one end of said hydraulic actuator to a lower pressure part of said hydraulic circuit..

5. The ambulance cot according to Claim 4, wherein said manually operable hydraulic valve is further configured so that said removal of said fluid pressure can only be accomplished by lifting said cot and any load thereon away from a support surface on which rests said base frame.

6. The ambulance cot according to Claim 1, wherein said manually operable electric controls include a plurality of manually operable switches mounted on said litter frame adjacent said foot end thereof and configured to be readily accessible to an attendant oriented adjacent said foot end, and wherein said hydraulic circuit includes a plurality of hydraulic

valves electrically operatively controlled by said manually operable switches.

7. The ambulance cot according to Claim 6, wherein said manually operable electric controls include two sets of a plurality of manually operable switches mounted on said litter frame adjacent said foot end thereof and configured to be readily accessible to an attendant oriented adjacent said foot end as well as being configured to redundantly control the direction of hydraulic fluid flow to said hydraulic actuator.

8. The ambulance cot according to Claim 1, wherein said motor is a direct current motor and said electrical energy source is a battery.

9. The ambulance cot according to Claim 1, wherein said hydraulic circuit includes a hydraulic fluid pressure sensing device oriented intermediate said pump and said hydraulic actuator and configured to provide a signal indicating at least one of the presence of a positive hydraulic fluid pressure and the absence of a positive hydraulic fluid pressure.

10. The ambulance cot according to Claim 1, wherein said manually operable electric controls include a plurality of manually operable switches mounted on said litter frame adjacent said foot end thereof and configured to be readily accessible to an attendant oriented adjacent said foot end, and wherein said hydraulic circuit includes a plurality of hydraulic valves electrically operatively controlled by said manually operable switches, and wherein said control mechanism includes a processor responsive to manual operation of a selected one of said switches and being

configured to effect a selective supply of electrical energy to said motor to effect a pumping of hydraulic fluid to said hydraulic actuator to change the elevation of said litter frame relative to said base frame.

11. The ambulance cot according to Claim 10, wherein said plurality of manually operable switches includes two switches, a first switch for facilitating an increase in a spacing between said litter frame and said base frame and a second switch for facilitating a decrease in the spacing between said litter frame and said base frame.

12. The ambulance cot according to Claim 11, wherein said motor is a direct current motor and said electrical energy source is a battery, said motor including a rotatably supported output shaft connected to a rotatably supported input shaft on said pump, said shafts being configured to be drivingly rotated in opposite directions of rotation, said processor being configured to separately supply electrical energy to said motor causing said motor to rotate in a first direction of rotation in response to an operation of said first switch and supply electrical energy to said motor causing said motor to rotate in a second direction of rotation in response to an operation of said second switch.

13. The ambulance cot according to Claim 12, wherein said hydraulic circuit includes a hydraulic fluid pressure sensor located intermediate said pump and said hydraulic actuator and configured to provide a first signal indicating a positive hydraulic pressure and a second signal indicating an absence of a positive hydraulic pressure, said processor being configured to

monitor said first and second signals in response to an operation of said second switch.

14. The ambulance cot according to Claim 12, wherein said processor includes a ramp circuit for effecting a gradual change in the supply of electrical energy to said motor in response to an operation of at least one of said first and second switches to gradually change a speed of rotation of said shafts.

15. The ambulance cot according to Claim 14, wherein said hydraulic circuit includes a first position detector configured to provide a third signal indicating a presence of said litter frame at a prescribed location relative to said base frame and a fourth signal indicating an absence of said litter frame at said prescribed location, said processor being configured to activate said ramp circuit in response to an activation of at least one of said first and second switches and in response to said fourth signal.

16. The ambulance cot according to Claim 14, wherein said hydraulic circuit includes a hydraulic fluid pressure sensor located intermediate said pump and said hydraulic actuator and configured to provide a first signal indicating a positive hydraulic pressure and a second signal indicating an absence of a positive hydraulic pressure, said processor being configured to monitor said first and second signals in response to an operation of said second switch, and wherein said hydraulic circuit includes a first position detector configured to provide a third signal indicating a presence of said litter frame at a prescribed location relative to said base frame and a fourth signal indicating an absence of said litter frame at said

prescribed location, said processor being configured to activate said ramp circuit in response to an activation of said second switch and in response to said second and fourth signals.

17. The ambulance cot according to Claim 14, wherein said hydraulic circuit includes a first position detector configured to provide a third signal indicating a presence of said litter frame at a prescribed location relative to said base frame and a fourth signal indicating an absence of said litter frame at said prescribed location, said processor being configured to activate said ramp circuit in response to an activation of said first switch and in response to said fourth signal.

18. The ambulance cot according to Claim 14, wherein said hydraulic circuit includes a first position detector configured to provide a third signal indicating a presence of said litter frame at a first prescribed location relative to said base frame and a fourth signal indicating an absence of said litter frame at said first prescribed location, and a second position detector configured to provide a fifth signal indicating a presence of said litter frame at a second prescribed location relative to said base frame and a sixth signal indicating an absence of said litter frame at said second prescribed location, said processor being configured to activate said ramp circuit to effect an increase in response to an activation of said first switch and said fourth and sixth signals, said processor being additionally configured to activate said ramp circuit to effect a decrease in the supply of electrical energy to said motor to gradually decrease the speed of rotation of

said shafts in response to an operation of said first switch and said fourth and fifth signals.

19. The ambulance cot according to Claim 18, the processor further being configured to effect a jog function comprising a stopping of the motor in response to a continued operation of said first switch and said fourth and fifth signals, and to provide a short duration supply of electrical energy upon a release and reactivation of said first switch.

20. The ambulance cot according to Claim 14, wherein said hydraulic circuit includes a first position detector configured to provide a third signal indicating a presence of said litter frame at a first prescribed location relative to said base frame and a fourth signal indicating an absence of said litter frame at said first prescribed location, and a second position detector configured to provide a fifth signal indicating a presence of said litter frame at a second prescribed location relative to said base frame and a sixth signal indicating an absence of said litter frame at said second prescribed location, said processor being configured to activate said ramp circuit to effect an increase in response to an activation of said second switch and said fourth and sixth signals, said processor being additionally configured to activate said ramp circuit to effect a decrease in the supply of electrical energy to said motor to gradually decrease the speed of rotation of said shafts in response to an operation of said second switch and said third and sixth signals.

21. The ambulance cot according to Claim 20, the processor further being configured to effect a jog function comprising a stopping of the motor in response

to a continued operation of said second switch and said third and sixth signals, and to provide a short duration supply of electrical energy upon a release and reactivation of said second switch.

22. A power lifting apparatus for adjusting the height of a patient supporting frame on an ambulance cot, the patient supporting frame having a head end and a foot end as well as a patient support deck with a top surface for holding a person, a base frame containing wheels, and an elevating mechanism for facilitating a varying of the height of said patient supporting frame relative to said base frame, said elevating mechanism comprising:

an electric motor;

a battery connected to said electric motor;

an electric circuit for controlling said electric motor;

a hydraulic fluid circuit comprising at least a hydraulic cylinder body having a reciprocal rod thereon and configured to effect said varying of the height of said patient supporting frame in response to relative movement between said hydraulic cylinder body and said reciprocal rod, said hydraulic cylinder body having first and second ports oriented adjacent opposite ends of said hydraulic cylinder body and through which hydraulic fluid can enter said hydraulic cylinder body;

a hydraulic pump connected between said first and second ports and providing hydraulic fluid to said hydraulic cylinder body to effect movement of said reciprocal rod; and

said electric motor drivingly connected to said hydraulic pump.

23. The apparatus according to Claim 22, wherein said hydraulic pump has third and fourth ports, said hydraulic fluid circuit including a first conduit connecting said first and third ports and a second conduit connecting said second and fourth ports.

24. The apparatus according to Claim 23, wherein said first conduit includes a third conduit connected to a first valve, said first valve providing an open or closed connection of said first conduit to tank through said third conduit.

25. The apparatus according to Claim 24, wherein said second conduit includes a second valve, said second valve providing an open or closed connection between said second and fourth ports.

26. The apparatus according to Claim 25, wherein said third conduit includes a flow controller for regulating a rate of hydraulic fluid flowing therethrough when said first valve is open to tank.

27. The apparatus according to Claim 26, wherein said second conduit includes an orifice or fluid throttle connected in series with said second valve and is oriented between said second and fourth ports.

28. The apparatus according to Claim 27, wherein said first conduit includes a pressure switch for monitoring hydraulic fluid pressure at said first port.

29. The apparatus according to Claim 22, wherein said hydraulic fluid circuit includes a manual release circuit for connecting at least one of said first and second ports to tank.

30. The apparatus according to Claim 29, wherein said manual release circuit includes a manually engageable handle mounted to said patient supporting frame adjacent one end thereof for easy access by an ambulance cot attendant.

31. The apparatus according to Claim 30, wherein said one end is said foot end.

32. The apparatus according to Claim 22, wherein said hydraulic fluid circuit includes a manual release circuit for connecting said first and second ports to tank.

33. The apparatus according to Claim 32, wherein said manual release circuit includes a manually engageable handle mounted to said patient supporting frame adjacent one end thereof for easy access by an ambulance cot attendant.

34. The apparatus according to Claim 33, wherein said one end is said foot end.

35. The apparatus according to Claim 22, wherein said electric motor is a variable speed electric motor.

36. The apparatus according to Claim 22, wherein an output shaft of said electric motor is connected directly to a drive shaft of said pump.

37. The apparatus according to Claim 22, wherein there is provided between said first and second ports a pair of series connected check valves each oriented to

permit only a fluid flow from tank to a respective one of said first and second ports.

38. The apparatus according to Claim 22, wherein there is provided a closed fluid flow circuit between said first and second ports and said pump and a fluid flow compensation circuit connected between said first and second ports and in parallel with said pump for regulating a first volume of fluid flow exiting from an end of said hydraulic cylinder body remote from said reciprocating rod to a second volume entering said pump so that said second volume through said pump is equal to an amount that enters said end of said hydraulic cylinder body whereat said reciprocating rod exits said hydraulic cylinder body.

39. The apparatus according to Claim 38, wherein said second volume is less than said first volume.

40. An ambulance cot, comprising:

a first frame;

a second frame;

an elevation mechanism interconnecting said first and second frames to facilitate moving said first and second frames toward and away from one another; and

a timing device mounted on one of said first and second frames and configured to provide an indication of the elapsed time that said elevation mechanism has been operated.

41. The ambulance cot according to Claim 40, wherein said elevation mechanism includes an electric motor, said timing device being configured for indication of the elapsed time that said electric motor has been operated.

42. The ambulance cot according to Claim 40, wherein said timing device is configured to provide an iconic indication feature to indicate that service is needed to the cot.

43. An ambulance cot comprising:

a wheeled base;

a patient litter disposed above said base;

a support mechanism which supports said patient litter for vertical movement relative to said base, said support mechanism including elongate first and second support elements which each have first and second ends respectively pivotally coupled to said patient litter and to said base, which can each expand and contract in length, and which are pivotally coupled to each other at a location between the ends thereof for pivotal movement about an approximately horizontal pivot axis, said support mechanism further including a fixed-length link member having a first end supported on said base for pivotal movement about a common axis with said second end of said first support element, and having a second end supported on said second support element at a location axially between said pivot axis and said second end thereof for pivotal movement about a further axis which is substantially parallel to said pivot axis; and

an elevating system for selectively raising and lowering the patient litter, the elevating system having at least one extensible and retractable member with first and second ends, said first end being connected to the base for pivotal movement about a common axis with said second end of said first support element and a second end pivotally supported on said second support element at a location axially between said pivot axis and said first end thereof for pivotal movement about a further axis

which is substantially parallel to said pivot axis, said elevating system further comprising selectively actuable locking means for releasably locking said support mechanism so as to respectively permit and prevent vertical movement of said patient litter relative to said base.

44. The ambulance cot according to Claim 43, wherein said first and second support elements each include a tubular outer member having an upper end pivotally coupled to said patient litter, and an inner member telescopically slidably disposed within said outer member and having a lower end pivotally coupled to said base.

45. The ambulance cot according to Claim 44, wherein said tubular outer member includes a non-circular cross-section and said inner member is received in a bushing within said tubular outer member for a low torque sliding connection.

46. The ambulance cot according to Claim 44, wherein said second ends of said support elements pivotally supported on said base remain a predetermined distance from each other on said base in all operational positions of said support mechanism, and wherein said first and second support elements each telescope in length at locations between said pivot axis and said second ends thereof.

47. The ambulance cot according to Claim 46, wherein each said inner member has means defining therein a slot which extends lengthwise thereof and transversely therethrough, and including an axle which extends along said horizontal pivot axis through said outer members of

each of said first and second support elements and through said slots in said inner members thereof.

48. The ambulance cot according to Claim 46, wherein said tubular outer members are pivotally connected by an axle defining said pivot axis and each said inner member comprises an uninterrupted tubular member.

49. The ambulance cot according to Claim 43, wherein said elevating system includes a hydraulic elevating system for selectively raising and lowering the patient litter, the hydraulic elevating system comprising a hydraulic pump and a hydraulic cylinder, the hydraulic cylinder having a first end connected to the base for pivotal movement about a common axis with said second end of said first support element and a second end pivotally supported on said second support element at a location axially between said pivot axis and said first end thereof for pivotal movement about a further axis which is substantially parallel to said pivot axis, said hydraulic elevating system further comprising selectively actuable locking means for releasably locking said support mechanism so as to respectively permit and prevent vertical movement of said patient litter relative to said base.

50. The ambulance cot according to Claim 46, wherein said second end of said link member is secured to said tubular outer member.

51. The ambulance cot according to Claim 44, wherein said second end of said link member is secured to said tubular outer member.

52. The ambulance cot according to Claim 43, wherein said support mechanism includes third and fourth elongate support elements which each have first and second ends respectively pivotally coupled to said patient support and to said base, which can each expand and contract in length, and which are pivotally coupled to each other at locations between the ends thereof for pivotal movement about said horizontal pivot axis, said third and fourth support elements being spaced axially along said pivot axis from said first and second support elements, said first and third support elements pivoting about a common pivot axis at said first ends thereof and about a common pivot axis at said second ends thereof, and said second and fourth support elements pivoting about a common axis at said first ends thereof and about a common axis at said second ends thereof, said support mechanism further including a second fixed-length link member having a first end supported on said base for pivotal movement about a common axis with said second end of said third support element, and having a second end supported on said second support element at a location axially between said pivot axis and said second end thereof for pivotal movement about a further axis which is substantially parallel to said pivot axis.

53. The ambulance cot according to Claim 52, wherein said upper end of said tubular outer members of one of said first and second elongate support elements and one of said third and fourth elongate support elements are pivotally mounted to a timing rod movable on said patient litter parallel to said pivot axis, the timing rod including a pinion gear mounted on each end for rotation therewith, and said patient litter further comprises a pair of toothed racks each configured for engagement by one pinion gear of the timing rod.

54. The ambulance cot according to Claim 43, wherein said patient litter includes a frame having a fixed member and includes a movable member which is movably supported on said frame, wherein said first end of said first support member is pivotally supported on said fixed member and said first end of said second support member is pivotally supported on said movable member.

55. An ambulance cot comprising:

a wheeled base; and

a patient litter disposed above and supported for adjustable vertical movement on said base by a support mechanism, the patient litter comprising:

a pair of longitudinally extending side rails, the side rails configured to extend from a head end to a foot end of the patient litter;

a retractable, generally U-shaped head section, the head section having a pair of parallel legs connected by a cross rail, the legs being configured to be slidably received into the interior of the respective longitudinally extending side rails, a pair of brackets connecting the legs to a head rail, a cross rail pivotally received by the brackets, at least one handle pivotally mounted for movement about an axis corresponding to or parallel to the axis of the cross rail, the handle being connected to a pin configured for rotation about the axis of rotation defined by or parallel to the axis of the cross rail.

56. The ambulance cot according to Claim 55, wherein the at least one handle comprises first and second handles, the first and second handles being affixed to the cross rail such that actuation of either

of the first and second handles effects a rotation of the cross rail and actuation of the other handle.

57. The ambulance cot according to Claim 56, further comprising a locking mechanism for selectively fixing the position of the head section in one of an extended and a retracted position, the locking mechanism configured for actuation by the first and second handles.

58. The ambulance cot according to Claim 57, further comprising a locking mechanism deactivation mechanism for preventing the locking mechanism from becoming disengaged by the actuation of the first or second handle.

59. The ambulance cot according to Claim 58, further comprising the safety bar being configured to engage the locking mechanism deactivation mechanism.

60. The ambulance cot according to Claim 57, further comprising a pin extending from each handle into the interior of a respective bracket for engaging a first end of a locking mechanism linkage, the linkage having a second end for engaging the locking mechanism, the locking mechanism comprising a retractable pin configured to engage one of a plurality of receivers within the side rail for fixing the position of the head section relative to the side rail.

61. The ambulance cot according to Claim 60, wherein the plurality of receivers within the side rail are covered so as to be inaccessible from outside the side rail.

62. The ambulance cot according to Claim 60, wherein the locking mechanism deactivation mechanism operates by preventing movement of the pin extending from each handle into the respective bracket.

63. The ambulance cot according to Claim 55, further comprising the head section including a pair of steering wheels.

64. The ambulance cot according to Claim 63, further comprising the steering wheels being mounted for rotation about a fixed axis (i.e. non-castered).

65. The ambulance cot according to Claim 63, further comprising the steering wheels being mounted such that they are in contact with the ground only when the litter is in the lowered position and the head section is in the extended position to create a "steer" condition.

66. The ambulance cot according to Claim 55, further comprising the patient litter being supported by the support mechanism at an angle α relative to a support surface, the angle α being between 1°-10°.

67. The ambulance cot according to Claim 66, further comprising the angle α being between 2°-3°.

68. The ambulance cot according to Claim 66, further comprising the head section including a pair of steering wheels mounted such that they are in contact with the ground only when the litter is in the lowered position and the head section is in the extended position.

69. An ambulance cot comprising:

a wheeled base;

a patient litter disposed above said base;

a support mechanism which supports said patient litter for vertical movement relative to said base, said support mechanism including elongate first and second support elements which each have first and second ends respectively pivotally coupled to said patient litter and to said base, which can each expand and contract in length, and which are pivotally coupled to each other at locations between the ends thereof for pivotal movement about an approximately horizontal pivot axis, said support mechanism further including a fixed-length link member having a first end supported on said base for pivotal movement about a common axis with said second end of said first support element, and having a second end supported on said second support element at a location axially between said pivot axis and said second end thereof for pivotal movement about a further axis which is substantially parallel to said pivot axis;

a hydraulic elevating system for selectively raising and lowering the patient litter, the hydraulic elevating system comprising an electrically operated hydraulic pump and a hydraulic cylinder, the hydraulic cylinder having a first end connected to the base for pivotal movement about a common axis with said second end of said first support element and a second end pivotally supported on said second support element at a location axially between said pivot axis and said first end thereof for pivotal movement about a further axis which is substantially parallel to said pivot axis; and

a control system for said hydraulic elevating system, said control system comprising a first switch assembly and a second switch assembly, the first and second switch assemblies being electrically connected to

the control system, each of the first and second switch assemblies comprising at least two operating buttons for raising and lowering the patient litter respectively, the first and second switch assemblies being physically remote from one another.

70. The ambulance cot according to Claim 69, wherein the switch assemblies are configured to require actuation of two switch contacts to effect a raising or lowering of the patient litter.

71. The ambulance cot according to Claim 70, wherein the switch assemblies are configured to enable actuation of the two switch contacts simultaneously by manual actuation of a single operating button.

72. The ambulance cot according to Claim 71, wherein the two switch contacts are contained in a single membrane-style button, configured such that light depression of the button actuates a first of the two switch contacts to initiate a power on condition of the ambulance cot and full depression of the button actuates a second of the two switch contacts to initiate the raising or lowering of the patient litter.

73. The ambulance cot according to Claim 69, the first and second switch assemblies each further comprising a shroud shielding the buttons from inadvertent actuation.

74. The ambulance cot according to Claim 69, the first and second switch assemblies further comprising low profile membrane design buttons.

75. An ambulance cot comprising:

a wheeled base; and

a patient litter disposed above and supported for adjustable vertical movement on said base by a support mechanism, the patient litter comprising:

a pair of longitudinally extending side rails, the side rails configured to extend from a head end to a foot end of the patient litter;

a retractable, generally U-shaped head section, the head section having a pair of parallel legs connected by a cross rail, the legs being configured to be slidably received by the respective longitudinally extending side rails, and at least one handle pivotally mounted for movement about an axis of the cross rail, a latch mechanism for selectively fixing the position of the head section in at least one of an extended and a retracted position, the latch mechanism configured for operation by the at least one handle, and

a latch disabler configured to prevent the operation of the latch mechanism by the at least one handle.

76. The ambulance cot according to Claim 75, the head section further comprising a safety bar connected by a mounting bracket for pivotal movement about the axis of the cross rail, the mounting bracket including a head portion eccentrically disposed about the axis of the cross rail.

77. The ambulance cot according to Claim 76, the head portion further comprising a ramp portion configured for displacing a blocking pin within one of the parallel legs to block the link pin.

78. The ambulance cot according to Claim 77, the at least one handle further comprising a first handle and

a second handle, each associated with a respective parallel leg and corresponding latch mechanism within the respective parallel leg.

79. The ambulance cot according to Claim 78, further comprising a pair of latch disablers, each associated with a respective parallel leg, handle and latch mechanism.

80. The ambulance cot according to Claim 78, the first and second handles being affixed to the cross rail such that actuation of either of the first and second handles effects a rotation and actuation of the other handle.

81. The ambulance cot according to Claim 75, further comprising the handle including a link pin extending into the interior of a respective leg for engaging a first end of a latch mechanism linkage, the linkage having a second end for engaging the latch mechanism, and the latch mechanism comprising a retractable latch pin configured to engage one of a plurality of receivers within the side rail for fixing the position of the head section relative to the side rail.

82. The ambulance cot according to Claim 81, further comprising the latch disabler preventing the movement of the handle about the axis of the cross rail by blocking the link pin.

83. An ambulance cot, comprising:
a base frame;
a litter frame;

an elevating mechanism interconnecting said base frame and said litter frame and being configured to effect changes in elevation of said litter frame relative to said base frame; and

a control mechanism including a cot antenna and a separate tool configured for at least one of cot programming, remote control and cot diagnostics and having a tool antenna, said control mechanism and said tool being configured for wireless communication so that said tool can execute diagnostic analysis of said control mechanism and report the results thereof.

84. The ambulance cot according to Claim 83, wherein said litter frame includes a patient support deck having a head section, a seat section and a foot section, said cot antenna being oriented beneath said seat section.

85. A combination of an ambulance cot and a load system onboard an ambulance for facilitating a loading and unloading of said ambulance cot, comprising:

said ambulance cot including a base frame, a litter frame and an elevating mechanism interconnecting said base frame and said litter frame and being configured to effect changes in elevation of said litter frame relative to said base frame, said elevating mechanism comprising an extendable and retractable actuator connected to and extending between said base frame and said litter frame, an onboard control circuit for controlling an operation of said extendable and retractable actuator;

said load system onboard said ambulance having thereon a load system control circuit and a device for effecting a coupling of said ambulance cot to said load system;

a cot antenna mounted on said ambulance cot and connected in circuit with said onboard control circuit;

a load system antenna mounted on said ambulance and connected in circuit with said load system circuit; and

a separate tool configured for at least one of cot programming, remote control and cot diagnostics and load system diagnostics, said tool having a tool antenna, said tool being configured for wireless communication so that said tool can execute at least one of cot programming, remote control and diagnostic analysis of said control circuit onboard said cot and said load system circuit separately and/or together.

86. The combination according to Claim 85, wherein said litter frame includes a patient support deck having a head section, a seat section and a foot section, said cot antenna being oriented beneath said seat section, and wherein said load system further comprises a trolley, said load system antenna being oriented on said trolley.

87. The combination according to Claim 86, wherein said trolley includes a load arm having said device thereon for facilitating a coupling of said load arm to said ambulance cot, wherein said load system antenna is oriented on said load arm.

88. An ambulance cot, comprising:

a base frame;

a litter frame;

an elevating mechanism interconnecting said base frame to said litter frame and being configured to effect changes in elevation of said litter frame relative to said base frame;

a motor for driving said elevating mechanism;

a computerized control system for monitoring a state of said cot and regulating operation of said motor, said control system including a transceiver configured to communicate data concerning said cot with a computerized monitoring and diagnostic system; and

an electrical energy source for energizing said motor and said computerized control system.

89. The ambulance cot according to Claim 88, wherein said motor is one of an electrical motor, a hydraulic pump, and a pneumatic pump.

90. The ambulance cot according to Claim 88, wherein said computerized control system further includes memory for retaining operation and usage statistics concerning said cot.

91. The ambulance cot according to Claim 90, wherein said computerized control system further includes a user interface configured to display at least one of a monitored state of said cot and usage statistic of said cot.

92. The ambulance cot according to Claim 88, wherein said computerized monitoring and diagnostic system comprises a separate tool that can be selectively configured to monitor at least one operating state of said cot and conduct diagnostic tests on said cot.

93. The ambulance cot according to Claim 92, wherein said tool includes a transceiver configured to wirelessly communicate data with said cot computerized control system.

94. The ambulance cot according to Claim 92, wherein said tool operates in one of a variety of modes, including:

a passive mode whereby said tool observes wireless communication activity between said cot computerized control system and a second wireless device;

a two-way active communications mode, whereby said tool interacts with said cot computerized control system; and

a multi-way active communications mode whereby said computerized tool interacts with at least two cot computerized control systems, or interacts with at least one cot computerized control system and a second wireless device.

95. The ambulance cot according to Claim 92, wherein said tool is configured to automatically enter a predetermined monitoring mode or diagnostic mode based upon:

a type of data wirelessly detected by said tool;

a number of active participants wirelessly detected by said tool; or

a combination of type of data wirelessly detected by said tool as well as number of active participants wireless detected by said tool.

96. The ambulance cot according to Claim 88, wherein said cot computerized control system wirelessly transmits a series of digital signals, with each said signal comprising a predetermined number of bits.

97. The ambulance cot according to Claim 96, wherein said predetermined number of bits include at least one bit for error correction and a plurality of bits representing cot data.

98. The ambulance cot according to Claim 96:

wherein at least a portion of said predetermined number of bits represents a diagnostic code when said cot computerized control system operates in a diagnostic mode; and

wherein each individual bit of at least a portion of said predetermined number of bits acts as an independent flag representing a specific state or condition of said cot when said cot computerized control system operates in a monitoring mode.

99. An ambulance cot system for facilitating the transport of a patient, comprising:

a cot for supporting and transporting said patient to and from an ambulance, said cot comprising:

a base frame,

a litter frame,

an elevating mechanism interconnecting said base frame to said litter frame and being configured to effect changes in elevation of said litter frame relative to said base frame,

a motor for driving said elevating mechanism,

a computerized control system for monitoring a state of said cot and regulating operation of said motor, said control system including a transceiver configured to wirelessly communicate data concerning said cot, and

an electrical energy source for energizing said motor and said computerized control system;

a load system mounted upon an interior surface of said ambulance and configured to selectively secure said cot within said ambulance, said load system comprising:

a guide track for guiding movement of said cot into and out of said ambulance,

a device for securing said cot relative to said guide track, and

a load system control circuit for selectively monitoring and controlling one or more states of said load system, said load system control circuit including a transceiver configured to wirelessly communicate data concerning said load system; and

a separate tool that can be selectively configured to monitor one or more operating states of at least one of said cot computerized control system and load system control circuit, as well as at least one of execute remote control commands and conduct diagnostic tests on at least one of said cot computerized control system and load system control circuit, said tool including a transceiver configured to wirelessly communicate data with at least one of said cot computerized control system and load system control circuit.

100. The ambulance cot system according to Claim 99, wherein said motor is one of an electrical motor, a hydraulic pump, and a pneumatic pump.

101. The ambulance cot system according to Claim 99, wherein said cot computerized control system further includes a user interface configured to display at least one of a monitored state of said cot and usage statistic of said cot.

102. The ambulance cot system according to Claim 99, wherein said tool operates in one of a variety of modes, including:

a passive mode whereby said tool observes wireless communication activity between said cot computerized control system and said load system control circuit;

a two-way active communications mode, whereby said tool interacts with one of said cot computerized control system and load system control circuit; and

a multi-way active communications mode whereby said computerized tool interacts with at least two cot computerized control systems, or interacts with at least one cot computerized control system and at least one load system control circuit.

103. The ambulance cot system according to Claim 99, wherein said tool is configured to automatically enter a predetermined monitoring mode or diagnostic mode based upon:

a type of data wirelessly detected by said tool;

a number of active participants wirelessly detected by said tool; or

a combination of type of data wirelessly detected by said tool as well as number of active participants wireless detected by said tool.

104. The ambulance cot system according to Claim 99, wherein at least one of said cot computerized control system and load system control circuit wirelessly transmits a series of digital signals, with each said signal comprising a predetermined number of bits.

105. The ambulance cot system according to Claim 104, wherein said predetermined number of bits include at least one bit for error correction and a plurality of bits representing either cot data or load system data.

106. The ambulance cot system according to Claim 104:

wherein at least a portion of said predetermined number of bits represents a diagnostic code when said cot

computerized control system or load system control circuit transmitting said signal operates in a diagnostic mode; and

wherein each individual bit of at least a portion of said predetermined number of bits acts as an independent flag representing a specific state or condition of said cot or load system when said cot computerized control system or load system control circuit transmitting said signal operates in a monitoring mode.

107. An ambulance cot, comprising:

a base frame;

a litter frame; and

an X-frame support mechanism interconnecting said base frame and said litter frame and being configured to support said litter frame in one of a plurality of positions relative to said base frame, said support mechanism including at least one pair of frame members pivotally secured to each other proximate the mid-length thereof, said frame members each having opposite ends respectively secured to one of said base frame and said litter frame, at least one of said pair of frame members having a first mount oriented between said mid-length thereof and said base, said at least one of said pair of frame members having a second mount oriented between said mid-length thereof and said litter frame, said first and second mounts being configured to respectively engage said base frame and said litter frame in response to said litter frame becoming proximate said base frame.

108. An ambulance cot, comprising:

a base frame;

a litter frame; and

an elevating mechanism interconnecting said base frame and said litter frame and being configured to

effect changes in elevation of said litter frame relative to said base frame, said elevating mechanism being configured to detect a presence and an absence of a force urging a change in elevation of said litter frame relative to said base frame to cause said base frame and said litter frame to become oriented closer together.

109. An ambulance cot, comprising:

a base frame;

a litter frame; and

an elevating mechanism interconnecting said base frame and said litter frame and being configured to effect changes in elevation of said litter frame relative to said base frame, said elevating mechanism including at least one pair of frame members pivotally secured to each other proximal the mid-length thereof to form a X-frame, said frame members each having opposite ends respectively secured to one of said base frame and said litter frame, an end of said frame members adjacent at least one of said base frame and said litter frame including thereon a rotational pivot mechanism having an axis of rotation that extends co-extensively with a longitudinal axis of said frame member, said rotational pivot mechanism being configured to pivotally connect said frame members to said base frame so that relative movement between said base frame and said frame members occurs about said axis of rotation.

110. An ambulance cot, comprising:

a base frame;

a litter frame;

an elevating mechanism interconnecting said base frame and said litter frame and being configured to effect changes in elevation of said litter frame relative to said base frame; and

a control system for said elevating mechanism, said control system comprising a first switch assembly and a second switch assembly, said first and second switch assemblies being electrically connected to said control system and configured to be functionally redundant of one another, each of said first and second switch assemblies comprising at least two operating buttons for raising and lowering said litter frame respectively.

111. The ambulance cot according to Claim 110, wherein said first and second switches are physically remote from one another and mounted on a foot end of said litter frame.

112. An ambulance cot, comprising:

a base frame;

a litter frame;

an elevating mechanism interconnecting said base frame and said litter frame;

a first control system configured to effect changes in distance between said litter frame and said base frame; and

a second control system comprising a manually engageable handle operatively connected to said elevating mechanism and configured to usurp said first control system and only effect at least one of an increase and a reduction in distance between said litter frame and said base frame.

113. The ambulance cot according to Claim 112, wherein said elevating mechanism includes a cot low height detection mechanism oriented adjacent an end of travel of said elevating mechanism.

114. An ambulance cot, comprising:

a base frame;

a litter frame;

an elevating mechanism interconnecting said base frame and said litter frame and being configured to effect changes in distance between said litter frame and said base frame, said elevating mechanism including an adjustable height limiting mechanism for facilitating a customized in-ambulance adjustment of the height of said litter frame relative to said base frame to correspond to a configuration of an ambulance with which said ambulance cot is being used.

115. The ambulance cot according to Claim 114, wherein said adjustable height limiting mechanism includes a cot low height detection mechanism oriented adjacent an end of travel of said elevating mechanism.

116. The ambulance cot according to Claim 115, wherein said cot low height detection mechanism is a limit switch.

117. The ambulance cot according to Claim 115, wherein said cot low height detection mechanism is a Hall effect mechanism.

118. The ambulance cot according to Claim 115, wherein said cot low height detection mechanism is a programmable LVDT mechanism.

119. An ambulance cot, comprising:

a base frame;

a litter frame;

a variable speed elevating mechanism interconnecting said base frame and said litter frame and being

configured to effect changes in distance between said litter frame and said base frame, said elevating mechanism including a first adjustable height detecting mechanism for facilitating a customized adjustment of the height of said litter frame relative to said base frame, said elevating mechanism additionally having a second adjustable height detecting mechanism oriented intermediate said first adjustable height detecting mechanism and a remote end of travel location of said elevating mechanism and being configured to effect a change in speed of said variable speed elevating mechanism.

120. The ambulance cot according to Claim 119, wherein said first adjustable height mechanism is oriented adjacent an end of travel of said elevating mechanism and is configured to effect a halting of movement of said elevating mechanism, and wherein said second adjustable height mechanism is configured to effect a slowing of said speed of said variable speed elevating mechanism.

121. An ambulance cot, comprising:

a base frame;

a litter frame;

an elevating mechanism interconnecting said base frame and said litter frame and being configured to effect changes in distance between said litter frame and said base frame, said elevating mechanism including at least one of a variable and a selectable multiple speed drive mechanism for facilitating a driving of a change in distance operation at variable speeds, said elevating mechanism additionally including a cot height detection mechanism oriented adjacent an end of travel of said

elevating mechanism and being configured to ramp down the speed of operation of said drive mechanism.

122. The ambulance cot according to Claim 121, wherein said cot height detection mechanism includes at least one limit switch.

123. The ambulance cot according to Claim 121, wherein said cot height detection mechanism is a Hall effect mechanism.

124. The ambulance cot according to Claim 121, wherein said cot height detection mechanism is a programmable LVDT mechanism.

125. The ambulance cot according to Claim 121, wherein said cot height detection mechanism includes a plurality of spaced sensors each configured to effect a change in speed of operation of said drive mechanism, a first of said sensors being configured to selectively slow the speed of operation while a second of said sensors being configured to halt the speed of operation.

126. The ambulance cot according to Claim 125, wherein said first and second sensors are proximity switches.

127. The ambulance cot according to Claim 125, wherein said first and second sensors are Hall effect sensors.

128. The ambulance cot according to Claim 125, wherein said first and second sensors are LVDT mechanisms.

129. An ambulance cot, comprising:

a base frame;

a litter frame;

an elevating mechanism interconnecting said base frame and said litter frame and being configured to effect changes in elevation of said litter frame relative to said base frame, said elevating mechanism including a variable speed drive mechanism for facilitating a driving of a change in elevation operation at variable speeds, said elevating mechanism additionally including a control circuit configured to ramp up the speed of operation of said variable speed drive mechanism to cause a smooth acceleration of said change in elevation operation.

130. A combination of an ambulance cot and an ambulance having a cargo area, comprising:

a base frame and a litter frame on said ambulance cot;

an elevating mechanism interconnecting said base frame and said litter frame and being configured to effect changes in elevation of said litter frame relative to said base frame; and

an in-ambulance device configured to operatively detect a presence and absence of said ambulance cot in said cargo area, a component of said cot being configured to operatively couple with said in-ambulance device to deactivate said elevating mechanism.

131. The combination according to Claim 130, wherein said component of said cot is said elevating mechanism that includes at least one cot height detection mechanism configured to deactivate said elevating mechanism solely in response to said cot being operatively coupled in said in-ambulance device.

132. The combination according to Claim 131, wherein said in-ambulance device includes a magnet, said cot height detection mechanism is a Hall effect sensor configured to detect the presence and absence of said magnet.

133. The combination according to Claim 132, wherein said Hall effect sensor is a cot low height detection sensor.

134. A combination of an ambulance cot and a load system onboard an ambulance for facilitating a loading and unloading of said ambulance cot, comprising:

said ambulance cot including a base frame, a litter frame and an elevating mechanism interconnecting said base frame and said litter frame and being configured to effect changes in distance between said base frame and said litter frame, said elevating mechanism comprising an extendable and retractable actuator connected to and extending between said base frame and said litter frame, an onboard control circuit for controlling an operation of said extendable and retractable actuator;

said load system onboard said ambulance having thereon a load system control circuit and a device for effecting a coupling of said ambulance cot to said load system;

a cot antenna mounted on said ambulance cot and connected in circuit with said onboard control circuit; and

a load system antenna mounted on said ambulance and connected in circuit with said load system circuit, said onboard control circuit being configured for a first mode of operation when communication between antennas is present and a second mode of operation when communication between antennas is not present.

135. The combination according to Claim 134, wherein said load system includes a radio frequency identification device oriented within a communication envelop defined between said cot antenna and said load system antenna, said onboard control circuit being configured to be responsive to communication received from said radio frequency identification device that results from said radio frequency identification device communicating with said cot antenna.

136. The combination according to Claim 134, wherein said radio frequency identification device is configured to record diagnostic/statistics relating to an interface between said load system and said cot.

137. An ambulance cot, comprising:

a base frame;

a litter frame;

an elevating mechanism interconnecting said base frame and said litter frame and being configured to effect changes in elevation of said litter frame relative to said base frame, said elevating mechanism comprising a hydraulic circuit having an extendable and retractable hydraulic actuator, said elevating mechanism being connected to and extending between said base frame and said litter frame, and a drive mechanism coupled through conduits to said hydraulic actuator for effecting a pumping of hydraulic fluid to said hydraulic actuator; and

a velocity fuse device connected in circuit with said hydraulic actuator and through which hydraulic fluid flows to at least one of extend and retract said extendable and retractable hydraulic actuator, said velocity fuse being configured to permit a maximum

hydraulic fluid flow rate in an event of a ruptured conduit to thereby regulate a speed of at least one of extension and retraction of said extendable and retractable hydraulic actuator to thereby regulate a speed of descent of said litter frame toward said base frame.

138. The ambulance cot according to Claim 137, wherein said velocity fuse is integral with said hydraulic actuator.

139. An ambulance cot comprising:

a base frame and a litter frame;

a deployment mechanism interconnecting said base frame and said litter frame and being configured to effect changes in distance between said litter frame and said base frame, said deployment mechanism having a detection device configured to detect a presence and an absence of a force urging a change in distance between said litter frame and said base frame to cause said base frame and said litter frame to become oriented closer together; and

a control mechanism on said ambulance cot, said control mechanism including a manually operable device for controlling said deployment mechanism, said control mechanism being configured to effect a rapid movement of said deployment mechanism in response to said detection device detecting an absence of said force and in response to an operation of said manually operable device, whereby when said ambulance cot is lifted away from a support surface, causing said detection device to detect an absence of said force, and said manually operable device is operated, said base frame will be rapidly drawn toward said litter frame by said deployment mechanism.

140. The ambulance cot according to Claim 139, wherein said deployment mechanism includes a hydraulic element and said detection device is further configured to detect a change in pressure of a hydraulic fluid in the hydraulic element.

141. The ambulance cot according to Claim 139 in combination with an ambulance having a cargo area, the ambulance comprising a loading mechanism configured to couple to said ambulance cot and lift said ambulance cot away from the support surface, the movement of said base frame away from said support surface causing said detection device to detect the absence of said force.

142. An ambulance cot, comprising:

a base frame;

a litter frame adjustably supported on said base frame and including an

extendable and retractable head section; and

a pouch mounted on said extendable and retractable head section.

143. The ambulance cot of Claim 142, further comprising the pouch being further mounted to said litter frame and collapsible as said head section is placed in a retracted position.

144. An ambulance cot, comprising:

a base frame;

a litter frame adjustably supported on said base frame and including a fowler pivotally connected thereto; and

an accessory hook mounted to said fowler.

145. The ambulance cot according to Claim 144, further comprising the accessory hook being mounted to an underside of the fowler for access with the fowler in a raised position.

146. The ambulance cot according to Claim 145, wherein said accessory hook is configured to orient objects thereon within a perimeter of said cot.

147. The ambulance cot according to Claim 145, further comprising an extendable and retractable head section, and a collapsible pouch connected between the litter frame and the head section, wherein the accessory hook is suspended over the pouch with the head section in an extended position.

148. An ambulance cot, comprising:

a base frame;

a litter frame;

an elevating mechanism interconnecting said base frame and said litter frame and being configured to effect changes in elevation of said litter frame relative to said base frame, said elevating mechanism comprising a hydraulic circuit having an extendable and retractable hydraulic actuator, said elevating mechanism being connected to and extending between said base frame and said litter frame, and a drive mechanism coupled through conduits to said hydraulic actuator for effecting a pumping of hydraulic fluid to said hydraulic actuator; and

said hydraulic actuator having a cylinder body and a piston movably supported in said cylinder body, said piston having an elongate rod mounted thereto for movement therewith;

a weep valve and a connection connecting an interior of said cylinder body to a port on said hydraulic body that is adjacent an end of said cylinder body that said elongate rod exits said cylinder body, said connection being oriented on a side of said piston oriented at said end remote from said end so that when said piston is at said end, hydraulic fluid will be permitted to flow from said interior of said cylinder body through said weep valve to prevent a pressure build up in said cylinder body.

149. An ambulance cot and docking (antler) system, the system comprising:

an ambulance cot having an extendable and retractable head end, a latch mechanism for selectively releasing said head end for movement between a retracted position and an extended position, and a pair of steering wheels rotatably mounted to the head end; and

a docking system configured for mounting to an ambulance cargo area floor and configured for receiving the ambulance cot between a pair of outwardly and rearwardly extending projections.

150. The ambulance cot and docking system according to Claim 149, further comprising the docking system including a center yoke and a forward yoke, each yoke being mounted to the ambulance cargo floor, with a centerline of the yokes aligned in the fore-aft direction of the ambulance, and

the center yoke being formed of two rods arranged as mirror images about the centerline of the antler system, each rod including a longitudinal segment and an outwardly divergent segment, each outwardly divergent segment terminating in the rearwardly extending projections,

wherein the ambulance cot is configured for rolling into the ambulance cargo area, a portion the ambulance cot engages the center yoke, and the cot is rolled further until the forward end of the cot engages the divergent segments of the antler system between the rearwardly extending projections.

151. The system according to Claim 149, further comprising the ambulance cot having a latch mechanism disabler operably connected to a depending safety bar.

152. The system according to Claim 151, further comprising the safety bar positioned on the ambulance cot to engage the docking system in order to activate the latch mechanism disabler when the ambulance cot is received in the docking system.

153. The system according to Claim 151, further comprising the safety bar being pivotally mounted to the ambulance cot and biased by a torsion spring toward a neutral position wherein the latch mechanism disabler is disengaged.

AMBULANCE COT AND HYDRAULIC ELEVATING MECHANISM THEREFOR

ABSTRACT OF THE DISCLOSURE

An ambulance cot is disclosed and the ambulance cot has, if desired, a wheel supported base and a litter raisable and lowerable by a powered elevating mechanism oriented between the base and the litter. The ambulance cot also has wireless communication capability to facilitate communication between the ambulance cot and a loading system on an ambulance as well as facilitating wireless troubleshooting via a handheld wireless unit. The ambulance cot also has a longitudinally extendable head section. The ambulance cot also has several accessories, such as an accessory hook mounted to the underside of the fowler, and a collapsible pouch accessory fastened to the retractable head section and the litter frame.

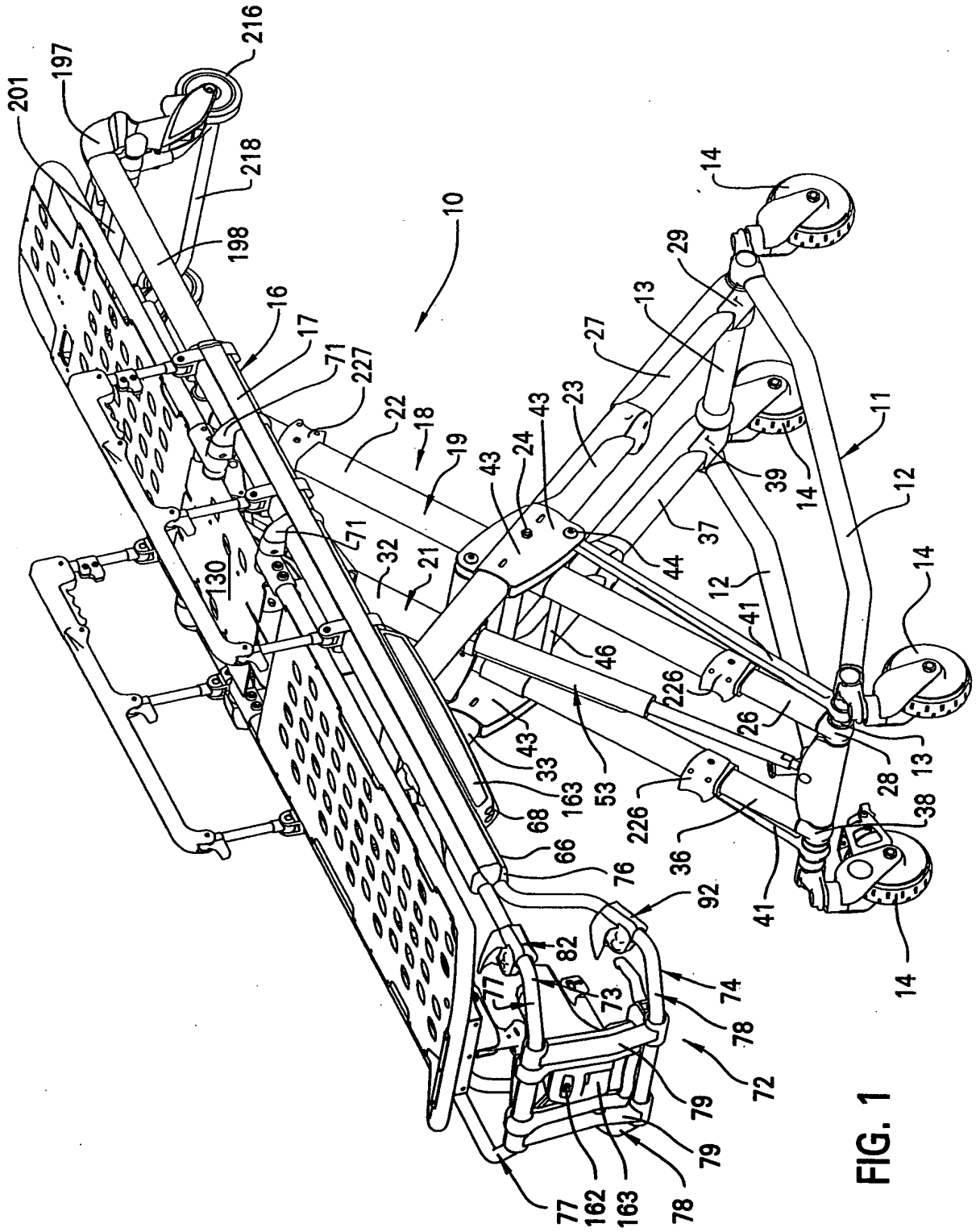

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FIG. 1

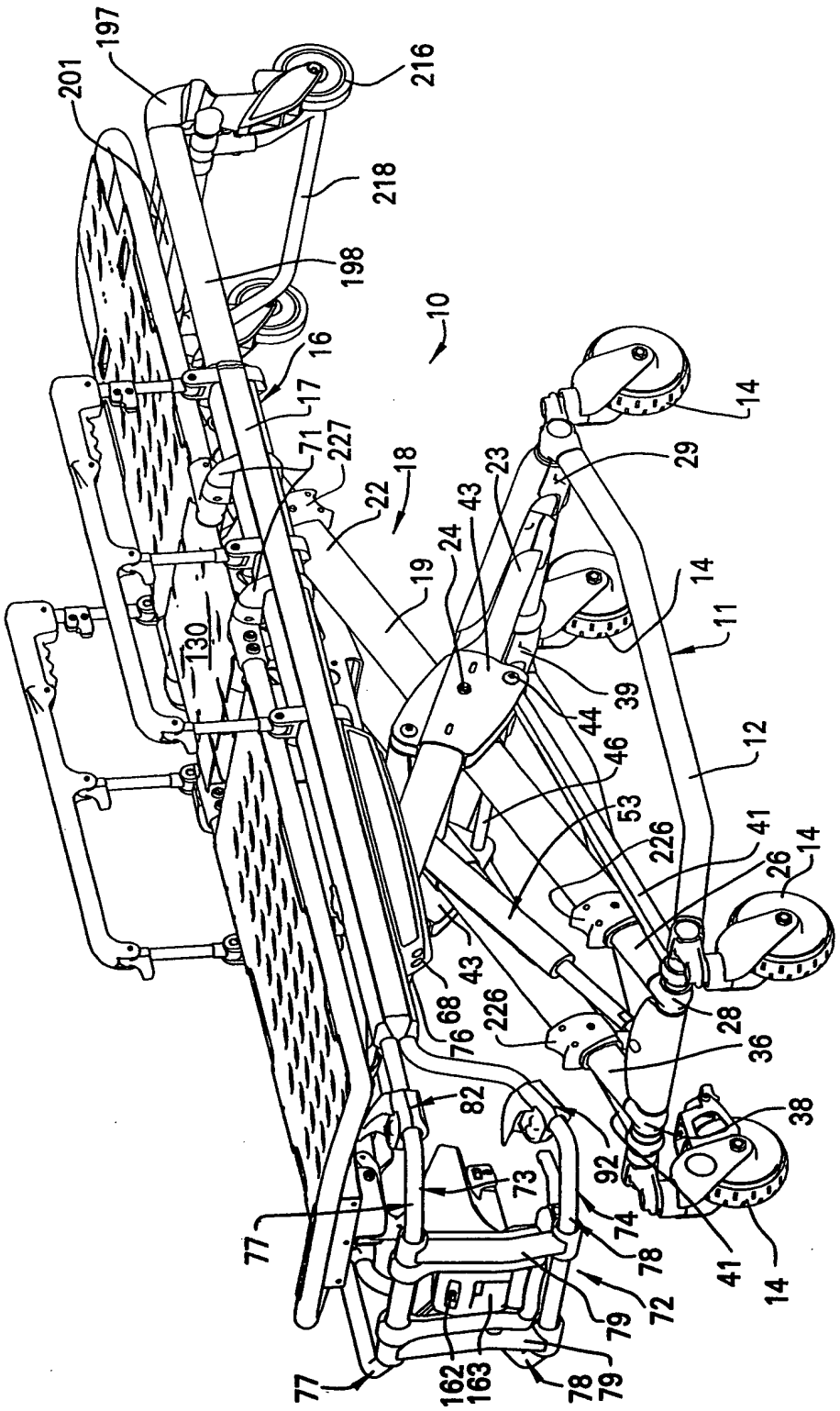

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FIG. 2

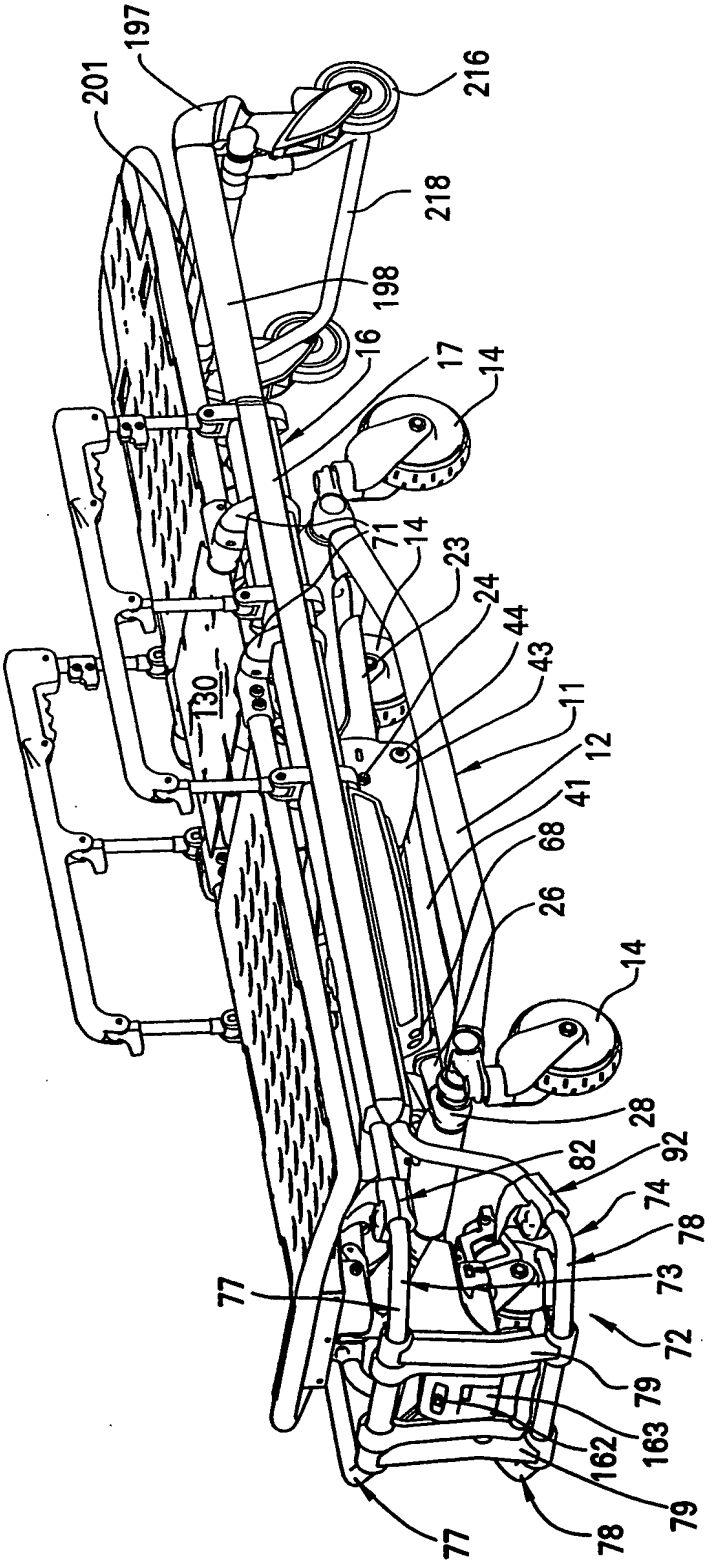

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FIG. 3

FIG. 15

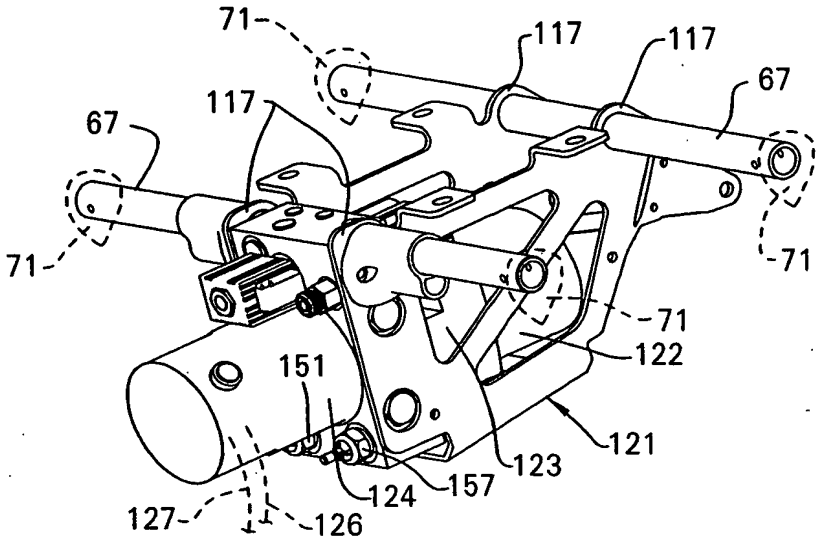
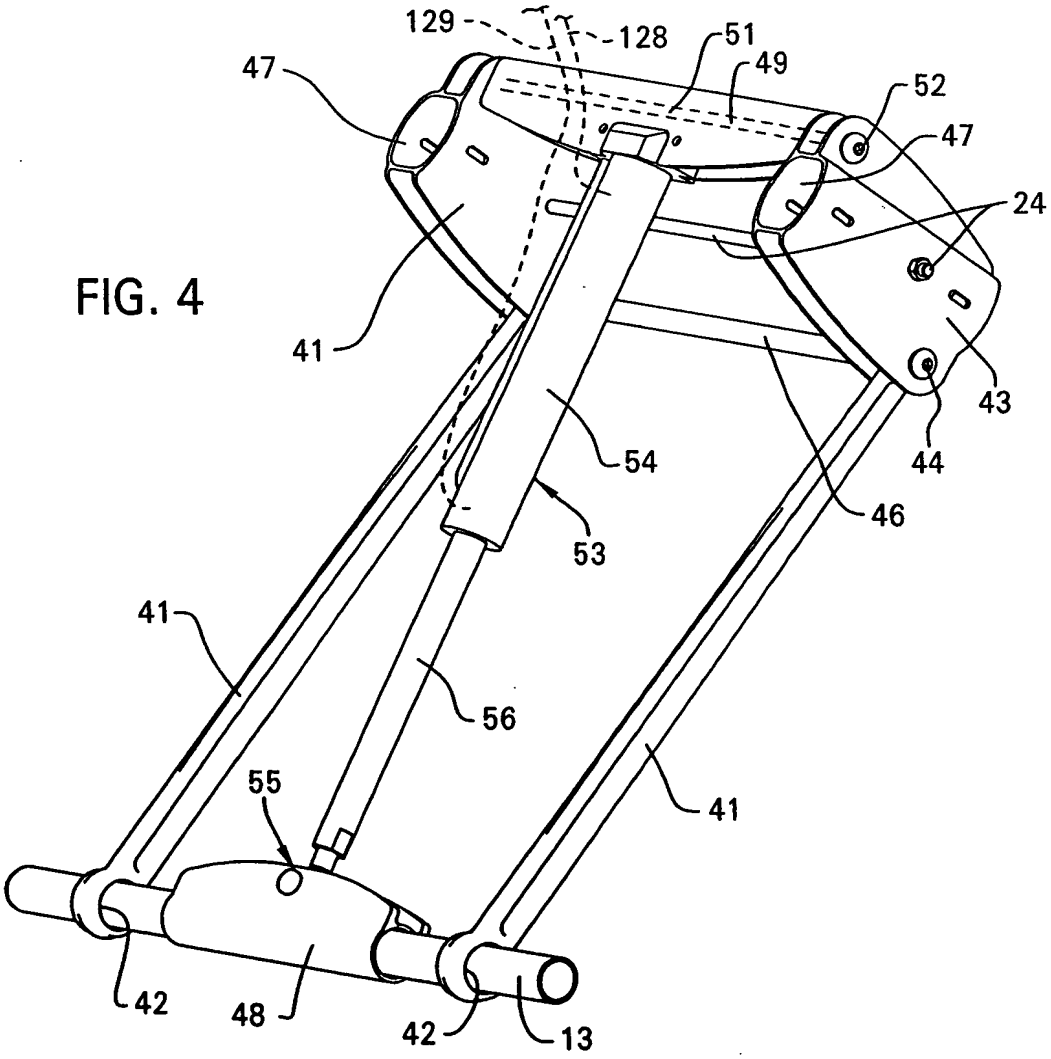

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FIG. 4


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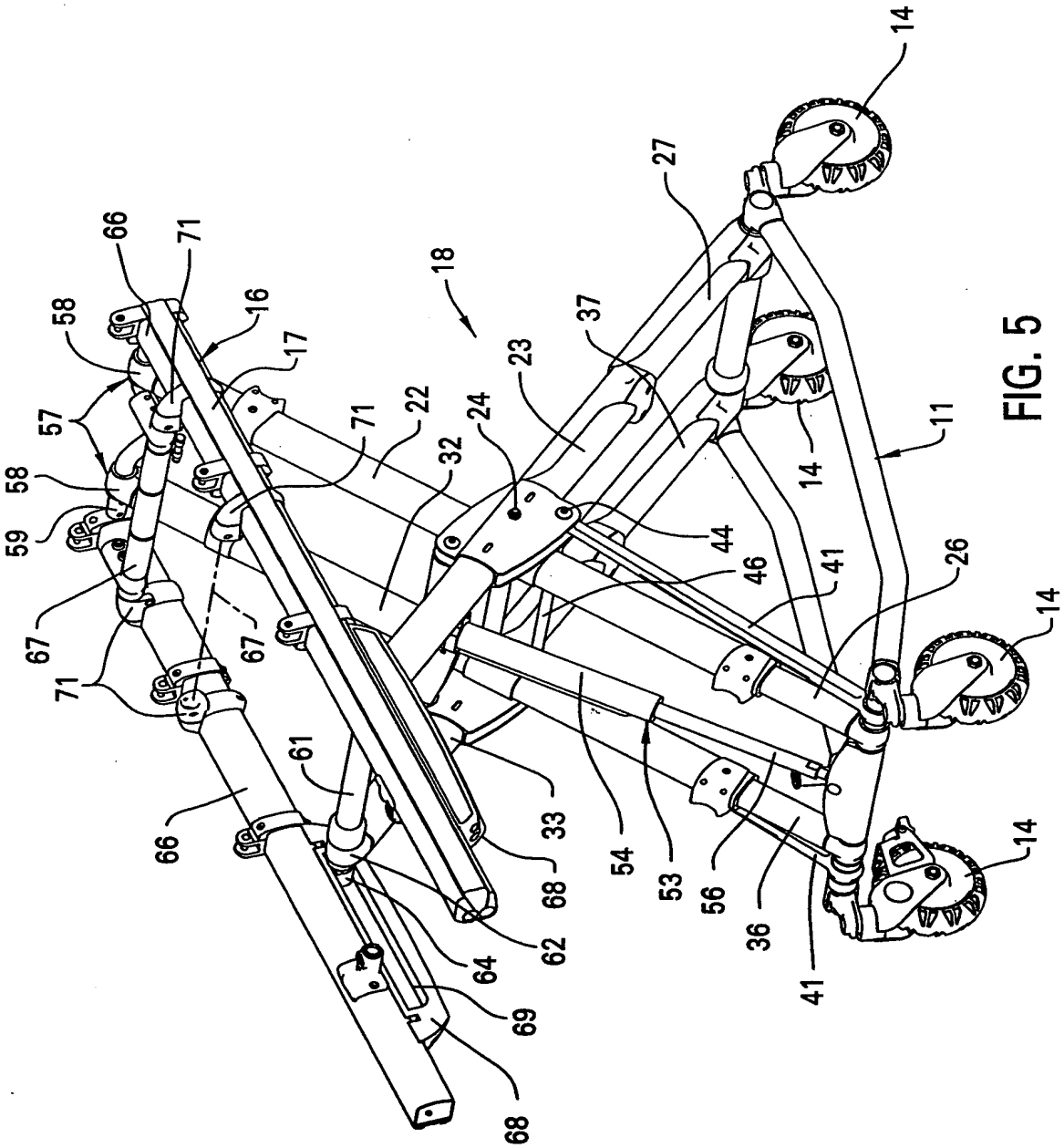

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53
56
36
14
68
62
64
69
68
41

FIG. 5

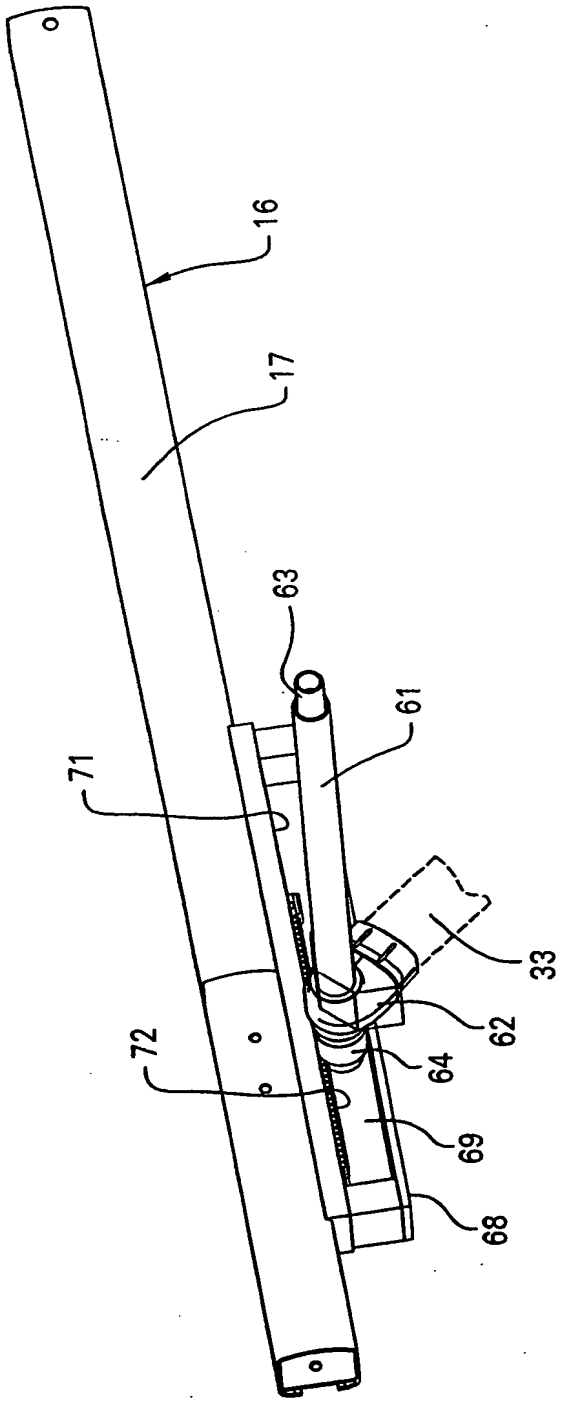


FIG.6

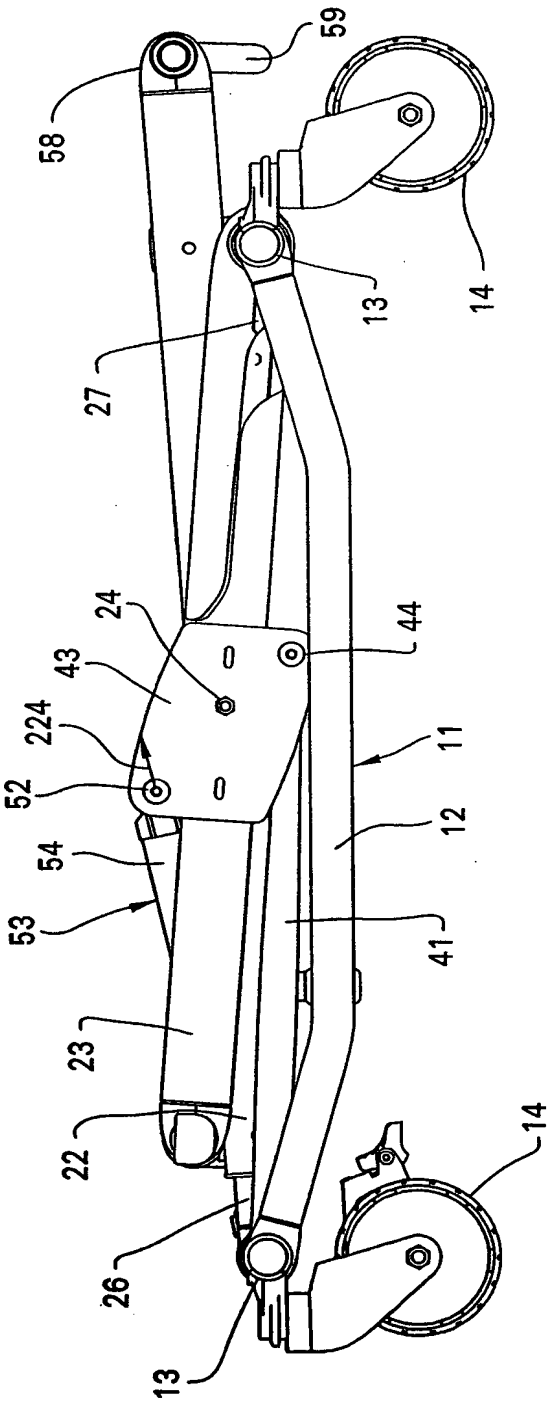


FIG. 7

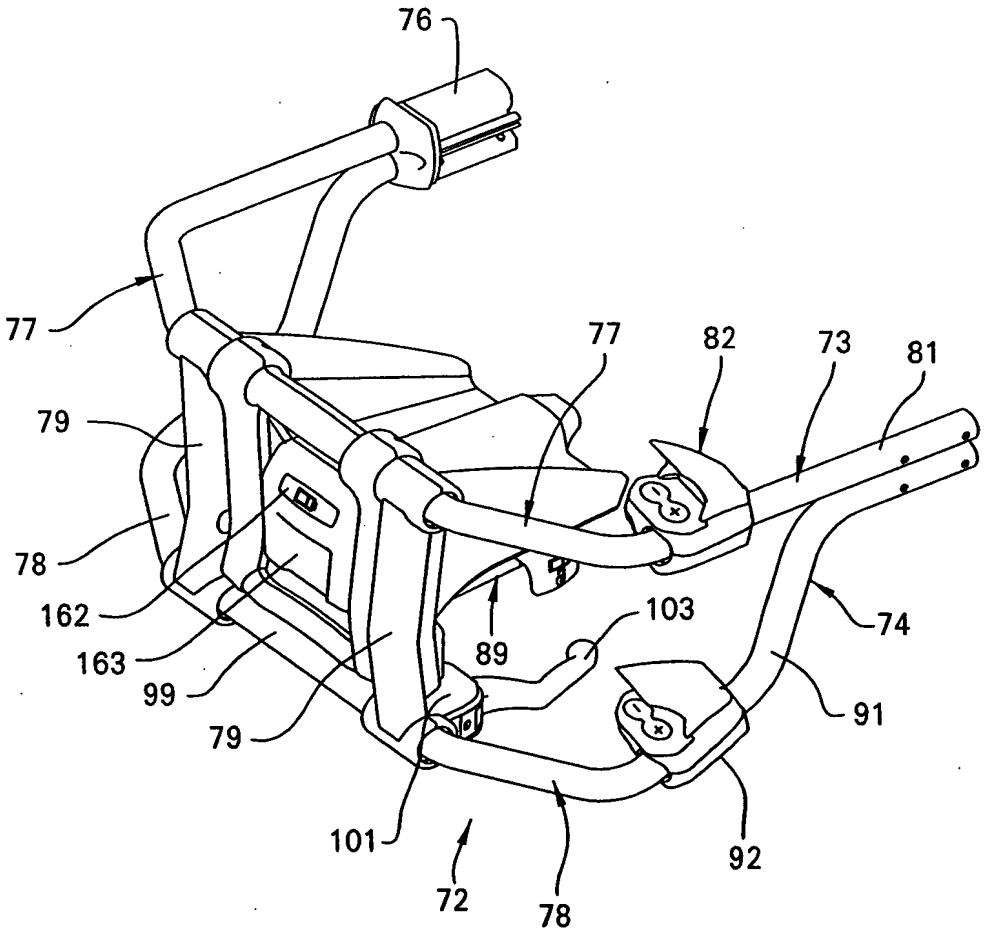


FIG. 8

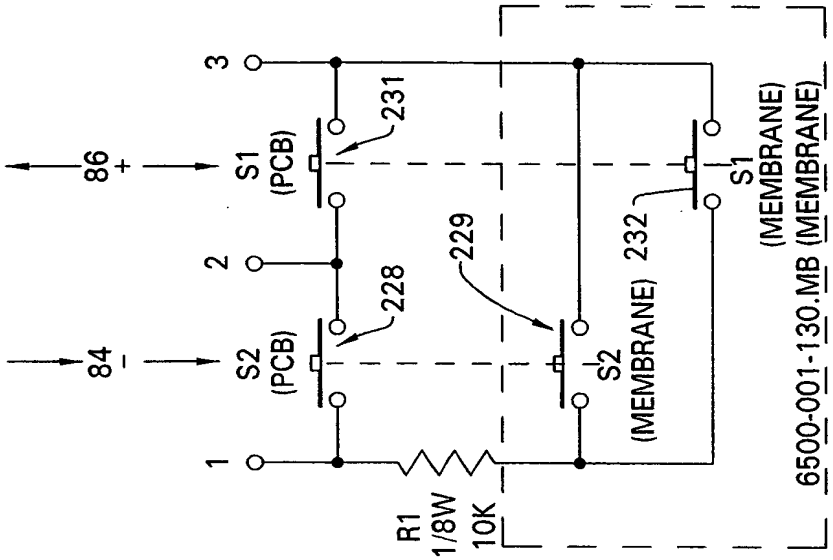

3
2
1
86
84
+
-
S1 (PCB)
S2 (PCB)
231
228
229
232
S1 (MEMBRANE)
S2 (MEMBRANE)
R1 1/8W 10K
6500-001-130.MB (MEMBRANE)

FIG. 11

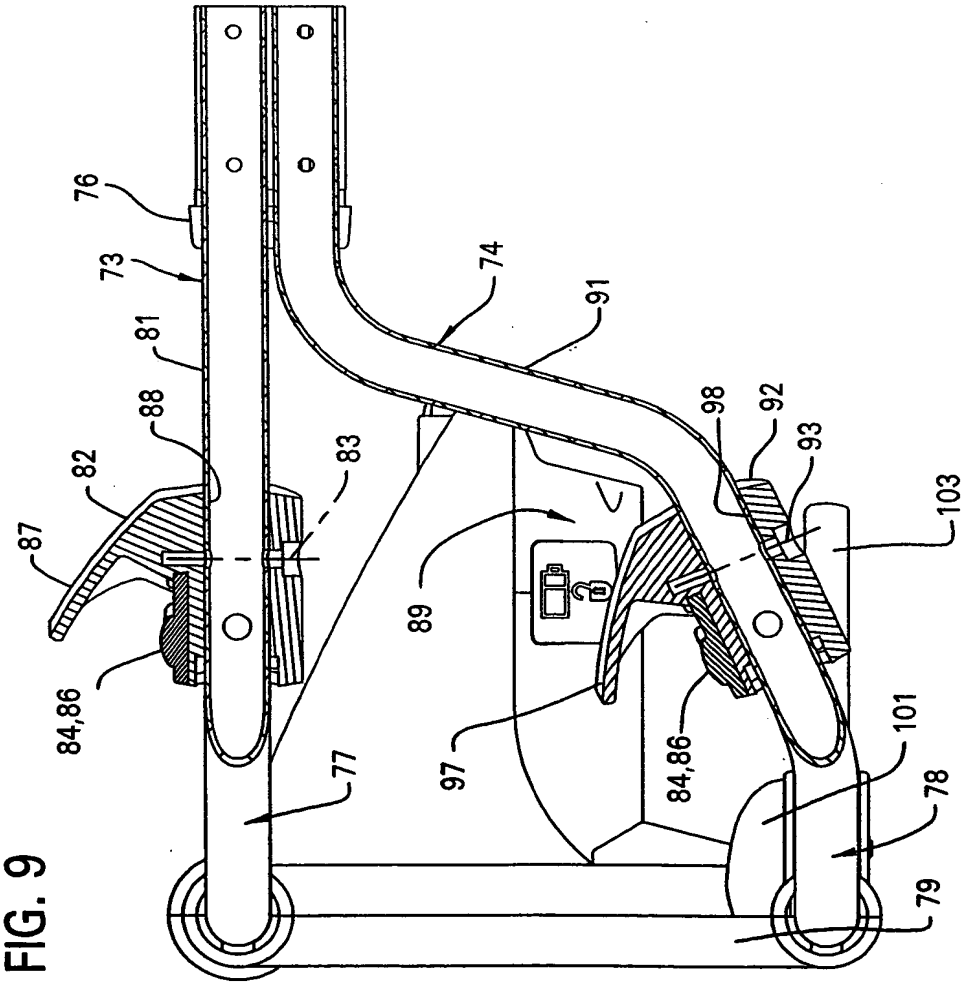

76
73
81
88
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87
84,86
83
74
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89
98
92
93
103
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84,86
101
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77

FIG. 9

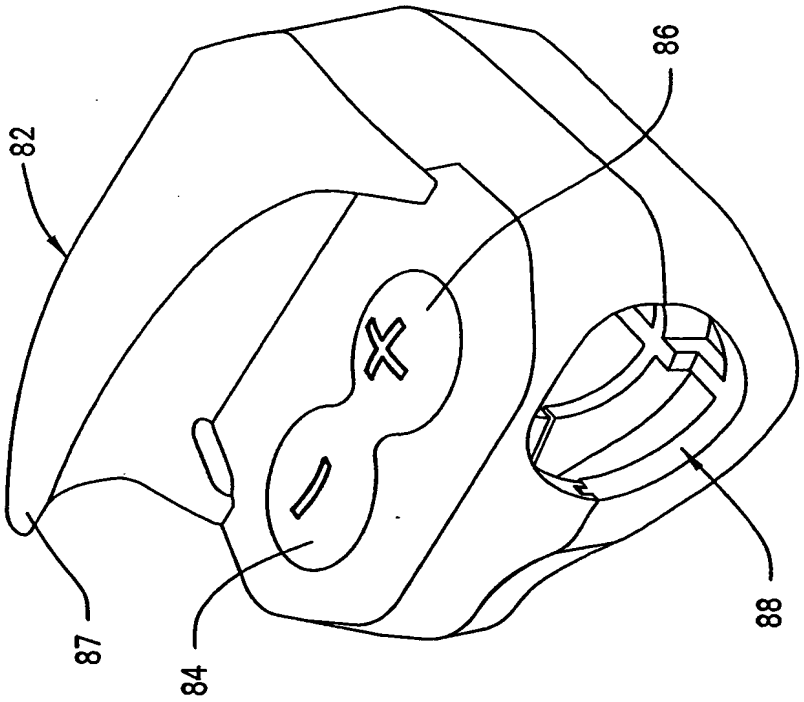


FIG. 10

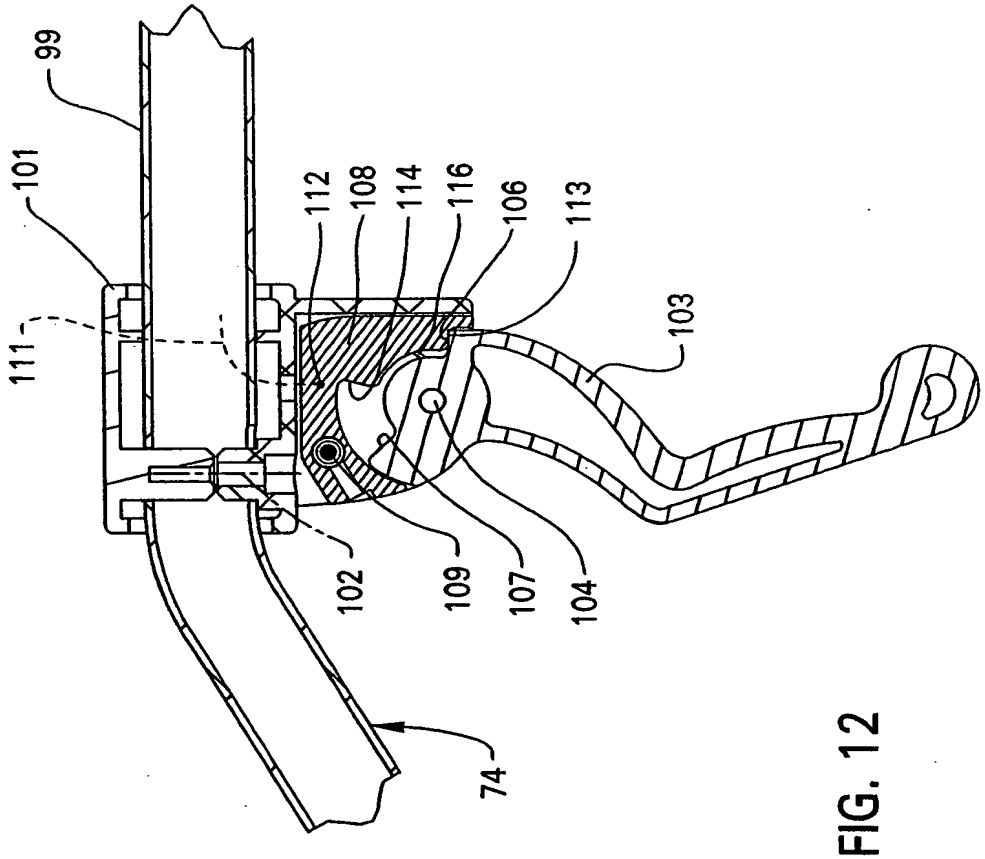


FIG. 12

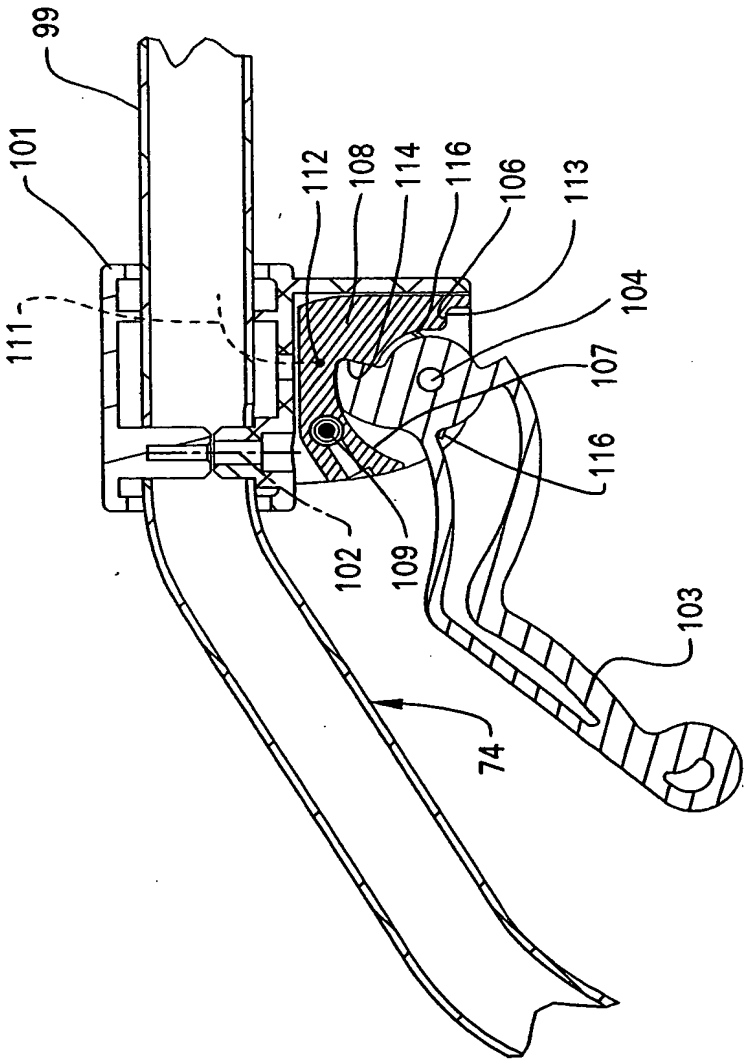


FIG. 13

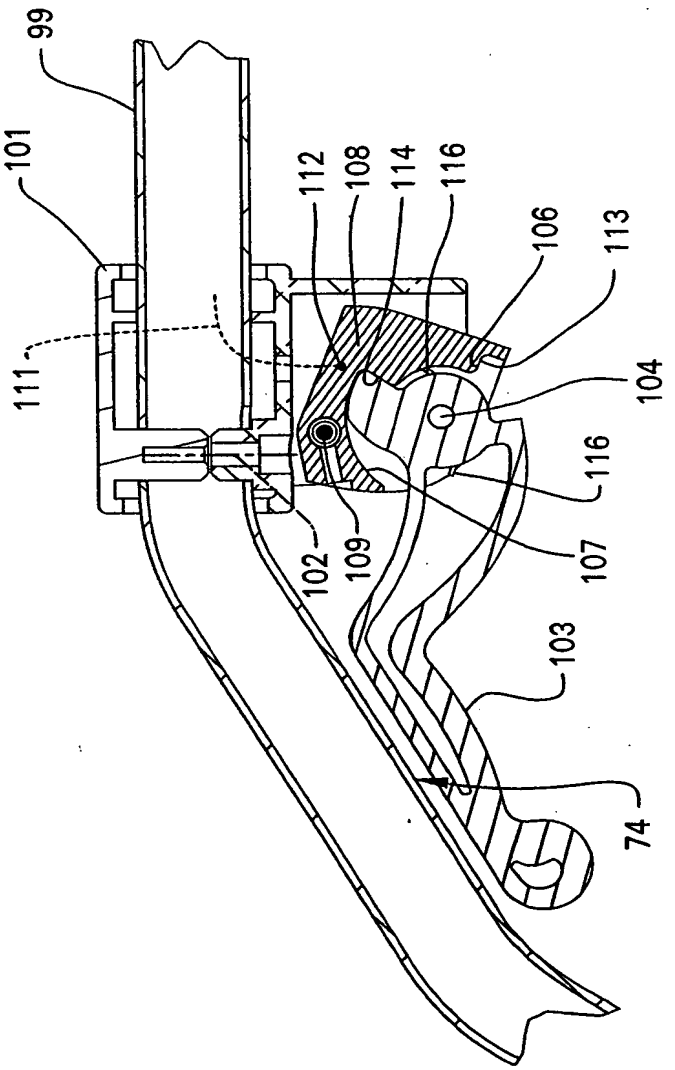


FIG. 14

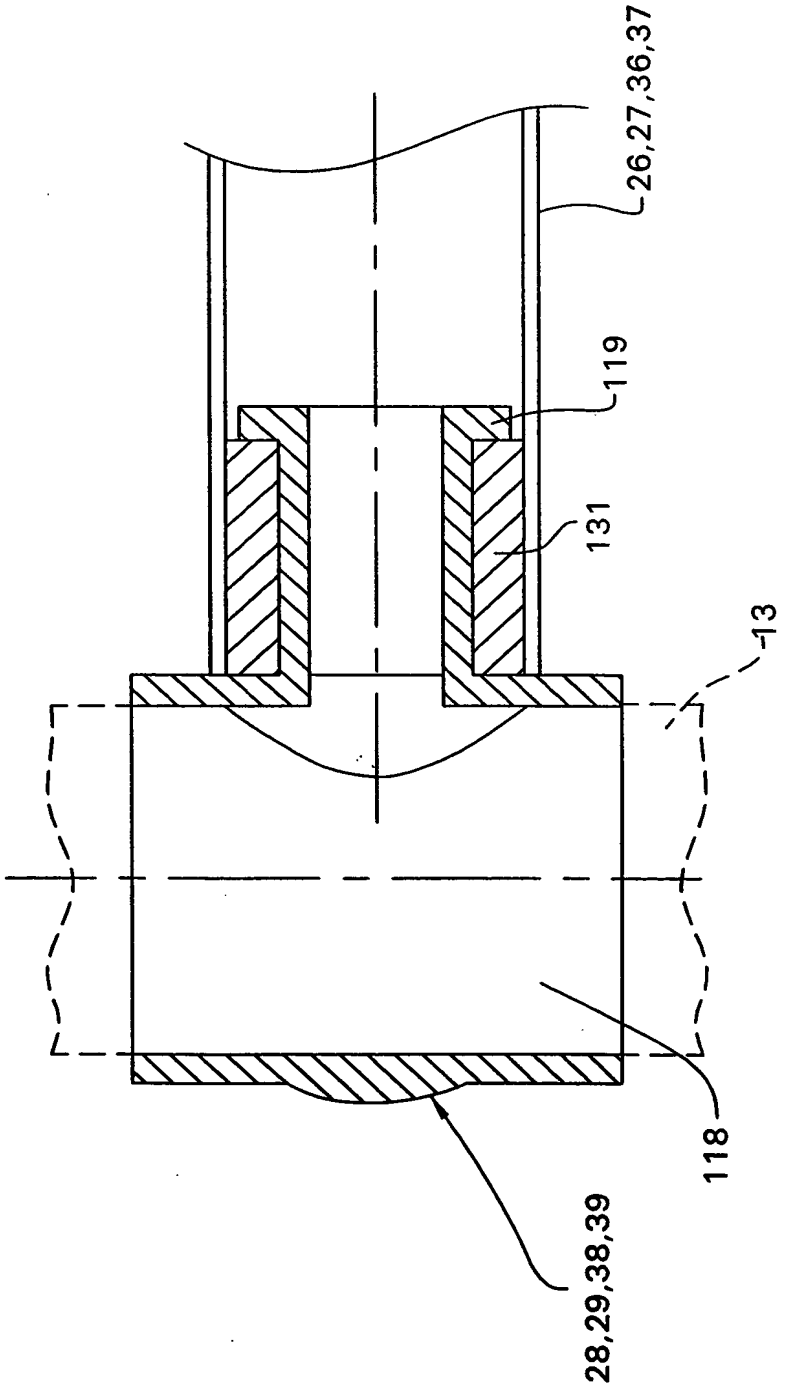


FIG. 16

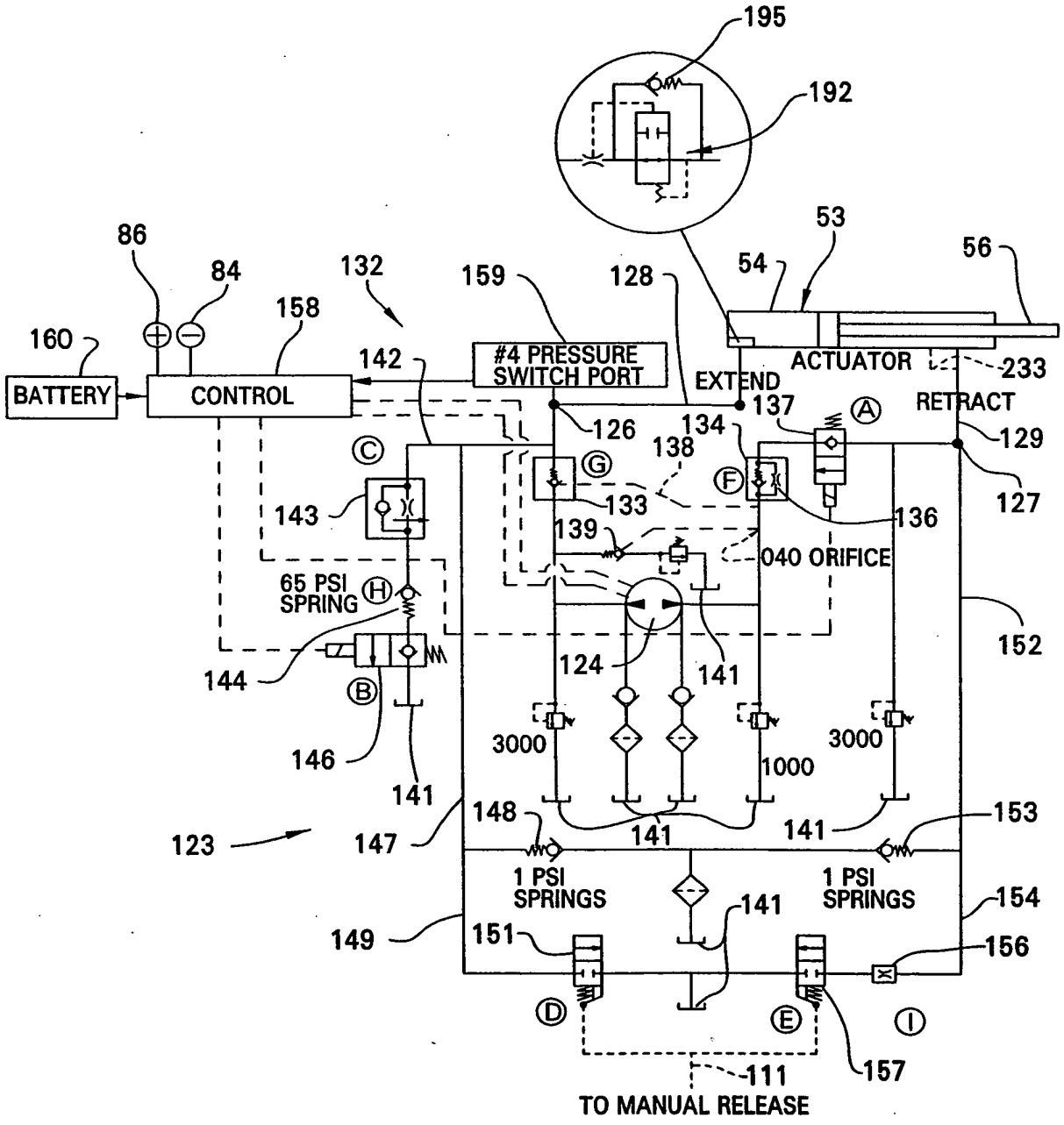

195
192
53
54
56
86
84
132
159
128
158
160
142
#4 PRESSURE SWITCH PORT
EXTEND
ACTUATOR
233
BATTERY
CONTROL
137
RETRACT
126
134
129
138
143
133
136
127
139
040 ORIFICE
65 PSI SPRING
152
144
124
141
146
3000
1000
3000
141
148
153
123
147
141
1 PSI SPRINGS
1 PSI SPRINGS
154
149
151
141
156
157
111
TO MANUAL RELEASE

FIG. 17

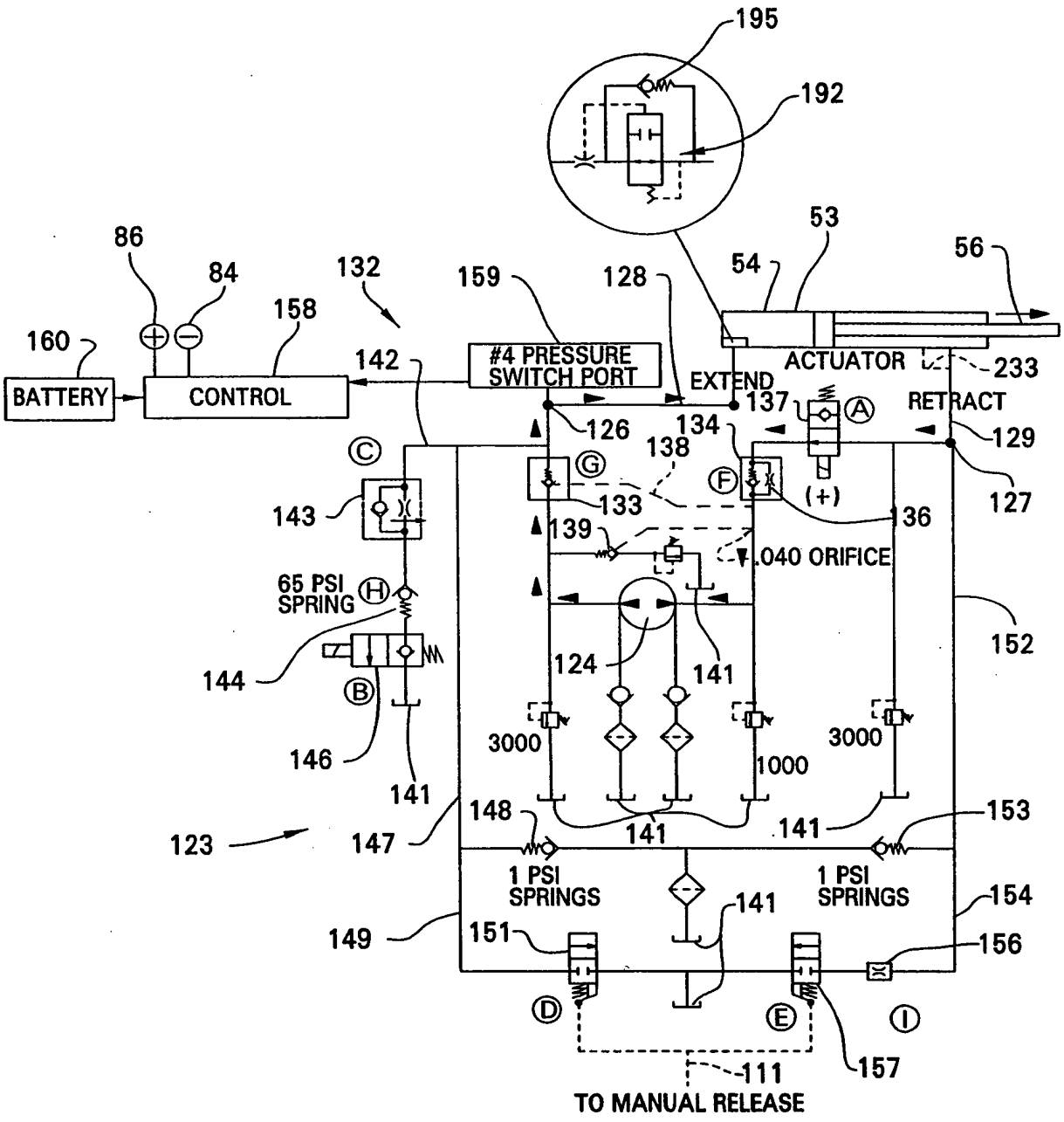

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142
#4 PRESSURE SWITCH PORT
ACTUATOR
233
BATTERY
CONTROL
EXTEND
137
RETRACT
126
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143
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.040 ORIFICE
65 PSI SPRING
152
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1000
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141
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153
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141
1 PSI SPRINGS
1 PSI SPRINGS
154
149
151
141
156
157
111
TO MANUAL RELEASE

FIG. 18

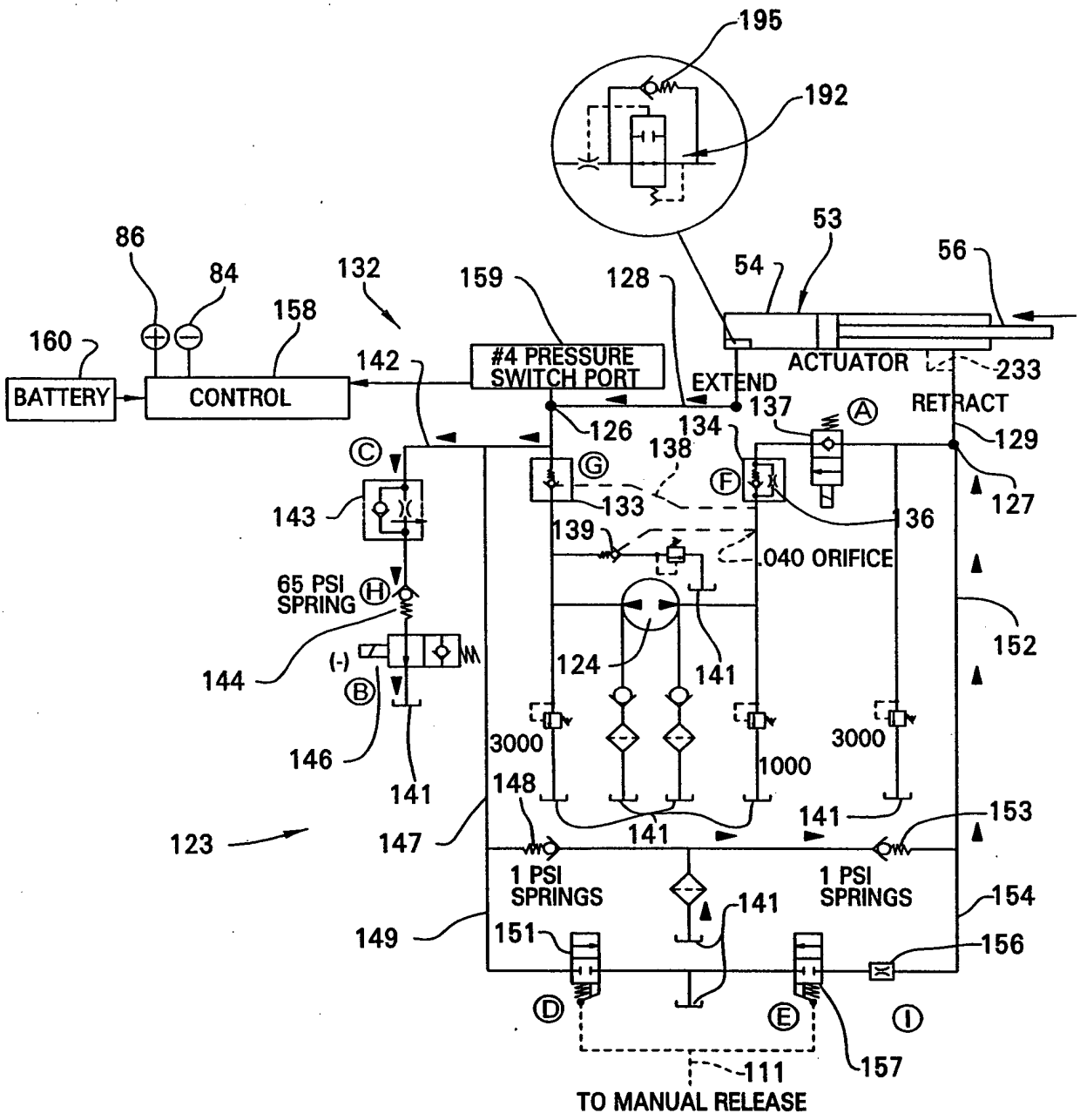

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142
#4 PRESSURE SWITCH PORT
ACTUATOR
233
BATTERY
CONTROL
EXTEND
137
RETRACT
126
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129
138
143
133
36
127
139
.040 ORIFICE
65 PSI SPRING
152
144
124
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1000
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1 PSI SPRINGS
154
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151
156
157
111
TO MANUAL RELEASE

FIG. 19

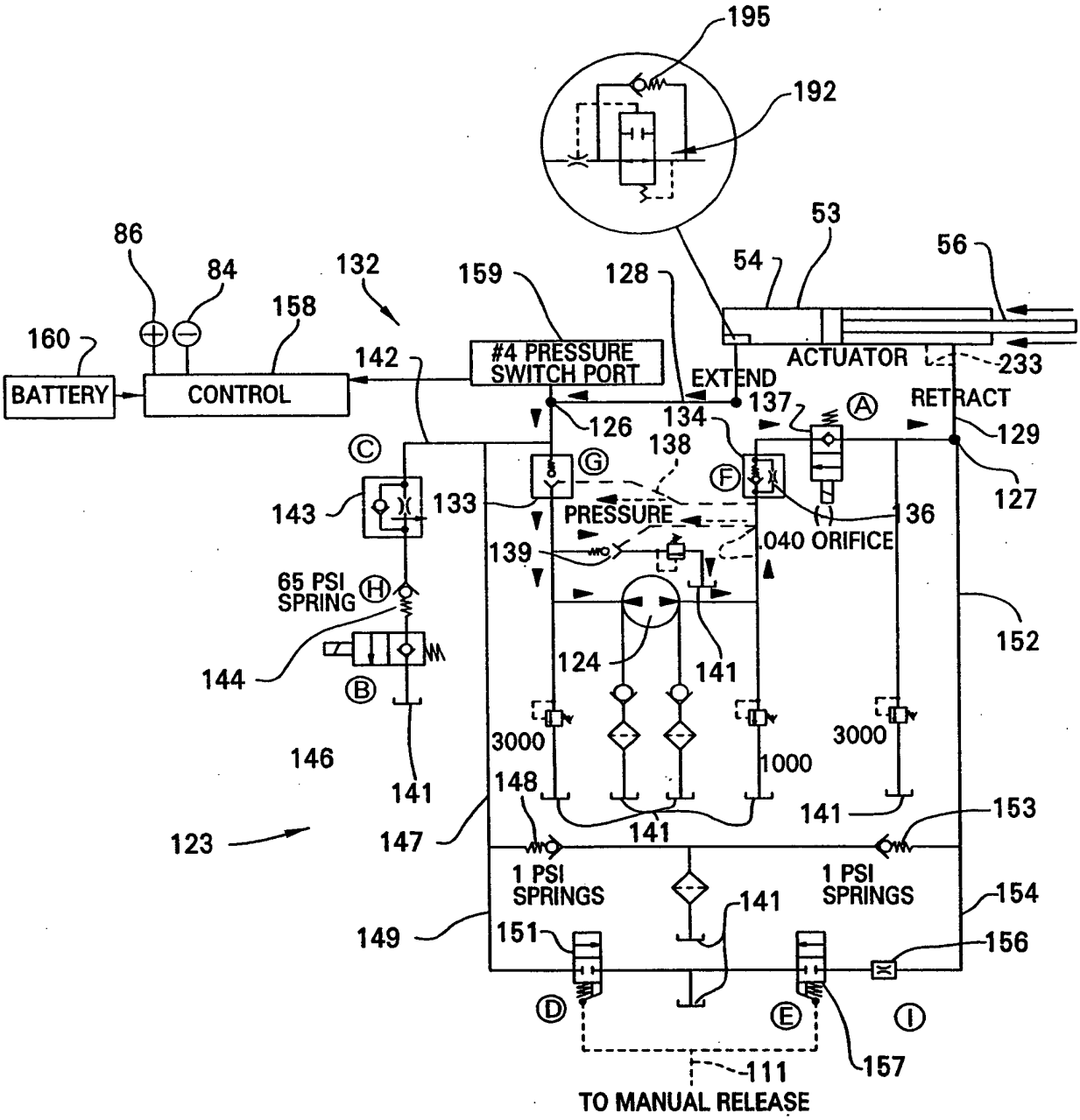

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128
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142
#4 PRESSURE SWITCH PORT
EXTEND
ACTUATOR
233
BATTERY
CONTROL
137
RETRACT
126
134
129
138
127
143
133
PRESSURE
36
139
.040 ORIFICE
65 PSI SPRING
152
144
124
141
3000
1000
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146
148
153
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123
147
141
1 PSI SPRINGS
1 PSI SPRINGS
154
149
151
141
156
157
111
TO MANUAL RELEASE

FIG. 20

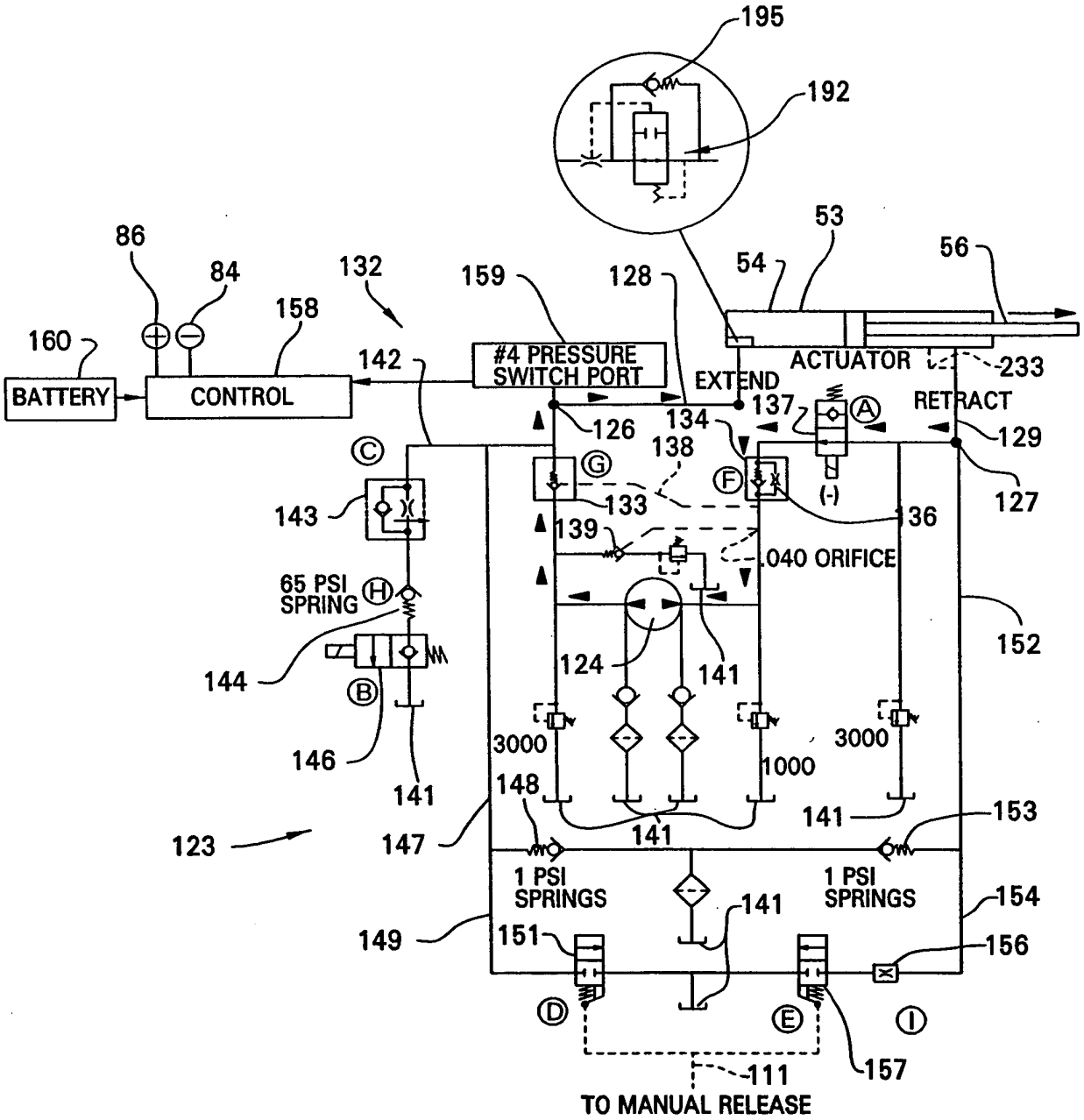

195
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142
#4 PRESSURE SWITCH PORT
EXTEND
ACTUATOR
233
BATTERY
CONTROL
137
RETRACT
126
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143
133
136
139
.040 ORIFICE
65 PSI SPRING
152
144
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3000
1000
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148
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123
147
1 PSI SPRINGS
154
149
151
156
157
111
TO MANUAL RELEASE

FIG. 21

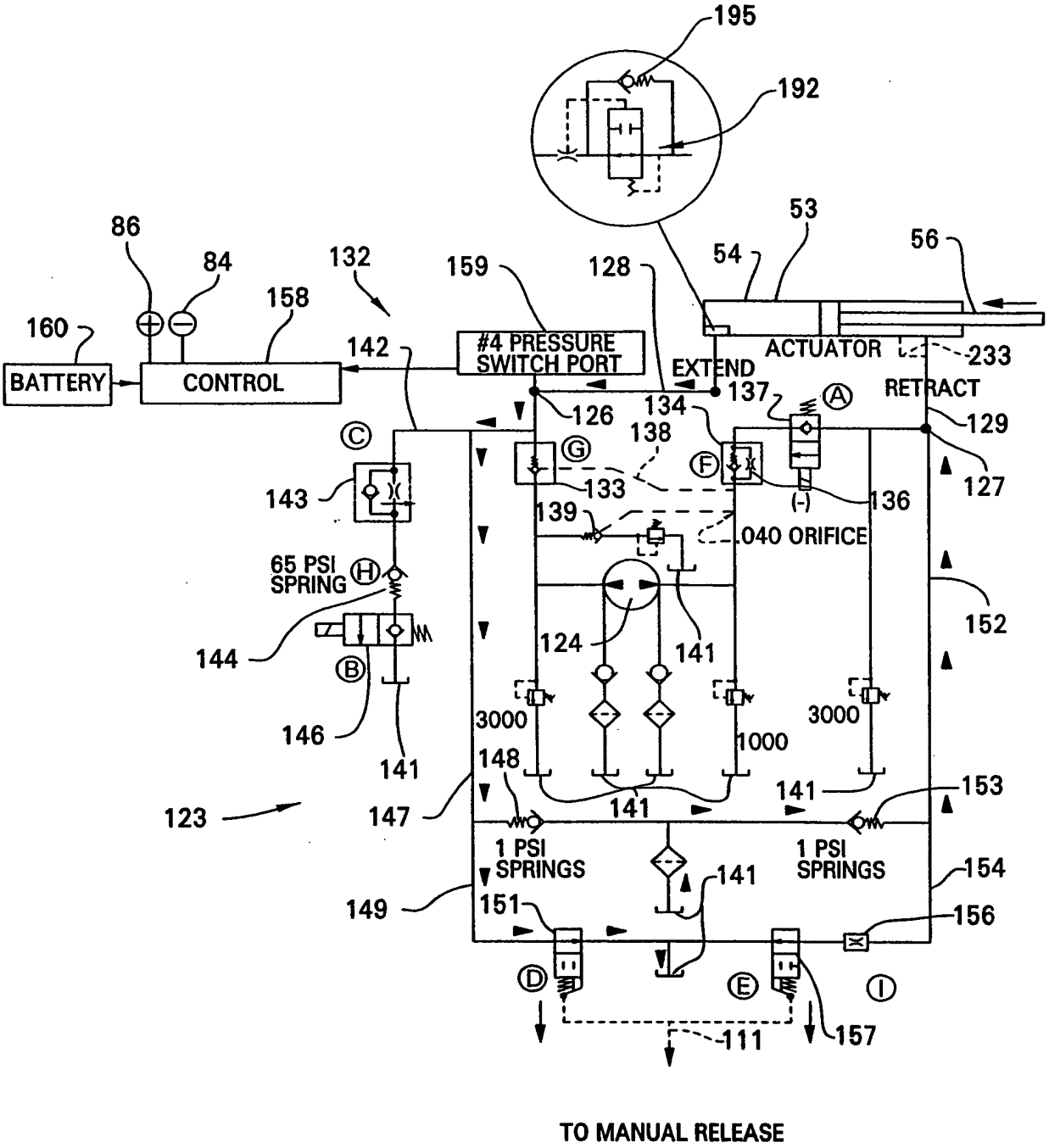

195
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86
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159
128
158
160
142
#4 PRESSURE SWITCH PORT
ACTUATOR
233
BATTERY
CONTROL
EXTEND
137
RETRACT
126
134
129
138
143
133
136
127
139
040 ORIFICE
65 PSI SPRING
152
144
124
141
146
3000
1000
3000
148
153
123
147
141
141
1 PSI SPRINGS
1 PSI SPRINGS
154
149
151
156
111
157
TO MANUAL RELEASE

FIG. 22

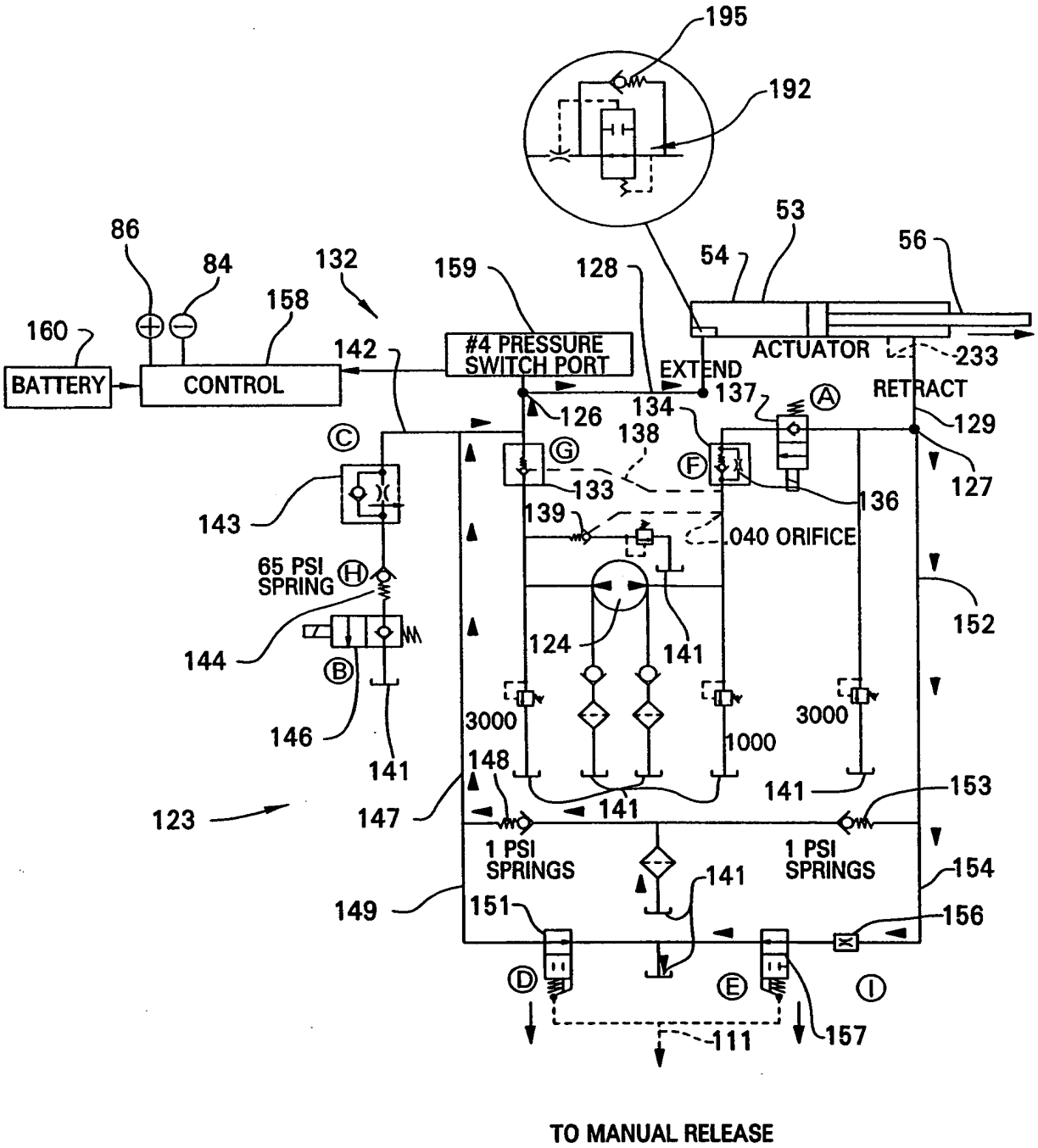

195
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159
128
158
160
142
#4 PRESSURE SWITCH PORT
EXTEND
ACTUATOR
233
BATTERY
CONTROL
137
A
RETRACT
126
134
129
C
G
138
F
127
133
136
143
139
.040 ORIFICE
65 PSI SPRING
H
152
144
124
141
B
3000
1000
3000
146
148
153
141
123
147
141
1 PSI SPRINGS
1 PSI SPRINGS
154
141
149
151
156
D
E
I
111
157
TO MANUAL RELEASE

FIG. 23

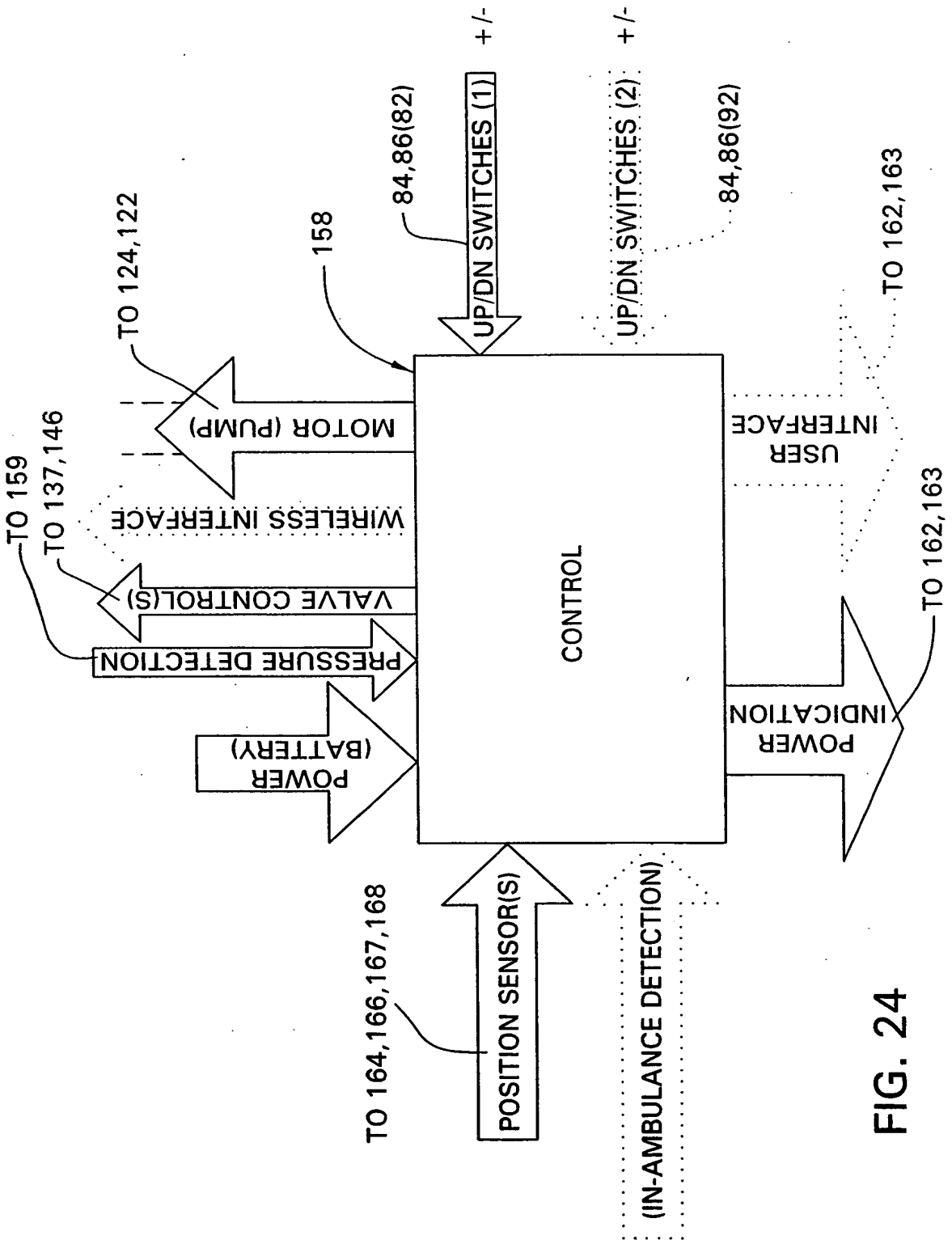

+/-
+/-
84,86(82)
UP/DN SWITCHES (1)
UP/DN SWITCHES (2)
84,86(92)
TO 162,163
158
TO 124,122
MOTOR (PUMP)
USER INTERFACE
TO 159
TO 137,146
WIRELESS INTERFACE
VALVE CONTROL(S)
CONTROL
TO 162,163
PRESSURE DETECTION
POWER INDICATION
POWER (BATTERY)
TO 164,166,167,168
POSITION SENSOR(S)
(IN-AMBULANCE DETECTION)

FIG. 24

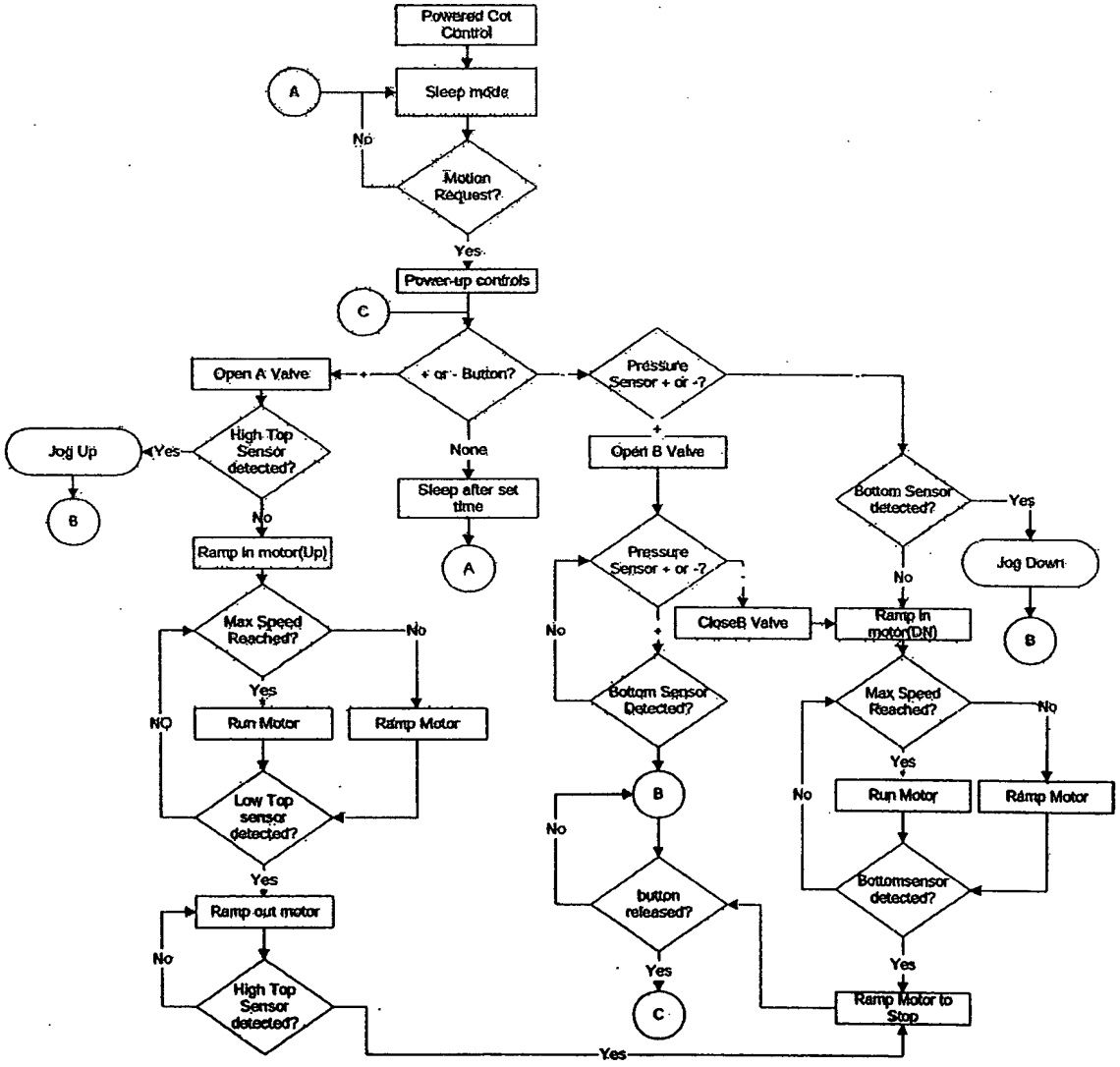

Powered Cot Control
A
Sleep mode
No
Motion Request?
Yes
Power-up controls
C
+ or - Button?
Open A Valve
Pressure Sensor + or -?
Jog Up
Yes
High Top Sensor detected?
No
None
Sleep after set time
A
B
Ramp in motor(Up)
Max Speed Reached?
No
Yes
NO
Run Motor
Ramp Motor
Low Top sensor detected?
Yes
Ramp out motor
No
High Top Sensor detected?
Yes
Open B Valve
Pressure Sensor + or -?
No
CloseB Valve
Bottom Sensor Detected?
B
No
button released?
Yes
C
Bottom Sensor detected?
Yes
Jog Down
B
No
Ramp in motor(DN)
Max Speed Reached?
No
Yes
No
Run Motor
Ramp Motor
Bottomsensor detected?
Yes
Ramp Motor to Stop
Yes

FIG. 25

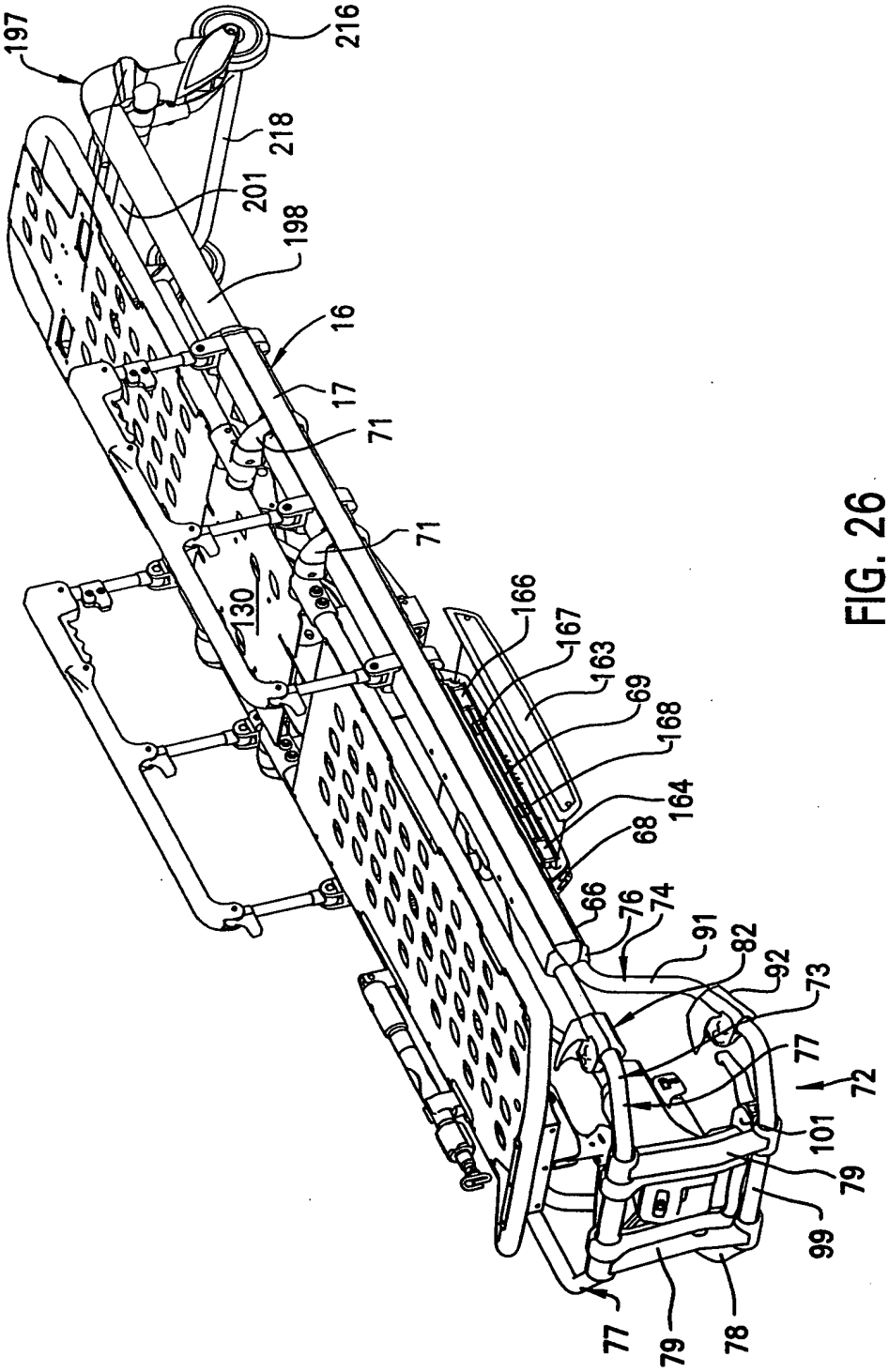

197
216
218
201
198
16
17
71
71
130
166
167
163
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168
164
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78

FIG. 26

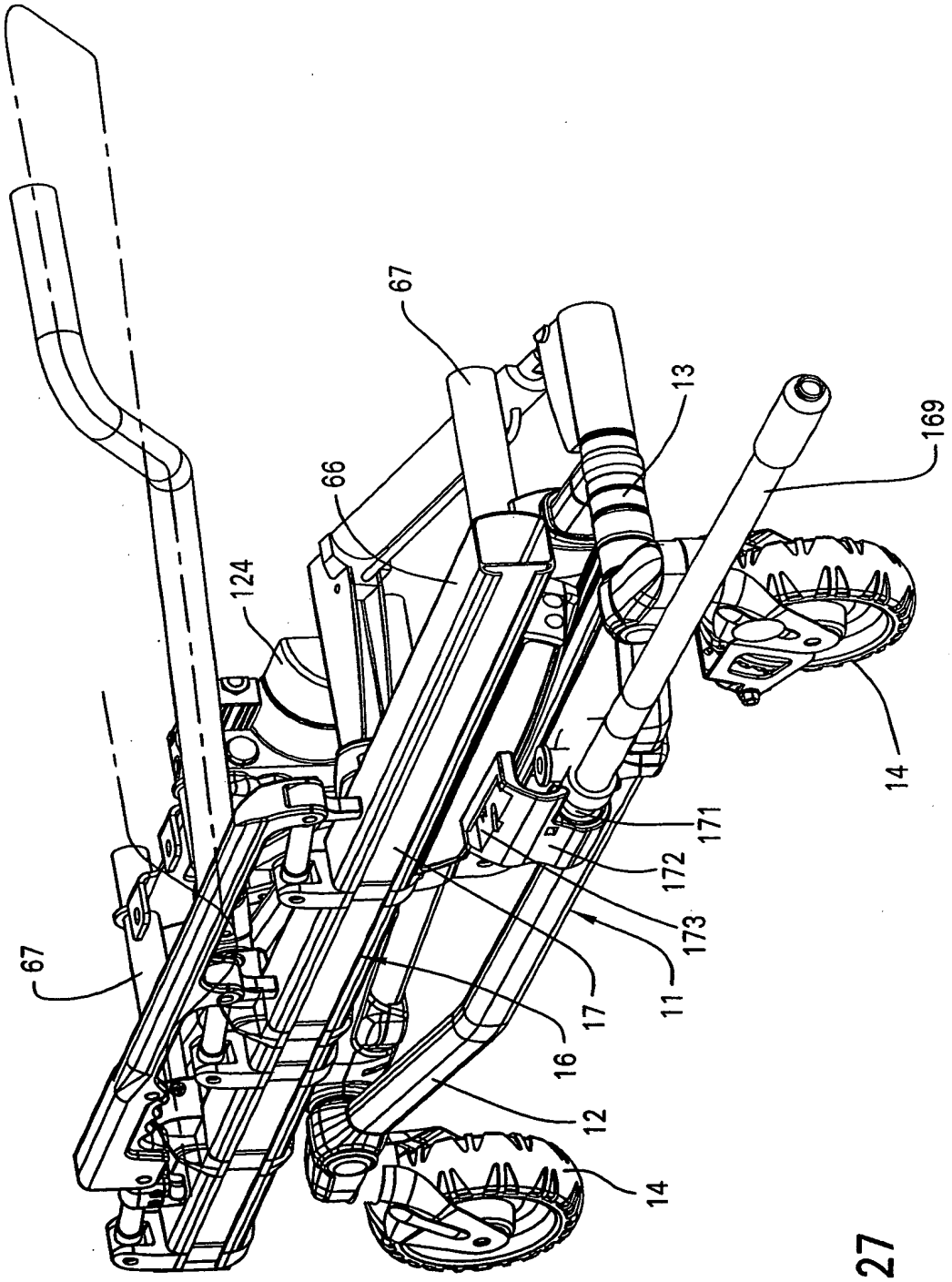


FIG. 27

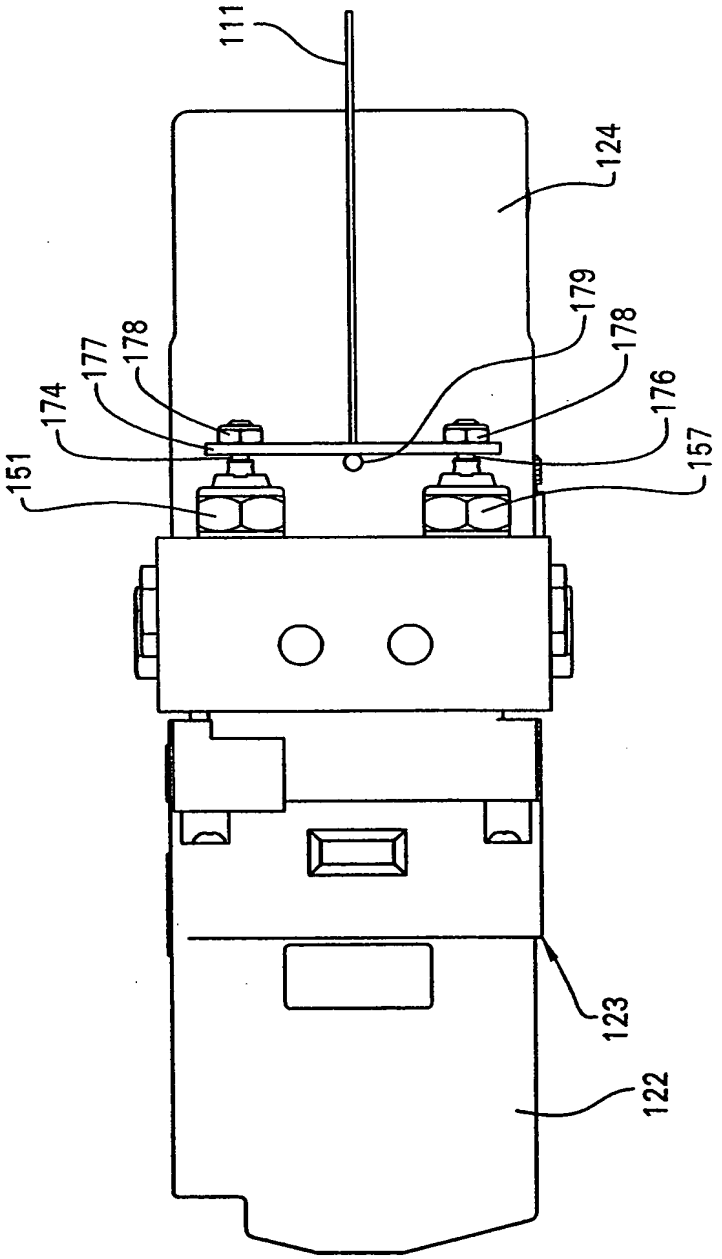


FIG. 28

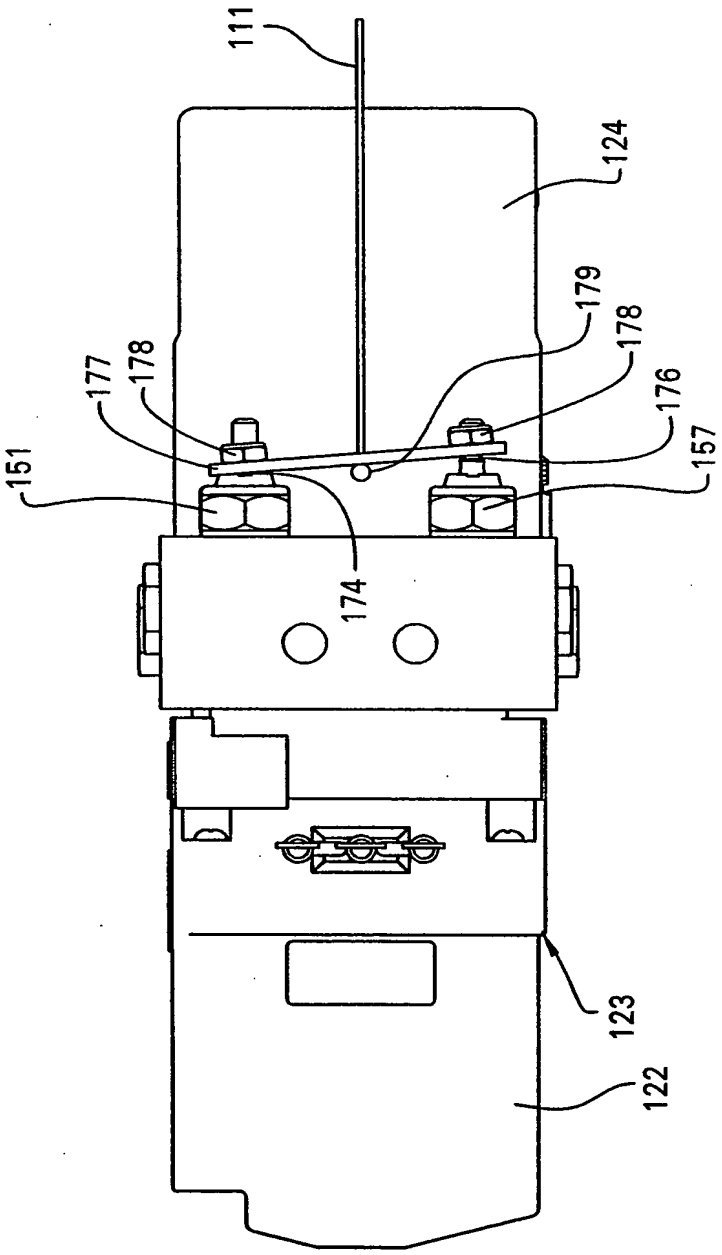


FIG. 29

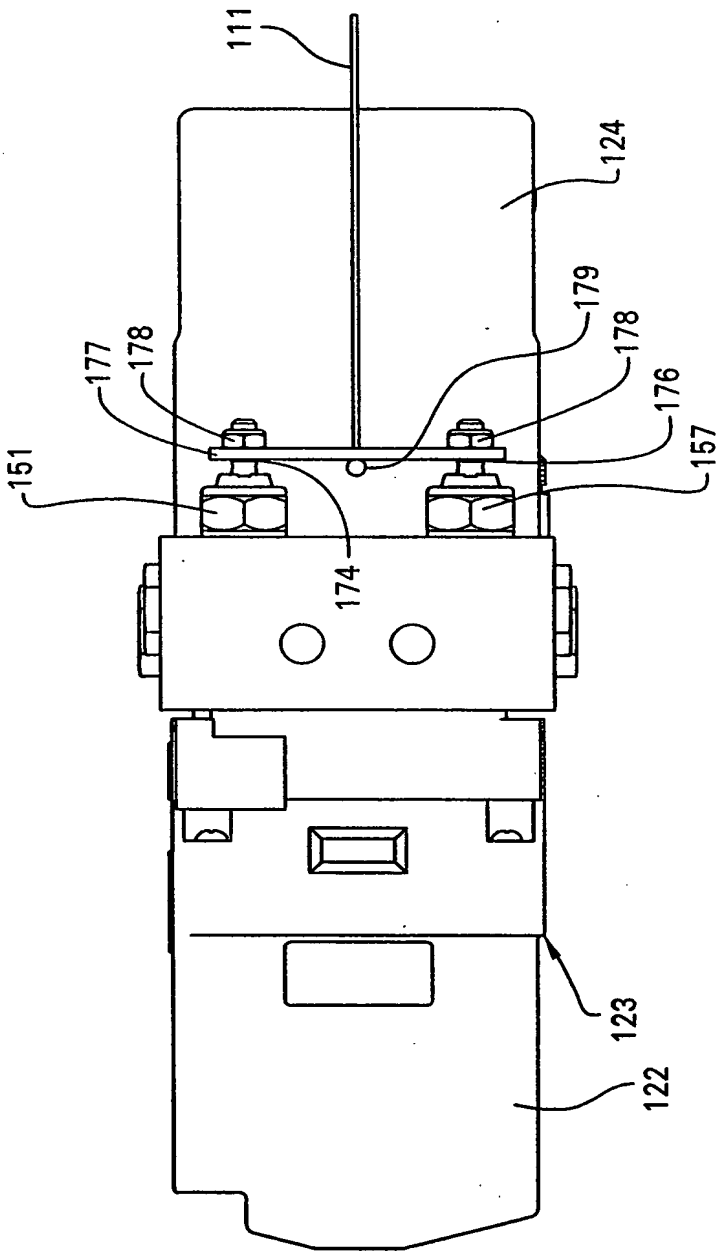


FIG. 30

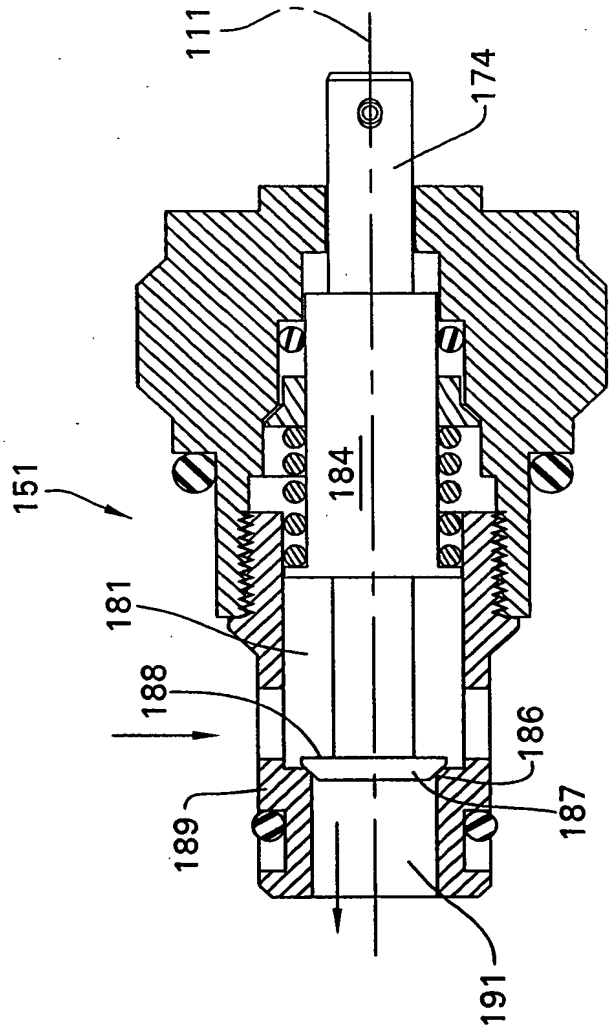


FIG. 31

FIG. 32

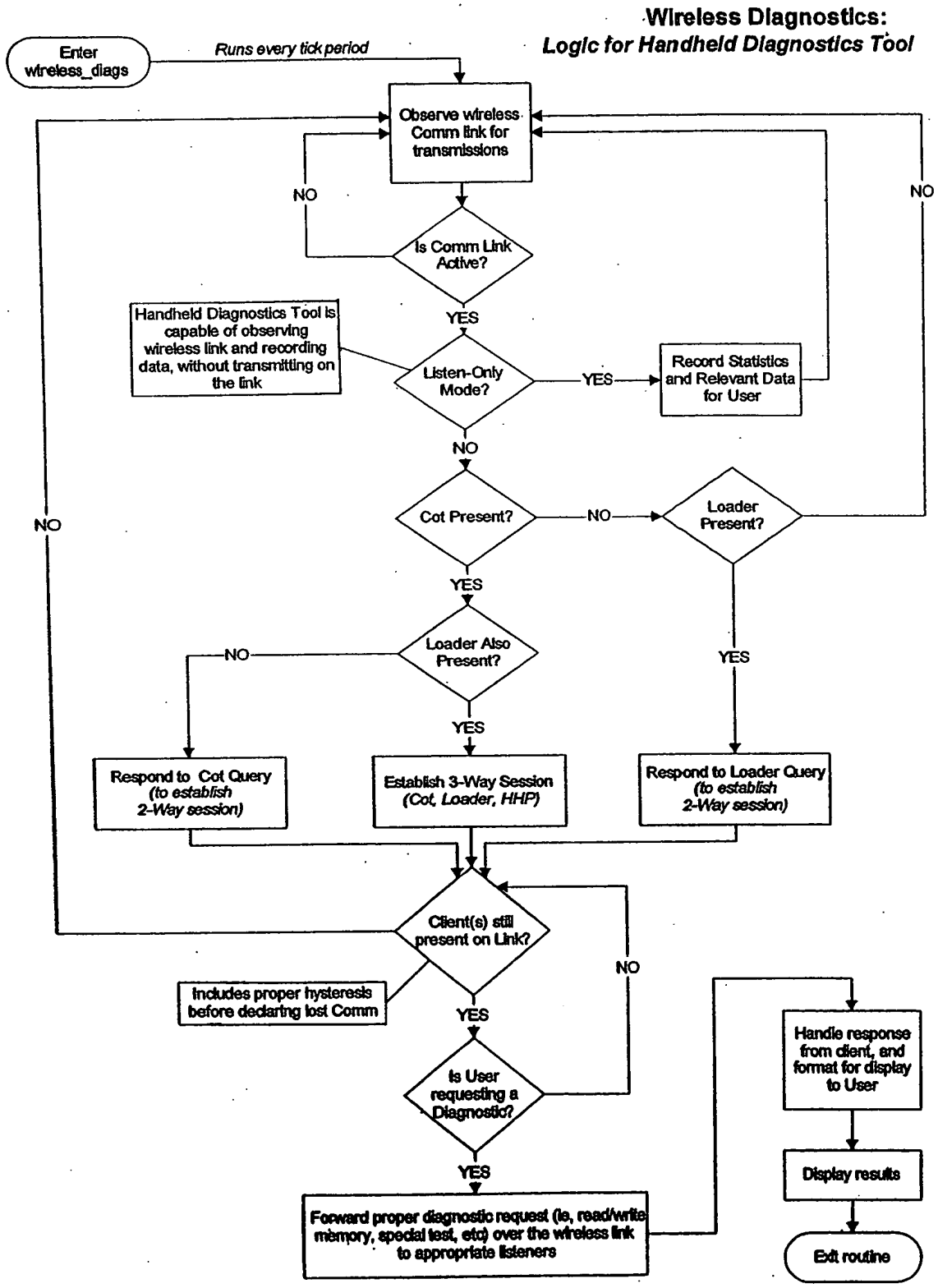

Wireless Diagnostics:
Logic for Handheld Diagnostics Tool
Enter wireless_diags
Runs every tick period
Observe wireless Comm link for transmissions
NO
Is Comm Link Active?
YES
Handheld Diagnostics Tool is capable of observing wireless link and recording data, without transmitting on the link
Listen-Only Mode?
YES
Record Statistics and Relevant Data for User
NO
Cot Present?
NO
Loader Present?
NO
YES
Loader Also Present?
NO
YES
YES
Respond to Cot Query (to establish 2-Way session)
Establish 3-Way Session (Cot, Loader, HHP)
Respond to Loader Query (to establish 2-Way session)
Client(s) still present on Link?
NO
Includes proper hysteresis before declaring lost Comm
YES
Is User requesting a Diagnostic?
YES
Forward proper diagnostic request (ie, read/write memory, special test, etc) over the wireless link to appropriate listeners
Handle response from client, and format for display to User
Display results
Exit routine

FIG. 33

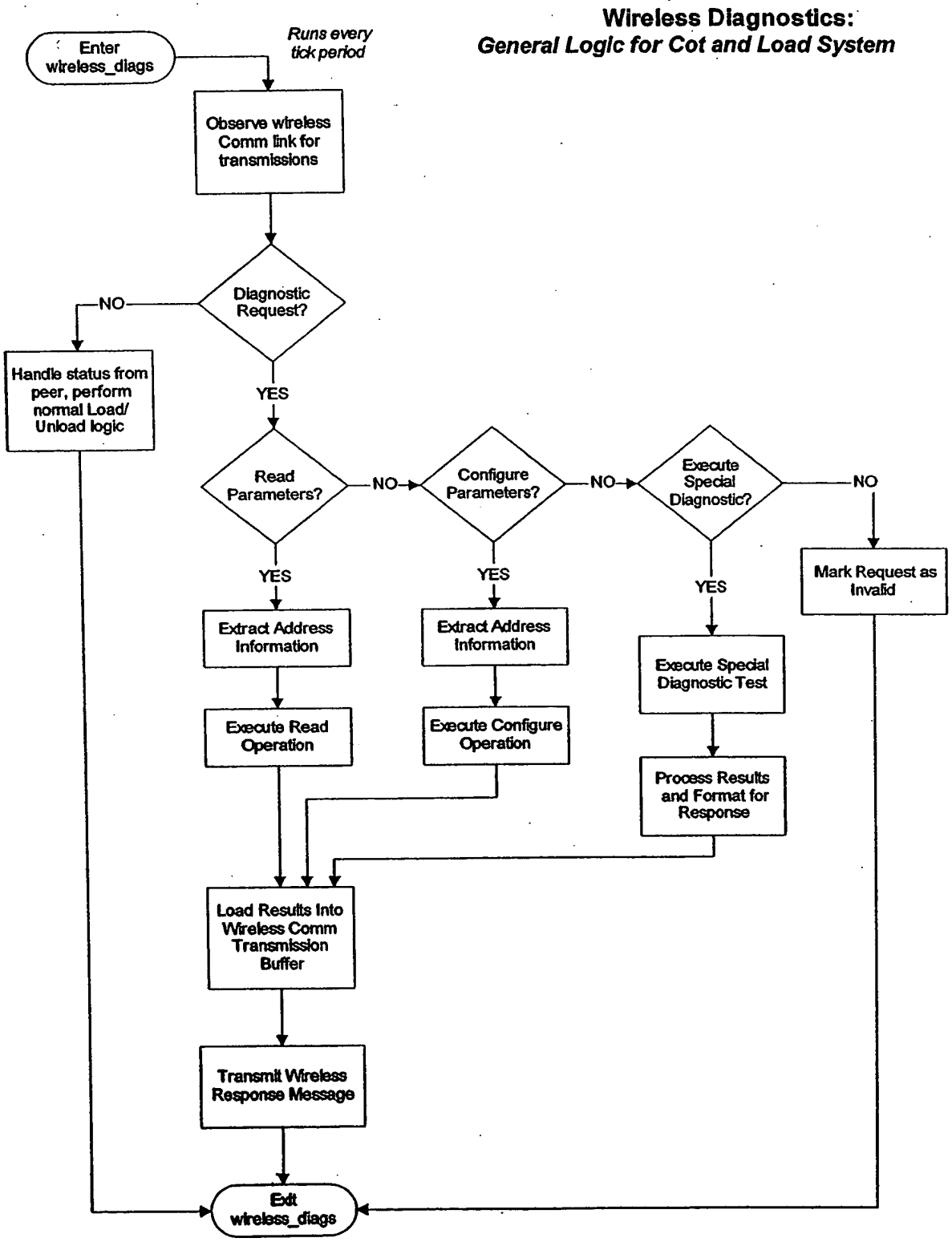
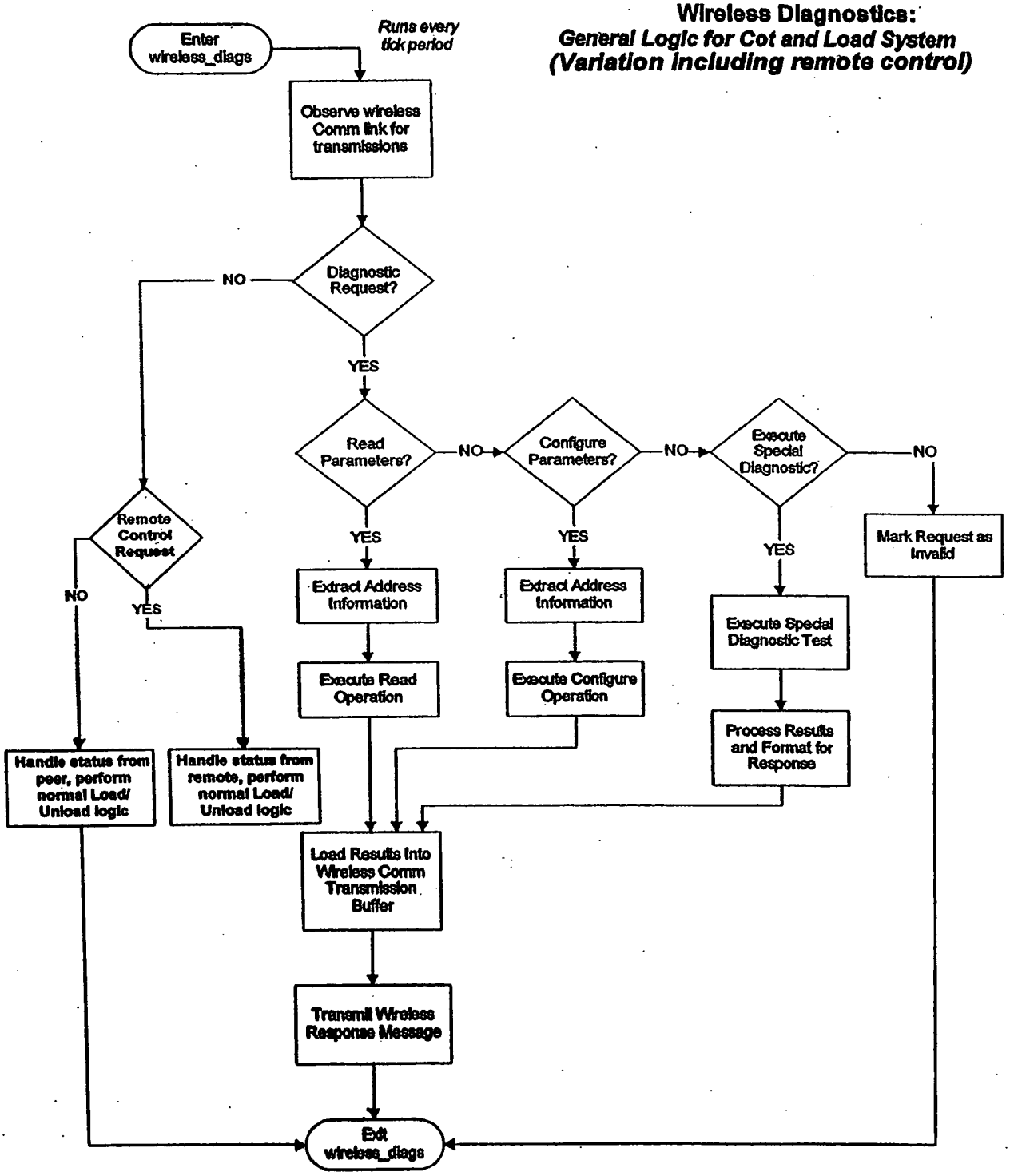

Wireless Diagnostics:
General Logic for Cot and Load System
Enter wireless_diags
Runs every tick period
Observe wireless Comm link for transmissions
Diagnostic Request?
NO
YES
Handle status from peer, perform normal Load/ Unload logic
Read Parameters?
NO
Configure Parameters?
NO
Execute Special Diagnostic?
NO
Mark Request as Invalid
YES
YES
YES
Extract Address Information
Extract Address Information
Execute Special Diagnostic Test
Execute Read Operation
Execute Configure Operation
Process Results and Format for Response
Load Results Into Wireless Comm Transmission Buffer
Transmit Wireless Response Message
Exit wireless_diags

FIG. 33A


Wireless Diagnostics:
General Logic for Cot and Load System
(Variation including remote control)
Enter wireless_diags
Runs every tick period
Observe wireless Comm link for transmissions
Diagnostic Request?
NO
YES
Read Parameters?
NO
Configure Parameters?
NO
Execute Special Diagnostic?
NO
Mark Request as Invalid
YES
YES
YES
Extract Address Information
Extract Address Information
Execute Special Diagnostic Test
Execute Read Operation
Execute Configure Operation
Process Results and Format for Response
Remote Control Request
NO
YES
Handle status from peer, perform normal Load/ Unload logic
Handle status from remote, perform normal Load/ Unload logic
Load Results Into Wireless Comm Transmission Buffer
Transmit Wireless Response Message
Exit wireless_diags

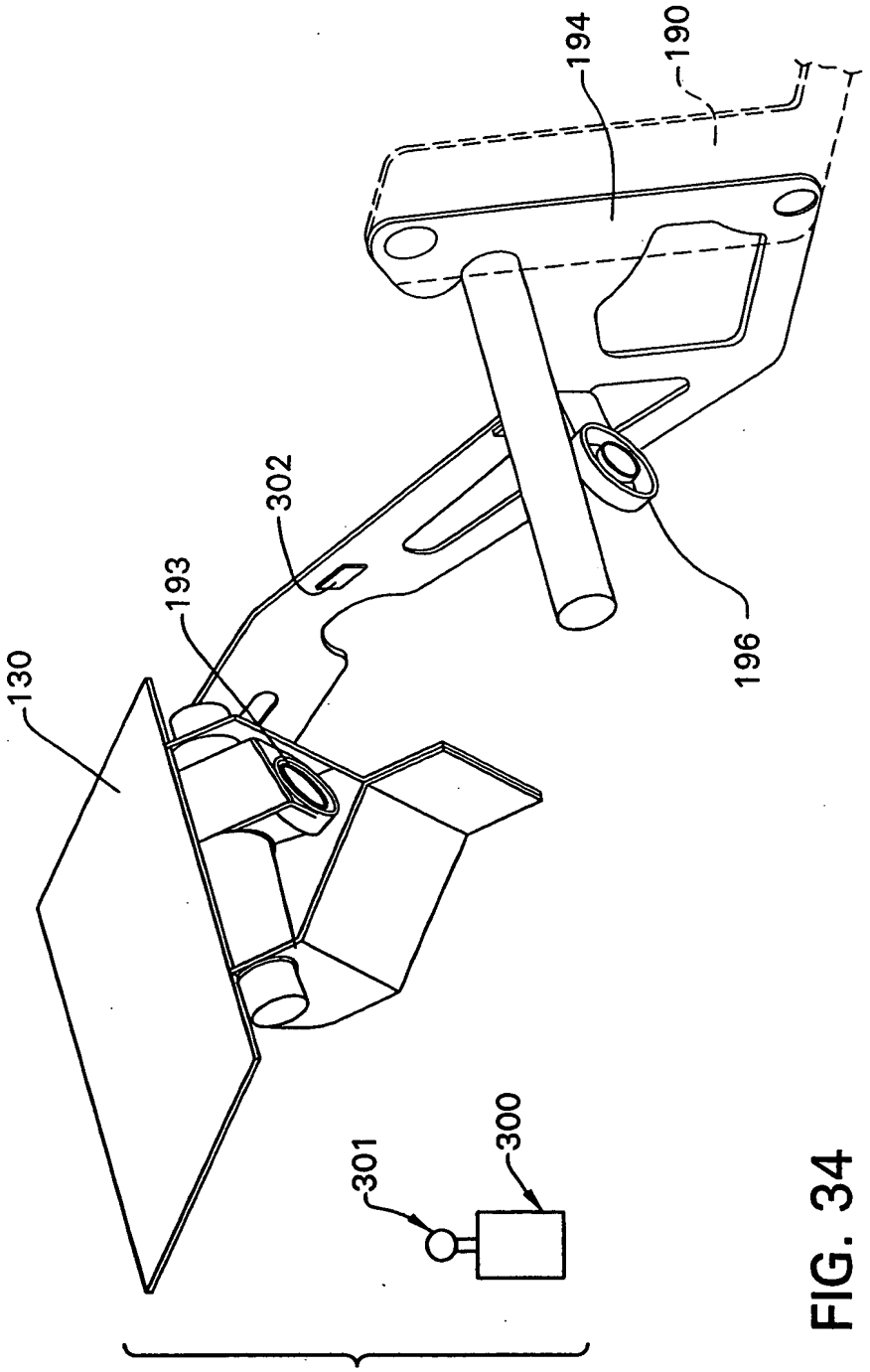


FIG. 34

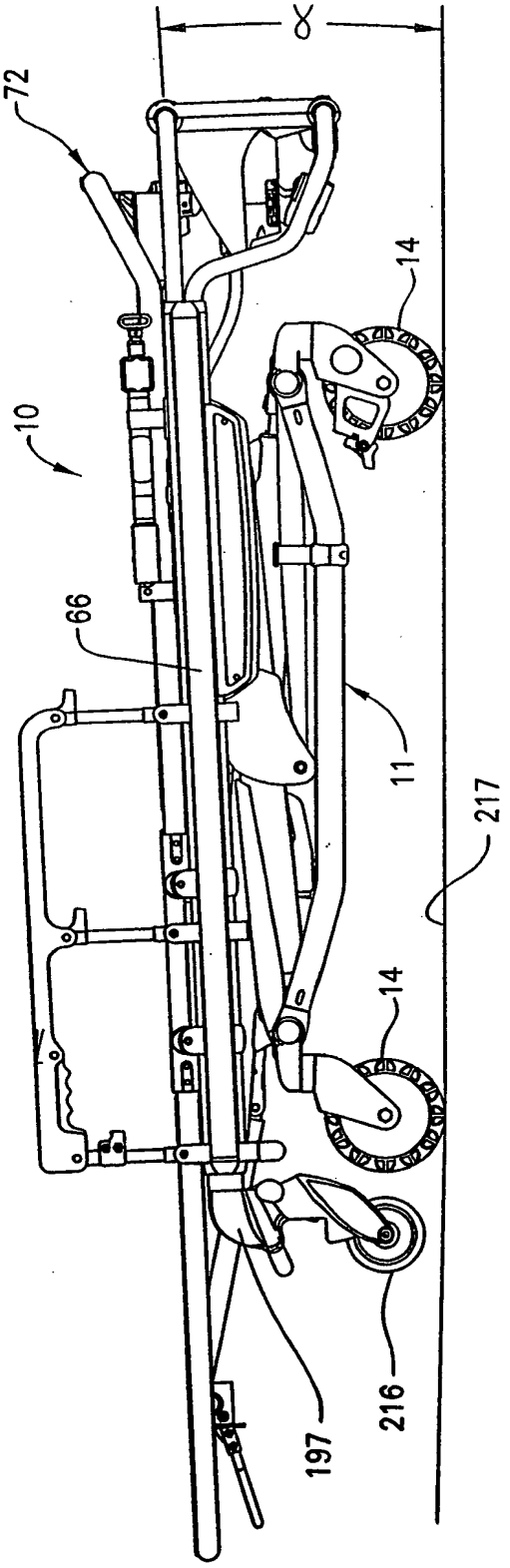


FIG. 35

EXHIBIT 1006 PAGE0212

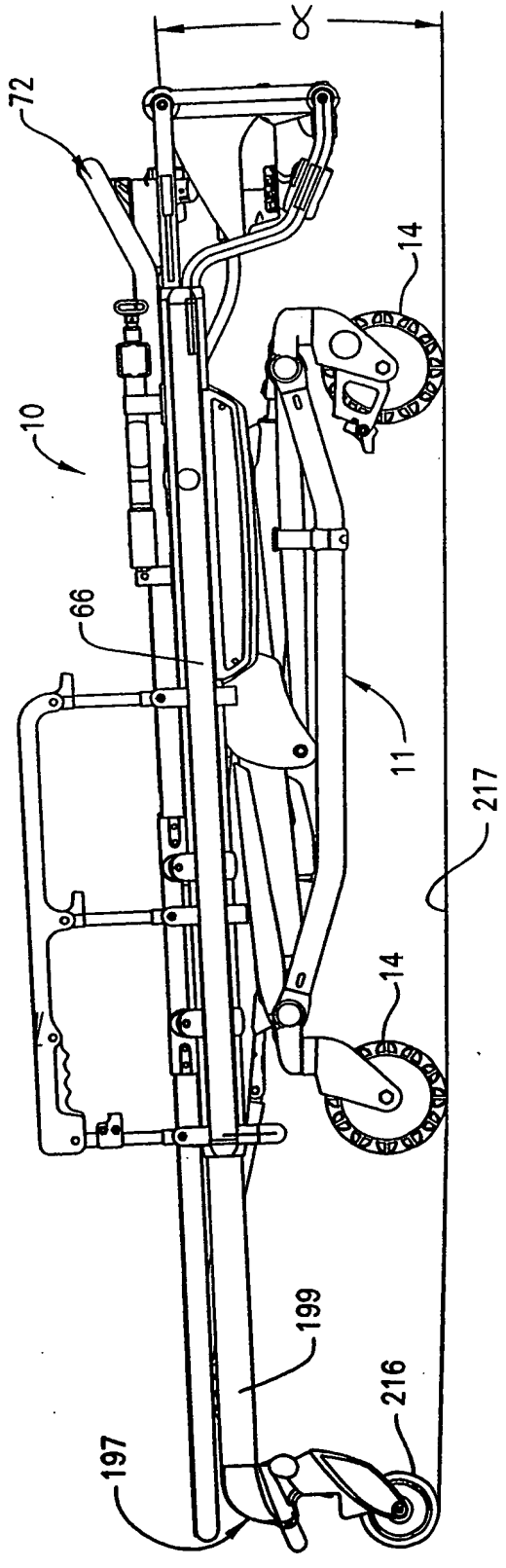


FIG. 36

FERNO: IPR2024-00042
EXHBIT 1006 PAGE0212

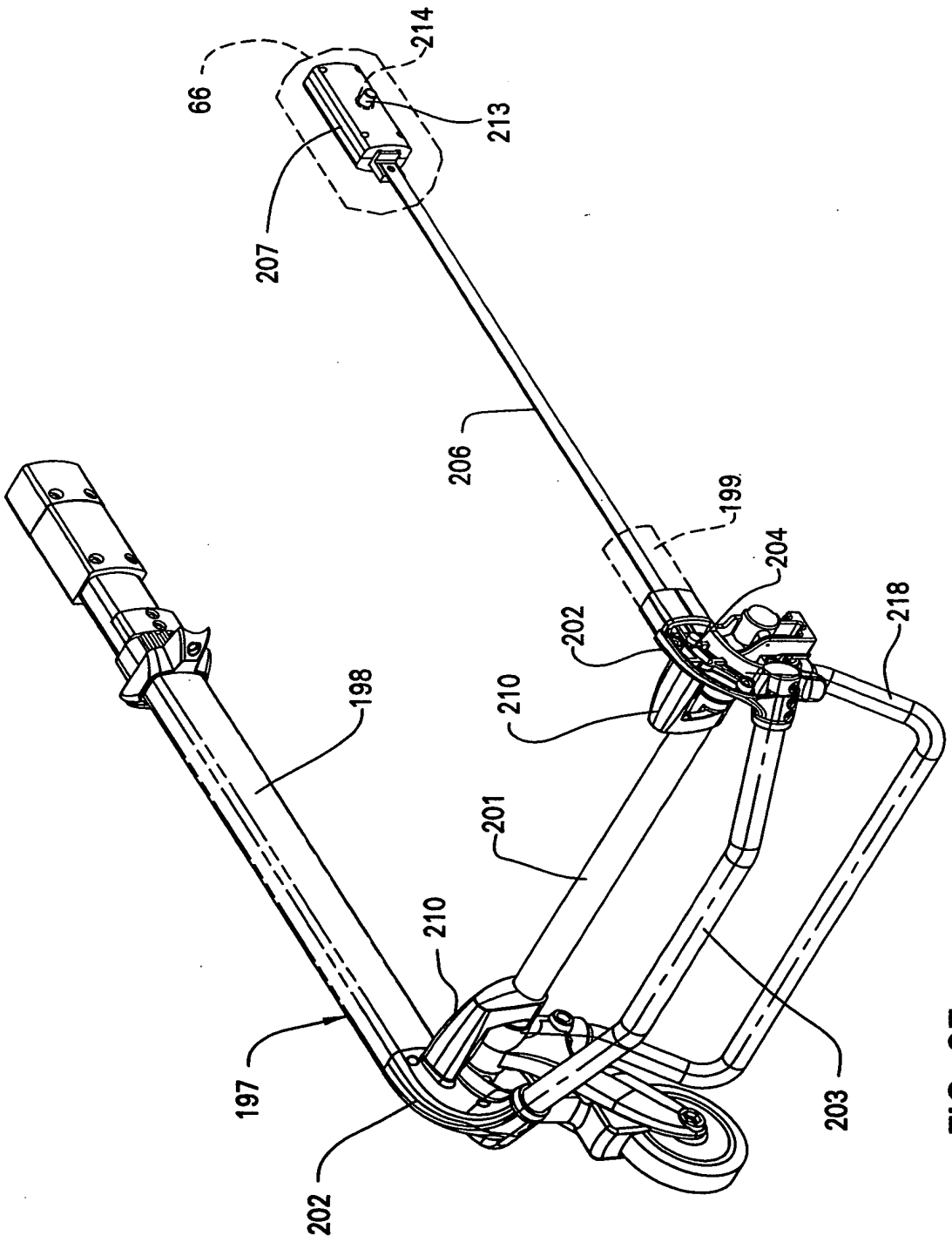


FIG. 37

Title: AMBULANCE COT AND HYDRAULIC ELEVATING MECHANISM THEREFOR
Inventor(s): Clifford E. LAMBARTH et al.
Serial No.: Unknown
Docket No.: 3007.P0315US

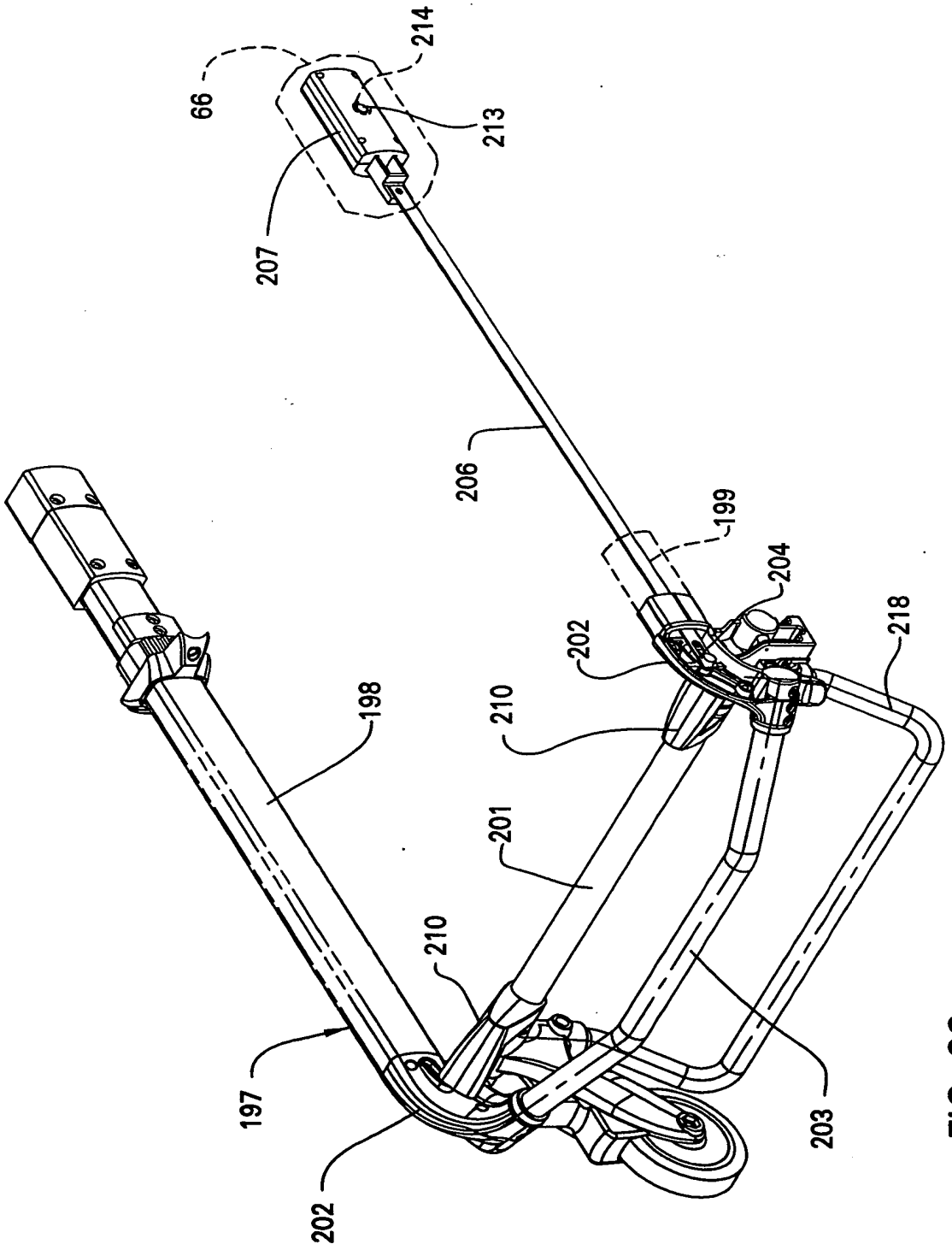


FIG. 38

EXHBIT 1006 PAGE0215

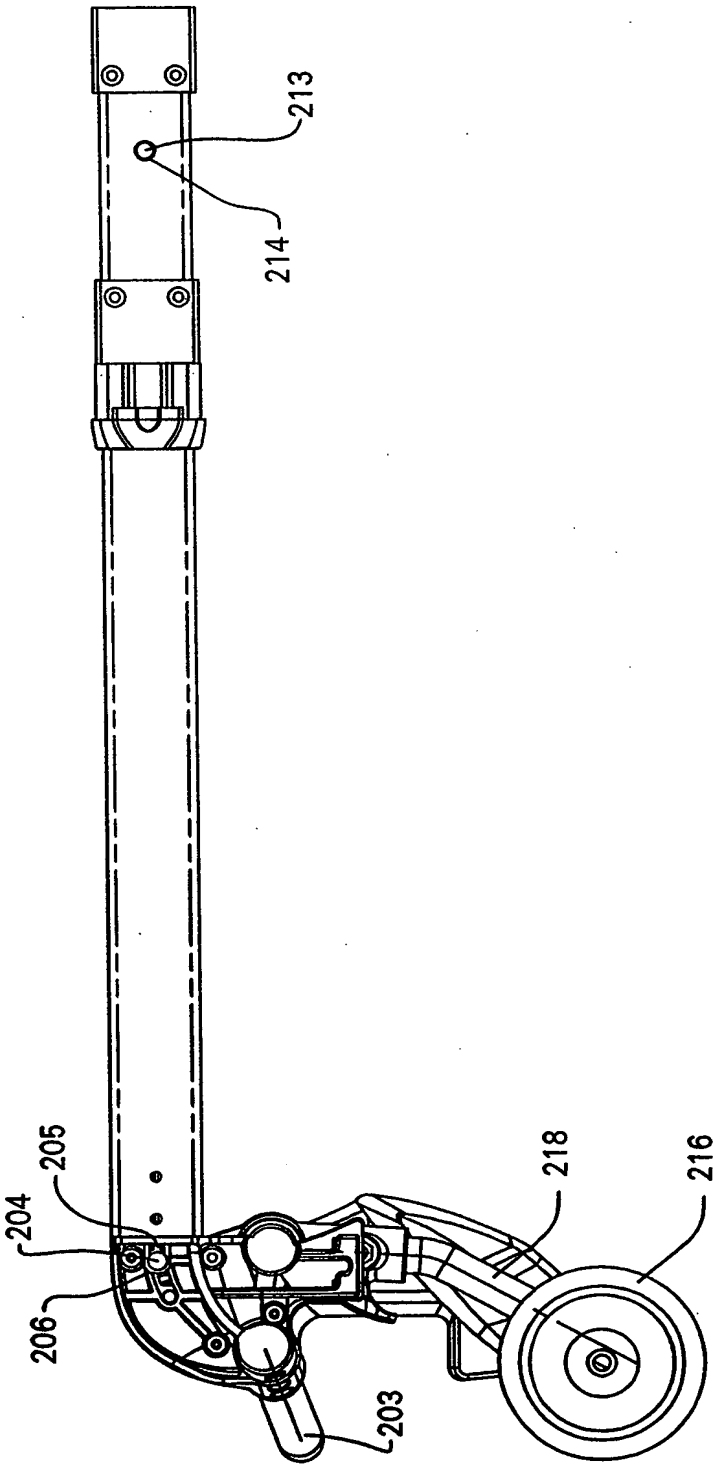


FIG. 39

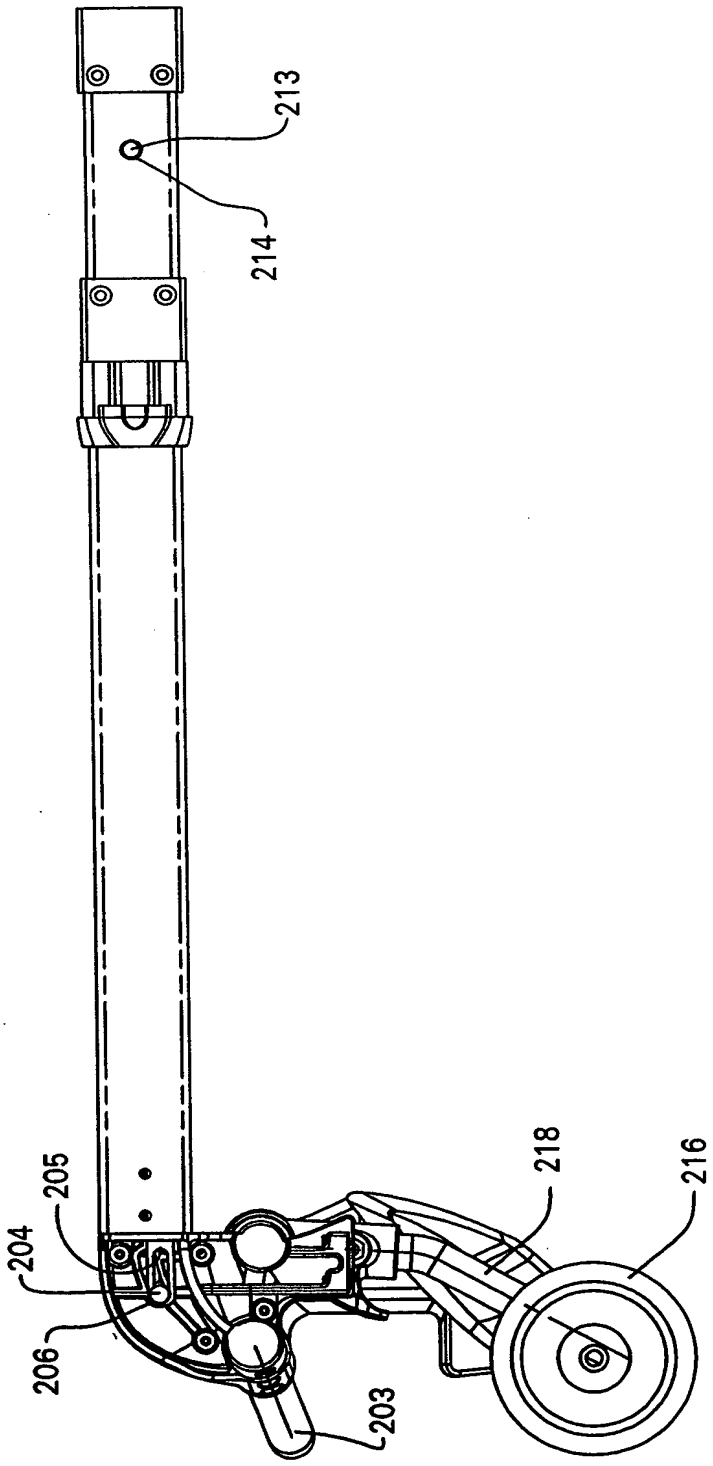


FIG. 40

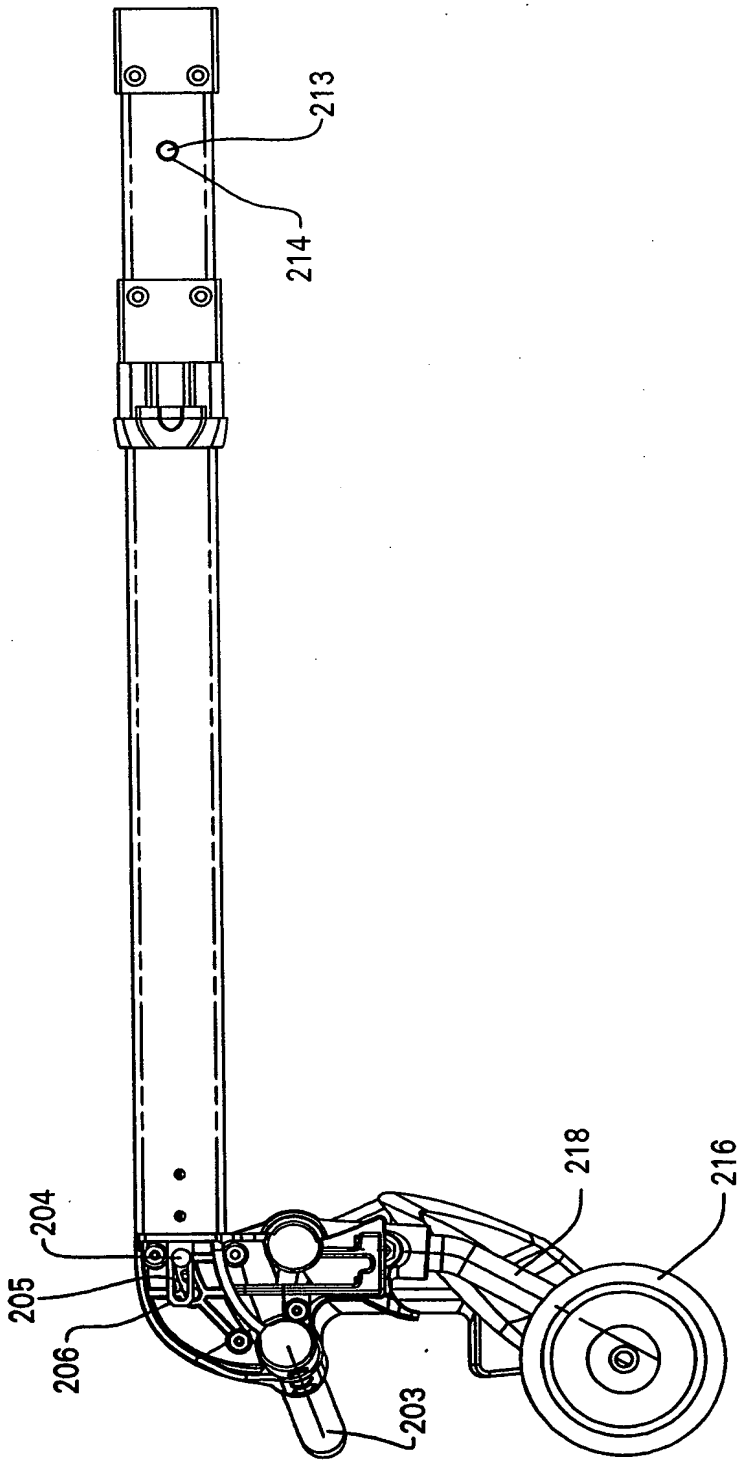


FIG. 41

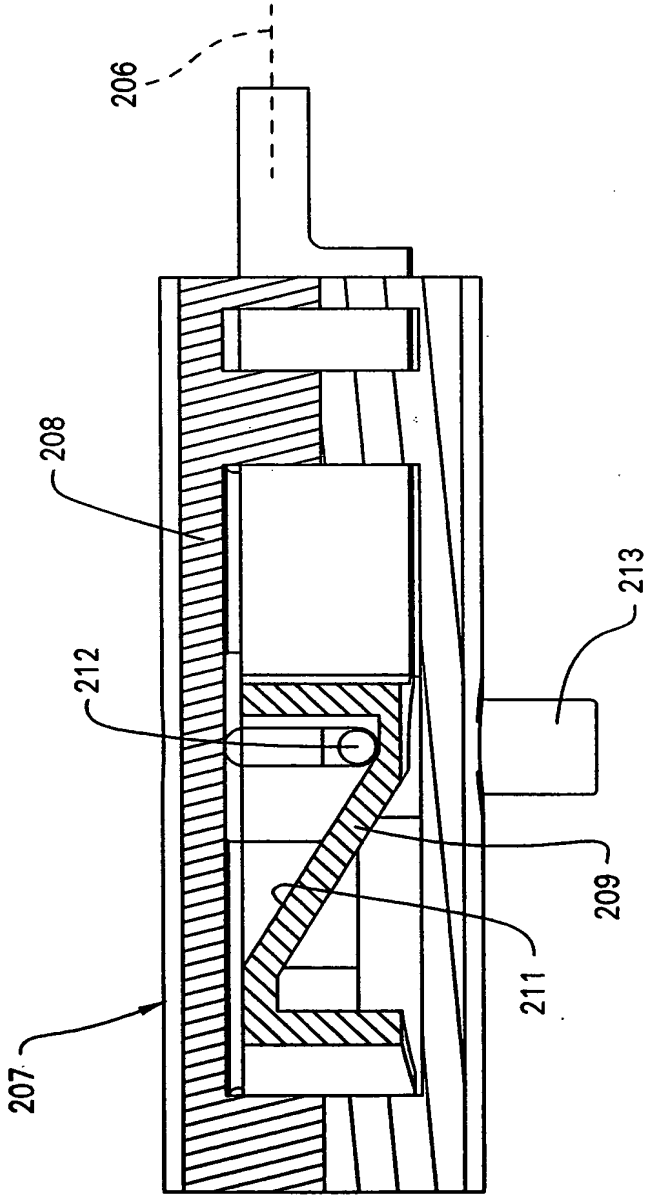


FIG. 42

Title: AMBULANCE COT AND HYDRAULIC ELEVATING MECHANISM THEREFOR
Inventor(s): Clifford E. LAMBARTH et al.
Serial No.: Unknown
Docket No.: 3007.P0315US

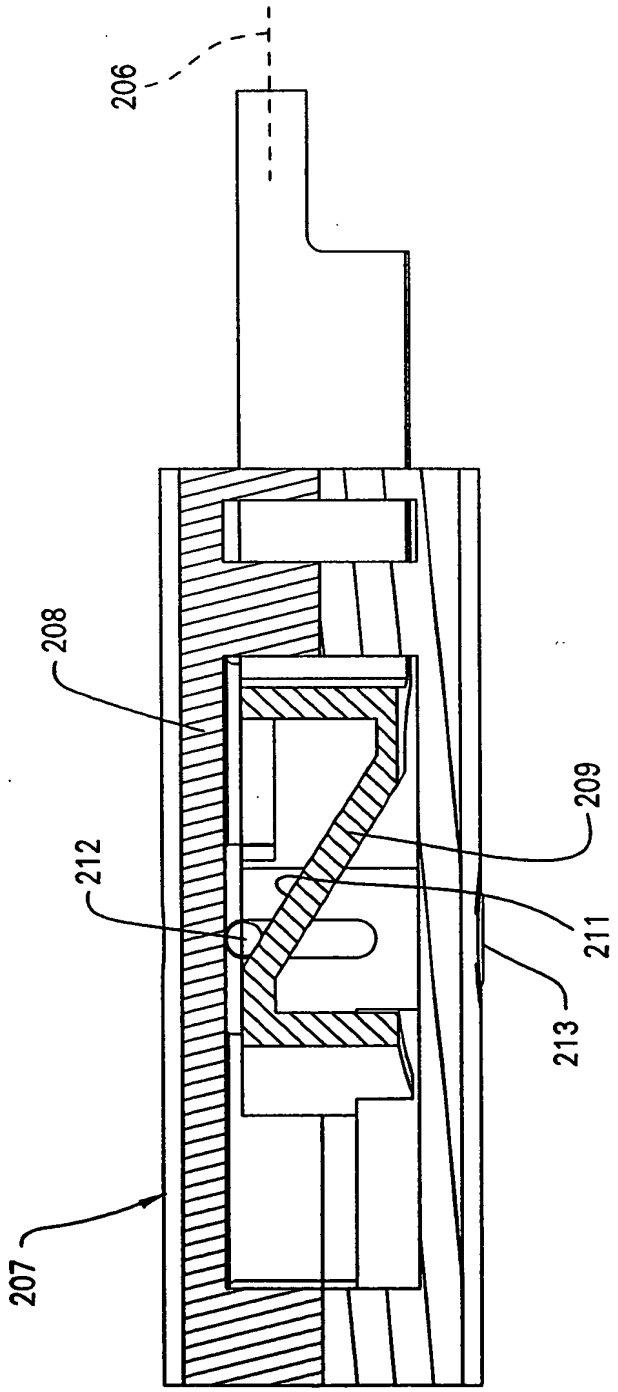


FIG. 43

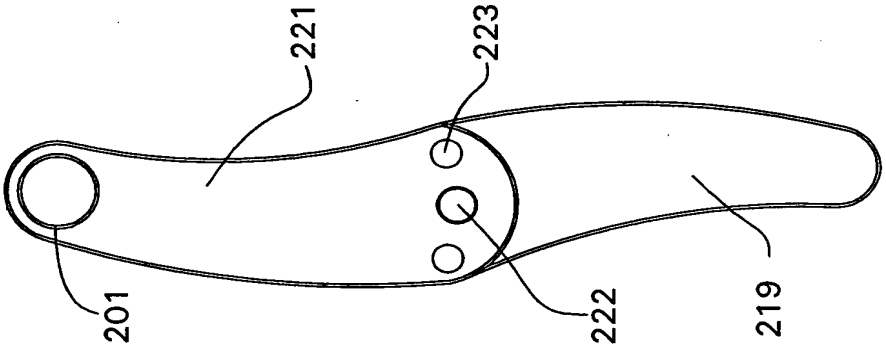


FIG. 46

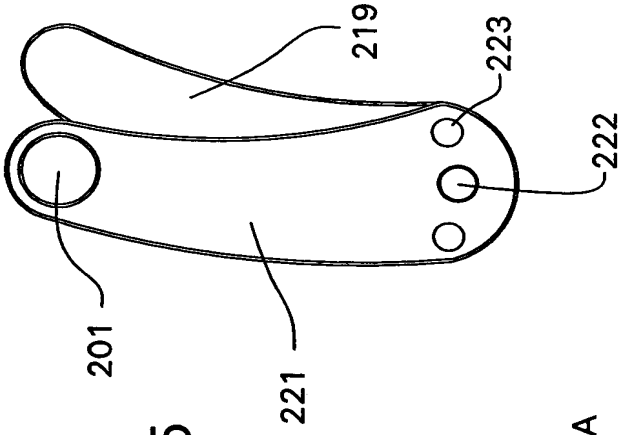


FIG. 45

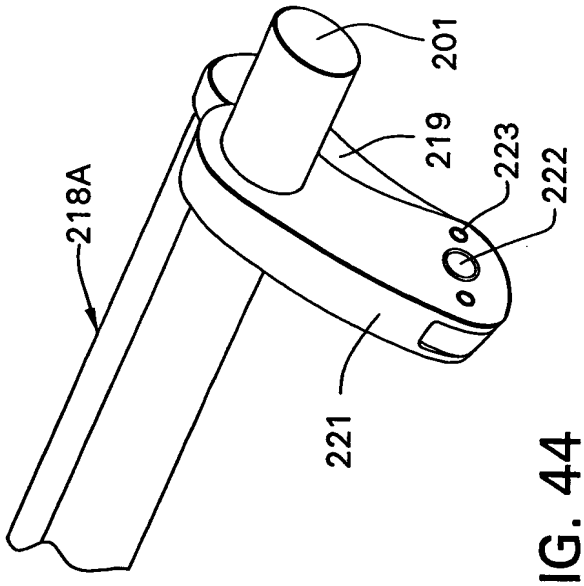


FIG. 44

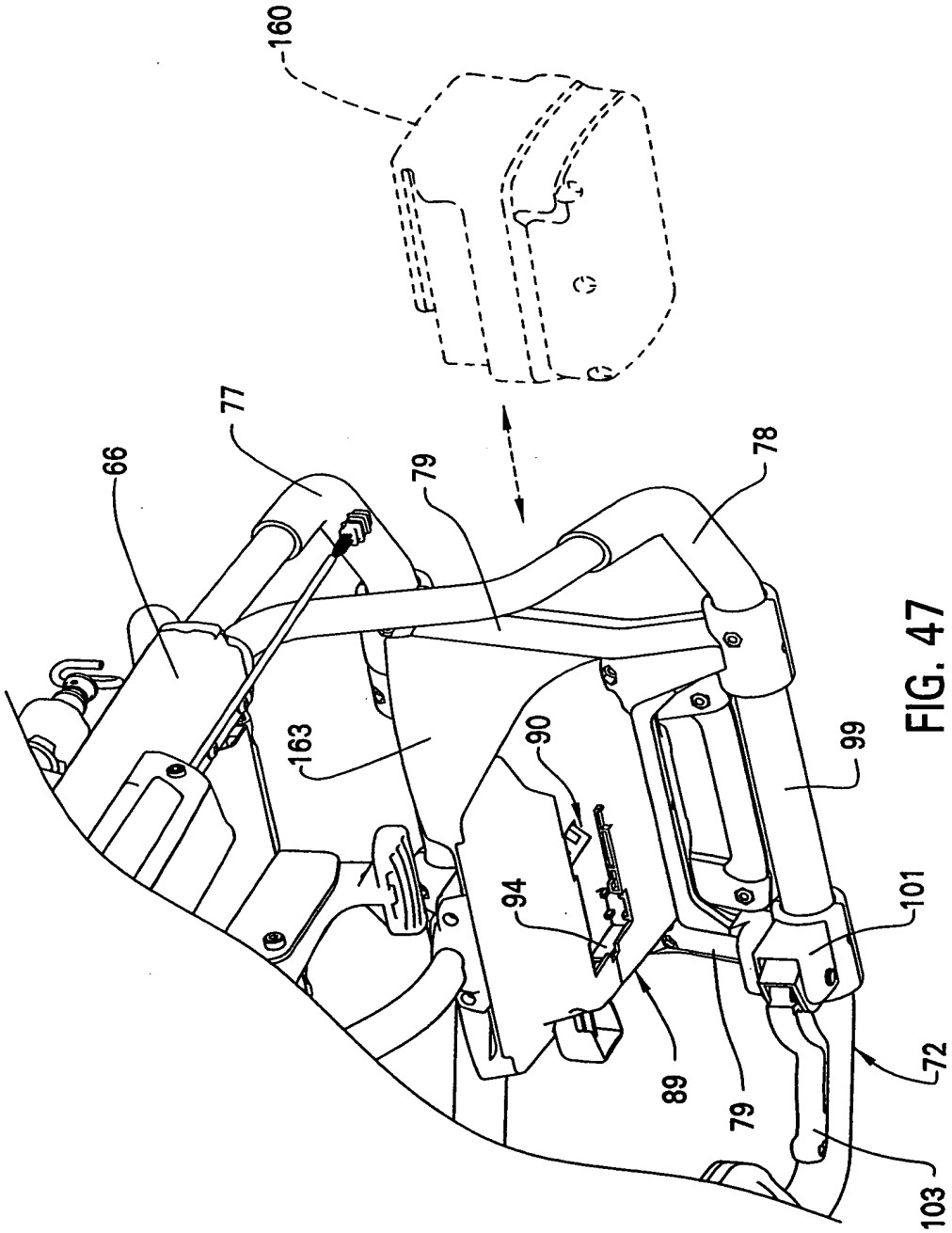


FIG. 47

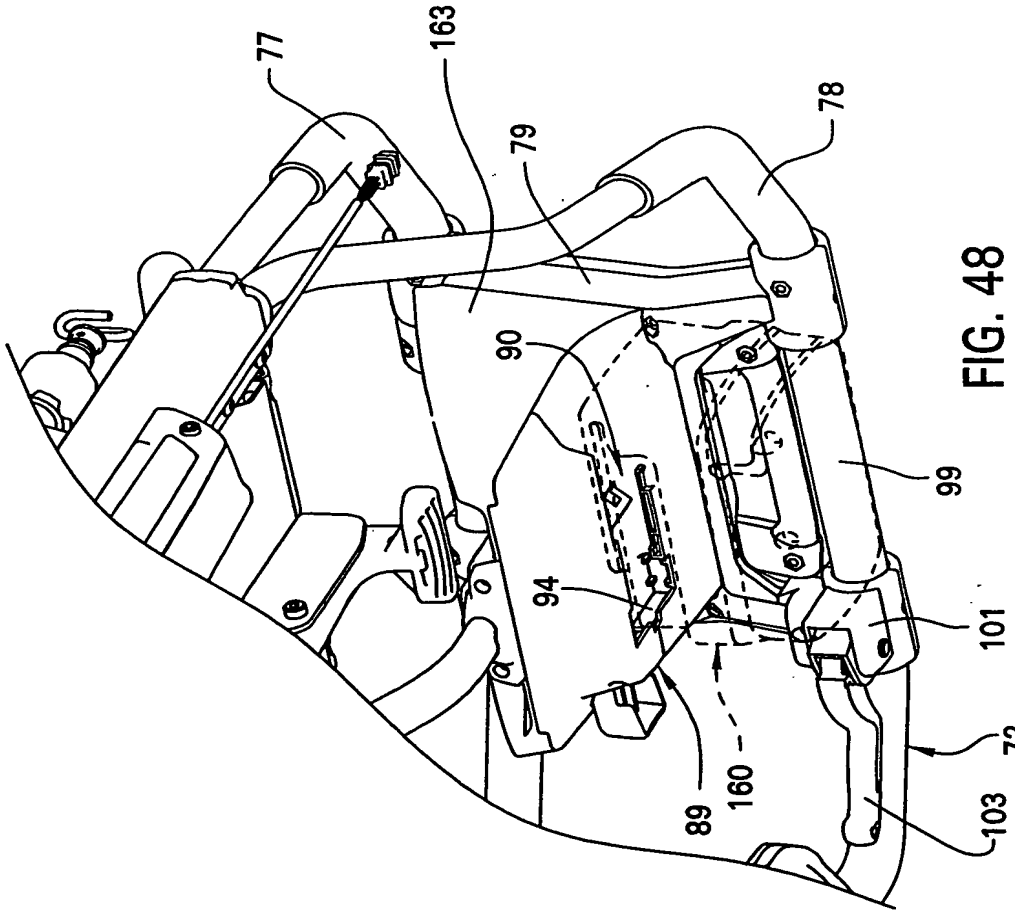


FIG. 48

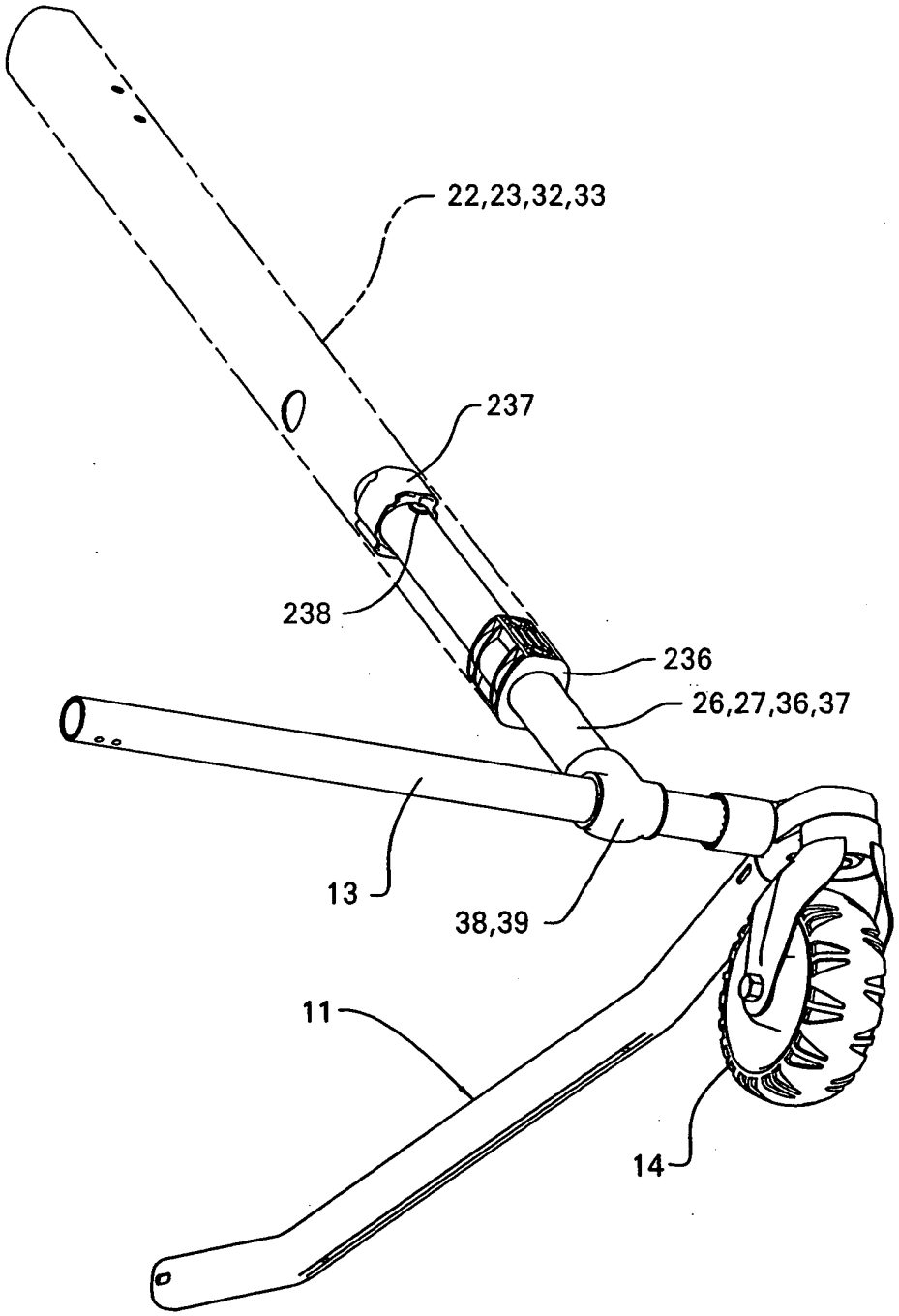


FIG. 49

FIG. 50

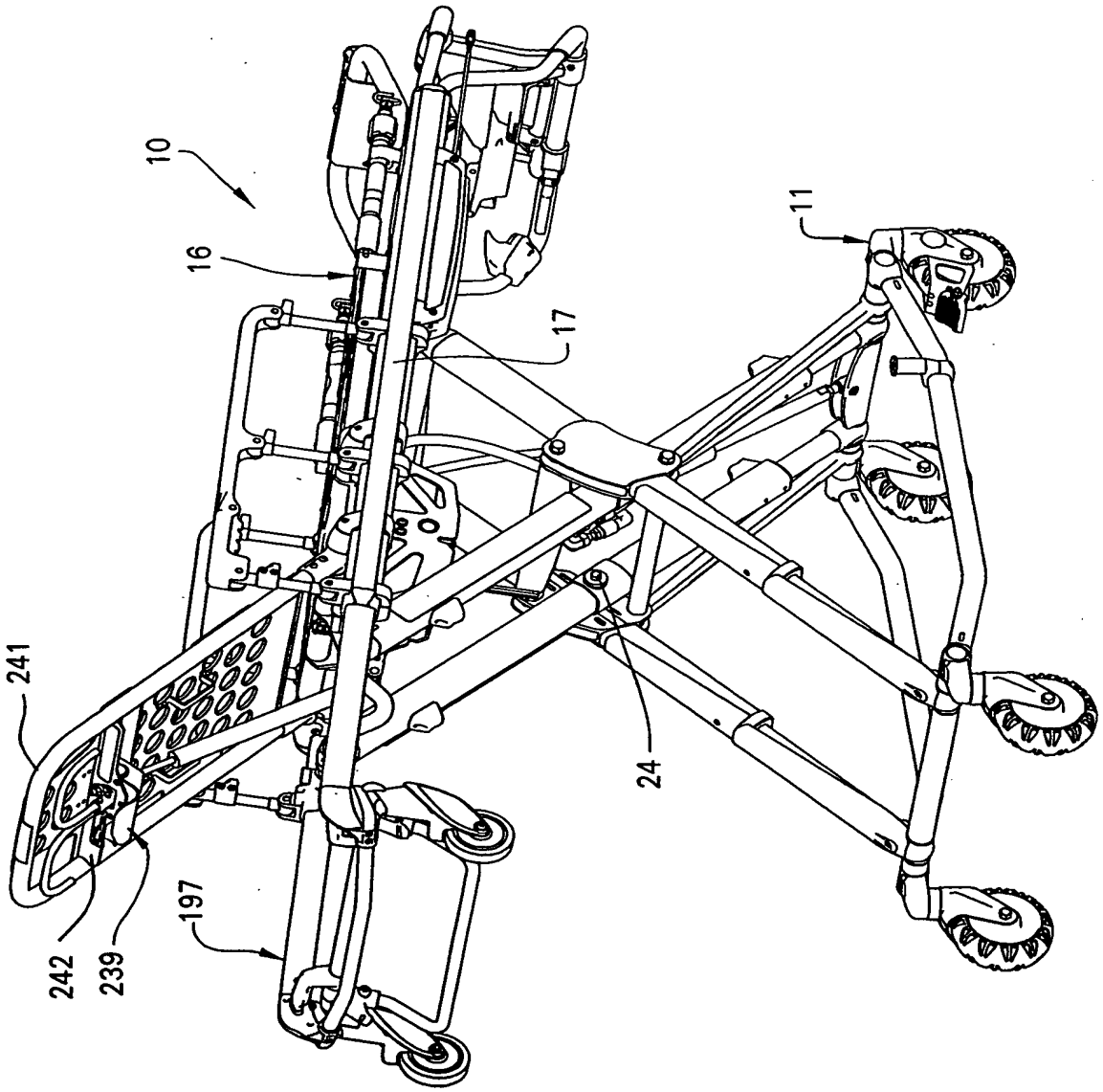
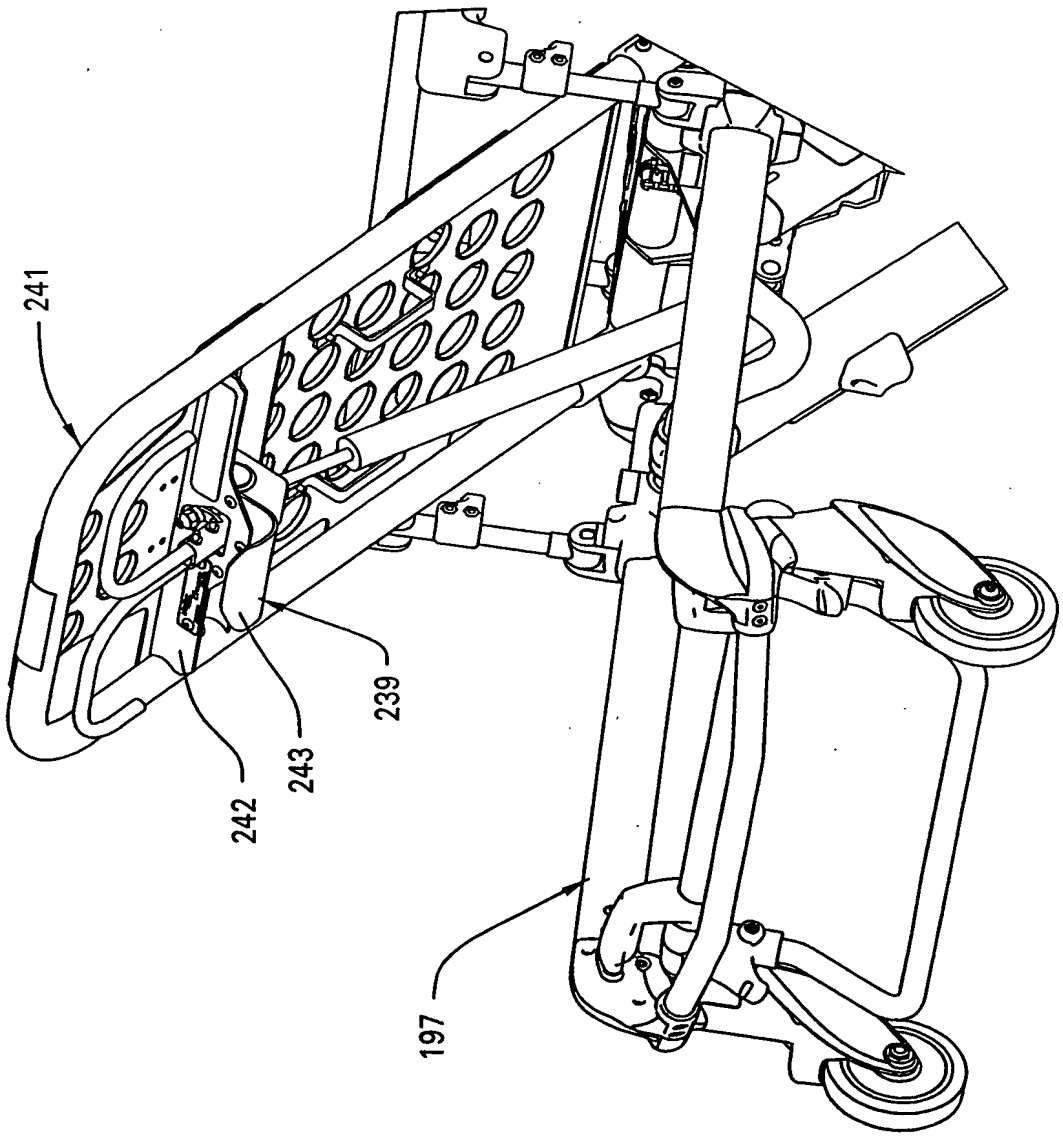


FIG. 51



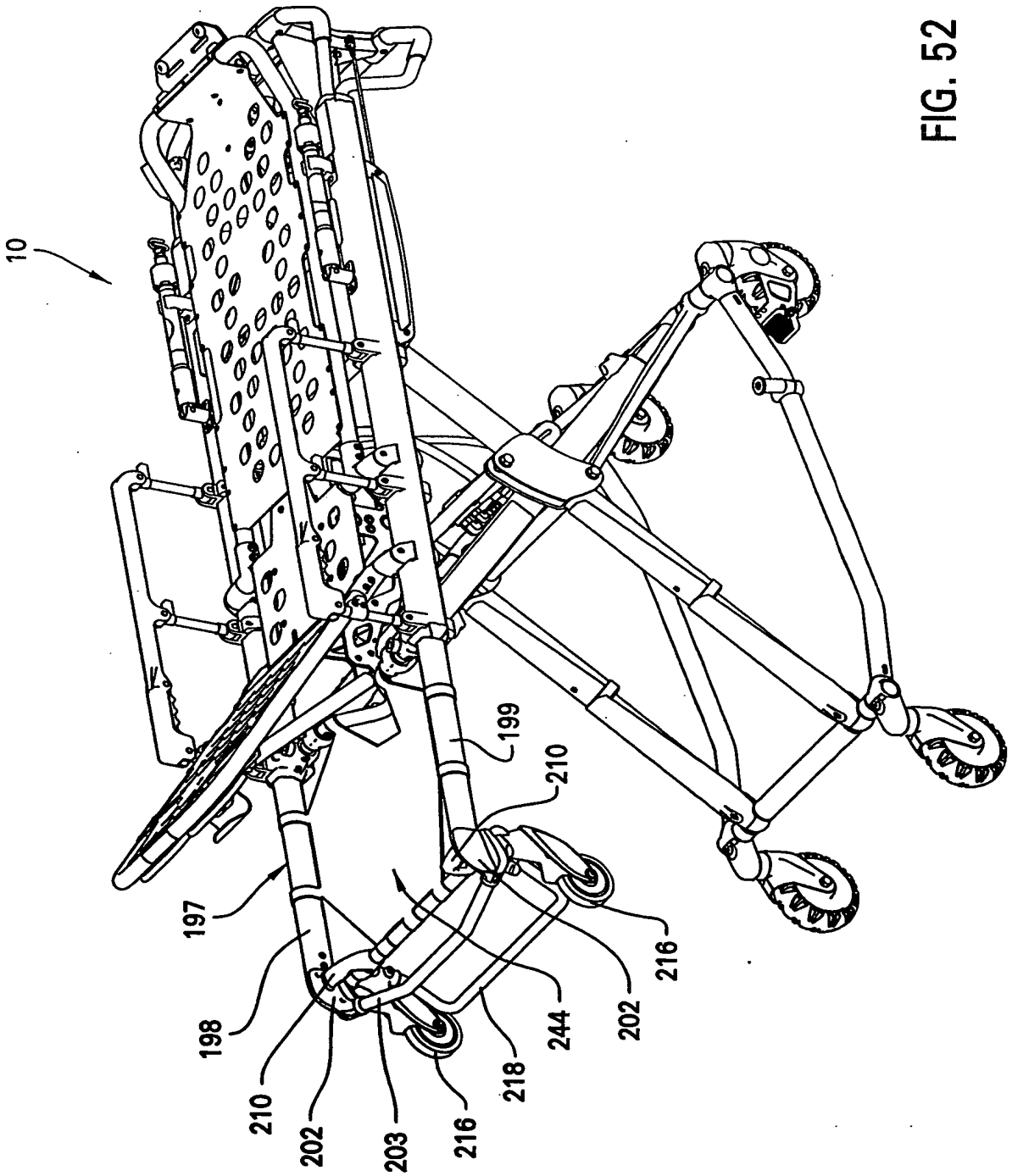


FIG. 52

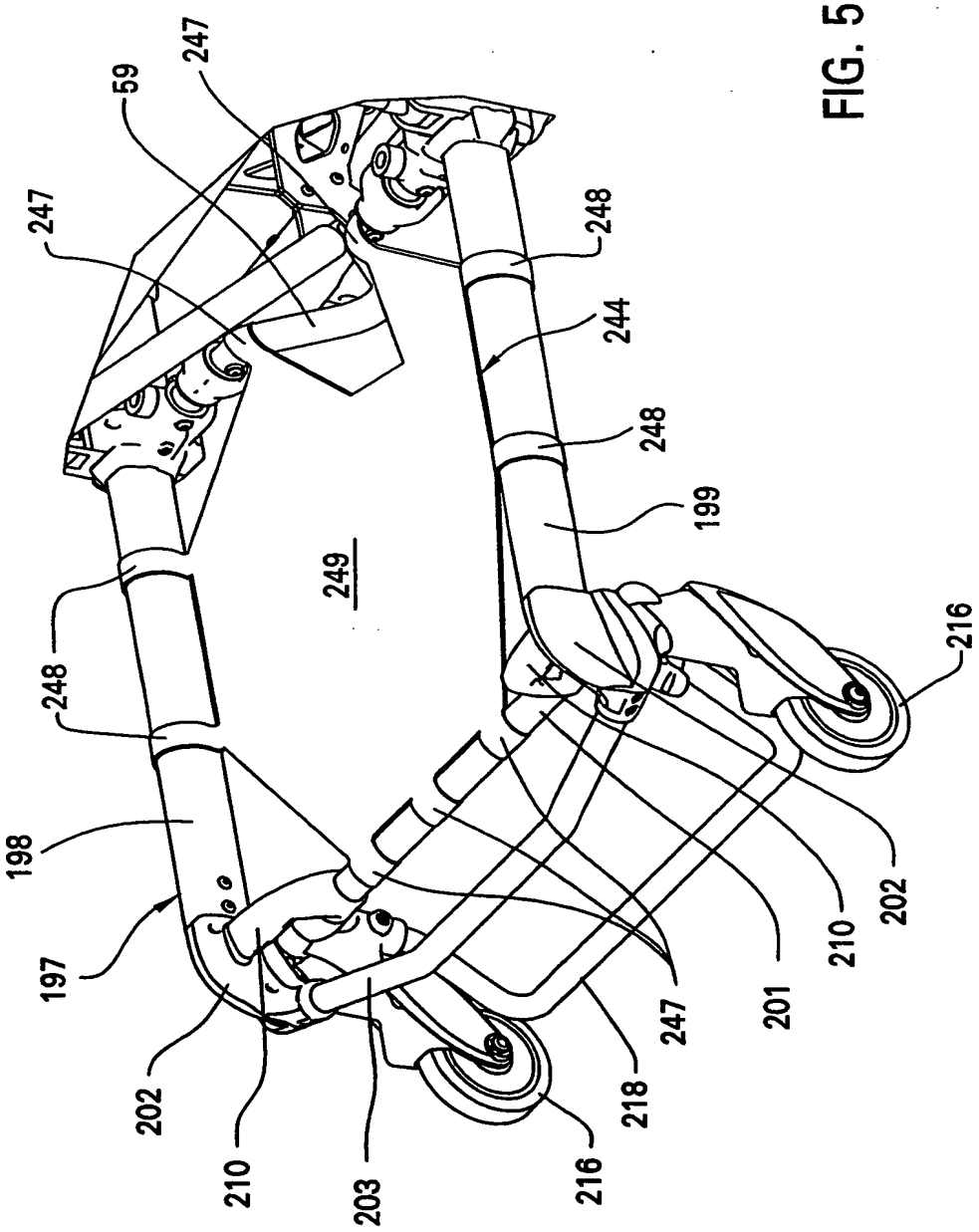

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FIG. 53

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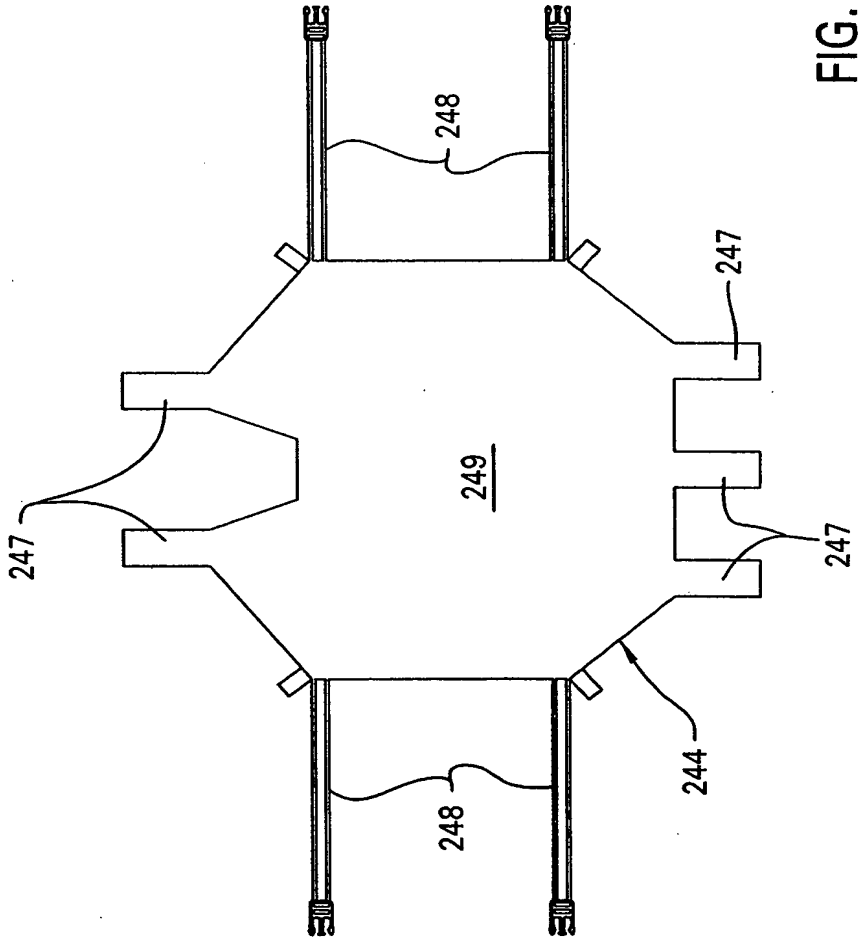


FIG. 54

FIG. 55

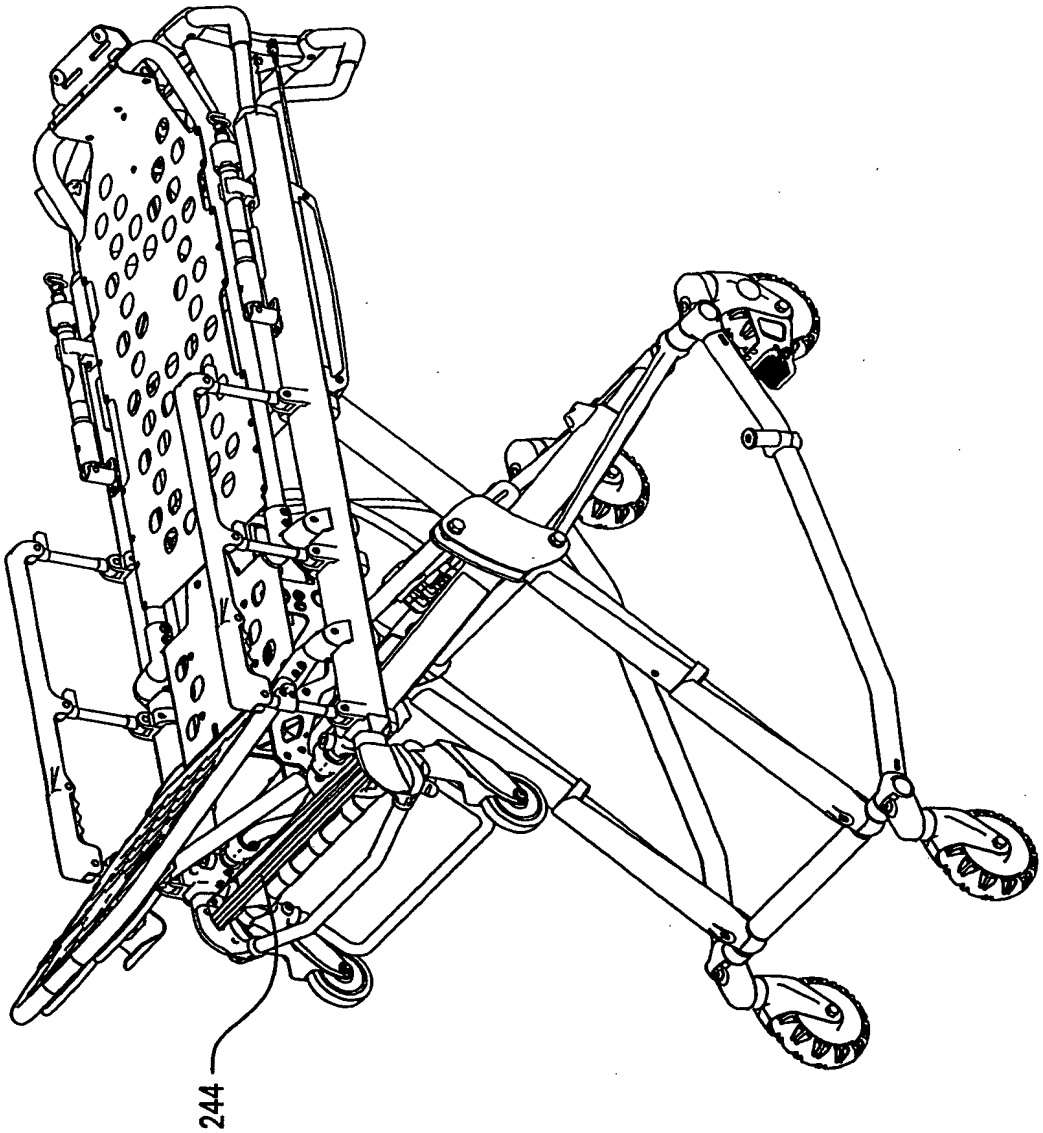
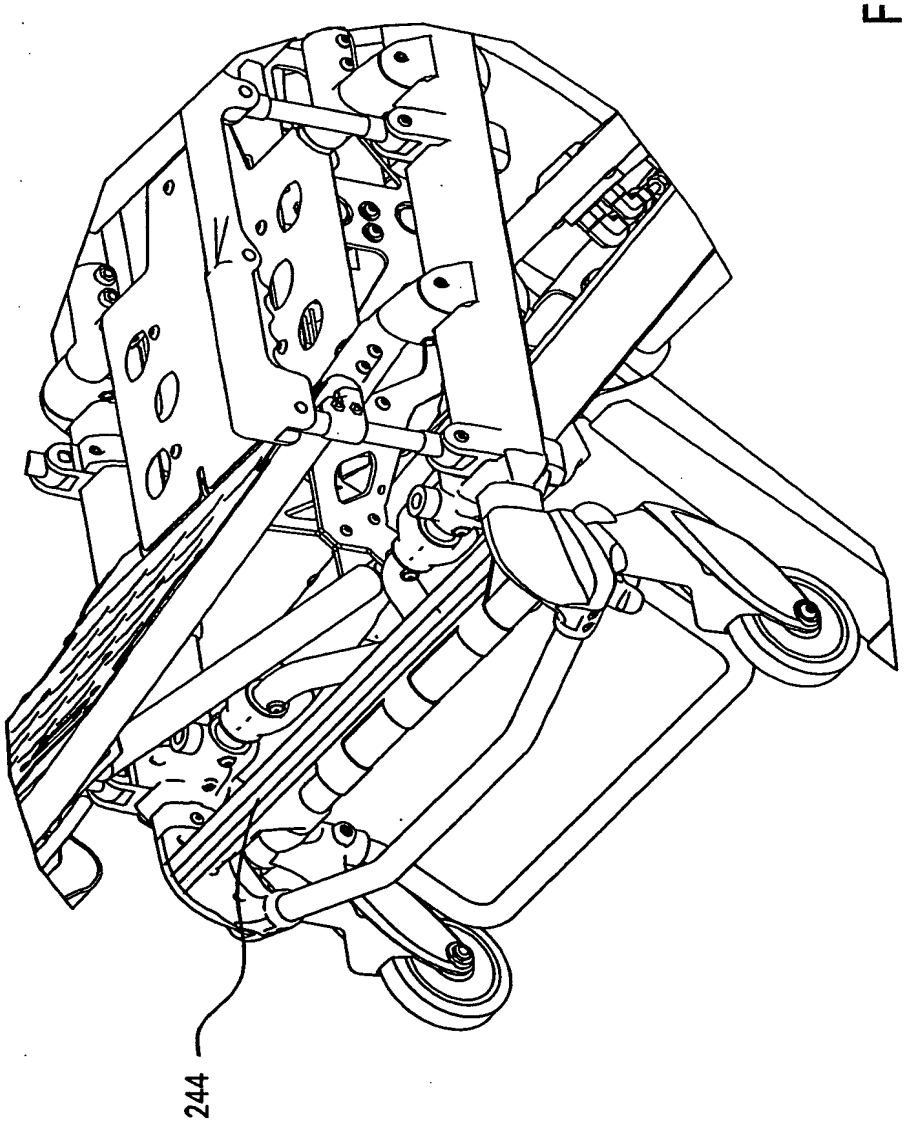


FIG. 56



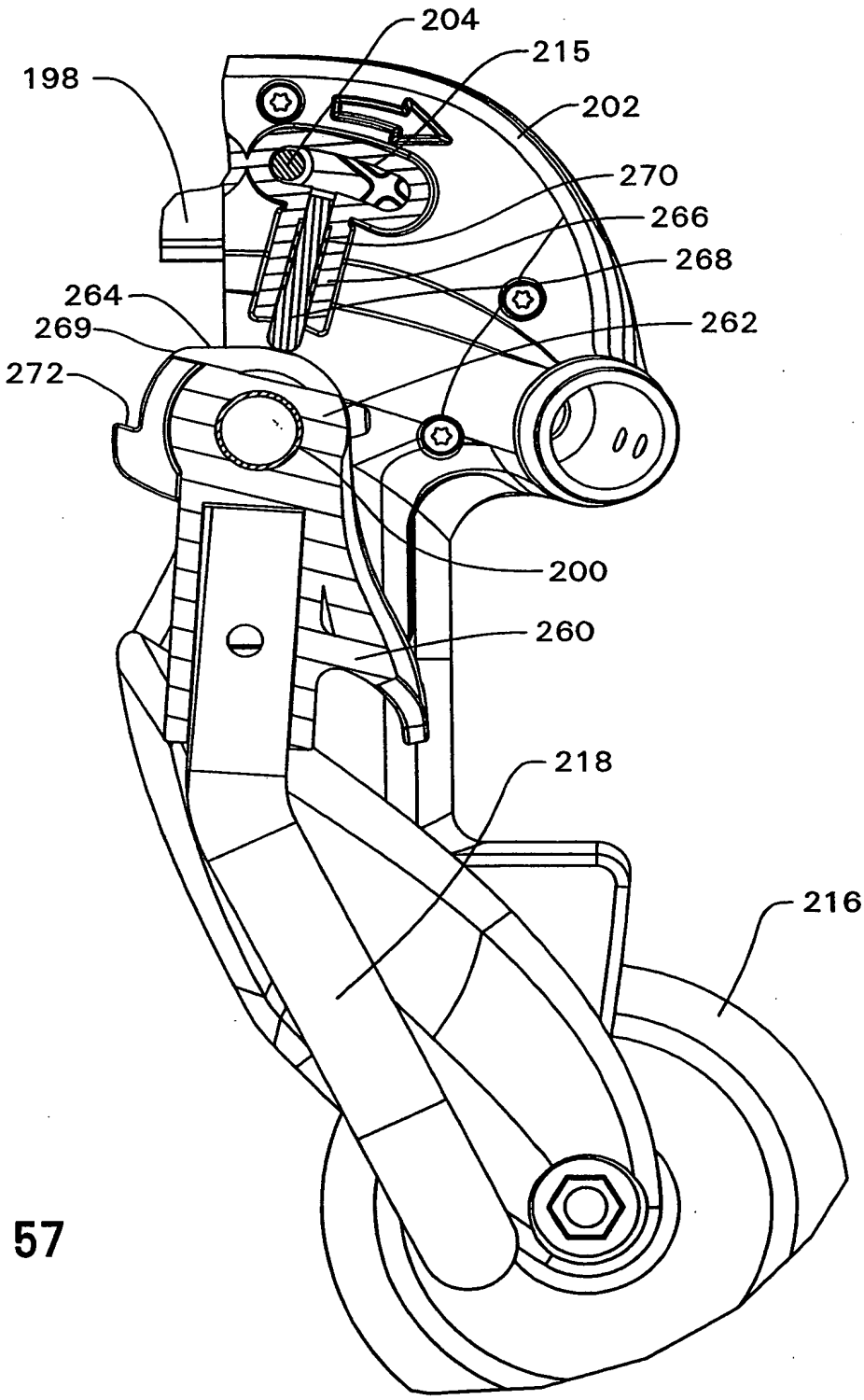


FIG. 57

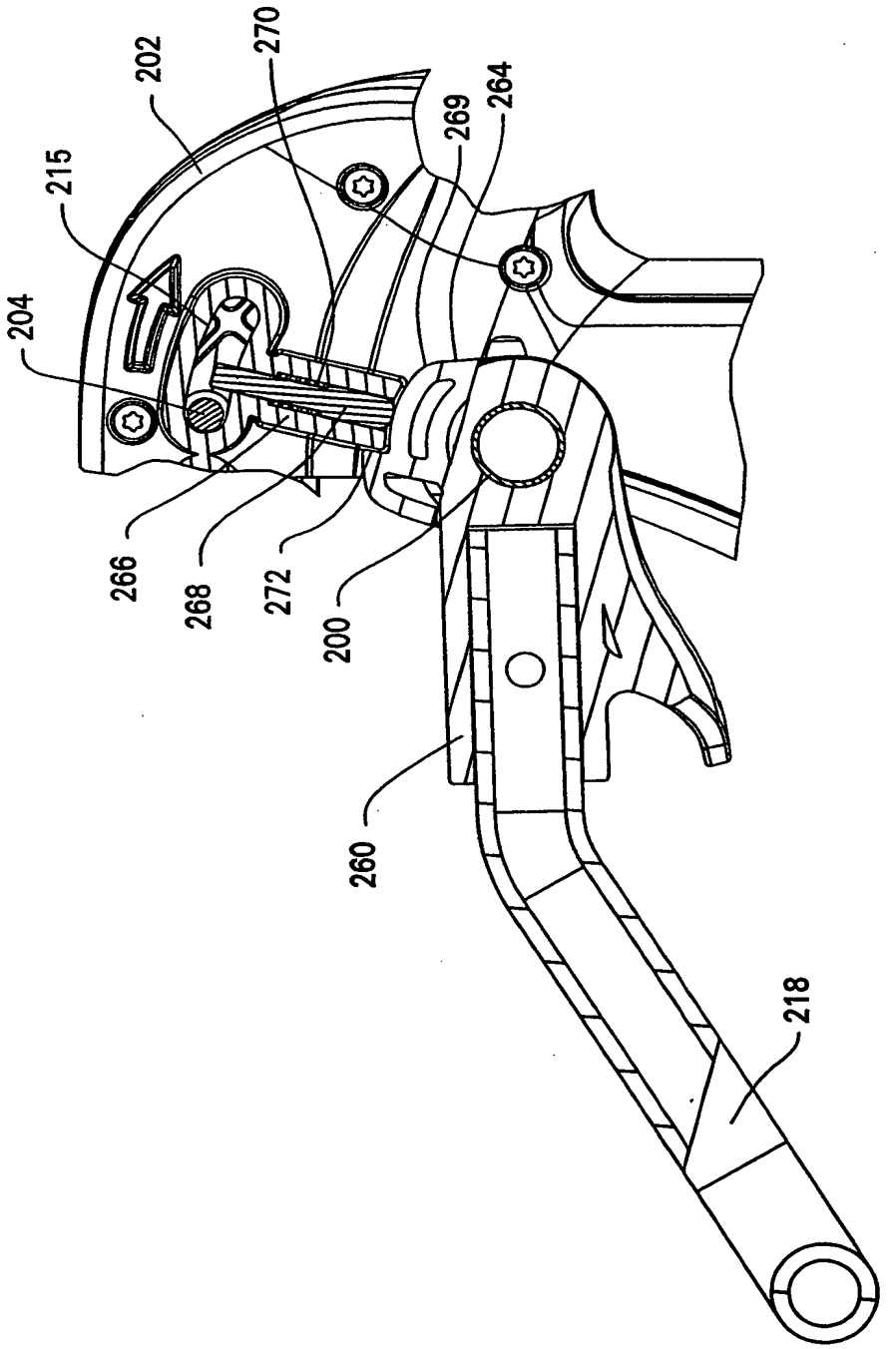


FIG. 58

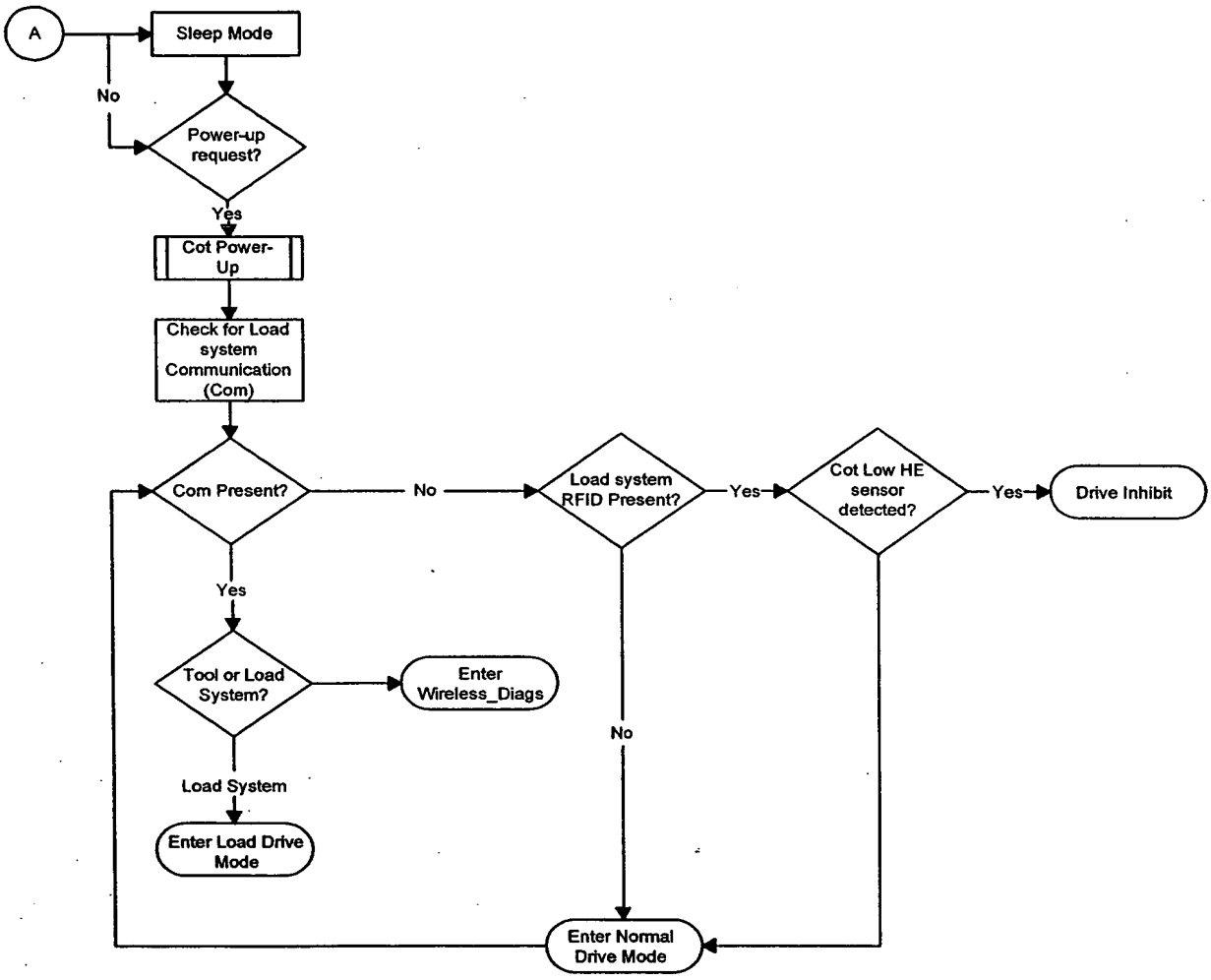

A
Sleep Mode
No
Power-up request?
Yes
Cot Power-Up
Check for Load system Communication (Com)
Com Present?
No
Load system RFID Present?
Yes
Cot Low HE sensor detected?
Yes
Drive Inhibit
Yes
Tool or Load System?
Enter Wireless_Diags
Load System
Enter Load Drive Mode
No
Enter Normal Drive Mode

FIG. 59

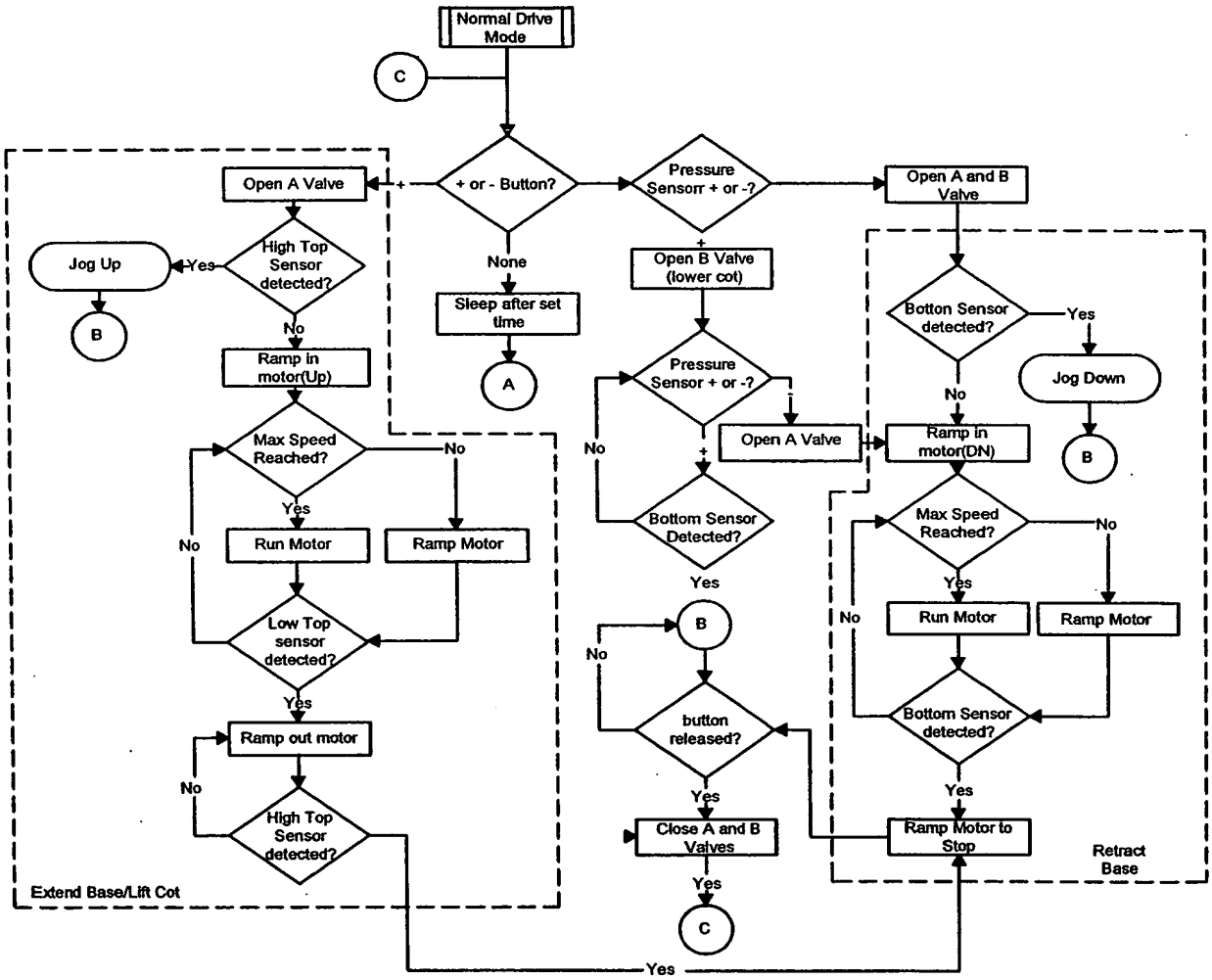

Normal Drive Mode
C
+ or - Button?
Pressure Sensorr + or -?
Open A Valve
Open A and B Valve
Jog Up
High Top Sensor detected?
Yes
No
None
Sleep after set time
B
A
Ramp in motor(Up)
Open B Valve (lower cot)
Botton Sensor detected?
Jog Down
Pressure Sensor + or -?
Open A Valve
Ramp in motor(DN)
Max Speed Reached?
Run Motor
Ramp Motor
Low Top sensor detected?
Ramp out motor
High Top Sensor detected?
Bottom Sensor Detected?
button released?
Close A and B Valves
Bottom Sensor detected?
Ramp Motor to Stop
Extend Base/Lift Cot
Retract Base

FIG. 60

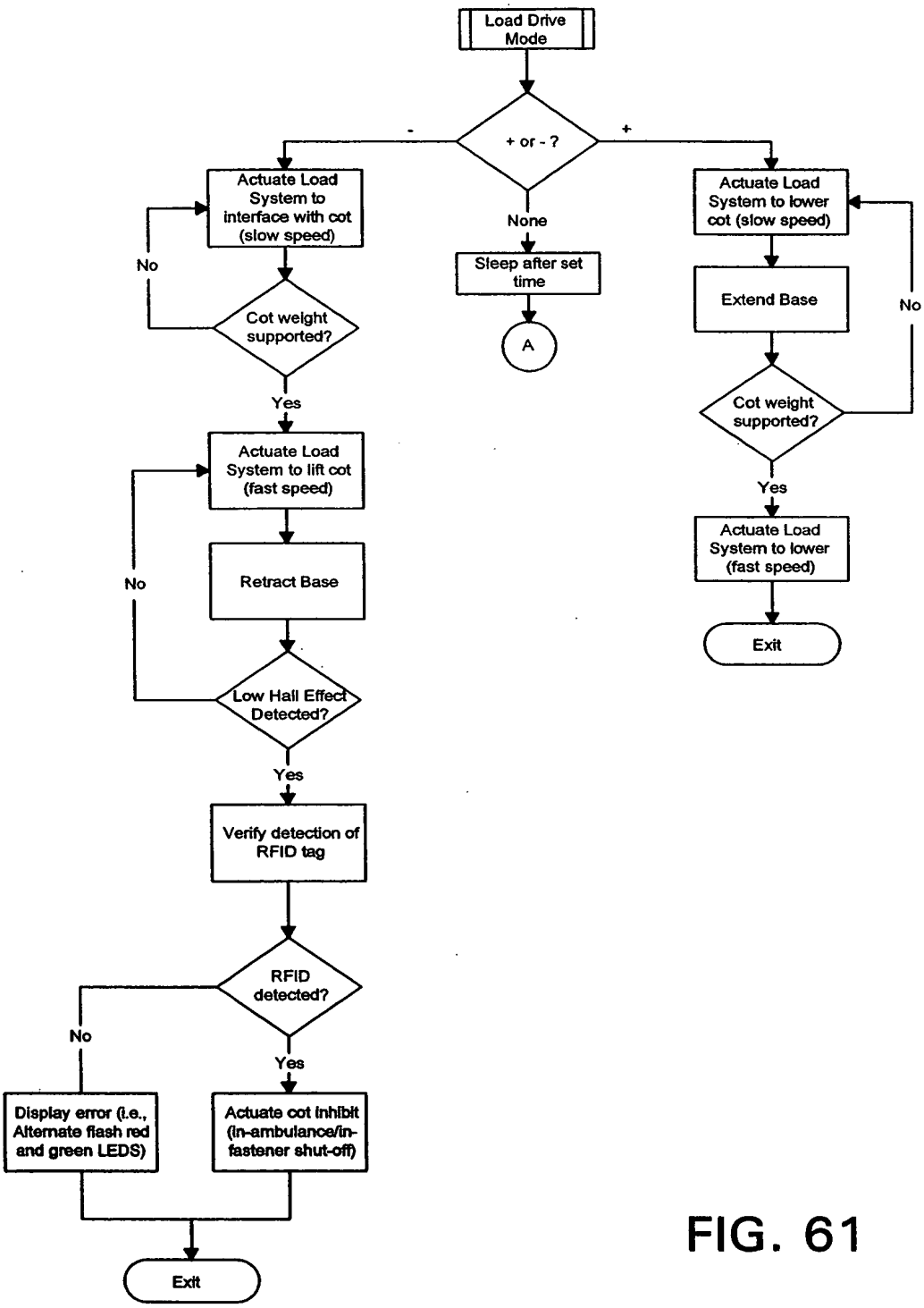

Load Drive Mode
+ or - ?
-
+
None
Actuate Load System to interface with cot (slow speed)
No
Cot weight supported?
Yes
Actuate Load System to lift cot (fast speed)
No
Retract Base
Low Hall Effect Detected?
Yes
Verify detection of RFID tag
RFID detected?
No
Yes
Display error (i.e., Alternate flash red and green LEDS)
Actuate cot inhibit (in-ambulance/in-fastener shut-off)
Exit
Sleep after set time
A
Actuate Load System to lower cot (slow speed)
Extend Base
No
Cot weight supported?
Yes
Actuate Load System to lower (fast speed)
Exit

FIG. 61

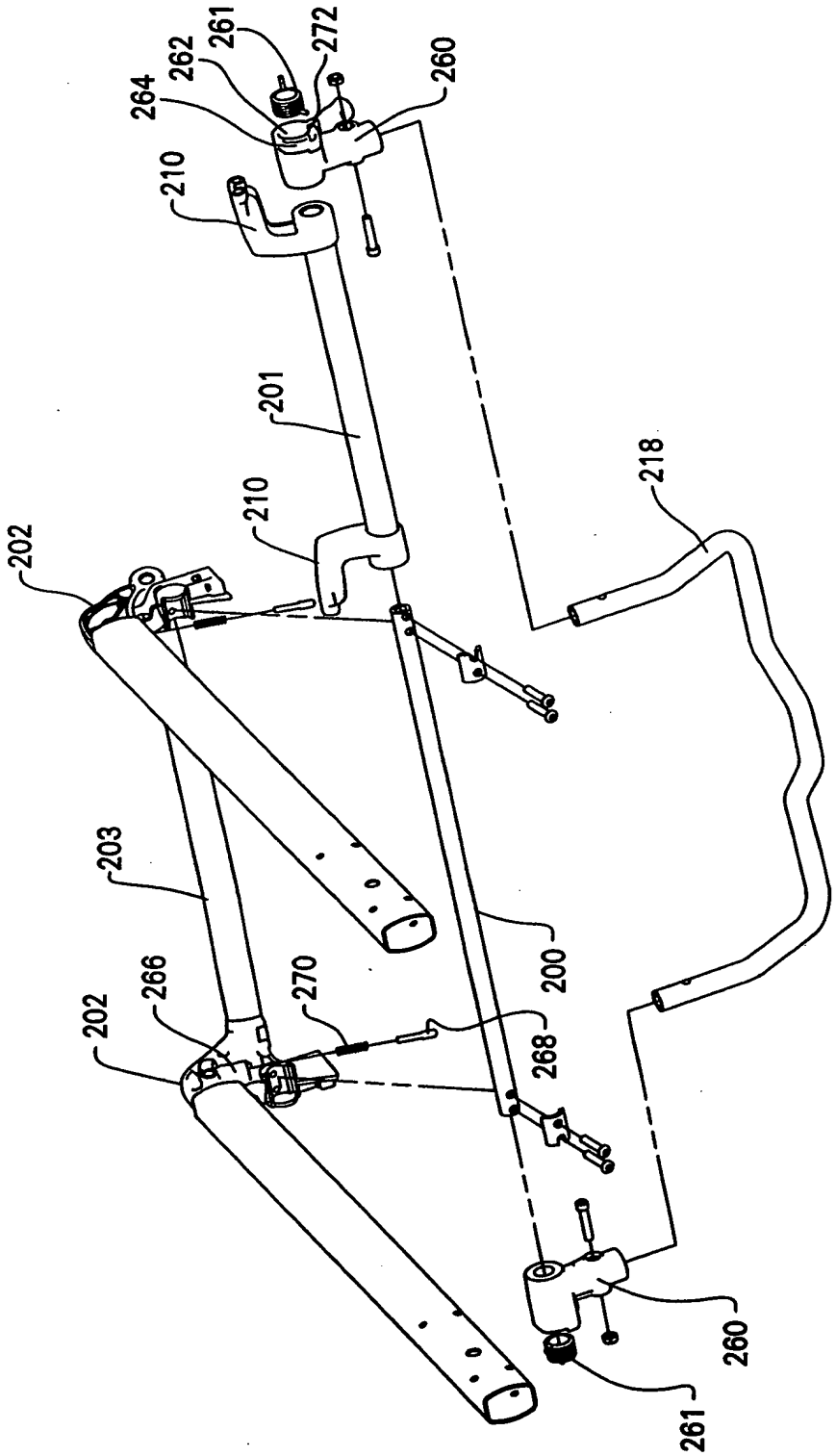

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FIG. 62

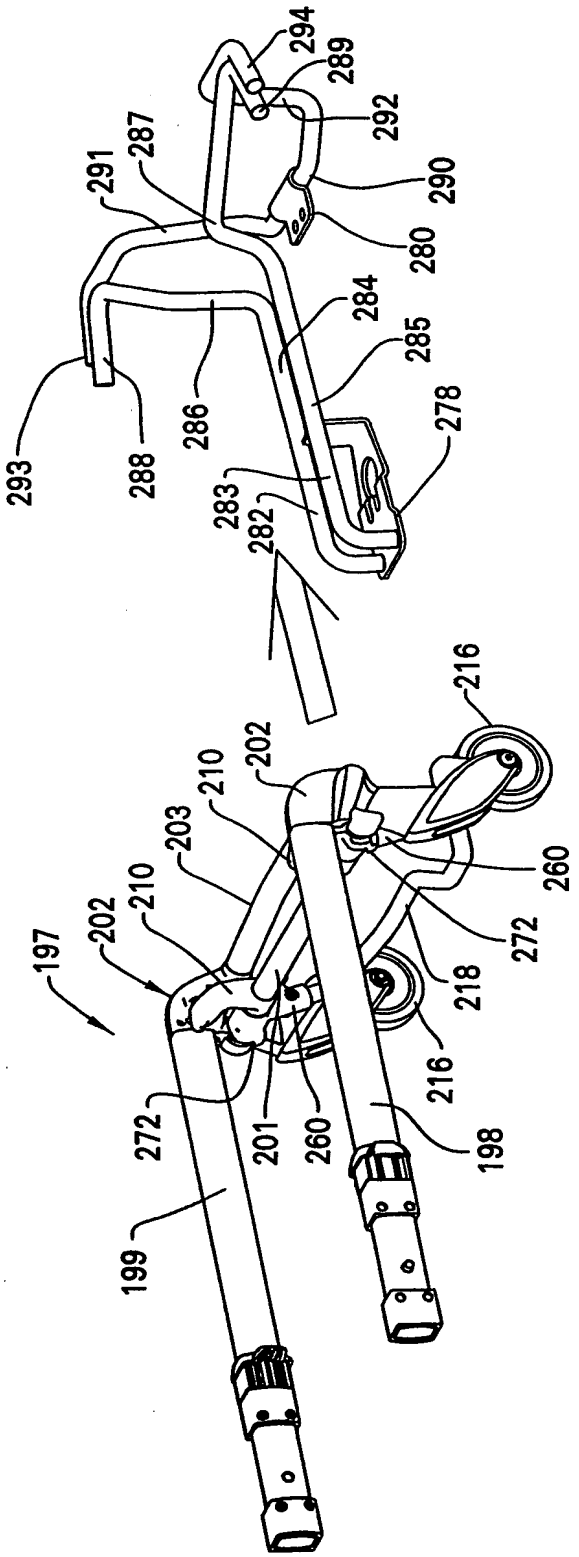

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FIG. 63

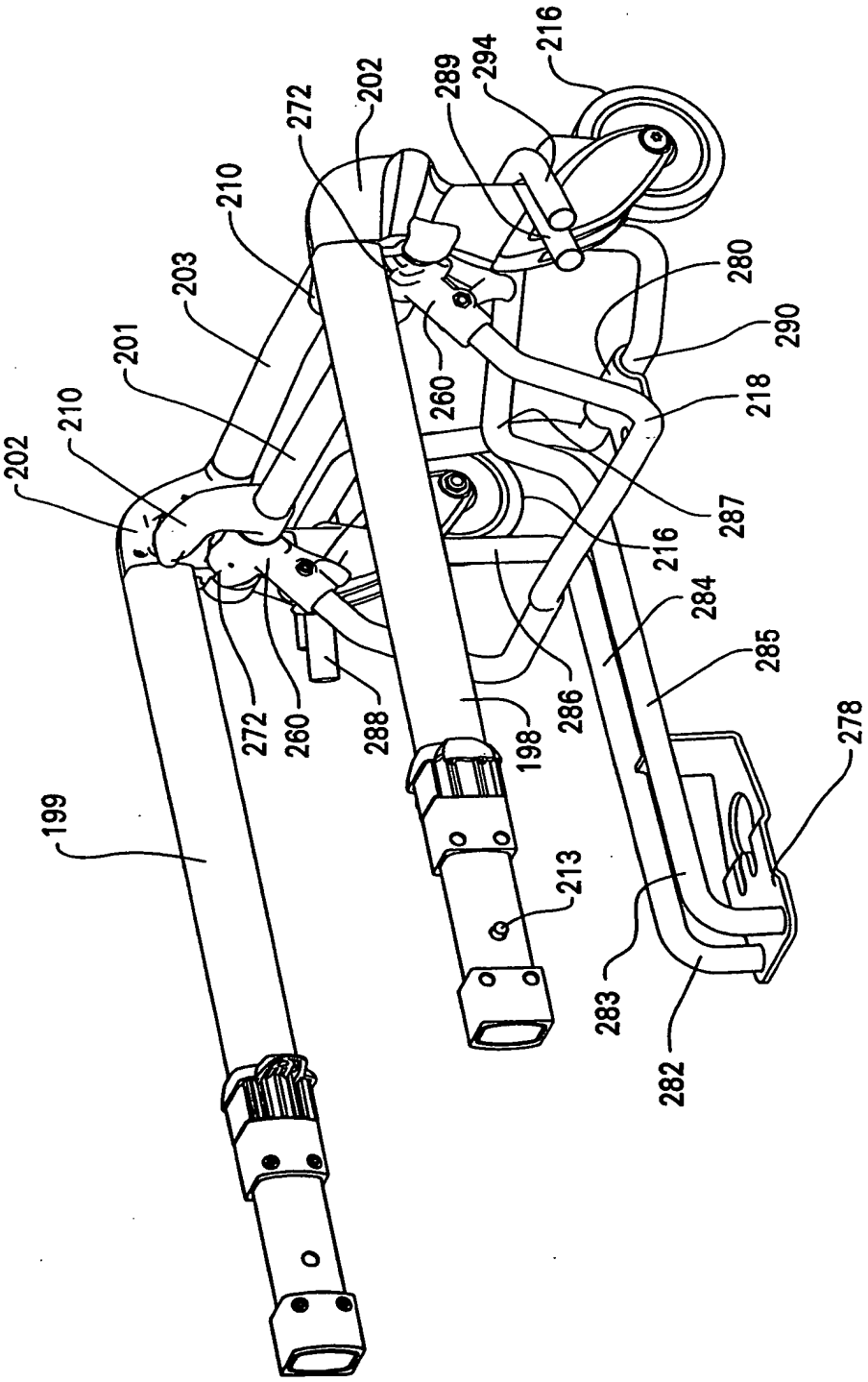

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FIG. 64

PATENT APPLICATION

IN THE U.S. PATENT AND TRADEMARK OFFICE

September 20, 2005

Applicant(s) : Clifford E. LAMBARTH et al

For : AMBULANCE COT AND HYDRAULIC ELEVATING MECHANISM THEREFOR

Serial No. : 11/172 434 Group: 3673

Confirmation No.: 5270

Filed : June 30, 2005 Examiner: Unknown

International Application No. : N/A

International Filing Date : N/A

Atty. Docket No.: 3007.P0315US

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

INFORMATION DISCLOSURE STATEMENT

Sir:

In compliance with the provisions of Rules 1.97(b)(3) and 1.98, enclosed herewith is Form PTO-1449 and the references cited thereon. Copies of cited U.S. references are not submitted in accordance with 37 CFR 1.98(a).

Also identified on the Form PTO-1449 is co-pending U.S. Patent Application Serial No. 10/850 144 which is owned by the assignee of the above-identified '434 application. A copy of the '144 application is not provided pursuant to 37 CFR 1.98(a)(2)(iii).

Further consideration is respectfully solicited.

Respectfully submitted,

DGB/DJW/jas

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Liane L. Churney	Reg. No. 40 694
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Donald J. Wallace	Reg. No. 43 977
Kevin L. Pontius	Reg. No. 37 512
Sidney B. Williams, Jr.	Reg. No. 24 949

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INFORMATION DISCLOSURE CITATION	Applicant: Clifford E. LAMBARTH et al Ser.No.: 11/172 434 Filed: June 30, 2005 Conf. No.: 5270 Atty. Docket No.: 3007.P0315US Group: 3673

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Examiner Initials*	Cite No.	Document Number - Kind Code	Publication Date MM-DD-YYYY	Name of Patentee or Applicant
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	AB	US 2 833 587	05-06-1958	H. B. Saunders
	AC	US 3 099 020	07-30-1963	S. R. Garfield et al
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	AW	US 5 271 113	12-21-1993	White
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	AY	US 5 575 026	11-19-1996	Way et al
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	BH	US 2004/0088792 A1	05-13-2004	O'Krangley et al
	BI			

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Examiner Initials*	Cite No.	Country Code - Document No. - Kind Code	Publication Date MM-DD-YYYY	Name of Patentee or Applicant	Trans.
	BJ	WO 2004/064698 A2	08-05-2004	Stryker Corporation	

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.	(Include Author, Title, Date, Pages, Etc.)
	BK	Co-pending U.S. patent application Serial No. 10/850 144, filed May 20, 2004, DEVICE FOR PREVENTING EMERGENCY VEHICLE BUMPER INTERFERENCE WITH COT WHEEL DEPLOYMENT

EXAMINER SIGNATURE	DATE CONSIDERED

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

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
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(43) International Publication Date
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(10) International Publication Number
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PCT/US2004/001070

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(30) Priority Data:
60/440,209 15 January 2003 (15.01.2003) US

(71) Applicant *(for all designated States except US)*: **STRYKER CORPORATION A CORPORATION OF THE STATE OF MICHIGAN** [US/US]; 2725 Fairfield Road, P.o. Box 4085, Kalamazoo, Michigan 49003-4085 (US).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **LAMBARTH, Clifford, E.** [US/US]; 6933 Oakland Drive, Portage, Michigan 49024 (US). **WAY, Christopher, B.** [US/US]; 10770 East Cd Avenue, Richland, Michigan 49083 (US).

(74) Agents: **BOUTELL, David, G.** et al.; 2026 Rambling Road, Kalamazoo, MI 49008-1631 (US).

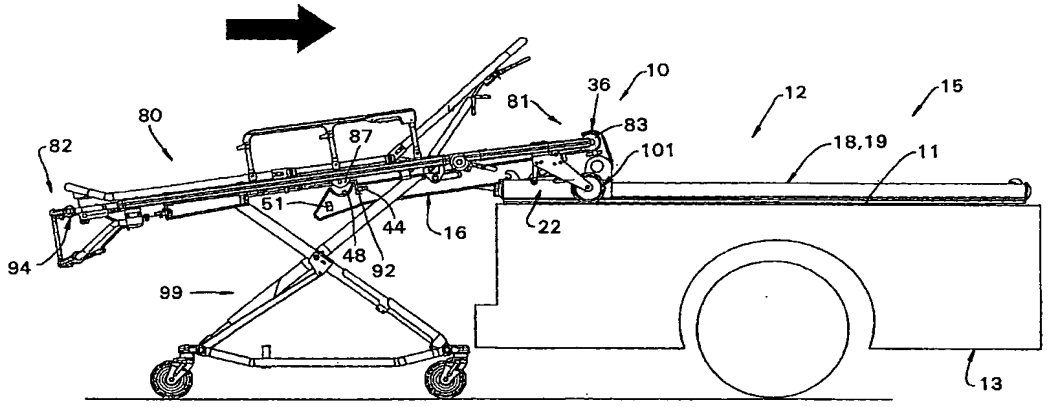
(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— *without international search report and to be republished upon receipt of that report*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: AMBULANCE COT LOADING AND UNLOADING DEVICE



(57) Abstract: An ambulance cot loading and unloading device which utilizes an elongate guide track configured for mounting to a floor surface of a cargo area on the ambulance. A trolley is supported for movement relative to the guide track and has an elongate boom. The ambulance cot has a powered collapsible and extendable base and a patient support deck mounted on the base. A connection mechanism is provided on the trolley and the ambulance cot which is configured to interconnect and securely hold the ambulance cot on the trolley.

WO 2004/064698 A2

AMBULANCE COT LOADING AND UNLOADING DEVICE

FIELD OF THE INVENTION

[0001] This invention relates to an ambulance cot loading and unloading device and methodology, as well as an ambulance cot support arrangement, especially suitable for ambulances.

BACKGROUND OF THE INVENTION

[0002] Emergency medical service (EMS) personnel are required to handle the combined weight of a patient and the ambulance cot during various stages of insertion of the ambulance cot into the cargo area of an ambulance. In some instances, the head end of the ambulance cot needs to be lifted by a first EMS attendant for insertion into the cargo area so that the head end wheels become supported on the floor surface of the cargo area as the base construction for the ambulance cot is collapsed thereby necessitating a second EMS attendant to lift the combined weight of the ambulance cot and patient at the foot end of the ambulance cot during the completion of an insertion of the ambulance cot into the cargo area. The same requirement exists when the ambulance cot with a patient thereon is removed from the cargo area. In some instances, there exists a risk of back injury to the EMS personnel as a result of this lifting and insertion as well as removal methodology. In addition, there is a risk of injury to the patient on the ambulance cot when an EMS attendant is injured and is no longer able to support the ambulance cot and the patient thereon when the ambulance cot is spaced above the ground during insertion or removal thereof from the cargo area. Accordingly, it is advantageous to provide an ambulance cot loading and unloading device as well as methodology for accomplishing same as well as providing an ambulance cot support arrangement in the ambulance which will

minimize the likelihood of injury to the patient during transport.

SUMMARY OF THE INVENTION

[0003] The objects and purposes of the invention are met by providing an ambulance cot loading and unloading device which utilizes an elongate guide track configured for mounting to a floor surface of a cargo area on the ambulance. A trolley is supported on the elongate guide track for movement relative to the guide track. The trolley is configured to extend to a location outside of the cargo area when the trolley is in a first position and additionally configured to be housed entirely inside the cargo area when the trolley is not in the first position. The ambulance cot has a collapsible and extendable base and a patient support deck mounted on the base. A connection mechanism is provided on the trolley and the ambulance cot which is configured to interconnect and securely hold the ambulance cot on the trolley.

BRIEF DESCRIPTION OF THE DRAWINGS

[0004] Other objects and purposes of this invention will be apparent to persons acquainted with apparatus of this general type upon reading the following specification and inspecting the accompanying drawings in which:

[0005] Figure 1 is an isometric view of the interior of a cargo area of an ambulance with an ambulance cot loading and unloading device embodying the invention being incorporated therein;

[0006] Figure 2 is a view similar to Figure 1, but with the ambulance cot loading and unloading device shifted from a stowed position in the interior of the cargo area as shown in Figure 1 to a deployed position;

[0007] Figure 3 is a view similar to Figure 1, but with the ambulance cot loading and unloading device removed;

[0008] Figure 4 is a schematic side illustration of the ambulance cot loading and unloading device in a deployed position thereof;

[0009] Figure 5 is a schematic side view of the ambulance cot loading and unloading device in a stowed and locked position inside the cargo area of the ambulance;

[0010] Figure 6 is a schematic side illustration similar to Figure 5, but in an unlocked condition;

[0011] Figure 7 is a schematic sectional view of the encircled area identified in broken lines in Figure 4;

[0012] Figure 8 is a side view of Figure 7 and illustrating a locking pin in a locked position;

[0013] Figure 9 is a view like Figure 8, but with the locking pin shifted to the unlocked position;

[0014] Figure 10 is an isometric view of the ambulance cot loading and unloading device in the stowed position;

[0015] Figure 11 is an isometric view of a fragment of the ambulance cot loading and unloading device with the trolley and elongate boom thereon located in the deployed position;

[0016] Figure 12 is a fragment of the interior-most end of the ambulance cot loading and unloading device;

[0017] Figure 13 is a schematic side illustration of the ambulance cot loading and unloading device;

[0018] Figure 14 is an illustration of the encircled area of Figure 13;

[0019] Figure 15 is like Figure 14, but with a locking device shifted to the locked position;

[0020] Figure 16 is a view like Figure 15, but with the locking device shifted to the unlocked position;

[0021] Figure 17 is a schematic side illustration of the trolley and elongate boom;

[0022] Figure 18 is a side illustration of an ambulance cot embodying the invention;

[0023] Figure 19 is a top illustration of a head end of the ambulance cot;

[0024] Figure 20 is a enlarged detail of an operative link between the ambulance cot and the trolley;

[0025] Figure 21 is a schematic illustration of the start of an ambulance cot loading sequence;

[0026] Figure 22 is a view similar to Figure 21, but with the trolley and elongate boom thereon moved to the deployed position ready to accept the ambulance cot thereon;

[0027] Figure 23 is a view similar to Figure 22, but with the ambulance cot engaged with the trolley;

[0028] Figure 24 is a view similar to Figure 23, but with the ambulance cot supported entirely on the trolley and associated elongate boom;

[0029] Figure 25 is a view similar to Figure 24, but with the ambulance cot base shifted to a position ready for insertion into the cargo area of the ambulance;

[0030] Figure 26 is a view similar to Figure 25, but with the ambulance cot and trolley moved partially into the cargo area of the ambulance;

[0031] Figure 27 is a view similar to Figure 26, but with the trolley and the ambulance cot inserted fully into the interior of the cargo area of the ambulance;

[0032] Figure 28 is an enlarged isometric of one end of the elongate guide track and the associated structure at the foot end of the ambulance cot;

[0033] Figure 29 is an enlarged side view of the operatively engaged elongate track and foot end of the ambulance cot;

[0034] Figure 30 is a side view illustrating the starting of an unloading sequence;

[0035] Figure 31 is a view similar to Figure 30, but with the ambulance cot having partially exited the cargo area;

[0036] Figure 32 is a view similar to Figure 31, but with the base portion of the ambulance cot oriented above the ground surface;

[0037] Figure 33 is a view similar to Figure 32, but with the base of the ambulance cot partially extended;

[0038] Figure 34 is a view similar to Figure 33, but with the base of the ambulance cot fully extended so that the wheels thereof are supported on the ground surface; and

[0039] Figure 35 is a view similar to Figure 34, but with the ambulance cot separated from the ambulance cot loading and unloading mechanism.

DETAILED DESCRIPTION

[0040] Figures 1 and 2 are both an isometric view of an ambulance cot loading and unloading device 10 embodying the invention and oriented on the floor surface 11 of a cargo area 12 of an ambulance 13. Figure 2 illustrates the ambulance cot loading and unloading device in a deployed position wherein a distal end 14 of an elongate boom 16 extends to a location outside of the cargo area 12. Inside a conventional cargo area 12 there is provided a plurality of floor mounted plates 17 (Figure 3). These plates are provided almost in a standard array in every cargo area of an ambulance so that the inventive ambulance cot loading and unloading device 10 can interface therewith.

[0041] More specifically, the ambulance cot loading and unloading device 10 includes an elongate guide track 15 consisting of a pair of elongate and parallel guide tubes 18 and 19 having a plurality of mounting plates interconnecting the guide tubes at multiple locations along the lengths thereof. The mounting plates 21 are spaced apart at an interval equal to the spacing between the floor plates 17 illustrated in Figure 3 so that the

mounting plates 21 can be utilized to secure the guide tubes 18 and 19 to the floor 11.

[0042] The ambulance cot loading and unloading device 10 includes a trolley 22 that is movable along the length of the guide tubes 18 and 19. The trolley includes a pair of tubular sleeves 23 and 24 respectively telescoped over the guide tubes 18 and 19 and a plate 26 (Figure 12) interconnecting the sleeves 23 and 24 together. A locking bar 27 is also connected to and extends between the sleeves 23 and 24 as is also illustrated in Figure 12. The trolley 22 also has a pair of upstanding bearing blocks 28 and 29 provided on the sleeves 23 and 24, respectively.

[0043] The rightmost mounting plate 21 in Figure 1 includes a plate 31 having an electrical connector 32 centrally mounted thereon, the electrical connector 32 being connected to an electrical system onboard the ambulance at a location beneath the floor plate 17. An electrical connector 33 is centrally provided on the locking bar 27 and is configured to mate with the electrical connector 32 when the trolley 22 reaches a location at the rightmost end of the guide tubes 18 and 19.

[0044] The elongate boom 16 is pivotally secured at one end to the bearing blocks 28 and 29 by any convenient structure providing an axle therefor. The axle has been generally indicated by the reference numeral 34. The elongate boom includes at the end thereof adjacent the axle 34 an upstanding hook-like configuration 36 wherein the opening into the hook-like configuration opens in a direction toward the distal end 14 of the elongate boom 16. Within the interior 37 of the hook-like configuration 36 there is provided two sets of toggle locking members 38 and 39, also shown in Figure 17. Each of the set of toggle levers 38 and 39 are pivotally

mounted on the elongate boom 16 and are configured to move in a manner suggested by Figures 14, 15 and 16. Each of the toggle levers 38 and 39 includes a torsion spring (not shown) urging the toggle levers 38 and 39 to the position illustrated in Figures 1 and 17. When an object is moved into the interior 37 of the hook-like configuration 36, as will be explained in more detail below, each of the toggle levers 38 and 39 will rotate counterclockwise so that the long legs 41 thereof will move to an upstanding position against the urging of the torsion spring. A latch 42 will move into a notch 43 provided on each toggle lever 38 and 39 to hold the long leg 41 in an upstanding position to block the exit of the object. A first manually engageable handle 44 is connected to the latch 42 by means of an elongate linkage 46 to facilitate a movement of the latch so that it is removable from the notch 43 to enable the torsion spring to return each of the toggle levers 38 and 39 to the position illustrated in Figure 17. A second manually engageable handle 45 is linked by a linkage member 50 (Figure 17) to the elongate linkage 46 to provide a second location from which to facilitate a movement of the latch 42 so that it is removed from the notch 43 to enable the torsion spring to return each of the toggle levers 38 and 39 to the position illustrated in Figure 17.

[0045] Adjacent the distal end 14 of the elongate boom 16 there is provided a depression 47 in which there is provided a set of electrical contacts 48. The electrical contacts 48 are electrically connected to the electrical contact 33 described above. The functionality of the set of electrical contacts 48 will be described in more detail below.

[0046] The elongate boom 16 is pivotal about the axle 34. An electrical jack mechanism 49 is connected to and

extends between the plate 26 and the underside of the elongate boom 16. The electrical jack mechanism 49 is extendable and contractible to effect a pivotal movement of the elongate boom in a manner that will be readily understood by those skilled in the art. A toggle switch 51 is mounted adjacent the distal end 14 and, upon manipulation, effects an extension or contraction of the jack mechanism 49 through the electrical connection provided between the switch 51 and a drive motor for the jack mechanism 49. If desired, an optional height sensor 52 (Figure 11) can be provided on the elongate boom 16 adjacent the distal end 14 so as to provide an indication of the distance between the underside of the elongate boom 16 and the ground surface.

[0047] A lug 53 is provided on the underside of the elongate boom 16 and is configured to be received into a receptacle 54 provided on the elongate guide track 15 defined by the guide tubes 18 and 19. It is desirable to orient the receptacle 54 on a mounting plate 21 so that upon reception of a lug 53 therein when the elongate boom 16 is lowered to the Figure 4 position, the trolley 22 will be incapable of movement relative to the elongate guide tubes 18 and 19. Upon a raising of the elongate boom 16 to the position illustrated in Figure 17, the lug 53 will be removed from the receptacle 54 to facilitate manual displacement of the trolley 22 along the length of the guide tubes 23 and 24.

[0048] In this particular embodiment, there is no drive mechanism for powering the trolley 22 along the length of the guide tubes 18 and 19. However, it is conceivable that such a drive mechanism could be provided and such is to be included within the scope of this invention.

[0049] As illustrated in Figure 10, there is provided a centrally disposed electrical connector 56 on a

mounting plate 57 oriented at an end of the guide track 15 remote from the electrical connector 32. The electrical connector 56 is connected to the onboard electrical system of the ambulance. When the trolley 22 is in the position illustrated in Figure 10, there is no electrical power being supplied to it. As a result, operation of the toggle switch 51 will not effect an operation of the jack mechanism 49. On the other hand, when the trolley 22 is moved leftwardly, there is provided an electrical connector 60 (Figure 12) on the trolley 22 which engages the electrical connector 56 so that electrical energy is supplied to the toggle switch 51 to effect a reverse in polarity of the drive motor for the jack mechanism 49 and to effect a corresponding raising and lowering of the elongate boom 16 only when the elongate boom is in the deployed position illustrated in Figures 2 and 11.

[0050] When the trolley 22 is in the Figure 10 position, it is normally locked to the elongate guide track 15 defined by the guide tubes 18 and 19. A locking mechanism 58 therefor is depicted in detail in Figures 5, 6, 7, 8 and 9. The locking mechanism 58 includes a pin 59 (Figure 8) which is supported for vertical movement. The pin includes a roller 61 rotatably secured to the bottom end of the pin 59. A plate 62 having a notch 63 therein is secured to the elongate guide track, such as to one of the mounting plates 21 so that the pin 59 can be moved vertically into and out of the notch 63. When the pin 59 is received in the notch 63 as depicted in Figure 8, the trolley 22 will be incapable of movement due to the interconnection of the pin 59 on the trolley to the guide track.

[0051] An object detector 66 is oriented in the interior 37 of the hook-like configuration 36 on the elongate boom 16. When an object is present in the

interior 37, the object detector 36 will be articulated downwardly as depicted in Figure 6. A linkage mechanism 67 is provided to effect a lifting of the pin 61 out of the notch 63 when the object detector 66 is moved to the Figure 6 position. On the other hand, when the trolley 22 is oriented intermediate the ends of the elongate guide track defined by the guide tubes 18 and 19, namely, is in the position illustrated in Figure 10, and no object is present in the interior 37 of the hook-like configuration 36, the pin will effect a locking of the trolley 22 in position so that the vehicle can be in motion without there being any corresponding inadvertent movement of the trolley relative to the elongate guide track 15.

[0052] When it is desired to move the trolley 22 leftwardly from the Figure 1 position to the Figure 2 position, the operator will grasp a handle configuration 68 to enable the elongate boom 16 to be easily grasped and pulled in a direction leftwardly in Figure 2 to draw the trolley 22 to the Figure 2 position. However, and before the trolley can be so moved, a removal of the locking pin 59 from the notch 63 is required. This is accomplished by manipulating a handle 69 oriented at the left end of the guide tube 16 as illustrated in Figure 10. The handle 69 is connected to an elongate rod 71 that extends through the interior of the guide tube 19 as depicted in Figures 5, 6 and 7. The elongate rod 71 spring centered and is connected to a cam having an inclined cam surface 73 thereon facing the roller 61. Thus, as the handle 69 is pulled leftwardly, the elongate rod 71 will be pulled leftwardly against a spring urging to bring the cam surface 73 into engagement with the roller 61 to cause the roller 61 to roll up the ramp-like inclination 73 to draw the pin 59 from the notch 63.

[0053] An ambulance cot 80 (Figure 18) is configured to operatively load and unload from the ambulance cot loading and unloading device 10 described above. The particular construction of the ambulance cot 80 is disclosed in detail in U.S. Patent No. 5 537 700 and the subject matter thereof is incorporated herein by reference. The ambulance cot 80 described in the aforesaid patent has been modified at both the head end 81 and the foot end 82 and as described below. More specifically, the head end 81 has been modified to include a roller 83 rotatably mounted on an axis of rotation that extends perpendicular to a longitudinal axis of the ambulance cot 80. At the foot end 82, the auxiliary handle described in the aforementioned patent has been reconfigured as a foot end lift bar 84 (Figures 28 and 29) and additional hand grips 86 have been operatively connected to the foot end 82 of the ambulance cot 80 to facilitate attendant handling of the ambulance cot.

[0054] The ambulance cot 80 has been further modified to include a midsection connection piece 87 having a set of electrical contacts 88 thereon configured to interconnect with the set of electrical contacts 48 on the elongate boom 16. The connection 87 is also configured to snugly nest into the depression 87 in which the electrical contacts 48 is provided.

[0055] The ambulance cot 80 has been further modified to include a handle 91 interconnected by a linkage (not shown) to an abutment 92 oriented adjacent the connection 87. The abutment 92 is configured to engage the handle 44 on the elongate boom in response to manual manipulation of the handle 91. In this particular embodiment, the handle 91 is reciprocally supported in an elongate slot 93 provided at the foot end 82 of the ambulance cot 80 so that upon reciprocation of the handle

91 in the slot 93, the abutment 92 will also reciprocate to effect movement of the handle 44.

[0056] Adjacent the handle 86 at the foot end 82 of the cot 80 there is provided a three position toggle switch 94. Just forward of the foot end 82 there is provided a housing 96 in which is housed an electric motor 97 (Figure 18) and a rechargeable battery pack 98 for supplying power to the motor in a manner controlled by the aforementioned toggle switch 94. The battery pack 98 is configured to be easily exchanged without the necessity of tools and could be one or more batteries. The motor 97 could be a conventional DC drive motor for rotatably driving an input shaft of a hydraulic pump configured to be connected in fluid circuit with a hydraulic cylinder, the extendible and retractable rod of which is connected to the movable cross member on the cot 80 to facilitate a powered raising and lowering of the cot base 99. The battery 98 is capable of being charged when electrical power is supplied to the electrical contacts 88. In addition, the three position toggle switch 94 is capable of controlling the battery energy to the jack mechanism 49 to effect the raising and lowering movements of the elongate boom 16 only when the electrical contacts 48 and 88 are engaged as will be described in more detail below. The collapsible and extendable base 99 structure is virtually the same as the base described in the aforementioned patent and, therefore, further detailed discussion thereof is believed unnecessary.

[0057] Turning now to Figure 21, when it is desired to load the ambulance cot 80 into the cargo area 12 of an ambulance 13, it is necessary for the ambulance cot loading and unloading device 10 to be deployed so that the distal end 14 of the elongate boom 16 extends rearwardly from the cargo area and is lowered as depicted

in Figure 22. The aforesaid operation is accomplished by an attendant pulling the handle 69 in a rearward direction to cause the handle to impart a rearward movement of the elongate rod 71 as well as the cam 72 (Figures 8 and 9) to cause the inclined surface 73 on the cam 72 to engage the roller 61 to impart an upward lifting movement of the pin 59 from the notch 63. This operation unlocks the trolley 22 from the elongate guide track. Thereafter, the attendant can grasp the handle 68 at the distal end 14 of the elongate boom 16 to impart a rearward movement to the trolley 22 so that it shifts its location from the position illustrated in Figure 21 to the position illustrated in Figure 22. In the position illustrated in Figure 22, the electrical contact 60 on the trolley 22 (Figure 12) will interconnect with the electrical connector 56 so that electrical power from the ambulance 13 will be supplied to the toggle switch 51 to enable operative control to be provided to the electric motor for the jack mechanism 49 so as to facilitate an extension or retraction of the jack mechanism 49 to thereby effect a raising or a lowering of the elongate boom 16 relative to the trolley 22. Since, as depicted in Figure 22, it is desired to load the ambulance cot 80 into the cargo area 12 of the ambulance 13, the toggle switch 51 will effect a lowering of the elongate boom 16 to a location wherein the lug 53 enters the receptacle 54 on the elongate guide track to effectively lock and hold the trolley 22 in place while the ambulance cot 80 is being loaded.

[0058] Next, the ambulance cot 80 is moved by the attendant and on its wheel supported base 99 until the roller at the head end of the ambulance cot engages the inclined upper surface of the elongate boom 16 and rolls into the interior 37 of the hook-like configuration 36. At this point in time, the lead support wheel 101 moves

into engagement and rests on the floor surface 11 of the cargo area 12 of the ambulance 13 as depicted in Figure 23. As the roller 83 enters the interior 37 of the hook-like configuration 36, the sets of toggle levers 38 and 39 will be moved clockwise from the position illustrated in Figure 17 to a position wherein the long legs 41 (Figure 17) become upright to effect a holding of the roller 83 into the interior space 37 of the hook-like configuration 36. The latch 42 will be received in a notch 43 to hold the toggle levers 39 in the locked position whereat the long leg 41 extends in a vertically upright manner. At this point in time, the ambulance cot 80 is now locked at the head end 81 thereof to the ambulance cot loading and unloading device 10. In addition, the roller 83 has depressed the object detector 66 inside the interior 37 of the hook-like configuration to effect a raising through the linkage 67 of the locking pin 61. The toggle lever switch 94 is next operated to change its state from a "neutral" state (Figure 18) to a "retract base" state to effect a battery powered operation of the motor 97 to effect a contracting of the base 99 as depicted in Figure 24. Since the spacing between the hook-like configuration 36 and the depression 47 on the elongate boom 16 is equal to the spacing between the roller 83 and the connection piece 87 on the cot 80 as the base 99 retracts, the ambulance cot 80 will initially be lowered about a pivot axis defined by the roller 83 received in the hook-like configuration 36 until the connection piece 87 is received in the depression 47 in the elongate boom 16 so that the sets of contacts 88 and 48 come into contact with each other. At this moment, the "retract base" state of the toggle switch 94 usurps the toggle switch 51 so that the toggle switch 94 in the "retract base" position effects an extension of the jack mechanism 49 and thence a raising

of the elongate boom 16 from the Figure 24 position to the Figure 25 position. The toggle switch 94 remains in the "retract base" condition until the base 99 is fully collapsed and all six wheels on the ambulance cot 80 are aligned with the floor 11 in the cargo area 12 of the ambulance 13. Thereafter, the attendant can simply push on the foot end 82 of the ambulance cot 80 to facilitate movement of the ambulance cot 80 and the interconnected trolley 22 through the position illustrated in Figures 26 to the position illustrated in Figure 27. During this transitional movement, the electrical contacts 56 and 60 become disconnected and when the trolley 22 reaches the position illustrated in Figure 27, the electrical contacts 32 and 33 will interconnect so that the battery 98 onboard the ambulance cot 80 will be recharged by the electrical system onboard the ambulance 13 and through the electrical connection provided by the interconnected set of contacts 48 and 88. As the trolley 22 moves toward its final location illustrated in Figure 27, the locking bar 27 (Figure 12) will be operatively received in a trolley locking mechanism 102. The trolley locking mechanism 102 consists of a pair of laterally spaced hook-like configurations 103 which each include an interior space 104 facilitating reception of the locking bar 27 on the trolley 22. A toggle lever 106 is associated with each hook-like configuration 103 and rotate against the urging of a not illustrated torsion spring so that the horizontal leg illustrated in Figure 12 will be shifted to a vertically upright position to hold the locking bar 27 in place. The change in state of the toggle levers 106 is illustrated in Figures 14, 15 and 16.

[0059] A foot end ambulance cot locking system 107 is connected to the elongate guide track 18, 19 (Figure 10) and is identical in form to the trolley locking mechanism

102. That is, each of the foot end ambulance cot locking mechanism 107 includes a pair of laterally spaced hook-like configurations 103 and a rotatable toggle lever 106 urged by a torsion spring to the position illustrated in Figure 10. Thus, as the cot lifting bar 84 (Figure 28) is moved rightwardly, the lifting bar 84 will effect a pivotal movement of the set of toggle levers 106 in the manner illustrated in Figures 14, 15 and 16. A latch mechanism 108 operatively engaging the toggle levers 106 at all four locations will effect a locking of the toggle levers 106 in the elevated position illustrated in Figure 15 in manner similar to the operative arrangement between the latch 42 and the set of toggle levers 38 and 39 described above. The ambulance cot 80 is now secured inside the cargo area 12 of the ambulance 13 at four spaced locations defined by the spaced hook-like configurations 103 illustrated in Figure 10. In addition, the head end 81 of the ambulance cot 80 is secured to the trolley 22 by the hook-like configuration 36 and associated sets of toggle levers 38 and 39.

[0060] Referring now to Figure 30, when it is desired to remove the ambulance cot 80 from the cargo area 12 of the ambulance 13, the handle 69 is pushed forwardly against the force of the not illustrated centering spring as depicted in Figures 14, 15 and 16 to cause the elongate rod 71 to unlatch the latches 108 to cause the torsion springs to move the toggle levers 106 from the Figure 15 position to the Figures 14 and 16 positions to thereby release the lift bar 84 and the locking bar 27 therefrom. Thereafter, the attendant can pull on the lift bar 84 or the handles 86 at the foot end 82 of the ambulance cot 80 to effect a movement of not only the ambulance cot 80 but also the trolley 22 from the position illustrated in Figure 30 through the position illustrated in Figure 31 to the position illustrated in

Figure 32. In this position, the set of contacts 56 and 60 reengage so that battery power from the battery 98 onboard the ambulance cot is interconnected to the toggle switch 94 onboard the ambulance cot to thereby enable the attendant to manipulate the switch to the "extend base" position to operatively simultaneously cause the jack mechanism 49 to be operated to retract and lower the elongate boom 16 from the position illustrated in Figure 32 to the position illustrated in Figure 33 and an extension of the base 99 from its fully retracted position illustrated in Figure 32 and as depicted in Figure 33. Even though the elongate boom 16 has reached its lowermost position as depicted in Figure 33, the attendant's continued operation of the toggle switch 94 by holding it in its "extend base" state, the base 99 will continue to extend until all four wheels are in engagement with the ground as illustrated in Figure 34 and the connection piece 87 is raised out of the depression 47 in the elongate boom 16 to decouple the electrical contacts 48 and 88. At this point in the ambulance cot 80 removal sequence, the wheels 101 at the head end 81 of the ambulance cot 80 are still in engagement with the floor 11 of the cargo area 12 of the ambulance 13 and as depicted in Figure 34. Thereafter, the handle 91 at the foot end 82 of the ambulance cot 80 is slid forwardly in the elongate slot 93 so that the abutment 92 interconnected therewith will abut the handle 44 on the elongate boom 44 to effect an unlatching of the set of toggle levers 38, 39 to release the roller 83 from the hook-like configuration 36 on the trolley 22. In the alternative, the handle 45 can be manually manipulated to free the ambulance cot 80 from the trolley 22.

[0061] The ambulance cot 80 is now freed from the ambulance cot loading and unloading device 10 and is

capable of moving freely away from the ambulance on the wheel supported base 99 as depicted in Figure 35.

[0062] Although a particular preferred embodiment of the invention has been disclosed in detail for illustrative purposes, it will be recognized that variations or modifications of the disclosed apparatus, including the rearrangement of parts, lie within the scope of the present invention. For example, all or selected ones of the electrical contacts could be replaced with electrical devices, such as proximity type switches or radio frequency activated devices where actual contact between components is not required in order to effect the desired electrical communication. Additionally, during loading, the boom and cot can be lifted before the base is collapsed. Similarly, during unloading, the base can be fully deployed before the boom is lowered.

What is claimed is:

1. A combination of an ambulance cot having a wheel supported base and an ambulance cot loading and unloading device, especially for ambulances, comprising:

an elongate guide track configured for mounting to a fixed surface of a cargo area on said ambulance;

a trolley supported for movement relative to said elongate guide track between first and second positions, said trolley being configured to move to a location adjacent an access opening to an interior of the cargo area when said trolley is in said first position and is additionally configured to move to a location spaced from said access opening when said trolley is not in said first position;

a connection mechanism on said trolley configured to interconnect and securely hold said ambulance cot on said trolley;

an energy consumer on said trolley for effecting, while said ambulance cot is coupled by said connection mechanism to said trolley, at least one of a vertical movement of said ambulance cot to operatively align the wheels of said wheel supported base thereof with a floor surface of said cargo area prior to a loading of said ambulance cot into said cargo area and a vertical movement of said ambulance cot after an unloading of said ambulance cot from said cargo area to facilitate engagement of the wheels of said wheel supported base with a ground surface; and

a first device on said ambulance cot configured to activate said energy consumer when said connection mechanism is interconnected to and securely holds said ambulance cot on said trolley.

2. The combination according to Claim 1, wherein said trolley includes an elongate boom secured to said trolley and configured to extend to a location outside of the cargo area, said elongate boom being configured for vertical movement relative to said trolley in order to accommodate varying ambulance cot loading and unloading conditions; and

wherein said energy consumer includes a motor for effecting, when said motor is operated, said vertical movement of said elongate boom.

3. The combination according to Claim 2, wherein a manually manipulatable first switch is provided on said elongate boom and is interconnected between an energy source onboard said ambulance and said energy consumer for facilitating an attendant controlled reversal in the energy of said energy source supplied to said motor to effect movement of said elongate boom in attendant selected vertical directions.

4. The combination according to Claim 3, wherein said manually manipulatable first switch is provided on said elongate boom adjacent a distal end thereof.

5. The combination according to Claim 4, wherein said manually manipulatable first switch provided on said elongate boom is configured to be usurped by the functionality of said first device on said ambulance cot.

6. The combination according to Claim 5, wherein said first device is provided on said ambulance cot adjacent a foot end thereof, a head end of said ambulance cot being configured to operatively couple to said connection mechanism.

7. The combination according to Claim 3, wherein said ambulance cot includes a collapsible and an extendable base and a patient support deck mounted on said base and an electrically operable motor and interconnected battery onboard said ambulance cot for effecting, when said motor is electrically operated, a collapsing or an extending of said base.

8. The combination according to Claim 7, wherein said trolley includes a second device connected in circuit with said first switch; and

wherein said ambulance cot includes a third device configured to communicate with said second device when said ambulance cot is securely held on said trolley and only when said base is collapsed from an extended position thereof.

9. The combination according to Claim 8, wherein said first device on said ambulance cot includes a manually manipulatable second switch interconnected between said battery and said electrical motor for facilitating an attendant controlled reversal in polarity of the electrical energy supplied to said electrical motor to effect a collapsing or an extending of said base of said ambulance cot and independent of the electrical communication between said second and third devices.

10. The combination according to Claim 7, wherein said trolley includes an elongate boom configured for vertical movement relative to said trolley in response to activation of said energy consumer, said ambulance cot includes a second device and said trolley includes a third device, said second and third devices being configured to communicate when said ambulance cot is

securely held on said trolley and only when said base is collapsed from an extended position thereof; and

wherein said first device on said ambulance cot is a manually manipulatable second switch configured to usurp the functionality of said manually manipulatable first switch when said third device communicates with said second device so that the attendant will be able to control the reversal in the energy supplied to said energy consumer to effect movement of said elongate boom in attendant selected vertical directions by manual manipulation of said manually manipulatable second electrical switch.

11. The combination according to Claim 10, wherein said manually manipulatable second switch is provided on said ambulance cot adjacent a foot end thereof, a head end of said ambulance cot being configured to operatively couple to said elongate boom and said first ambulance cot fastening assembly.

12. The combination according to Claim 10, wherein said elongate guide track includes a fourth device adjacent an end of said elongate guide track corresponding to said first position of said trolley thereon, said fourth device being connected to an energy source onboard said ambulance, said trolley including a fifth device configured to communicate with said fourth device only when said trolley is oriented at said end of said elongate guide track so that said elongate boom can be moved vertically only when said trolley is oriented at said end.

13. The combination according to Claim 1, wherein said trolley includes an elongate boom secured to said trolley and configured to extend to a location outside of the cargo area when said trolley is in said first position, said elongate boom being configured for vertical movement relative to said trolley in order to accommodate varying ambulance cot loading and unloading conditions; and

wherein said trolley is freely movable lengthwise of said elongate guide track when said elongate boom is elevated, said trolley being fixedly locked to said elongate guide track in response to said elongate boom being placed into a lowered position.

14. The combination according to Claim 1, wherein said trolley is configured for free movement lengthwise of said elongate guide track.

15. The combination according to Claim 1, wherein said elongate guide track includes a second device connected in circuit to an energy source onboard said ambulance, said second device being configured to communicate with a third device separate from said elongate guide track.

16. The combination according to Claim 15, wherein said third device is provided on said trolley.

17. The combination according to Claim 16, wherein said second device is oriented adjacent an end of said elongate guide track corresponding to said second position of said trolley thereon so that said second device will communicate with said third device when said trolley is in said second position thereon.

18. The combination according to Claim 17, wherein said ambulance cot includes a fourth device connected in circuit with said battery; and

wherein said fourth device is configured to communicate with said third device when said ambulance cot is securely held on said trolley to facilitate a recharging of said battery utilizing energy supplied by said energy source onboard said ambulance.

19. An ambulance cot support arrangement, especially for ambulances, comprising:

an elongate guide track configured for mounting to a fixed surface of a cargo area on said ambulance;

a trolley supported for movement relative to said elongate guide track between first and second positions, said trolley being configured to move to a location adjacent an access opening to an interior of the cargo area when said trolley is in said first position and is additionally configured to additionally move to a location spaced from said access opening when said trolley is not in said first position; and

an ambulance cot fastening assembly mounted on said trolley and configured to releasably securely hold an ambulance cot thereon in all positions of said trolley on said elongate guide track.

20. The ambulance cot support arrangement according to Claim 19, wherein said trolley includes an elongate boom secured to said trolley and configured to extend to a location outside of the cargo area when said trolley is in said first position, said elongate boom being configured for vertical movement relative to said trolley in order to accommodate varying ambulance cot loading and unloading conditions.

21. The ambulance cot support arrangement according to Claim 20, wherein said elongate boom is secured to said trolley for movement about a pivot axis that extends perpendicular to a theoretical vertically upright plane containing a longitudinal axis of said elongate guide track.

22. The ambulance cot support arrangement according to Claim 19, wherein said elongate guide track includes a first device connected in circuit to an energy source onboard said ambulance, said first device being configured to electrically communicate with a second device separate from said elongate guide track.

23. The ambulance cot support arrangement according to Claim 22, wherein said second device is provided on said trolley.

24. The ambulance cot support arrangement according to Claim 23, wherein said first device is oriented adjacent an end of said elongate guide track corresponding to said second position of said trolley thereon so that said second device will communicate with said first device when said trolley is in said second position thereon.

25. The ambulance cot support arrangement according to Claim 19, wherein said trolley includes an elongate boom secured to said trolley and configured to extend to a location outside of the cargo area when said trolley is in said first position, said elongate boom being configured for vertical movement relative to said trolley in order to accommodate varying ambulance cot loading and unloading conditions; and

wherein said trolley includes an onboard motor for effecting, when said motor is operated, said vertical movement of said elongate boom; and

wherein a manually manipulatable first switch is interconnected between said motor and an energy source onboard said ambulance for facilitating an attendant controlled reversal in energy supplied to said motor to effect movement of said elongate boom in attendant selected vertical directions.

26. The ambulance cot support arrangement according to Claim 25, wherein said manually manipulatable first switch is provided on said elongate boom adjacent a distal end thereof.

27. The ambulance cot support arrangement according to Claim 19, wherein said elongate guide track includes a first device adjacent an end of said elongate guide track corresponding to said first position of said trolley thereon, said first device being connected to an energy source onboard said ambulance, said trolley including a second device configured to communicate with said first device only when said trolley is oriented at said end of said elongate guide track so that said elongate boom can be moved vertically only when said trolley is oriented at said end.

28. The ambulance cot support arrangement according to Claim 19, wherein said trolley includes an elongate boom secured to said trolley and configured to extend to a location outside of the cargo area when said trolley is in said first position, said elongate boom being configured for vertical movement relative to said trolley in order to accommodate varying ambulance cot loading and unloading conditions; and

wherein said trolley is freely movable lengthwise of said elongate guide track when said elongate boom is elevated, said trolley being fixedly locked to said elongate guide track in response to said elongate boom being placed into a lowered position.

29. The ambulance cot support arrangement according to Claim 19, wherein said ambulance cot fastening assembly includes a second ambulance cot fastening assembly configured with a trolley fastening assembly and said trolley is also additionally configured for a releasable coupling to said trolley fastening assembly only when said trolley is in said second position.

30. The ambulance cot support arrangement according to Claim 29, wherein said trolley includes a first horizontal bar that extends along an axis that is perpendicular to a longitudinal axis of said elongate guide track; and

wherein said trolley fastening assembly includes a first pair of laterally spaced hook members configured to latch onto said first horizontal bar at laterally spaced locations thereon.

31. The ambulance cot support arrangement according to Claim 30, wherein said second ambulance cot fastening assembly is additionally provided on said elongate guide track at a location adjacent a position corresponding to said first position of said trolley, said second ambulance cot fastening assembly including a second pair of laterally spaced hook members.

32. The ambulance cot support arrangement according to Claim 31, wherein a manually manipulatable release lever is provided on said elongate guide track adjacent a location corresponding to said trolley being in said first position for effecting a simultaneous unlatch of said first and second pairs of said hook members.

33. The ambulance cot support arrangement according to Claim 19, wherein said ambulance cot fastening assembly includes a second ambulance cot fastening assembly provided on said elongate guide track at a location adjacent a position corresponding to said first position of said trolley, said second ambulance cot fastening assembly including a first pair of laterally spaced hook members.

34. The ambulance cot support arrangement according to Claim 19, wherein said trolley includes an elongate boom and a trolley position locking device for locking said trolley to said elongate guide track at a location intermediate said first and second positions of said trolley on said elongate guide track whereat a distal end of said elongate boom is oriented adjacent an end of said elongate guide track corresponding to said first position of said trolley.

35. The ambulance cot support arrangement according to Claim 34, wherein a handle is provided on said distal end of said elongate boom.

36. The ambulance cot support arrangement according to Claim 35, wherein a manually manipulatable release lever is provided on said elongate guide track adjacent a location corresponding to said trolley being in said first position and is configured to effect an unlocking of said trolley from said elongate guide track when said trolley is in said intermediate location.

37. The ambulance cot support arrangement according to Claim 19, wherein said trolley includes an ambulance cot detector configured for detecting a presence or absence of an ambulance cot held to said trolley by said ambulance cot fastening assembly, said ambulance cot detector being additionally configured to prevent a locking of said trolley to said elongate guide track by said trolley position locking device.

38. The ambulance cot support arrangement according to Claim 19, wherein said trolley includes an elongate boom secured to said trolley for vertical movement relative to said trolley in order to accommodate varying ambulance cot loading and unloading conditions; and

wherein said elongate boom includes a sensing device for monitoring the distance of said elongate boom from a ground surface on which said ambulance is supported in all vertically adjusted positions of said elongate boom.

39. The ambulance cot support arrangement according to Claim 19, wherein said trolley is freely manually movable lengthwise of said elongate guide track between said first and second positions thereof.

40. An ambulance cot support arrangement, especially for ambulances, comprising:

an elongate guide track configured for mounting to a fixed surface of a cargo area on said ambulance;

a trolley supported for movement relative to said elongate guide track between first and second positions, said trolley being configured to move to a location adjacent an access opening to an interior of the cargo area when said trolley is in said first position and is additionally configured to additionally move to a location spaced from said access opening when said trolley is not in said first position; and

an ambulance cot fastening assembly configured to securely hold said trolley and said ambulance cot relative to a fixed surface of the cargo area only when said trolley is in said second position.

41. The ambulance cot support arrangement according to Claim 40, wherein said trolley includes an elongate boom secured to said trolley for vertical movement relative to said trolley in order to accommodate varying ambulance cot loading and unloading conditions.

42. The ambulance cot support arrangement according to Claim 41, wherein said elongate boom is secured to said trolley for movement about a pivot axis that extends perpendicular to a theoretical vertically upright plane containing a longitudinal axis of said elongate guide track.

43. The ambulance cot support arrangement according to Claim 40, wherein said elongate guide track includes a first device connected in circuit to an energy source onboard said ambulance, said first device being configured to communicate with a second device separate from said elongate guide track.

44. The ambulance cot support arrangement according to Claim 43, wherein said second device is provided on said trolley.

45. The ambulance cot support arrangement according to Claim 44, wherein said first device is oriented adjacent an end of said elongate guide track corresponding to said second position of said trolley thereon so that said second device will communicate with said first device when said trolley is in said second position thereon.

46. The ambulance cot support arrangement according to Claim 40, wherein said ambulance cot fastening assembly is additionally configured with a trolley fastening assembly and said trolley is also additionally configured for a releasable coupling to said trolley fastening assembly only when said trolley is in said second position.

47. The ambulance cot support arrangement according to Claim 46, wherein said trolley includes a first horizontal bar that extends along an axis that is perpendicular a longitudinal axis of said elongate guide track; and

wherein said trolley fastening assembly includes a first pair of laterally spaced hook members configured to

latch onto said first horizontal bar at laterally spaced locations thereon.

48. The ambulance cot support arrangement according to Claim 47, wherein said ambulance cot fastening assembly is provided on said elongate guide track at a location adjacent a position corresponding to said first position of said trolley and includes a second pair of laterally spaced hook members.

49. The ambulance cot support arrangement according to Claim 48, wherein a manually manipulatable release lever is provided on said elongate guide track adjacent a location corresponding to said trolley being in said first position for effecting a simultaneous unlatch of said first and second pairs of said hook members.

50. The ambulance cot support arrangement according to Claim 40, wherein said ambulance cot fastening assembly is provided on said elongate guide track at a location adjacent a position corresponding to said first position of said trolley, said ambulance cot fastening assembly including a first pair of laterally spaced hook members.

51. The ambulance cot support arrangement according to Claim 40, wherein said trolley includes an elongate boom and a trolley position locking device for locking said trolley to said elongate guide track at a location intermediate said first and second positions of said trolley on said elongate guide track whereat a distal end of said elongate boom is oriented adjacent an end of said elongate guide track corresponding to said first position of said trolley.

52. The ambulance cot support arrangement according to Claim 51, wherein a handle is provided on said distal end of said elongate boom.

53. The ambulance cot support arrangement according to Claim 40, wherein said trolley includes an elongate boom secured to said trolley and configured to extend to a location outside of the cargo area when said trolley is in said first position, said elongate boom being configured for vertical movement relative to said trolley in order to accommodate varying ambulance cot loading and unloading conditions; and

wherein said trolley includes an onboard motor for effecting, when said motor is operated, said vertical movement of said elongate boom; and

wherein a manually manipulatable first switch is interconnected between said motor and an energy source onboard said ambulance for facilitating an attendant controlled reversal in energy supplied to said electrical motor to effect movement of said elongate boom in attendant selected vertical directions.

54. The ambulance cot support arrangement according to Claim 53, wherein said manually manipulatable first switch is provided on said elongate boom adjacent a distal end thereof.

55. The ambulance cot support arrangement according to Claim 54, wherein said elongate guide track includes a first device adjacent an end of said elongate guide track corresponding to said first position of said trolley thereon, said first device being connected to an energy source onboard said ambulance, said trolley including a second device configured to communicate with said first device only when said trolley is oriented at said end of

said elongate guide track so that said elongate boom can be moved vertically only when said trolley is oriented at said end.

56. The ambulance cot support arrangement according to Claim 40, wherein said trolley includes an elongate boom secured to said trolley and configured to extend to a location outside of the cargo area when said trolley is in said first position, said elongate boom being configured for vertical movement relative to said trolley in order to accommodate varying ambulance cot loading and unloading conditions; and

wherein said trolley is freely movable lengthwise of said elongate guide track when said elongate boom is elevated, said trolley being fixedly locked to said elongate guide track in response to said elongate boom being placed into a lowered position.

57. The ambulance cot support arrangement according to Claim 56, wherein a manually manipulatable release lever is provided on said elongate guide track adjacent a location corresponding to said trolley being in said first position and is configured to effect an unlocking of said trolley from said elongate guide track when said trolley is in said intermediate location.

58. The ambulance cot support arrangement according to Claim 40, wherein said trolley includes an elongate boom secured to said trolley and configured to extend to a location outside of the cargo area when said trolley is in said first position, said elongate boom being configured for vertical movement relative to said trolley in order to accommodate varying ambulance cot loading and unloading conditions; and

wherein said elongate boom includes a sensing device for monitoring the distance of said elongate boom from a ground surface on which said ambulance is supported in all vertically adjusted positions of said elongate boom.

59. The ambulance cot support arrangement according to Claim 40, wherein said trolley is freely manually movable lengthwise of said elongate guide track between said first and second positions thereof.

60. A method of loading a wheel supported ambulance cot having a collapsible and extendable base thereon from an ambulance, comprising the steps of:

deploying a trolley to a load position;

moving said ambulance cot toward and into coupled engagement with said trolley;

collapsing said base to effect said ambulance cot being supported entirely on said trolley; and

moving trolley and ambulance cot coupled thereto into said cargo area of said ambulance.

61. The method according to Claim 60, wherein said deploying step includes the step of deploying said trolley to a position spaced vertically above a ground surface on which said ambulance is supported and the step of tilting an elongate boom on said trolley from a position parallel to the floor surface of said cargo area downwardly toward the ground surface.

62. The method according to Claim 61, wherein said collapsing step additionally includes the step of raising the elongate boom to the position above the floor surface of said cargo area and with said ambulance cot coupled thereto.

63. The method according to Claim 62, wherein said raising step and said base collapsing step occur simultaneously after said wheels disengage from the ground surface.

64. A method of unloading a wheel supported ambulance cot having a collapsible and extendable base thereon, comprising the steps of:

moving an ambulance cot with a collapsed base coupled to a trolley out of a cargo area of said ambulance so that said ambulance cot is supported by said trolley above a ground surface on which said ambulance is supported;

extending said base so that said wheels engage said ground surface and effect a support of said ambulance cot on said wheels; and

moving said ambulance cot on said wheels in a direction until said ambulance cot is generally free of interference from said trolley.

65. The method of unloading a wheel supported ambulance cot according to Claim 64, wherein said extending step includes the step of tilting an elongate boom on said trolley from a position above the floor surface of said cargo area downwardly toward the ground surface.

66. The method of unloading a wheel supported ambulance cot according to Claim 65, wherein said extending step and said tilting step occur simultaneously during an extension of said base, said tilting step terminating when said wheels engage said ground surface.

67. An ambulance cot configured for reception into a cargo area of an ambulance, comprising:

a wheel supported base;

a patient support deck mounted on said wheel supported base;

an energy consumer mechanism for effecting a varying of the spacing between said wheel supported base and said patient support deck;

a rechargeable first energy source onboard said ambulance cot configured for supplying energy to said energy consumer mechanism to effect a change in said spacing, said rechargeable first energy source including a remotely located connection device onboard the ambulance cot configured for connecting the energy of said rechargeable first energy source to a second energy source to effect a recharging of said first energy source.

68. The ambulance cot according to Claim 67, wherein said rechargeable first energy source is a battery and said energy consumer mechanism is an electrically operable motor.

69. The ambulance cot according to Claim 67, wherein said rechargeable first energy source includes a switch interconnected between said rechargeable first energy source and said energy consumer mechanism for facilitating an attendant controlled operation of energy supplied to said energy consumer mechanism to effect a change of said spacing.

70. The ambulance cot according to Claim 69, wherein said rechargeable first energy source is a battery and said energy consumer mechanism is an electrically operable motor.

71. The ambulance cot according to Claim 67, wherein said remotely located connection device is fixedly located on at least one of said patient support deck and said wheel supported base.

72. An ambulance cot configured for reception into a cargo area of an ambulance, comprising:

a wheel supported base;

a patient support deck frame mounted on said wheel supported base; and

docking structure onboard said ambulance cot configured for connection to a cot loading and unloading device provided on an ambulance.

73. The ambulance cot according to Claim 72, wherein said docking structure includes at least two separate docking structures spaced lengthwise of the ambulance cot from each other.

74. The ambulance cot according to Claim 73, wherein one of said two docking structures is located adjacent a head end of the ambulance cot and the other docking structure is located intermediate the head end and a foot end thereof.

75. The ambulance cot according to Claim 74, wherein said two separate docking structures are oriented on said patient support deck frame.

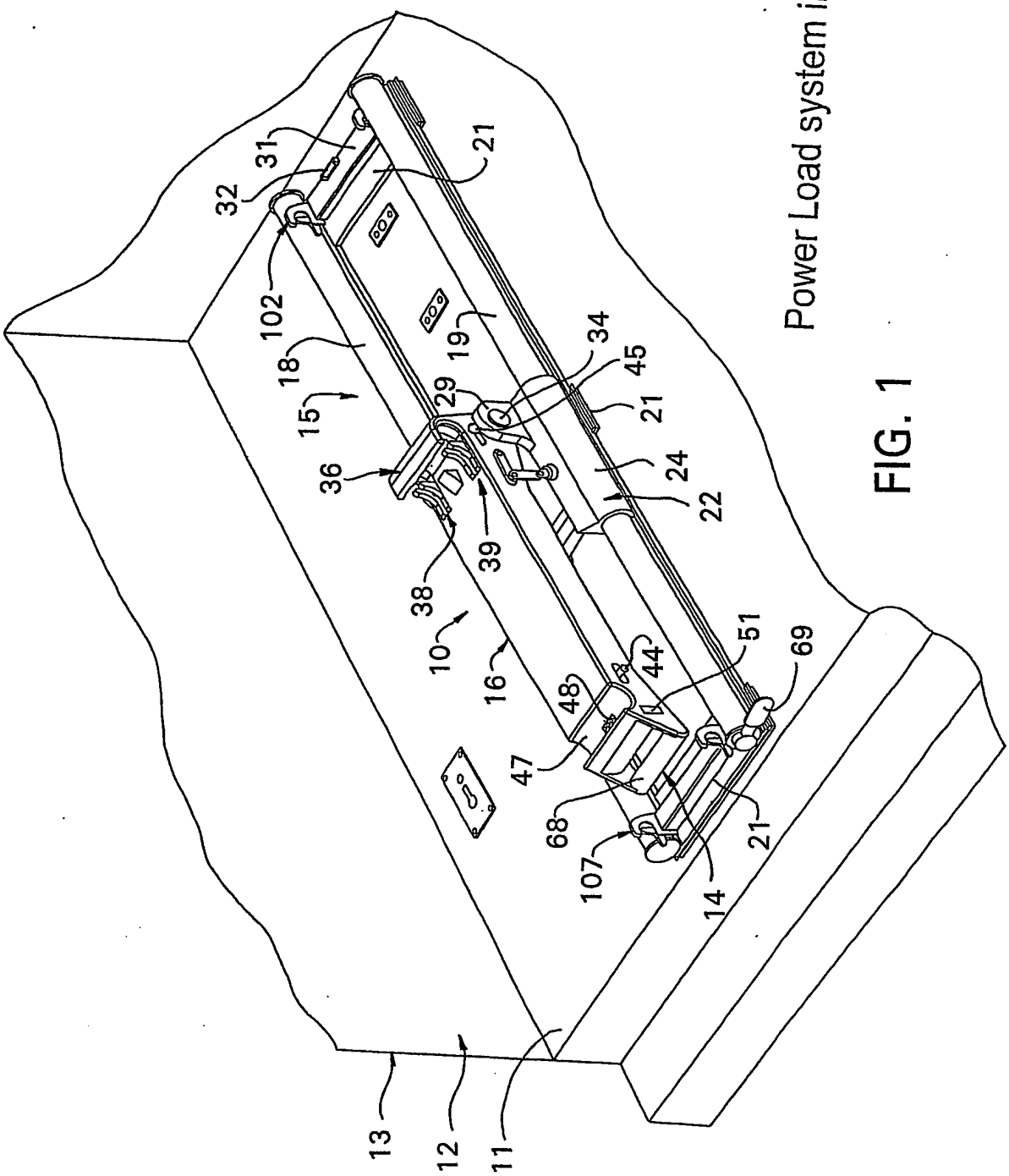

Power Load system installed
32
31
21
102
18
19
34
45
15
29
21
36
24
22
39
38
10
16
51
69
44
48
47
68
107
21
14
13
12
11

FIG. 1

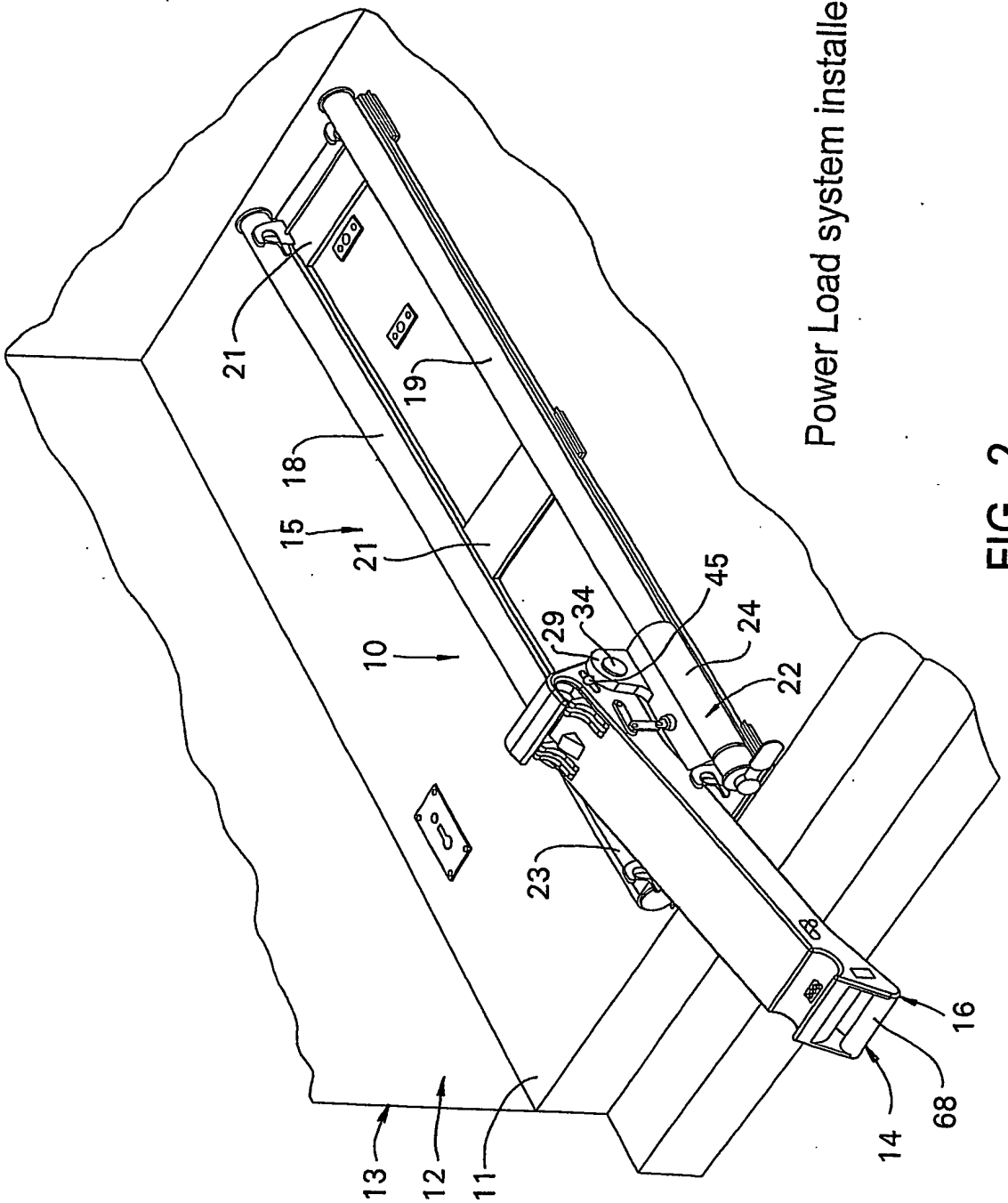

Power Load system installed and lowered
21
19
18
15
21
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29
34
45
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22
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16
68
14
13
12
11

FIG. 2

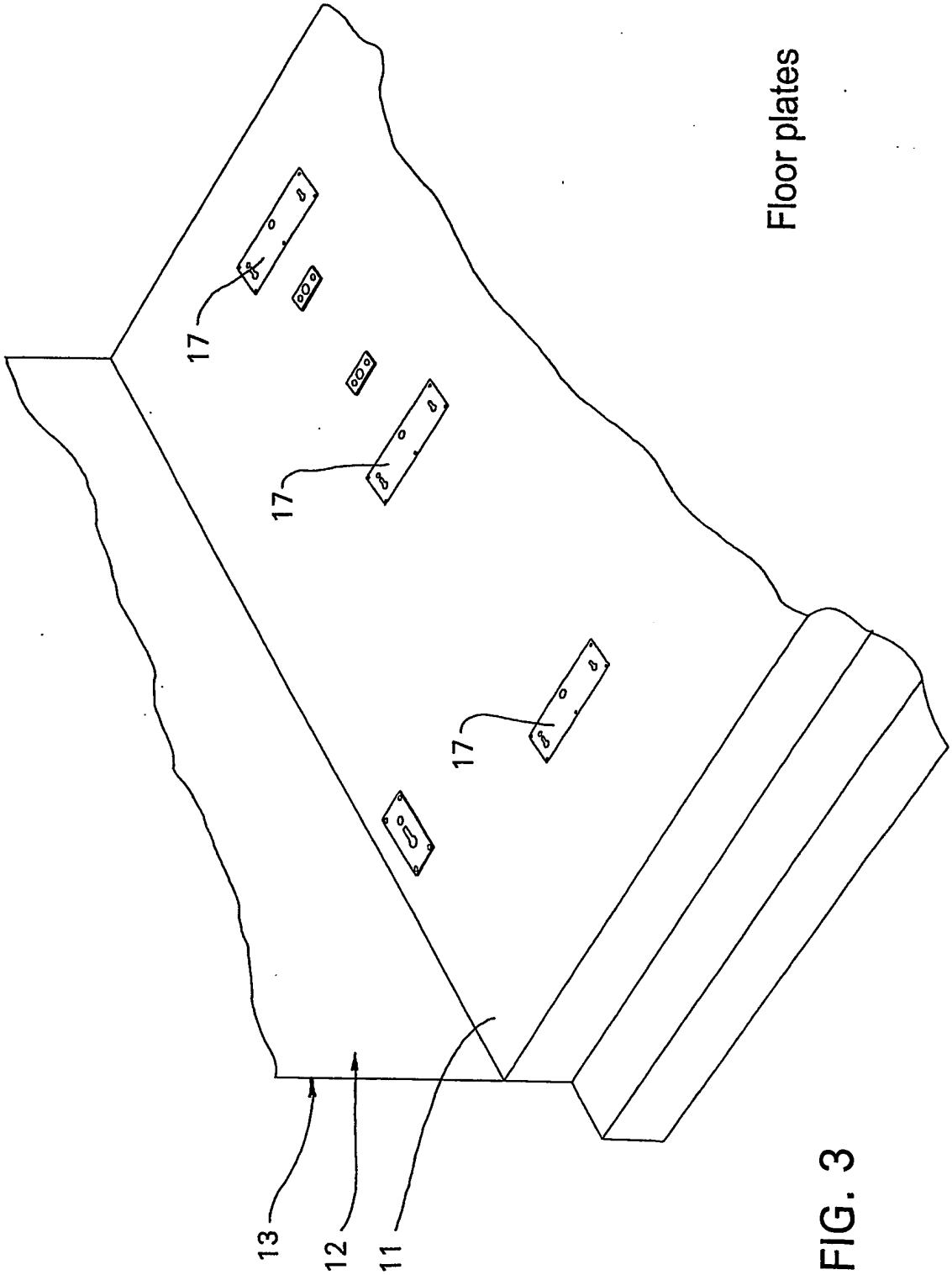


FIG. 3

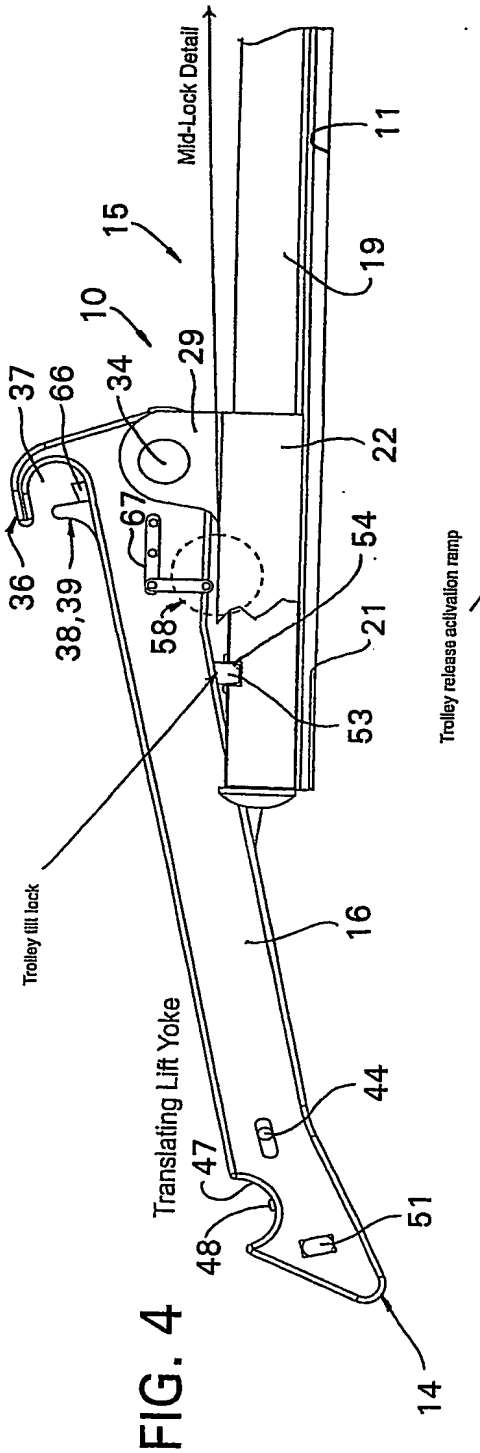


FIG. 4

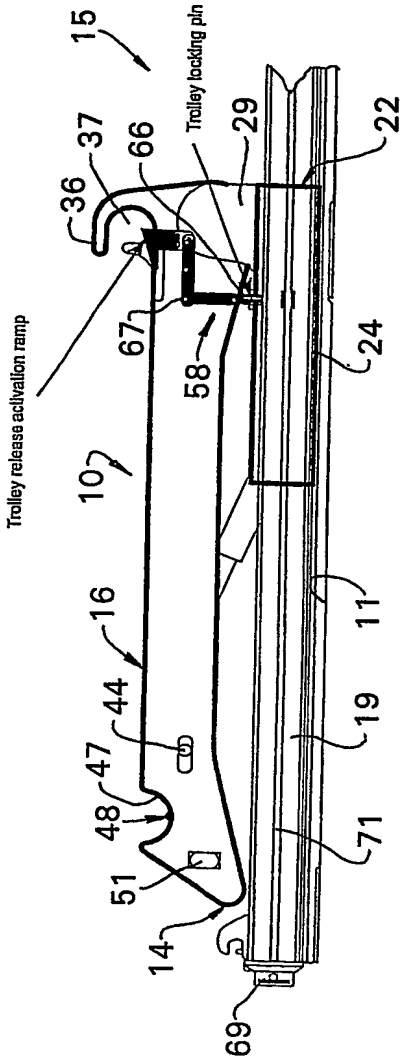


FIG. 5

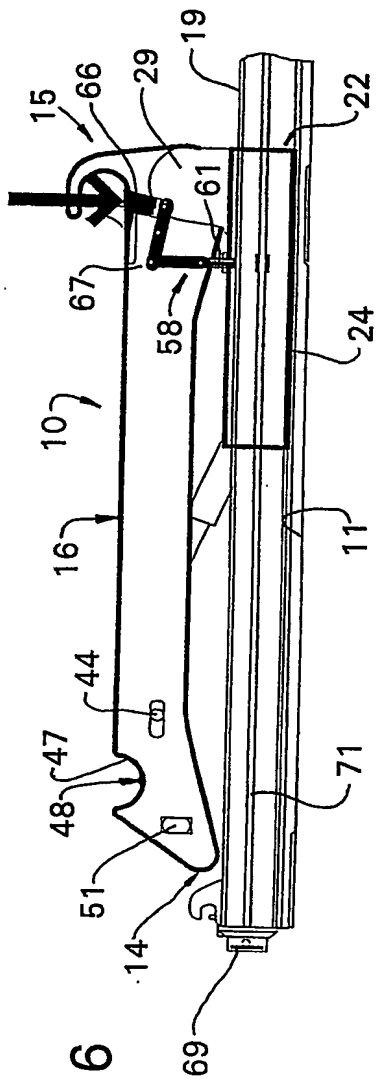


FIG. 6

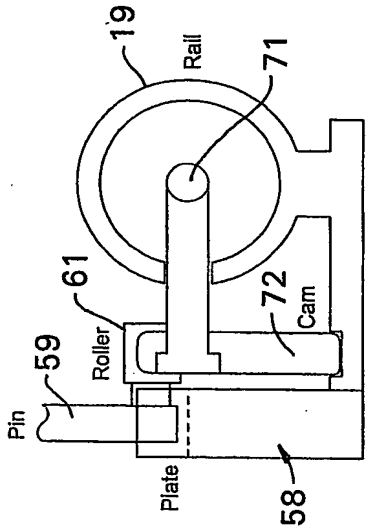


FIG. 7

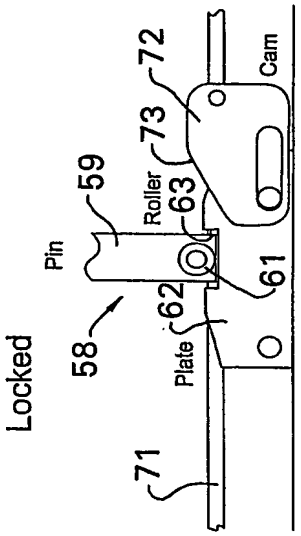


FIG. 8

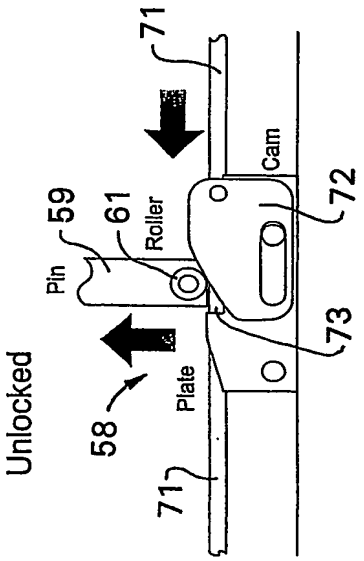


FIG. 9

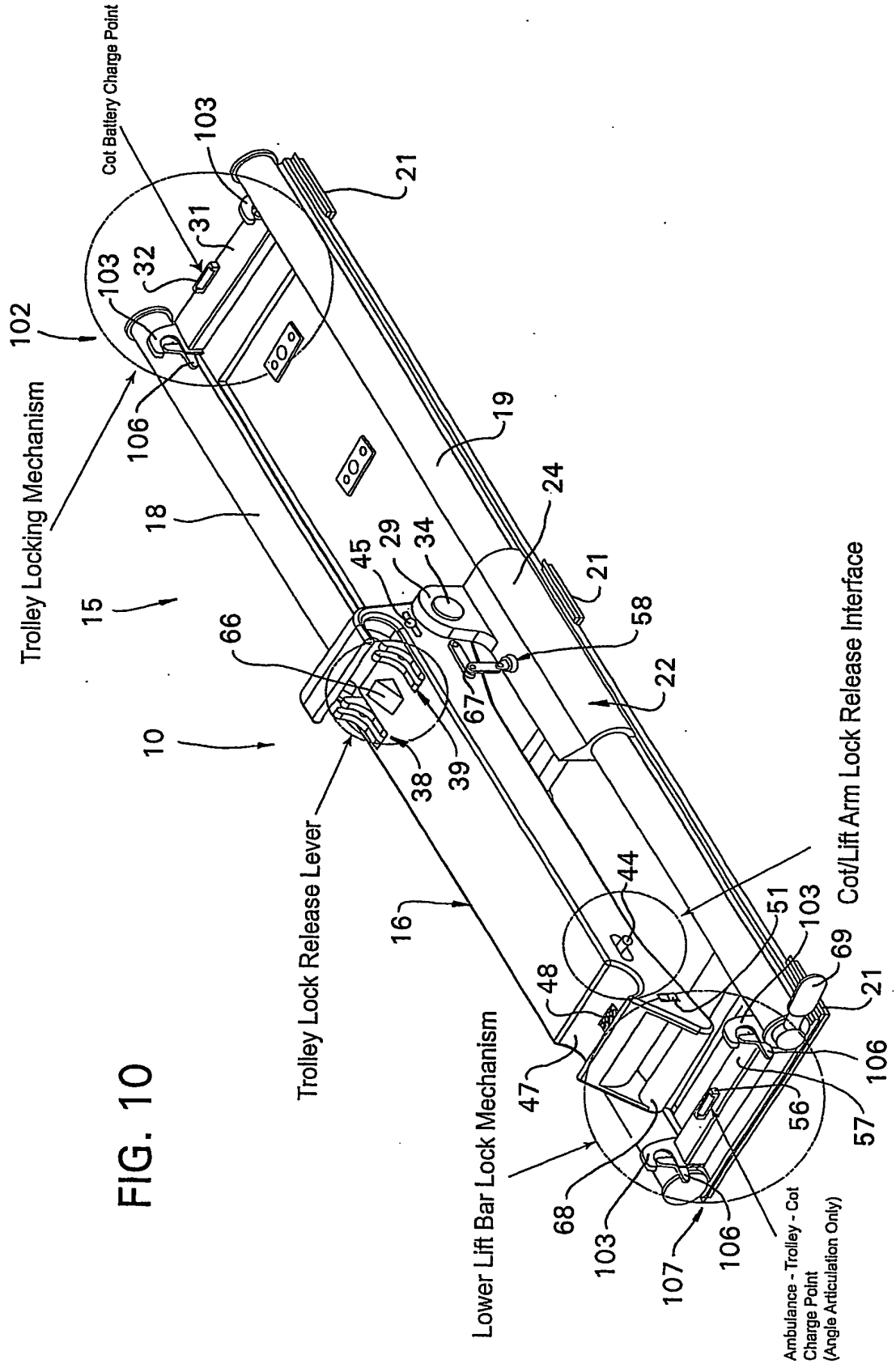

Cot Battery Charge Point
Trolley Locking Mechanism
Trolley Lock Release Lever
Lower Lift Bar Lock Mechanism
Cot/Lift Arm Lock Release Interface
Ambulance - Trolley - Cot Charge Point (Angle Articulation Only)
102
103
31
32
106
21
19
18
15
24
45
29
34
66
58
67
22
10
38
39
16
44
51
69
48
47
56
57
68
107

FIG. 10

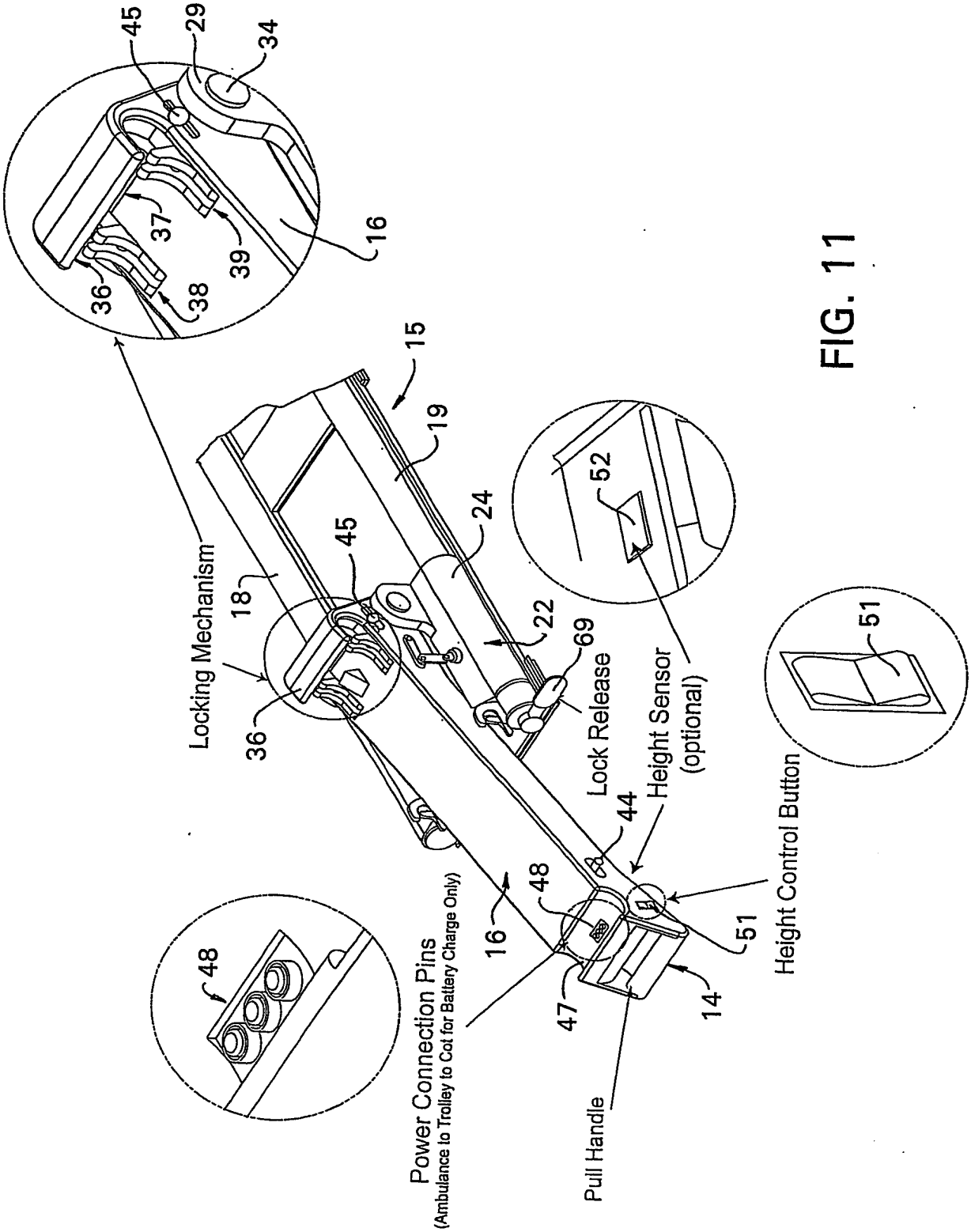

45
29
34
37
39
16
36
38
15
19
24
52
Locking Mechanism
18
45
22
69
36
Lock Release
Height Sensor
(optional)
44
48
51
Height Control Button
16
Power Connection Pins
(Ambulance to Trolley to Cot for Battery Charge Only)
47
14
Pull Handle
48

FIG. 11

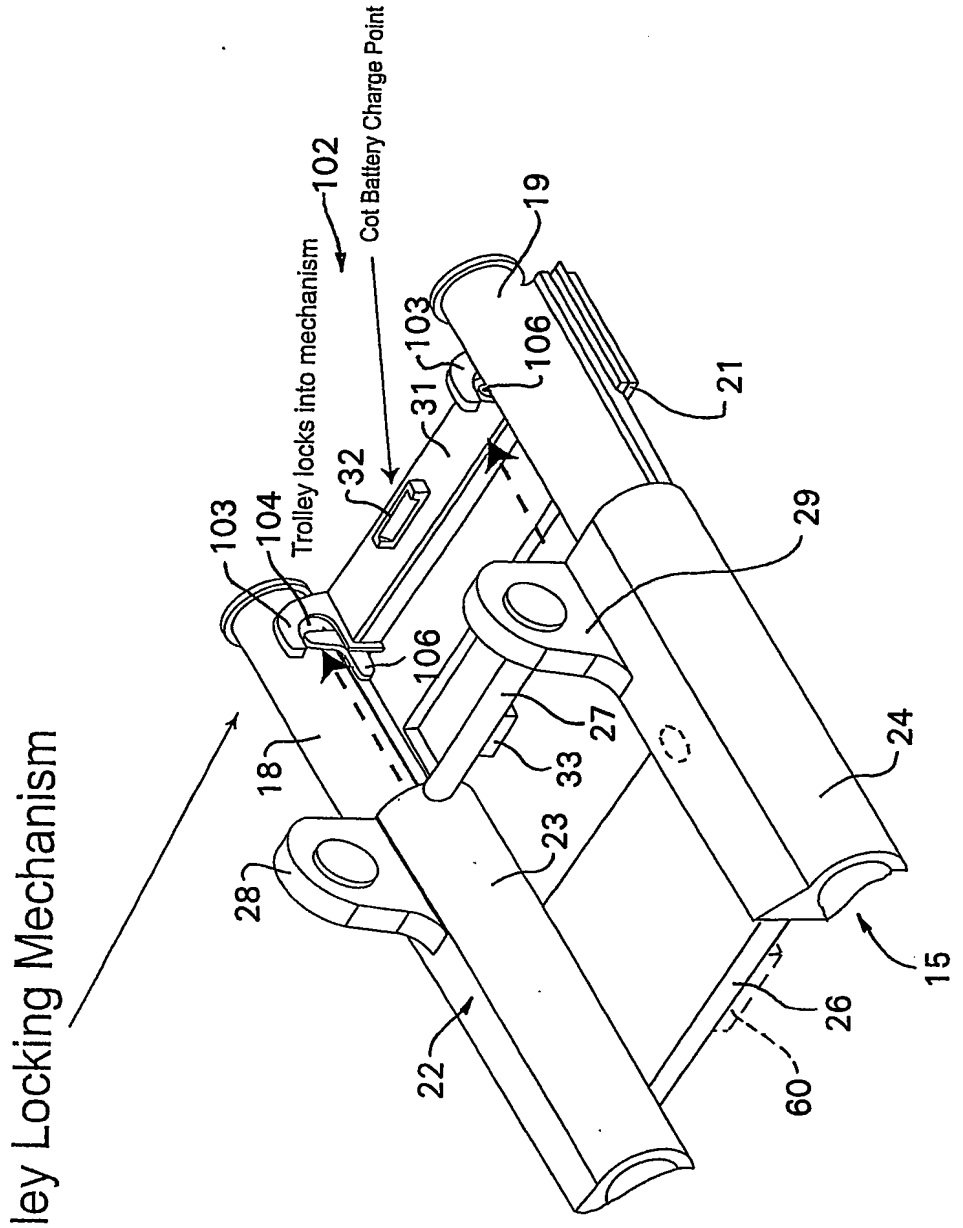

Trolley Locking Mechanism
Trolley locks into mechanism
Cot Battery Charge Point
102
103
104
32
31
103
106
19
21
29
106
27
33
18
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24
28
15
26
22
60

FIG. 12

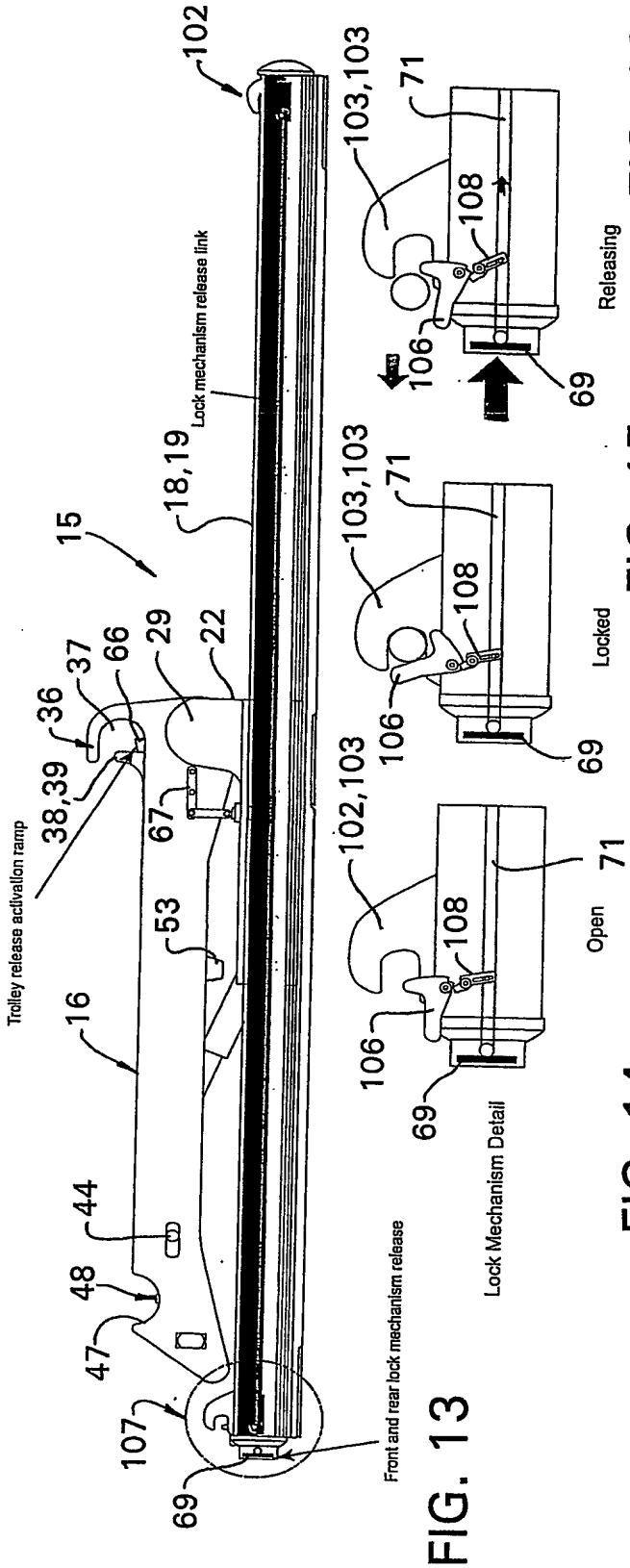


FIG. 13

FIG. 14

FIG. 15

FIG. 16

FIG. 17

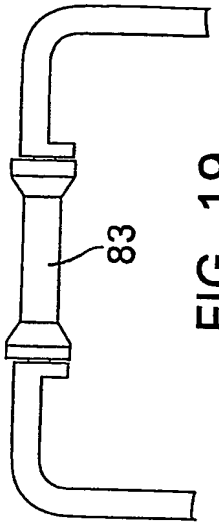


FIG. 19

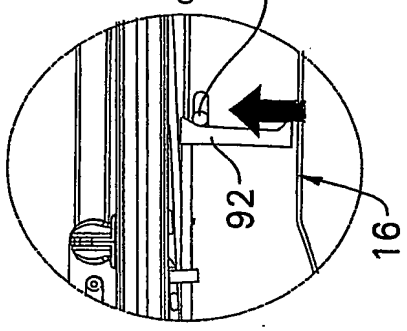


FIG. 20

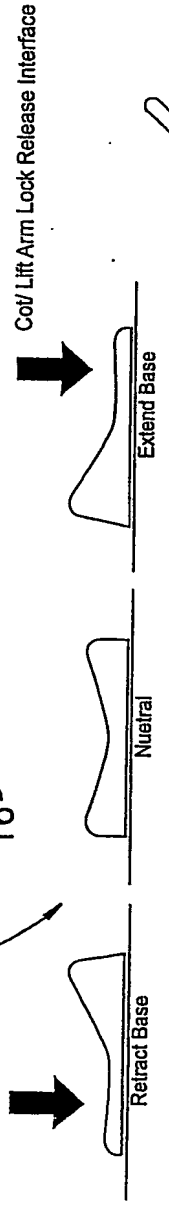
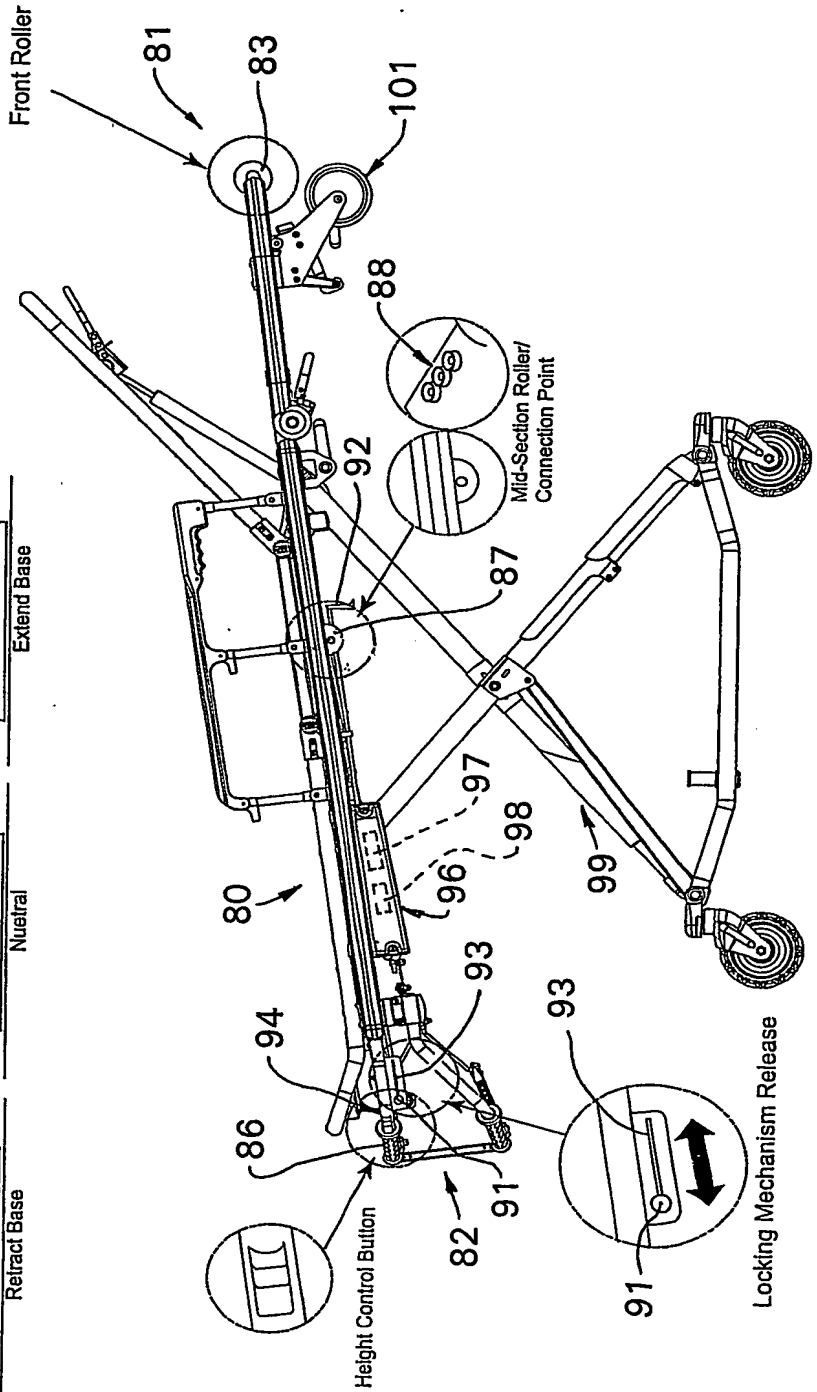


FIG. 18



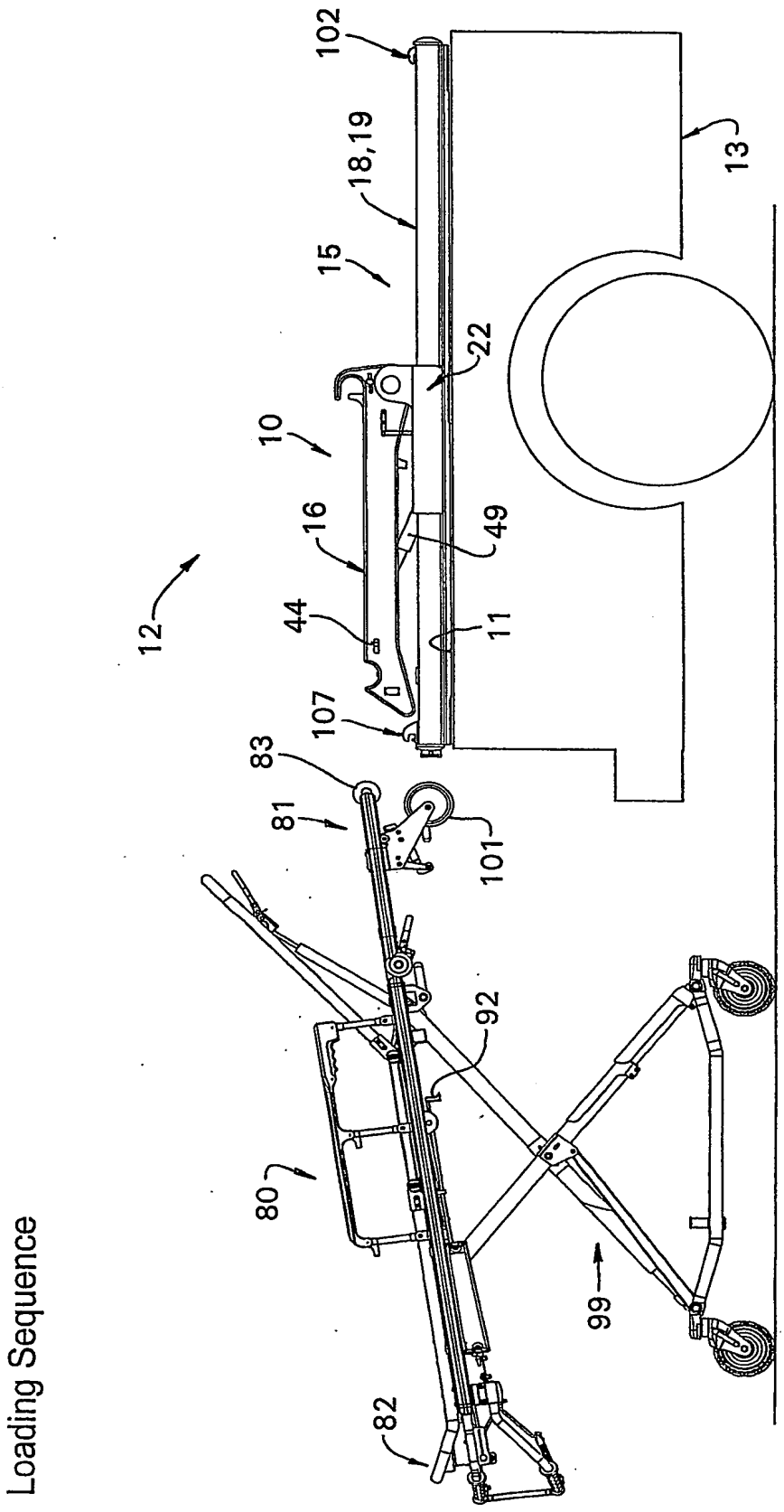

Loading Sequence
102
18,19
13
15
22
10
16
49
12
44
11
107
83
81
101
92
80
99
82

FIG. 21

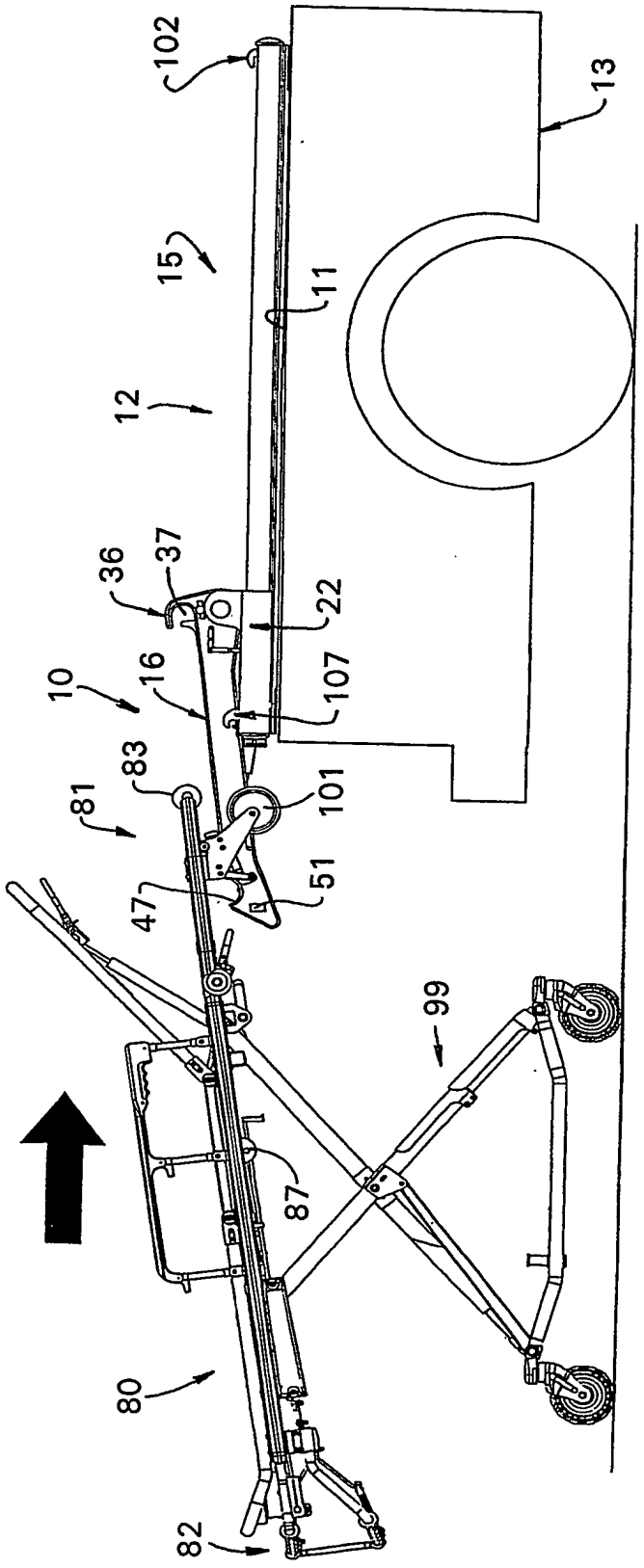


FIG. 22

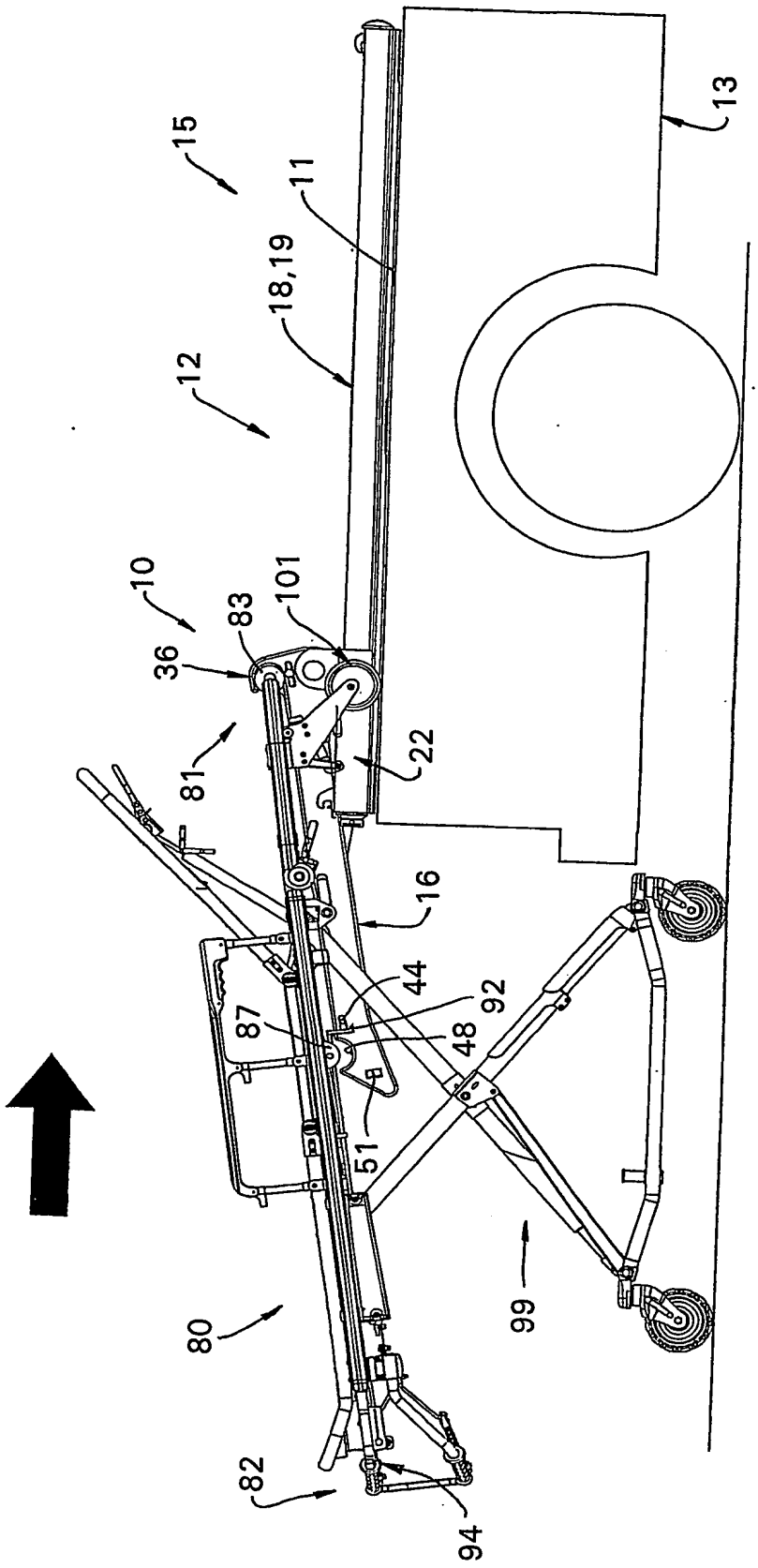


FIG. 23

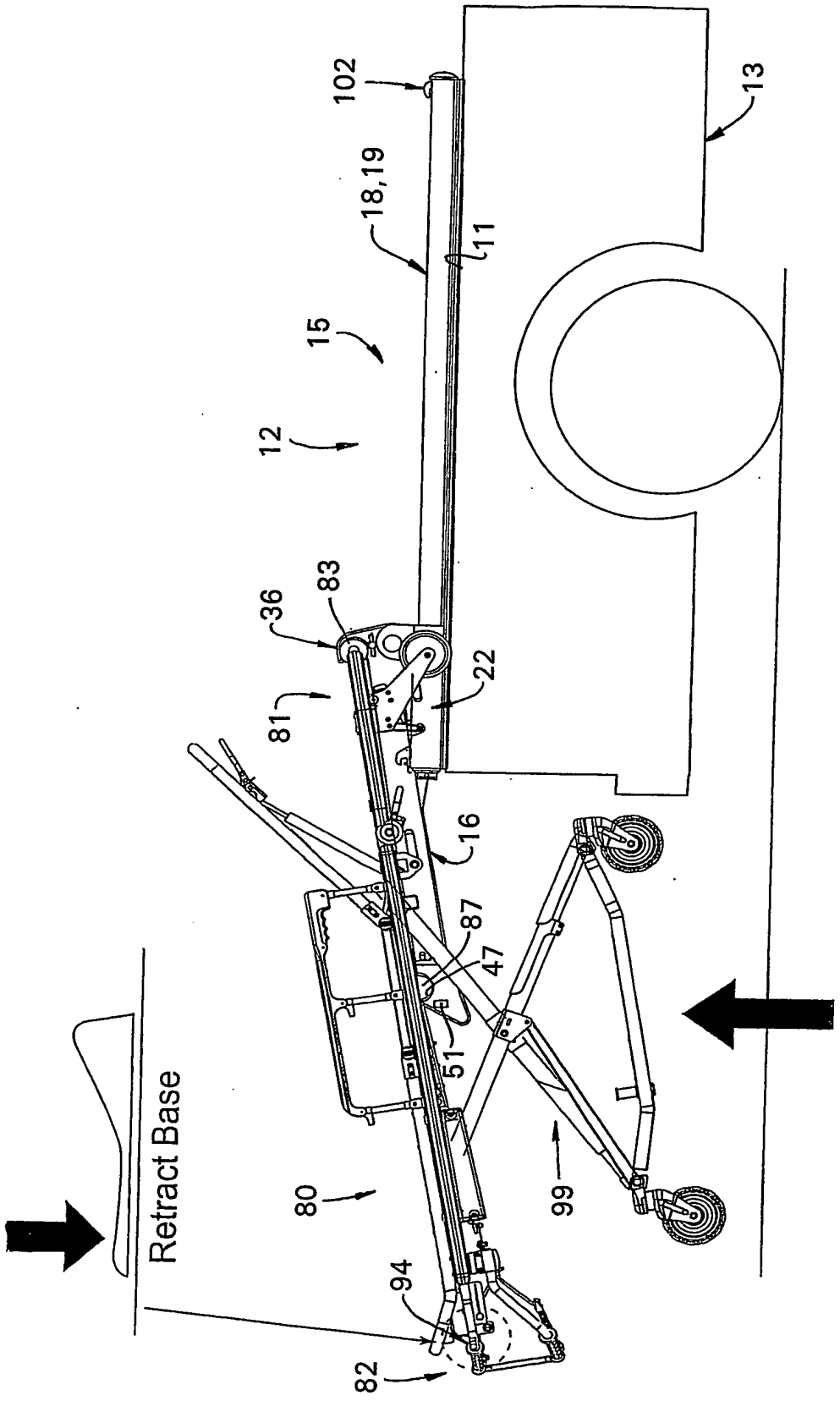

102
13
18,19
11
15
12
36
83
22
81
16
87
47
51
Retract Base
80
99
94
82

FIG. 24

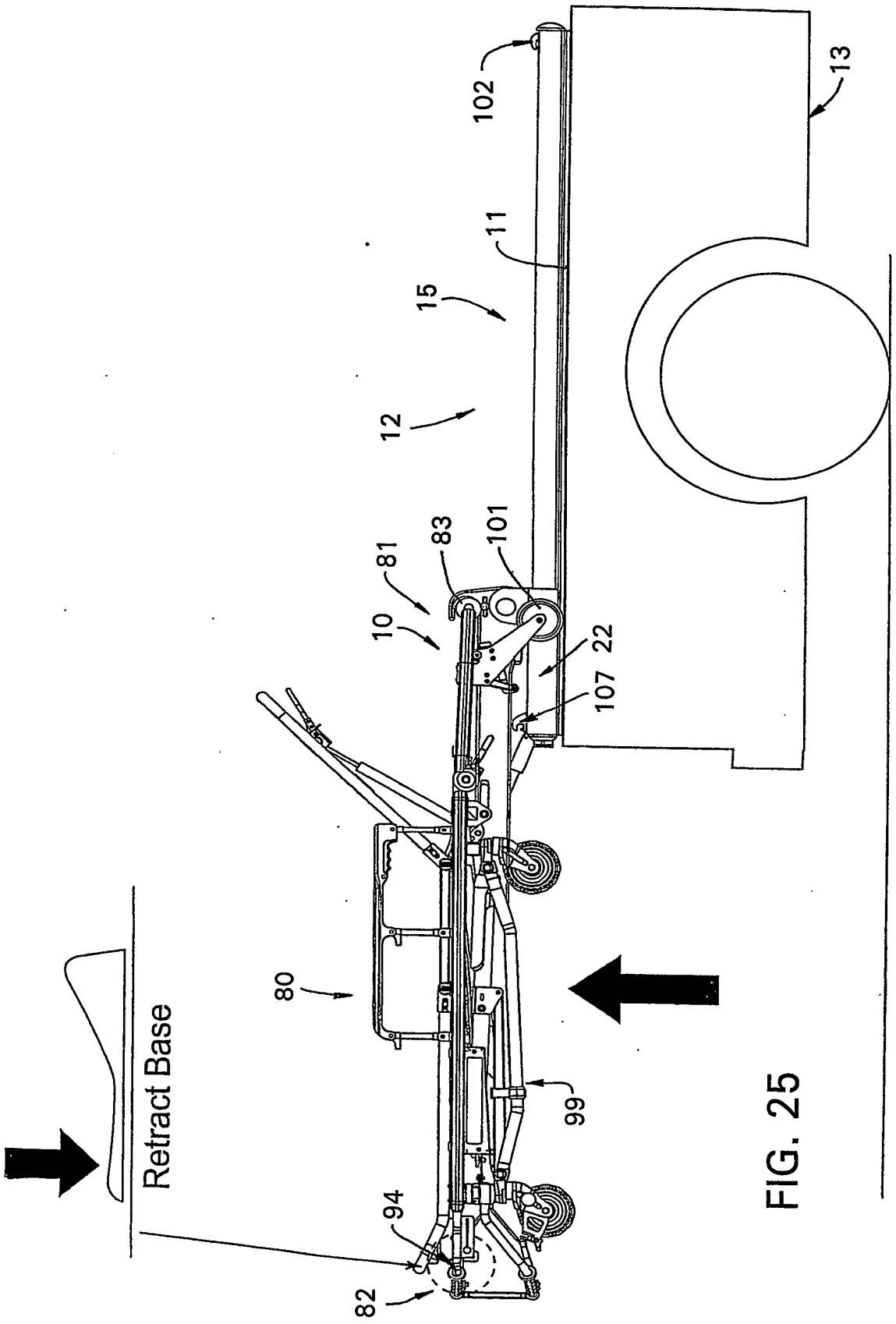


FIG. 25

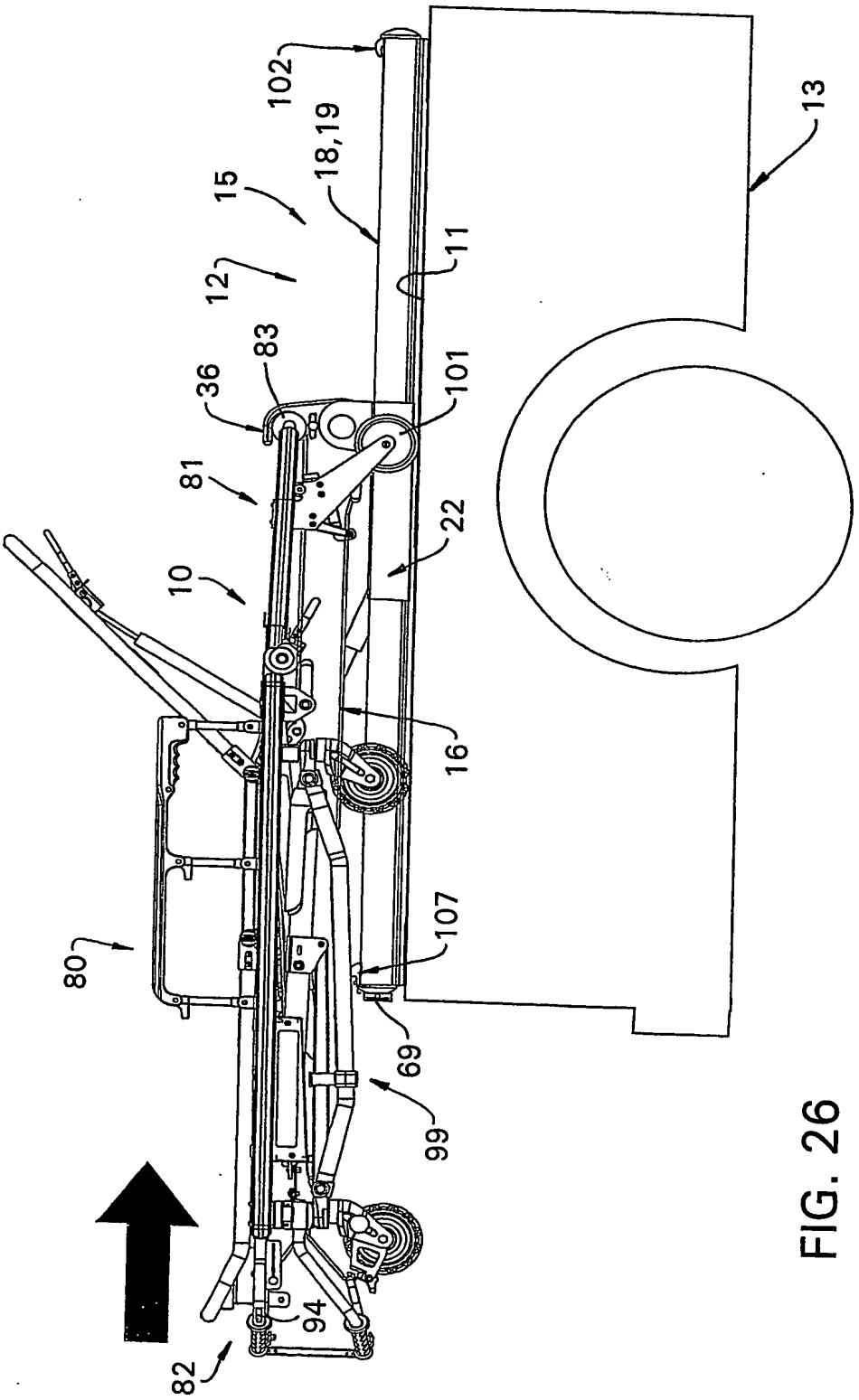


FIG. 26

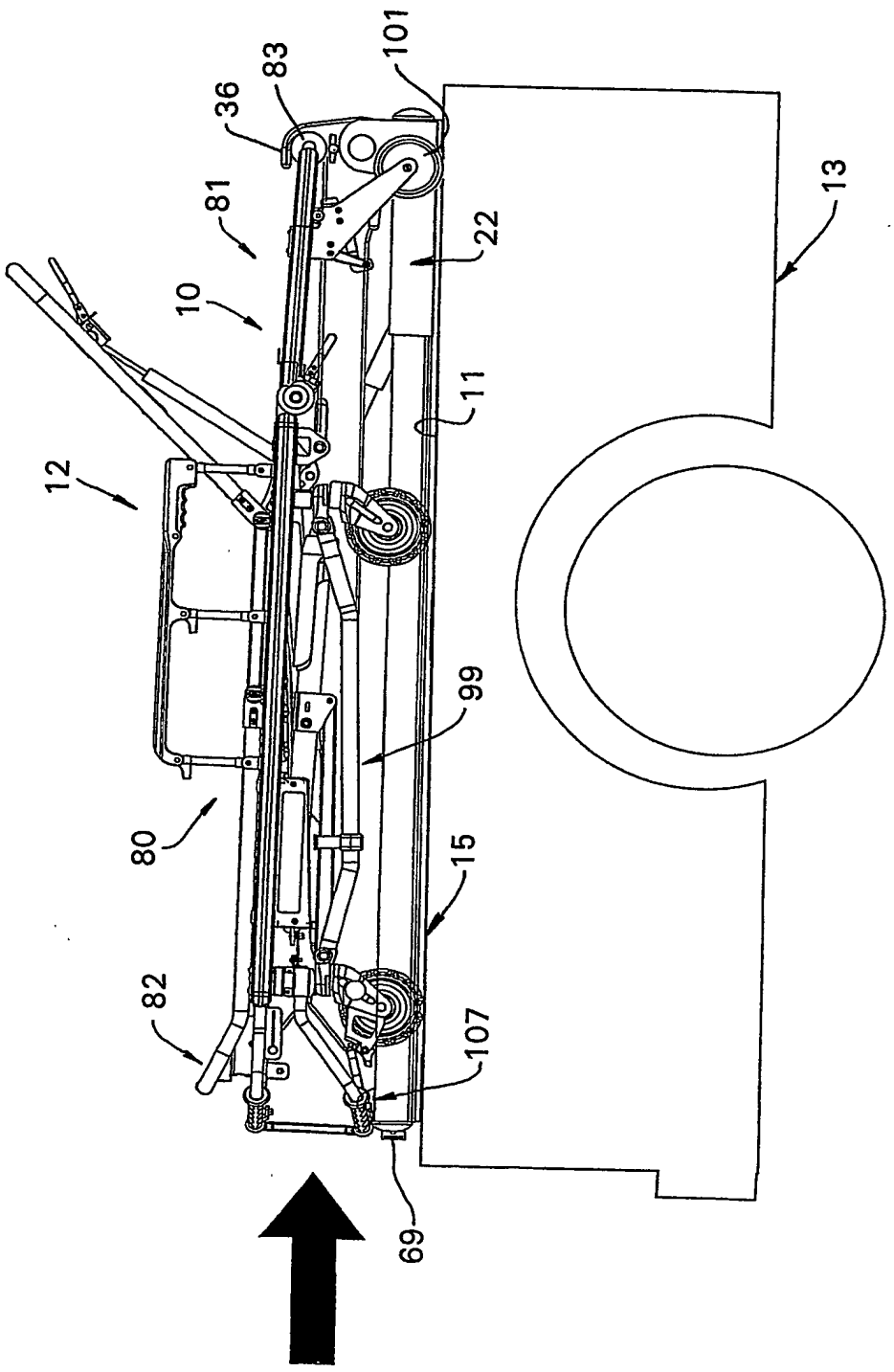


FIG. 27

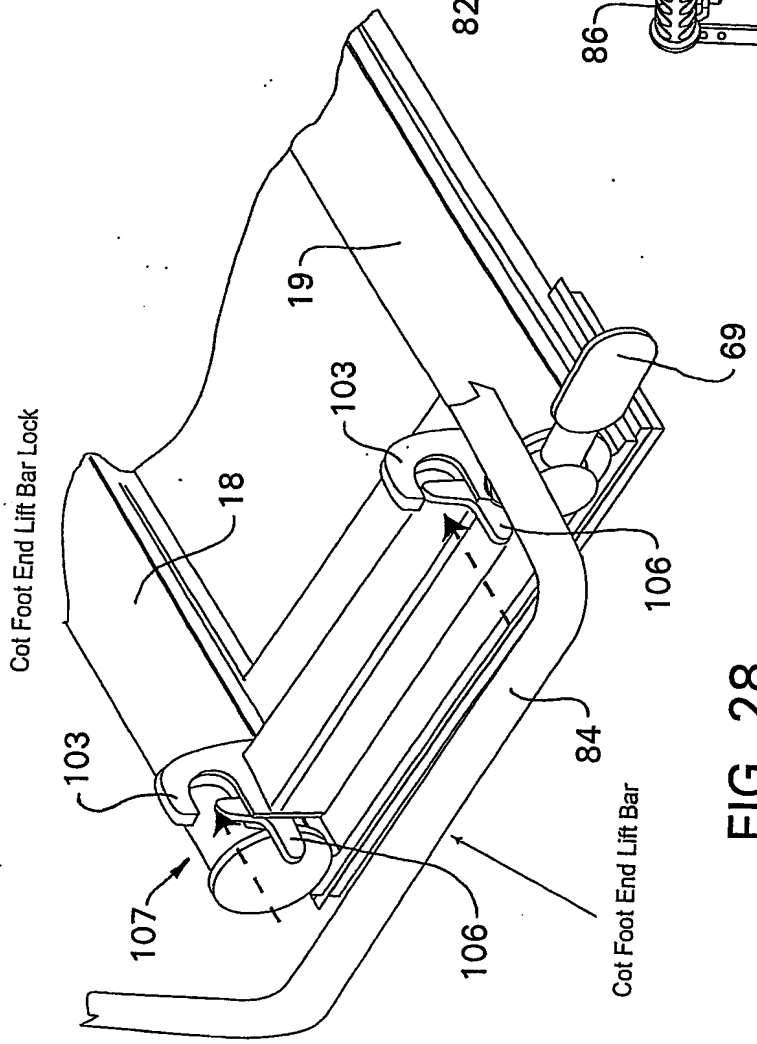

Cot Foot End Lift Bar Lock
18
103
19
69
106
84
103
107
106
Cot Foot End Lift Bar

FIG. 28

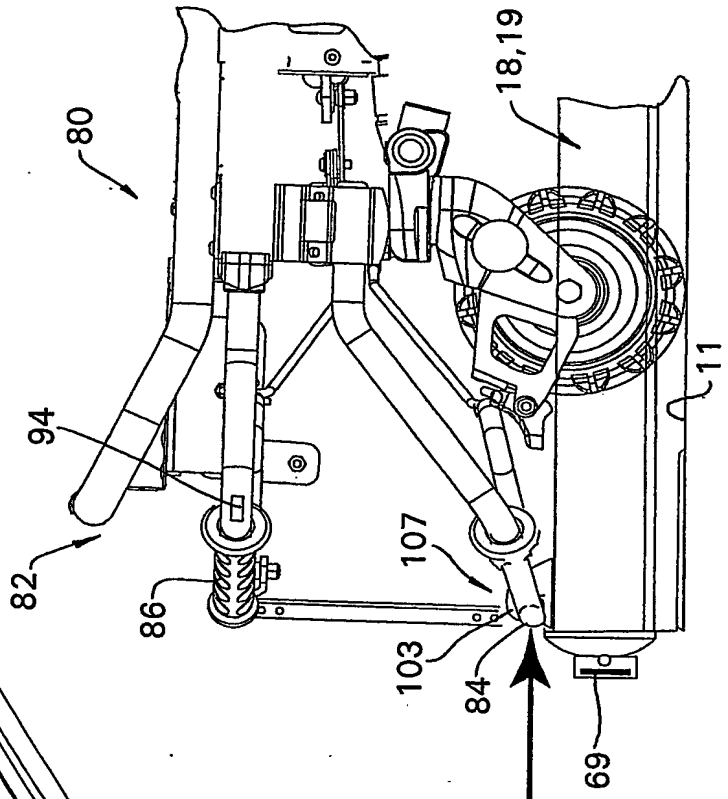

80
18,19
94
11
82
107
86
103
84
69
Lift Bar locked in

FIG. 29

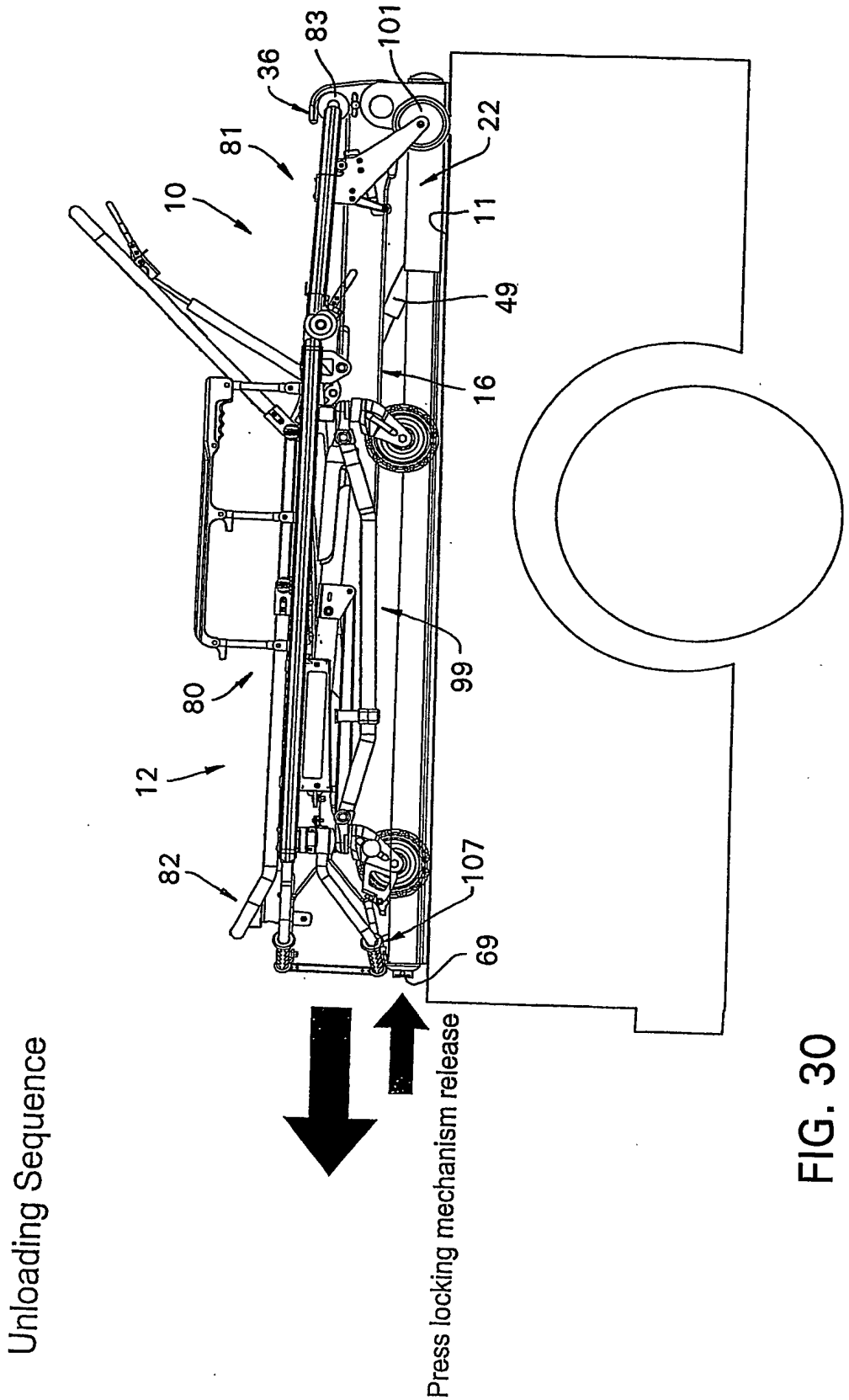

36
83
101
81
22
10
11
49
16
99
80
12
82
107
69
Unloading Sequence
Press locking mechanism release

FIG. 30

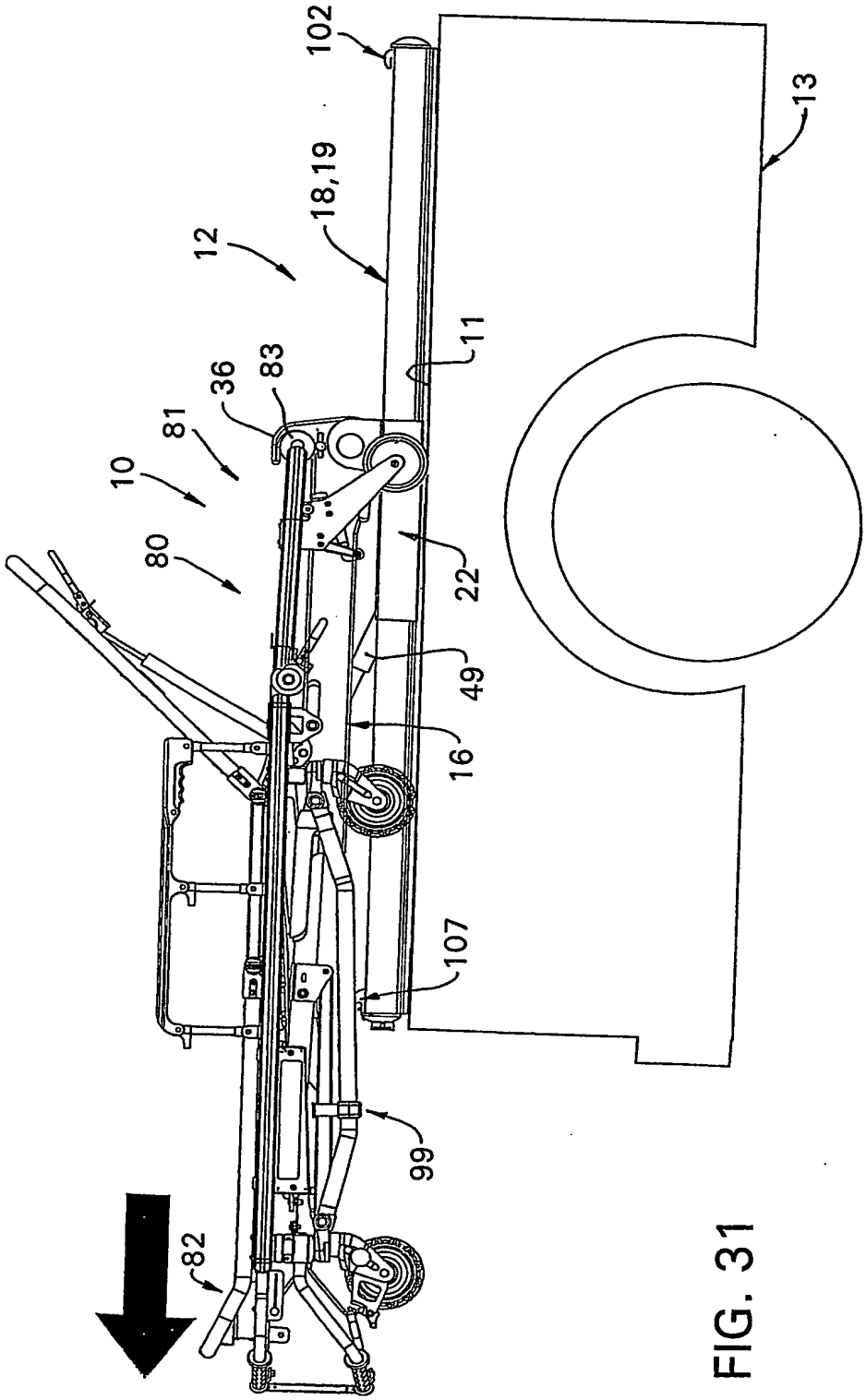


FIG. 31

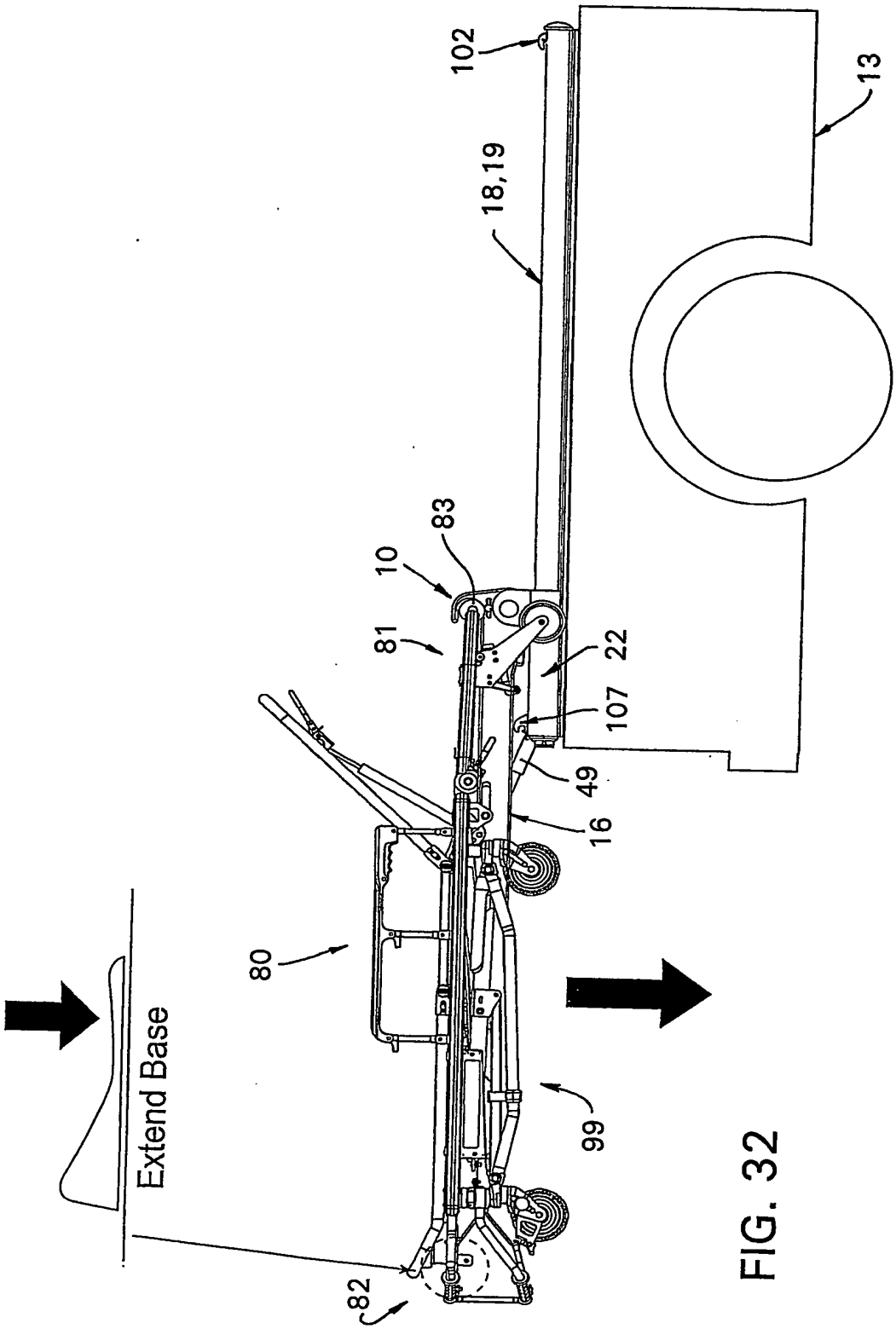


FIG. 32

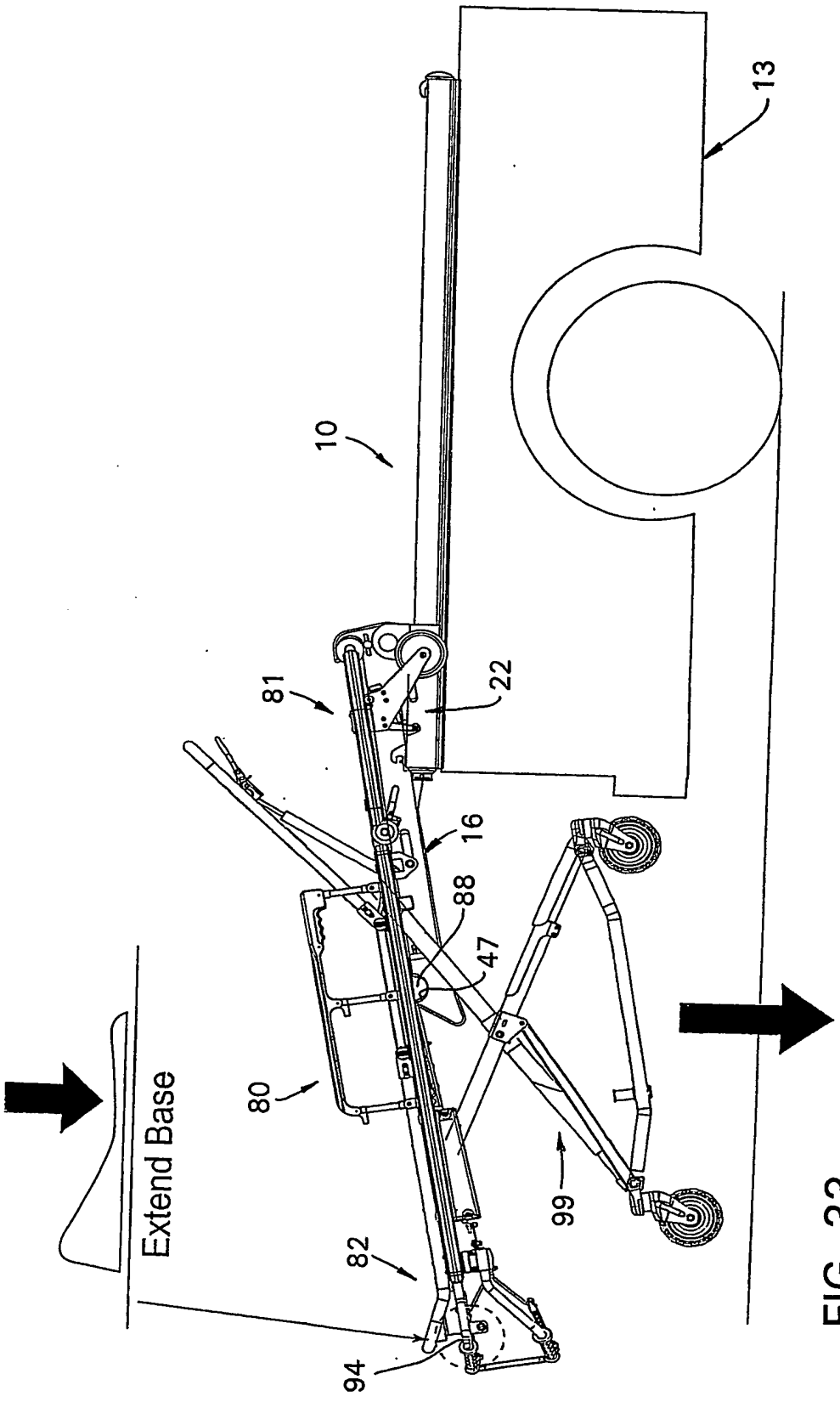


FIG. 33

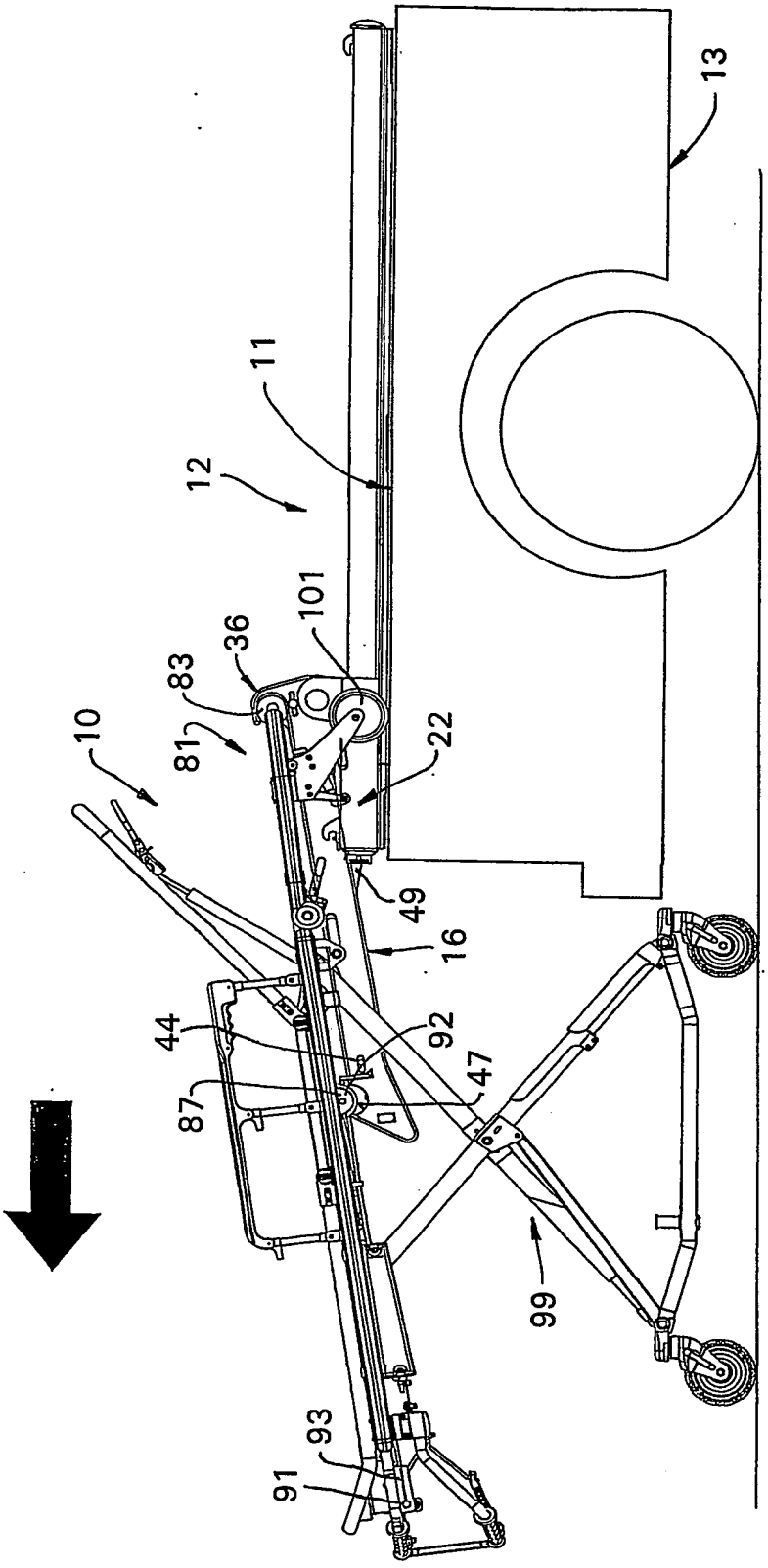


FIG. 34

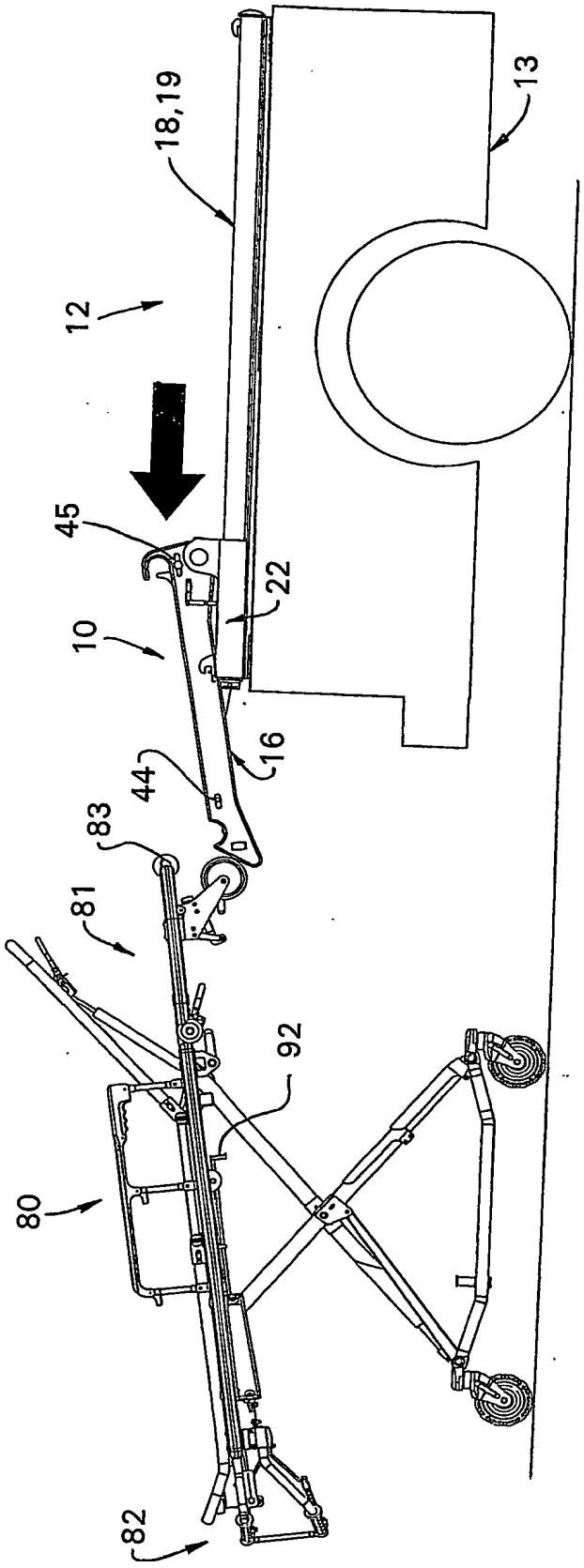


FIG. 35

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APPLICATION NUMBER	FILING OR 371 (c) DATE	FIRST NAMED APPLICANT	ATTORNEY DOCKET NUMBER
11/172,434	06/30/2005	Clifford E. Lambarth	3007.P0315US

CONFIRMATION NO. 5270

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Date Mailed: 07/21/2005

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 and pay any fees required 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 statutory basic filing fee is missing.
  Applicant must submit $ **300** *to complete the basic filing fee for a non-small entity. If appropriate, applicant may make a written assertion of entitlement to small entity status and pay the small entity filing fee (37 CFR 1.27).*
- The oath or declaration is missing. *A properly signed oath or declaration in compliance with 37 CFR 1.63, identifying the application by the above Application Number and Filing Date, is required.*
  Note: If a petition under 37 CFR 1.47 is being filed, an oath or declaration in compliance with 37 CFR 1.63 signed by all available joint inventors, or if no inventor is available by a party with sufficient proprietary interest, is required.
- To avoid abandonment, a late filing fee or oath or declaration surcharge as set forth in 37 CFR 1.16(f) of $130 for a non-small entity, must be submitted with the missing items identified in this letter.

The applicant needs to satisfy supplemental fees problems indicated below.

The required item(s) identified below must be timely submitted to avoid abandonment:

- Additional claim fees of **$11650** as a non-small entity, including any required multiple dependent claim fee, are required. Applicant must submit the additional claim fees or cancel the additional claims for which fees are due.

SUMMARY OF FEES DUE:

Total additional fee(s) required for this application is **$13030** for a Large Entity

- **$300** Statutory basic filing fee.

- **$130** Late oath or declaration Surcharge.

- The application search fee has not been paid. Applicant must submit **$500** to complete the search fee.
- The application examination fee has not been paid. Applicant must submit **$200** to complete the examination fee for a large entity
- The specification and drawings contain more than 100 pages. Applicant owes **$250** for **48** pages in excess of **100** pages for a non-small entity.

- Total additional claim fee(s) for this application is **$11650**

  - **$5000** for **25** independent claims over 3.
  - **$6650** for **133** total claims over 20.

Replies should be mailed to: Mail Stop Missing Parts
Commissioner for Patents
P.O. Box 1450
Alexandria VA 22313-1450

A copy of this notice MUST be returned with the reply.

Office of Initial Patent Examination (703) 308-1202

PART 3 - OFFICE COPY

063005
1750 U.S. PTO

PATENT APPLICATION

IN THE U.S. PATENT AND TRADEMARK OFFICE
Express Mail Label No.: EV 725 077 486 US
Attorney Docket No.: 3007.P0315US
June 30, 2005

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Transmitted herewith for filing is the [X] utility [ ] design patent application of:

Inventors: (1) Clifford E. LAMBARTH, (2) Chad SOUKE, (3) Todd GATTO, (4) Joshua C. COLVIN, (5) Kurosh NAHAVANDI, (6) Jason KNEEN, (7) Michael W. STEFFLER, (8) Christopher B. WAY, (9) Gary MORTON, (10) Dennis A. REED, (11) Michael McKEE, (12) Thomas A. PUVOGEL, (13) Brian BARTLEY, (14) Kurt DYKEMA and (15) Brent BOUWS

residing at: (1) Portage, MI, (2) Kalamazoo, MI, (3) Portage, MI, (4) Paw Paw, MI, (5) Portage, MI, (6) Mattawan, MI, (7) Kalamazoo, MI, (8) Kalamazoo, MI, (9) Kalamazoo, MI, (10) Portage, MI, (11) Aurora, IL, (12) Naperville, IL, (13) Westmont, IL, (14) Holland, MI and (15) Holland, MI

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(13) 115 S. Wilmette Avenue, Westmont, IL 60559
(14) 1230 Heather Drive, Holland, MI 49423, and
(15) 11326 Stonehedge Dr., Holland, MI 49424

and ALL having the following citizenship: United States.

Title: AMBULANCE COT AND HYDRAULIC ELEVATING MECHANISM THEREFOR

Please direct correspondence to the address associated with the following customer number:

30497
FLYNN, THIEL, BOUTELL & TANIS, P.C.
(STRYKER)

Pursuant to 37 CFR 1.53, the above-identified application is being submitted without the filing fee, and it is respectfully requested that this application be granted a serial number and filing date and that the undersigned be notified of the date by which the filing fee must be submitted.

Enclosed are:
[X] Specification
[ ] Declaration or Oath
[X] 61 Formal Drawing Sheets
[ ] Preliminary Amendment Cancelling Claims (Please enter before calculating the filing fee.)
[ ] Amendment Before First Office Action
[ ] Information Disclosure Statement
[ ] Assignment, with Recordation Form Cover Sheet.
[X] Acknowledgment Postal Card
[ ] Priority is claimed under 35 USC 119 based on Application No. , filed .
    [ ] A certified copy of the priority application is enclosed.

[X] Pursuant to 37 CFR 1.53, this application is being filed without the declaration or oath. Please notify the undersigned of the due date for submitting the declaration or oath. A Power of Attorney in favor of the undersigned will be submitted later.

[ ] Pursuant to 37 CFR 1.52, the enclosed application is in the form of a foreign language text. Please notify the undersigned of the due date for submitting an English translation and a statement that the English translation is accurate.

Please direct all telephone calls to the undersigned at telephone number (269) 381-1156.

Respectfully submitted,

FLYNN, THIEL, BOUTELL & TANIS, P.C.

Donald J. Wallace
Reg. No. 43 977

DJW/kc

Encl: Listed above

101.12/04

PATENT APPLICATION

IN THE U.S. PATENT AND TRADEMARK OFFICE

113010 U.S.PTO
11/172434
063005

"Express Mail" Mailing Label No.: EV 725 077 486 US
Date of Mailing: June 30, 2005
Applicant(s): Clifford E. LAMBARTH et al.
Title: AMBULANCE COT AND HYDRAULIC ELEVATING MECHANISM THEREFOR

Serial No.: Unknown
Group: Unknown
Confirmation No.: Unknown
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Examiner: Unknown
Atty Docket No.: 3007.P0315US

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

EXPRESS MAILING CERTIFICATE

Sir:

I hereby certify that the attached paper or fee is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 on the date indicated above and is addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

FLYNN, THIEL, BOUTELL & TANIS, P.C.

By: Anna Schippa

Date: June 30, 2005

Document(s) attached: Patent Application Transmittal dated June 30, 2005 including enclosures listed thereon

Telephone: (269) 381-1156

191.05/05

Express Mail No. EV 725 077 486 US

AMBULANCE COT AND HYDRAULIC ELEVATING MECHANISM THEREFOR

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of U.S. Provisional Application No. 60/613 151, filed September 24, 2004.

FIELD OF THE INVENTION

[0002] This invention relates to an ambulance cot and accessories. This invention also relates to an ambulance cot having a wheel supported base and a litter raisable and lowerable by a powered elevating mechanism oriented between the base and the litter. This invention also relates to an ambulance cot having a wireless communication capability to facilitate communication between the ambulance cot and a loading system on an ambulance as well as facilitating wireless troubleshooting via a handheld wireless unit. This invention also relates to an ambulance cot having a longitudinally extendable head section with a latching mechanism to fix it in selected locations.

BACKGROUND OF THE INVENTION

[0003] Emergency Medical Service (EMS) personnel are required to handle the combined weight of a patient and the ambulance cot during various stages of maneuvering of the ambulance cot while separated from the ambulance. This cot manipulation often requires that the patient supported on the litter be lifted to various elevated heights above the floor. In some instances, the weight factor can cause EMS personnel injury that requires medical treatment.

[0004] As the inclusion of more and more sophisticated technology onto ambulance cots continues to occur, there is an increasing need to be able to quickly and

accurately diagnose the complex equipment without requiring the ambulance cot to be removed from service.

[0005] Accordingly, it is advantageous to provide an ambulance cot equipped with an elevating mechanism to facilitate a lifting and lowering of the litter as well as an ability of the ambulance cot to communicate diagnostic issues in a convenient way without requiring removal of the ambulance cot from a field of use for a prolonged period of time.

SUMMARY OF THE INVENTION

[0006] This invention relates to an ambulance cot and accessories. This invention also relates to an ambulance cot having a wheel supported base and a litter raisable and lowerable by a powered elevating mechanism oriented between the base and the litter. This invention also relates to an ambulance cot having a wireless communication capability to facilitate communication between the ambulance cot and a loading system on an ambulance as well as facilitating wireless troubleshooting via a handheld wireless unit. This invention also relates to an ambulance cot having a longitudinally extendable head section with a latching mechanism to fix it in selected locations.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] Various objects and purposes of the invention will become apparent based upon a review of the following specification and upon a review of the several drawings, in which:

[0008] Figure 1 is an isometric view of an ambulance cot embodying the invention, which ambulance cot is in the fully raised position;

[0009] Figure 2 is an isometric view of an ambulance cot similar to Figure 1, except that the ambulance cot is in a mid-height position;

[0010] Figure 3 is an isometric view of an ambulance cot similar to Figure 1, except that the ambulance cot is in the fully collapsed and lowered position;

[0011] Figure 4 is an isometric view of a fragment of the hydraulic elevating mechanism on the ambulance cot;

[0012] Figure 5 is a fragmentary isometric view of the base, elevating mechanism and a fragment of the litter on the ambulance cot;

[0013] Figure 6 is an isometric view of a fragment of the litter frame;

[0014] Figure 7 is a side view of a collapsed base and elevating mechanism on the ambulance cot;

[0015] Figure 8 is an isometric view of a foot end lift handle assembly on the ambulance cot;

[0016] Figure 9 is a side elevational sectional view of the foot end lift handle assembly sectioned through the switches;

[0017] Figure 10 is an isometric view of a switch housing that is mounted on the foot end lift handle assembly;

[0018] Figure 11 is an electrical schematic of a switch mounted on the switch housing illustrated in Figure 10;

[0019] Figure 12 is a bottom view of a release handle mechanism mounted on the foot end lift handle assembly, which handle is in the stowed position;

[0020] Figure 13 is a view similar to Figure 12, except that the handle has been shifted to an operative position;

[0021] Figure 14 is a view similar to Figure 13, except that the handle has been moved to an operated position;

[0022] Figure 15 is an isometric view of a mounting assembly on the ambulance cot for the hydraulic circuit;

[0023] Figure 16 is a fragmentary sectional view of a portion of the base whereat the base connects to an X frame member;

[0024] Figure 17 is a hydraulic circuit diagram embodied on the ambulance cot;

[0025] Figures 18-23 are additional illustrations of the hydraulic circuit diagram illustrated in Figure 17, except that various valves have been shifted to demonstrate operation of the hydraulic circuit;

[0026] Figure 24 is a schematic representation of a control for the hydraulic circuit;

[0027] Figure 25 is a decision tree diagram representative of the operational characteristics of the control illustrated in Figure 24 and the hydraulic circuit of Figures 17-23;

[0028] Figure 26 is an isometric view of the litter and similar to the illustration in Figure 1;

[0029] Figure 27 is an isometric view of a fragment of the ambulance cot in the collapsed and lowered position inside a cargo area of an ambulance;

[0030] Figure 28 is a bottom view of the hydraulic assembly illustrated in Figure 15 (minus the mounting assembly);

[0031] Figure 29 is a view similar to Figure 28, except that one of the valves has been actuated;

[0032] Figure 30 is a view similar to Figure 29, except that both of the valves have been actuated;

[0033] Figure 31 is a sectional view of one of the valves illustrated in Figures 28-30;

[0034] Figure 32 is a decision tree diagram for the logic employed on a handheld diagnostics tool;

[0035] Figure 33 is a decision tree diagram for the general logic employed on the cot and load system in an ambulance to facilitate wireless diagnostics;

[0036] Figure 33A is a modified decision tree diagram for the logic employed on a handheld tool used for wireless programming, remote control and diagnostics.

[0037] Figure 34 is a fragmentary isometric view of an antenna system on the ambulance cot as well as an antenna system on a load arm provided on the ambulance;

[0038] Figure 35 is a side elevational view of the ambulance cot in the fully collapsed position with the head section retracted;

[0039] Figure 36 is a view similar to Figure 35, except that the head section on the ambulance cot has been moved to the fully deployed position;

[0040] Figure 37 is a fragmentary isometric view of the head section on the ambulance cot;

[0041] Figure 38 is a view similar to Figure 37, except that a handle has been shifted to a fully operated position;

[0042] Figure 39 is a side view of the head section with the handle in a first position;

[0043] Figure 40 is a view similar to Figure 39, except that the handle has been moved to the fully operated second position;

[0044] Figure 41 is a view similar to Figure 40, except that the handle has been shifted back to its first position illustrated in Figure 39;

[0045] Figure 42 is a sectional view of a latch mechanism on the head section;

[0046] Figure 43 is a view similar to Figure 42, except that the latch mechanism has been shifted to its fully operated position;

[0047] Figure 44 is an isometric view of a fully folded foldable safety bar on the head section;

[0048] Figure 45 is a side elevational view of the safety bar in the fully folded position as illustrated in Figure 44;

[0049] Figure 46 is a view of the safety bar in the unfolded position;

[0050] Figure 47 is a bottom isometric view of the foot end lift handle assembly with a battery locked into an operating position;

[0051] Figure 48 is a view similar to Figure 47 except that the battery has been moved to an inoperative position;

[0052] Figure 49 is a fragmentary isometric view of a non-circular X frame member receiving therein a circular further X frame member;

[0053] Figure 50 is an isometric view of the head end of the cot and showing on the underside of the fowler an accessory hook;

[0054] Figure 51 is an enlarged view of a fragment of Figure 50;

[0055] Figure 52 is an isometric view of the cot having a collapsible pouch accessory thereon, which pouch is in the extended position of use in response to an extension of the head section;

[0056] Figure 53 is an enlarged view of a fragment of Figure 52;

[0057] Figure 54 is a plan view of the pouch accessory;

[0058] Figure 55 is a view similar to Figure 52 but with the pouch in the collapsed condition in response to a retraction of the head section;

[0059] Figure 56 is an enlarged view of a fragment of Figure 55;

[0060] Figure 57 is a partial cross-sectional view of a retractable head section latch disabler in a disengaged position;

[0061] Figure 58 is a partial cross-sectional view according to Figure 57 of the latch disabler in an engaged position;

[0062] Figure 59 is a decision tree diagram for the logic employed in environments utilizing a Radio Frequency Identification tag;

[0063] Figure 60 is an enhanced decision tree diagram for Figure 59 presenting the general logic employed during a normal drive mode;

[0064] Figure 61 is a decision tree diagram for the logic employed in the Figure 59 environment, particularly during a loading of the ambulance cot onto the load mechanism on the ambulance;

[0065] Figure 62 is an exploded perspective view of the retractable head section and latch disabler of Figures 57-58;

[0066] Figure 63 is a perspective view of the head section of the ambulance cot aligned with an antler system for an ambulance cargo area; and

[0067] Figure 64 is a perspective view of the head section engaged with the antler system of Figure 63.

DETAILED DESCRIPTION

AMBULANCE COT

[0068] An ambulance cot 10 embodying the invention is illustrated in the drawings. The ambulance cot 10 is similar to the ambulance cots disclosed in U.S. Patent No. 5 537 700 and WO 2004/064698, the subject matters thereof being incorporated herein by reference. The ambulance cot 10 includes a base frame 11 composed of longitudinally extending side rails 12 and crosswise extending rails 13 interconnected at the ends thereof to the side rails 12 to form a rectangle. Castered wheels 14 are operatively connected to each corner of the rectangle base frame formed by the rails 12 and 13.

[0069] The ambulance cot 10 includes a litter 16 comprising a litter frame 17. An elevating mechanism 18 is provided between the base frame 11 and the litter frame 17 in order to facilitate a lifting and lowering of

the litter 16 relative to the ground. More specifically, the elevating mechanism 18 includes a pair of side-by-side oriented "X" frames 19 and 21. The X frame 19 includes a pair of X frame members 22 and 23 connected together adjacent their midlength portions by means of a pivot axle 24. Each of the X frame members 22 and 23 is hollow and telescopingly receives therein a further X frame member 26 and an X frame member 27, respectively. The further X frame members 26 and 27 are supported for movement into and out of the respective X frame members 22 and 23. The distal end of the further X frame member 26 is secured via a connection 28 to the cross rail 13 at the left end (foot end) of the base frame illustrated in Figure 1 whereas the distal end of the further X frame member 27 is connected via a connection 29 to the cross rail 13 at the right end of the base frame 11.

[0070] The X frame 21 is similarly constructed and includes a pair of X frame members 32 and 33 which are connected together at about their midlength portions by the aforesaid axle 24. While the axle 24 is illustrated to extend laterally between the X frames 19 and 21, it is to be understood that separate axles 24 can, if desired, be employed (as shown in Figure 50). The X frame members 32 and 33 are hollow and telescopingly receive therein a further X frame member 36 telescopingly received in the X frame member 32 whereas a further X frame member 37 is telescopingly received in the X frame member 33. The distal end of the further X frame member 36 is connected via a connector 38 to the cross rail 13 at the foot end of the base frame 11 and the distal end of the further X frame member 37 is connected via a connector 39 to the cross rail 13 at the head end of the base frame 11. The X frame members 22, 26 extend parallel to the X frame members 32, 36 whereas the X frame members 23, 27 extend parallel to the X frame members 33, 37.

[0071] Referring to Figure 4, the cross rail 13 at the foot end of the base frame 11 is illustrated. To the cross rail 13 there is pivotally connected a pair of laterally spaced linkage members 41. In this particular embodiment, each of the linkage members 41 includes at the end thereof adjacent the cross rail 13 a bore 42 which encircles the cross rail 13 to facilitate the pivotal connection of each of the linkages 41 about the longitudinal axis of the cross rail 13. The ends of each of the linkages 41 remote from the cross rail 13 are connected to respective laterally spaced brackets 43 by means of a fastener 44. In this particular embodiment, a sleeve 46 extends between the respective brackets 43 and receives therein the respective fastener 44 to facilitate the connection of the linkages 41 to the brackets 43. The axle 24 also facilitates a connection of the respective brackets 43. Each of the brackets 43 includes a receptacle 47 into which is received a respective X frame member 23 and 33 as illustrated in Figure 1. In this particular embodiment, the axle 24 passes through an opening provided in each of the respective X frame members 23 and 33.

[0072] A first bracket 48 (Figure 4) is fixedly secured to the cross rail 13. A second bracket 49 is secured to a rod 51 that is connected to and extends between the respective brackets 43. In this particular embodiment, the rod 51 is connected to each bracket by a respective fastener 52. It is to be noted that there is a spacing between the axle 24 and the respective rods 46 and 51. The purpose of this spacing will become apparent below.

[0073] At least one linear actuator 53 (two, if desired to provide improved stability) is connected to and extends between the respective brackets 48 and 49. In this particular embodiment, the linear actuator 53

includes a hydraulic cylinder housing 54 fastened to the bracket 49, which cylinder housing 54 includes a reciprocal rod 56 having a piston (not illustrated) at one end thereof located within the cylinder housing 54. The distal end of the reciprocal rod 56 is connected in a conventional manner by a universal-like joint 55 to the bracket 48. That is, the universal joint allows pivotal movement about two orthogonally related axes. As will be evident from Figure 4, extension and retraction of the reciprocal rod 56 will facilitate movement of the brackets 43 about the axis of the rod 46. The end of the rod is lengthwise adjustable to accommodate tolerances encountered during production.

[0074] As is illustrated in Figure 5, the ends of the X frame members 22 and 32 remote from the base frame 11 are each pivotally secured to a cross rail 59 adjacent the head end of the litter frame 17 as at 57 and by respective connectors 58. The connectors 58 are each relatively movable with respect to the cross rail 59. In one embodiment (Figure 6), on the other hand, the ends of the X frame members 23 and 33 remote from the base frame 11 are connected by a hollow pivot tube 61 via connectors 62. Only one of the connectors 62 is illustrated in Figure 6, it being understood that the end of the X frame member 23 remote from the base frame 11 also has a connector 62 thereon. A slide bearing (not shown) can, if desired, be provided to allow longitudinal movement of the X frame member 33 along the litter rail 66. Alternatively, a timing rod 63 can be relatively rotatably received inside the pivot tube 61. Opposite ends of the timing rod 63 have a pinion gear 64 fastened thereto and rotatable therewith. The purpose of the timing rod and the pinion gear 64 oriented at the opposite ends thereof will become apparent below. If desired, the X frame members 23, 33 and the pivot tube 61

can be welded together to enhance the overall strength and resistance to twisting characteristics.

[0075] As is shown in Figure 5, the litter 16 comprises a litter frame 17 which consists of a pair of lengthwise extending side rails that are laterally spaced from one another, which side rails 66 are connected at the head end by the aforesaid cross rail 59, further cross rails 67 and other cross rails not illustrated. A housing 68 (see also Figure 6) is secured to the underside of each of the side rails 66 at a location spaced from the head ends thereof. Each housing 68 has an inwardly opening recess 69 therein, the openings in each of the housings 68 opposing one another. In one embodiment, the openings 69 each have a downwardly facing upper wall 71 to which is secured a toothed rack 72 extending lengthwise of each of the respective side rails 66. The teeth of each of the pinion gears 64 are configured to mesh with the teeth of the toothed rack 72. Since the pinion gears 64 are fixedly secured to the timing rod 63, the mating teeth on the pinion gear 64 and the rack 72 will prevent twisting of the elevating mechanism 18 as it raises and lowers the litter 16 relative to the base frame 11.

[0076] In this particular embodiment, the longitudinally extending side rails 66 of the litter frame 17 are hollow. Thus, the cross rails 59 and 67 as well as others not specifically described are secured by brackets to the exterior surface of each of the side rails 66. Several of the brackets 71 are illustrated in Figure 5.

[0077] A foot end lift handle mechanism 72 is illustrated in Figure 8 and consists of a pair of vertically spaced U shaped frame members 73 and 74. The legs of each of the U shaped frame members 73 and 74 are joined together by a bracket 76 (only one bracket being

illustrated in Figure 8), which bracket 76 is fastened to the respective legs by fasteners not illustrated. Each bracket 76 is telescoped inside of the foot end of the respective side rail 66 as illustrated in Figure 1. Further, the legs of the lower frame member 74 diverge away from the legs of the frame member 73 so that there is provided pairs of vertically spaced hand grip areas as at 77 and 78 on the respective frame members 73 and 74, respectively. Plural spacer brackets 79 are connected to the bight portions of each of the frame members 73 and 74 to maintain the vertical spacing between the grip areas 77 and 78. Fasteners (not illustrated) facilitate a connection of the brackets 76 to the interior of each of the respective side rails 66.

[0078] A battery mount 89 is secured to the foot end lift handle assembly 72, preferably to the underside of the assembly as show in Figures 47 and 48. The battery mount 89 includes a downwardly opening bayonet socket 90 having electrical contacts 94 exposed therein for connection to a properly configured battery 160 shown in broken lines. The manner in which the battery 160 connects to the electrical contacts 94 when the battery is in the broken line position shown in Figure 48 is conventional and, therefore, further discussion about this connection is believed unnecessary. The electrical contacts 94 on the battery mount 89 are connected to the control 158 as schematically shown in Figure 24. In order to connect the battery 160 into place in the battery mount 89, the battery is moved leftwardly from the Figure 47 disconnected inactive position to the Figure 48 connected and active position. The battery 160 in the installed position of Figure 48 is releasably locked in place and is capable of withstanding excessive acceleration forces that will occur during an accident to remain locked in place in the Figure 48 position.

[0079] One leg 81 of the frame member 73 includes a switch housing 82 fastened thereto by at least one fastener 83 (Figure 9). The switch housing 82 is located in an ergonomically advantageous position to the obvious grasping point of the user. An enlarged isometric view of the switch housing 82 is illustrated in Figure 10. The switch housing has a pair of manually engageable buttons 84 and 86 thereon. The manually engageable buttons 84 and 86 are shielded from above by a shroud 87 and are of a low profile membrane design so as to prevent inadvertent actuation of the buttons 84 and 86 by a patient lying on the upper surface of the litter 16. That is, the shroud 87 is oriented at the head end of the switch housing 82. The switch housing 82 includes an opening 88 extending therethrough and through which the leg 81 of the frame 73 extends. The fastener 83 extends through a hole in the leg 81 to facilitate a connèction of the housing 82 to the leg 81 extending through the opening 88.

[0080] Similarly, the leg 91 of the frame member 74 includes a further switch housing 92, located in an ergonomically advantageous position to the obvious grasping point for the user, having an opening 98 extending therethrough and through which the leg 91 extends. A fastener 93 facilitates a connection of the switch housing 92 to the leg 91 that extends through the opening 98. The switch housing 92 includes a construction identical to the switch housing 82 illustrated in Figure 10 and it includes a pair of manually engageable buttons 84 and 86 which, as will be explained in more detail below, provide a redundant operation with respect to the buttons in the switch housing 82. The switch housing 92 also includes a shroud 97 similar to the shroud 87 and it is provided for the same purpose, namely, to shield the buttons 84, 86 from

inadvertent actuation by a patient lying on the litter 16. In addition to the safety shrouds 87 and 97 preventing inadvertent actuation of the push buttons 84 and 86, each of the push button switches 84, 86 have a dual switch closing feature requiring both switch contacts to be closed (see Figure 11) in order to effect the desired operation as will be explained in more detail below.

[0081] The bight section 99 of the frame member 74, particularly at the base of one of the spacers 79, there is provided a bracket 101 secured to the bight section by a fastener 102 (Figure 12). A manually engageable handle 103 is pivotally secured to the bracket 102 by a pivot axle 104. The handle includes a pair of arcuately spaced shoulders 106 and 107. A cable support member 108 is pivotally secured to the bracket 101 by a pivot axle 109. A cable, here a Bowden cable 111, is fastened as at 112 to the cable support 108 (at one end) while the other end is fastened to a valve actuation device which will be explained in more detail below. The cable 111 extends into and through the hollow interior of the frame member 74. The cable support member 108 has a pair of arcuately spaced shoulders 113 and 114 that operatively cooperate with the arcuate shoulders 106 and 107, respectively, as will be explained in more detail below. The handle 103 as illustrated in Figure 12, is in a stowed out of the way position. When it is desired to move the handle and use it for operation of the ambulance cot, it is shifted clockwise in its position from the position illustrated in Figure 12 to the position illustrated in Figure 13 at which time the shoulder 107 engages the shoulder 114 on the cable support member 108. When the handle 103 is further pivoted clockwise about the axle 104 to the position illustrated in Figure 14, the cable support member 108 will pivot about the axle 109 to effect a

pulling of the cable 111 to effect actuation of a valve structure that will be described in more detail below. A torsional spring 116 (only the ends of which are illustrated in Figures 12-14) serves to continually urge the handle 103 counterclockwise to the stowed position so that the shoulders 106 and 113 will engage one another.

[0082] Referring to Figure 5, and as stated above, there is provided a pair of longitudinally spaced brackets 71 on each of the side rails 66. Between laterally spaced ones of the brackets 71, there extends a respective cross rail 67. Referring to Figure 15, these cross rails 67 support a hydraulic assembly bracket 121. More specifically, the hydraulic assembly bracket 121 includes several ears 117 which operatively engage the respective cross rails 67 and from which ears is suspended the hydraulic assembly bracket 121. The hydraulic assembly bracket 121 is generally U shaped with the bight section forming a base upon which is mounted a variable speed electric motor 122, a hydraulic manifold plate 123 and a hydraulic pump 124. The hydraulic pump 124 has two outlets 126 and 127. The hydraulic outlets 126 and 127 are connected through hydraulic conduits 128, 129, respectively (Figure 4), to respective opposite ends of the hydraulic cylinder housing 54. In this particular embodiment, the cross rails 67 also provide a support for a seat section 130 (Figure 1) on the litter 16.

[0083] Referring to Figures 1 and 16, the further X frame members 26, 27, 36 and 37 are all connected through respective connectors 28, 29, 38 and 39 to a cross rail 13. Figure 16 illustrates a representative example of the connectors 28, 29, 38 and 39. That is, each connector includes a sleeve 118 that encircles the cross rail 13 and includes a stem 119 that is telescoped inside the interior of each of the respective further X frame members 26, 27, 36, 37. A bearing assembly 131 is

provided between the stem 119 and the interior surface of the further X frame members 26, 27, 36, 37. Thus during normal use, off center loads and flex in the aluminum frame members may cause some twisting in the geometry of the frame members which will cause a binding of the mechanism. In order to accommodate this twist, the bearing assembly 131 will facilitate a relative rotation between the sleeve 118 and the further X frame members 26, 27, 36, 37. The bearing assembly 131 becomes particularly important when the X frame members 22, 23, 32, 33 are not circular in cross section and the further X frame members 26, 27, 36, 37 are circular in cross section (as depicted in Figure 49). That is, a bushing 236 is fixedly positioned inside the non-circular X frame members 22, 23, 32, 33, which bushing 236 has a circular opening therethrough through which the further X frame members 26, 27, 36, 37 slidably extend. The end of the further X frame members 26, 27, 36, 37 remote from the base 11 have a further bushing 237 longitudinally slidably disposed in the X frame members 22, 23, 32, 33. The bushing 237 is relatively moveably secured to the respective further X frame members 26, 27, 36, 37, such as through the use of a rivet and washer mechanism 238 being secured to the further X frame members 26, 27, 36, 37 on opposite sides of the bushing 237 so as to prevent a relative longitudinal movement of the bushing 237 along the length of the further X frame members and so that the further X frame members can rotate about their respective longitudinal axes relative to the bushing 237.

HYDRAULIC CIRCUIT

[0084] A hydraulic circuit 132, illustrated in Figures 17-23, is included in the manifold plate 123 (Figure 15). It is to be understood that the pump 124 and the linear actuator 53 and the conduits carrying hydraulic fluid to the linear actuator 53 are preferably always filled with

hydraulic fluid. Further, the pump 124 is reversible and the electric motor 122 driving same is also reversible. As a result, there will be no delay in actuation of the linear actuator in response to an operation of the pump 124 by the electric motor 122. The output of the pump 124, in one direction of operation, will supply hydraulic fluid through a pilot operated check valve 133 to the outlet 126 connected through the hydraulic conduit 128 to the end of the cylinder housing 54 remote from the reciprocal rod 56. Operation of the pump 124 in the opposite direction will direct fluid through a poppet valve 134 having in parallel therewith an orifice or fluid throttle 136 and a two way poppet valve 137 to the outlet 127 which in turn is connected through a conduit 129 to the end of the cylinder housing 54 adjacent the reciprocal rod 56. The fluid controlling the pilot operated check valve 133 is delivered to it through a conduit 138 connected to the fluid path intermediate the poppet valve 134 and the pump 124. There is also provided a pressure relief operated check valve 139 connected at one end between the pilot operated check valve 133 and the pump 124 and, at the other end, to a tank or reservoir for the hydraulic fluid. Intermediate the pilot operated check valve 133 and the outlet 126, there is provided a fluid passageway 142 extending to a series connected pressure compensated flow controller 143, a spring controlled check valve 144 and a two way poppet valve 146 connected to the tank 141. The spring is sized in this check valve so as to provide a dampening against a surge of fluid when passively lowering. This prevents a lurch in the lowering action providing increased comfort to the patient during lowering. The passageway 142 includes a further passageway 147 connected through a spring biased check valve 148 to tank 141, on the one hand and through a passageway 149 to a

manual release valve 151 also connected to tank 141. The outlet 127 is connected through a passageway 152 to a spring biased check valve 153 connected to the tank 141, on the one hand, and through a passageway 154 to a series connected fluid throttle 156 and thence to a further manual release valve 157 connected to the tank 141.

[0085] The hydraulic circuit 132 is controlled by a control mechanism 158, which control mechanism is also schematically represented in Figures 24 and 25. A hydraulic fluid pressure monitoring mechanism 159 is connected to the outlet 126 and provides a signal indicative of the magnitude of the fluid pressure to the control mechanism 158. The battery 160 (Figures 47 and 48) on board the ambulance cot provides power to the control mechanism 158. The charged status of the battery 160 is linked to a display 161 on a user interface 162 mounted on the foot end lift handle assembly 72 near the battery mount 89, particularly between the spacer members 79. The user interface 162 also includes a mode switch (not illustrated) for allowing the user interface to display a multitude of different functions, one of which can be an hour meter indicative of the total elapsed time that the electrical motor 122 has been operated, such as "HH:MM", where H is hour and M is minute or in tenths of an hour such as "HH.H hours". Any other indication of total elapsed time from a set point is contemplated. In addition, it is also possible for the user interface to display the elapsed amount of time that the control 158 has been on, the elapsed amount of time a certain switch is activated, the elapsed amount of time certain valves have been actuated or the elapsed amount of time a certain pressure has been maintained on the system. These values may be combined to a suitable display to accurately determine the amount of wear that can be expected on the system. As a result, ambulance

attendants can more accurately determine what preventative maintenance is required based upon the aforesaid displays. Additionally, a symbol (preferably iconic) can be provided at pre-programmed interval(s) to indicate when service may be necessary.

[0086] The control mechanism 158 also receives signals from position sensors provided on the ambulance cot. More specifically, and referring to Figure 26, a cover 163 has been removed from the housing 68 to reveal the opening 69 inside the housing. A first transducer 164 is provided inside the opening 69, particularly at the foot end of the opening 69 whereas a second transducer 166 is oriented at the head end of the opening 69. These transducers 164 and 166 are, in this embodiment, Hall effect sensors which are used to indicate the low and high heights of the ambulance cot. Alternatively, proximity sensors or reed switches can be employed in place of the Hall effect sensors. These transducers are adjustably positioned in the opening 69 such that they detect a magnetic field of a magnet mounted, for example, on one end of the pivot tube 61 (Figure 5) or on the slide bearing thereat (not shown) and oriented on the outboard side of the pinion gear 64 or slide bearing located thereat. Thus, as the pinion gear 64 approaches either one of the transducers 164 or 166, the magnetic field of the magnet will saturate the respective transducer to create an appropriate signal to the control mechanism 158 that is indicative of the height position of the cot. The position of the transducers 164, 166 are variable lengthwise of the opening 69 so as to provide an ability to effect a height adjustment for the ambulance cot in both its collapsed and its uppermost position. A specific advantage of having a movable second transducer 166 is that the high height of the ambulance cot can be adjusted to provide a stopping point custom adjusted to a

specific ambulance for ease of loading the cot into the ambulance. A further transducer 167 is provided adjacent the second transducer 166 so as to cause an additional signal to be sent to the control mechanism 158. This additional signal is supplied as feedback to the control mechanism 158 to subsequently control motor speed to effect a smooth stop of the litter 16 in the uppermost position. Similarly, a further transducer 168 can be provided adjacent the first transducer 164 so as to cause a further signal in the form of feedback to be sent to the control mechanism 158 to effect a subsequent controlling of motor speed to effect a smooth stop of the litter 16 in the lowered position. This smooth stopping operation is provided for patient comfort.

[0087] The control mechanism 158 also receives signals indicative of the presence of the ambulance cot inside the ambulance. In the preferred embodiment and referring to Figure 27, an ambulance cot latching mechanism inside the ambulance includes a rod 169 that extends along one side of the ambulance cot and has adjacent its distal end 171 a bracket 172 which has a magnet 173 provided thereon. The magnet 173 becomes positioned adjacent a transducer (not shown) to send a signal to the control mechanism 158 to effect a total and complete deactivation of the hydraulic lift or lower operation capabilities of the hydraulic circuit. This transducer may optionally be the position transducer 164.

[0088] Figures 28-30 are a bottom view of the manifold plate 123 having mounted thereon the reversible electric motor 122 and the reversible pump 124. If desired, the motor 122 could be driven in one direction and a transmission utilized to effect a reverse operation of the pump 124. The release valves 151 and 157 are mounted on the manifold plate 123. The release valve 151 includes a reciprocal stem 174 which, when moved to the

right in the aforesaid figures, effects an opening of the valve to allow fluid flow to pass therethrough. Similarly, the release valve 157 has a stem 176 which, when moved to the right in the aforesaid drawing figures, also effects an opening of the valve 157 to allow hydraulic fluid to pass therethrough. Incrementally opening the valve will effect a variable flow through the valve, allowing variable drop rates of the litter. Additionally, the orifice 156 may be sized to control the drop rate of the base 11 when the litter 16 is supported by an attendant or plural attendants. A plate 177 is provided and has holes therethrough which receive the respective stems 174 and 176 therethrough so that an appropriate fastener 178 can effect a fastening of the respective stems 174 and 176 to the plate 177. The cable 111 is connected to the plate as at 179. The opposite end of the cable 111 is connected to the release handle mechanism illustrated in Figures 12-14.

[0089] In this particular embodiment, and referring to Figure 31, the release valves 151 and 157 each have a fluid chamber 181 therein into which hydraulic fluid directly from the outlet port 126 is fed through an inlet port 183. The valves 151 and 157 each have a reciprocal spool 184 therein, the movement of which is controlled by the tension applied to the stems 174, 176 by the cable 111. The spool 184 includes a land 186 having a valve seat surface 187 thereon which mates with a valve seat surface 188 provided on the body 189 of the release valve 151. A spring (not illustrated) serves to urge the valve seat surface 187 against the valve seat surface 188, especially when no fluid pressure is applied to the chamber 181. Once the fluid pressure inside the chamber 181 has been reduced to a desired level, tension applied to the cable 111 urging the spool 184 to the right (Figure 31) against the urging of the return spring, the

seat surface 187 will be separated from the seat surface 188 to allow fluid to flow from the inlet port 183 to an outlet port 191 and thence to tank 141. The purpose of the aforesaid construction of the valves 151 and 157 will facilitate it being necessary that the ambulance cot attendants lift the cot prior to activation of the manual release valves 151 and 157 so that the fluid pressure in the chamber 181 will be reduced to facilitate a rightward movement of the spool 184.

[0090] A conventional velocity fuse 192 (Figure 17) is provided in the inlet port to the end of the cylinder housing 54 of the linear actuator 53, particularly at the end thereof remote from the reciprocal rod 56. The velocity fuse can also be an integral component of the cylinder housing 54. This conventional velocity fuse is Model No. 8506 available from Vonberg Valve, Inc. of Rolling Meadows, Illinois. The purpose of the velocity fuse is to prevent a rapid lowering of the cot when there is a sudden loss of hydraulic pressure as in the case of a severed hydraulic hose, or accidental manual release with a patient on the cot. A check-valve 195 is provided in parallel to the velocity fuse in order to affect an increased speed of extending of the base. This allows the same or similar speed in powered, and manual mode such that the manual mode may be used in normal use to extend the base when unloading the cot from the ambulance.

WIRELESS DIAGNOSIS

[0091] The ambulance cot and load system electronics for facilitating a loading of the cot into an ambulance (see also WO 2004/064698, the subject matter of which is to be incorporated herein) contain the capability to interact with a handheld diagnostics tool over a wireless communication link. This tool allows manufacturing and maintenance personnel to perform basic configuration,

troubleshooting and complex diagnostic operations on both the cot and load system, while remaining free from physical cable attachment to either unit. An example of the functional descriptions for each of the elements involved in wireless diagnostics are set forth below.

WIRELESS DIAGNOSTIC TOOL

[0092] The handheld device or tool 300 (Figure 34) is self contained, and includes an antenna 301, a wireless transmitter and receiver that operate under the same basic protocol as the wireless link connecting the cot and load system during normal operation. Operations such as collecting and configuring control parameters and initiating simple or complex diagnostics tests are supported through this interface. By design, this handheld device is capable of four main modes of operation:

- Two-way active communication mode: The handheld device interacts with one other wireless-capable unit;
- Multi-way active communication mode: The handheld device interacts with two or more wireless-capable units;
- Passive "listen only" mode: The handheld device observes the communication activity which exists near one or more wireless-capable units without disrupting it; and
- Power and at least one of read from and write to an RFID tag described below (can also be included in two-way communication).

[0093] Two-way active communication allows the handheld device to interact directly and exclusively with one cot (or one load system) in order to provide streamlined communication during programming or troubleshooting phases. Multi-way communication allows the handheld device to participate in communications with

multiple other parties, and allows for more complex troubleshooting and diagnostics operations. For example, when a cot is docked in the load system and a handheld device is brought into proximity of the wireless communication field, it will be able to interact with both units to gather information or allow the user to invoke special tests to verify operation of the loading algorithm. For two-way and multi-way modes, the wireless diagnostic tool is capable of auto-detecting the proper mode in which to operate, which is based on the number of active participants it senses in the wireless communication field. The "listen only" mode is entered at the prompting of the user of the handheld device. This mode is passive in nature, and can be used to analyze communications coming from one unit (cot or load system), or multiple units which are in dialog with one another.

COT

[0094] The ambulance cot's electronic controller contains software components to support wireless diagnostics capabilities. This software functionality is capable of detecting the difference between a load system that is trying to communicate and a wireless handheld device that is trying to initiate a diagnostic session. As this determination is made, the cot is able to enter into either a normal session with the load system, a dedicated session with the handheld device (if no load system is present), or a three-way session that involves both the handheld device and the load system. In the latter case, the cot software allows normal operation of the loading sequence, while simultaneously supporting a specific set of diagnostics that are useful in troubleshooting the overall system.

LOAD SYSTEM

[0095] The load system's electronic controller is also capable of distinguishing between a basic communication session for loading and unloading, and a session which involves diagnostics operations. Using similar software components, the load system will participate in dedicated two-way communication with a handheld device, or allow the device to coexist during a load or unload operation with the cot being present. It is capable of detecting the difference between these various modes of operation, and react accordingly to provide the necessary functional behavior.

[0096] Figures 32 and 33 provide a further description of the software functionality used in the wireless control and diagnostics features. In Figure 33, the blocks entitled "Execute Configure Option" and "Transmit Wireless Response Message" include a read/write command to the RFID tag 302 (described below) when applicable in order to change the user statistics which may be coded on the RFID tag (Count of times programmer accessed, revision of software (if updated) etc).

[0097] Referring to Figure 34, beneath the seat section 130 there is provided a cot antenna 193. The load arm on the ambulance (see WO 2004/064698, here in Figure 34 the load arm 194) includes a load arm antenna 196. The two antennas 193 and 196 provide communication between the cot and the load system as well as communication with the handheld unit. The antennas also provide a controlled communication envelope to allow any cot to communicate with any load system or handheld trouble shooting device while not interfering with other load systems/cots in the area. In the preferred embodiment, the cot antenna 193 (Figure 34) consists of a loop of wire, as does the load antenna 196, and the tool antenna 301. It has been demonstrated that by passing a

modulated current through a loop of wire, an electro-magnetic field is produced that can be received by other loops of wire in the environment. It is further known that this modulated "carrier" can be added to a digital signal, allowing the transmission of the digital signal on the modulated carrier. This type of communication is commonly referred to as an active inductive link.

[0098] The cot antenna 193, when configured as described, can additionally be used to remotely power and read a Radio Frequency Identification, or RFID tag 302 (Figure 34) mounted on the load arm 194 or a trolley 190 to which the load arm 194 is mounted. Thus, the cot can be configured to selectively communicate with one of the load system and the tool through an active, inductive link; and power and one of read from and write to the RFID tag 302. The RFID tag 302 is useful in implementing the in-ambulance/in fastener shut-off feature (shown and described in more detail below) as well as for identifying the device for use with other specific RFID readers specifically as follows:

code (1 byte)	product code (2 bytes)	CRC (1 byte)	Product specific RFID tag.....

More specifically:

Product name	Group name	Group (1 byte)	Product (2 bytes)	CRC
EMS_COT_LOADING_SYS	**Medical_Beds**	**2**	**1**	**0x11**

This information may be used to configure the hand-held tool, or provide contact information for service.

[0099] Additionally, other information may be at least one of written to and read from the RFID tag 302 including at least one of the following: Model, Serial number of the unit, Software revision, and Usage

statistics (which may include at least one of a count of different powered cots used with the system, and a count of times diagnostic tools accessed or changed the cot or load system(s)).

[00100] One exemplary way of establishing communication between the cot and the fastener system or between the cot or load system and the troubleshooting handheld device, as well as communication therebetween, is set forth below.

Preamble	P0	P1	D0	P2	D1	D2	P3	D3	D4	D5	D6	D7	P

	Preamble for signal detection
Px	Parity bits for error detection (Hamming Code)
P	Parity bit for extra check of data integrity
Dx	Data bits

PREAMBLE

[00101] The preamble is a special sequence to separate real data from the random noise. The preamble will contain special characters that are of 'illegal' length. This will cue the processor for a start of packet.

ERROR CORRECTION BITS

[00102] The packet uses four bits for error correction (P0, P1, P2, P3). The error correction technique employs a Hamming code algorithm that will allow the processor to correct one bit that has been misinterpreted. Assuming a moderate bit error rate, the odds of a single bit being corrupted are relatively high while the odds of multiple bits being corrupted is relatively very low. Allowing for 1 bit to be corrected will result in an overall

greater throughput at a relatively low cost of extra bits.

PARITY BIT

[00103] The parity bit is an extra check to ensure data integrity. The parity bit is calculated using basic even parity checking; the parity bit is set so that the number of 1s in the packet will always be an even number. The parity bit will allow detection of a second bit error; however, it will not be able to correct it.

DATA BITS

[00104] There are 8 data bits. The data bits communicate information about the cot status, an action request or diagnostic information. The most significant bit (D7) indicates whether the data is in diagnostic mode or not. If in diagnostic mode, remaining 7 bits indicate a diagnostic code or response. Otherwise each bit acts as an independent flag for a certain condition. If the transmission gets a response, the value is passed to the master controller; if no response is found, a value of '0'.

Table 1 - Example of possible Ambulance to Cot Data Bits

Bit	Name	Value = 1	Value = 0
7	Normal/Diagnostic	In Normal Mode	In Diagnostic Mode
6	Arm Load	Detect load on arm	No load detected
5	Arm Up	Load arm is fully up	Load arm not fully up
4	Arm Down	Load arm is fully down	Load arm not fully down
3	Proximity Switch	Prox switch closed	Prox switch open
2	TBD		
1	TBD		
0	Comm present	Comm is active	No Comm

Table 2 - Example of possible Cot to Ambulance Data Bits

Bit	Name	Value = 1	Value = 0
7	Normal/Diagnostic	In Normal Mode	In Diagnostic Mode
6	Cot load	Detect load on cot legs	No load detected
5	Cot legs up	Cot legs are fully up/not extended	legs not fully up
4	Cot legs down	Cot legs are fully down/extended	legs not fully down
3	Plus button	"+" button is pressed	"+" button not pressed
2	Minus button	"-" button is pressed	"-" button is not pressed
1	TBD		
0	Comm present	Comm is active	No Comm

Table 3 - Example

Event	A→C	C→A	Comment
Cot "-" button pressed, turns on	----	111001xx	Patient on Cot, Ambulance not yet in range No response from Ambulance, a value of zero is passed to the cot controller
Cot moved within range of Ambulance	10010xxx	111001xx	"-" button is still pressed Prox switch is not set, Arm not bearing load
Cot docked to prox switch	10011xxx	111001xx	"-" button is still pressed Prox switch is set, Arm not bearing load
Cot legs folding up, Cot drop slightly	11011xxx	110001xx	Arm starts to take weight, still down

Cot legs continue folding up	11001xxx	100001xx	Arm starts lifting up
Cot legs completely up	11001xxx	101001xx	Arm still lifting
Arm is all the Way up	11101xxx	101001xx	
Button is released Arm still up	11101xxx	101000xx	Waiting for cot to be pushed on

[00105] Further software may be provided for the in-ambulance/in-ambulance shut-off feature when used with an RFID tag 302. When used with the load system (to detect the RFID tag), the upper-level software diagram may look like that illustrated in Figure 59.

[00106] In operation, and referring to Figure 59, upon power-up, the cot attempts communication with the load system in order to detect if it is present. If communication (com) is present, it executes function according to a specific and separate load protocol. If not, the cot communication will switch to check for the RFID tag. If it is not present, the cot drives according to the normal cot protocol. If the cot sees the RFID tag, it will then check for the low Hall Effect (HE) sensor (to determine if the cot legs are retracted). Once fully retracted, the cot inhibits driving (up), and thus activates the in-ambulance/in fastener shut-off feature. The advantages of looking for the Low HE sensor is allowing function of the cot while docked, but not fully loaded. It is reasonably assumed that once the cot is fully retracted, it is locked into the load system, and will be pushed into the ambulance. A further advantage is that normal drive function is returned by simply manually dropping the base such that the low HE sensor is no longer activated, thus allowing normal

driving of the cot in the specific instance of a loss of load communication.

[00107] Driving normally is described in Figure 25, but Figures 60 and 61 illustrate the decision tree for the software when the RFID tag 302 is present in the overall system.

RETRACTABLE HEAD SECTION AND LATCH

[00108] By comparing Figures 35 and 36, it will be noted that the ambulance cot 10 includes a retractable head section 197. This feature can be provided on a manual lift cot or a power lift cot. In the power lift environment, and as is illustrated in Figure 37, the retractable head section 197 is generally U shaped, namely, having a pair of parallel legs 198 and 199 connected by a pair of brackets 202 to a head rail 203. A cross brace 200 (Figure 62) also connects the brackets 202. A tubular cross rail 201 is rotatably mounted to the cross brace 200. The legs 198 and 199 are configured to be slidably received by, into the interior of (shown), next to, or below the respective longitudinally extending side rails 66 on the cot 10. The handles 210 are fixed to the cross rail 201 for pivotal movement with the cross rail 201 about an axis corresponding to or parallel to the axis of the cross rail 201 in order to facilitate the movement of a pin 204 projecting from each handle 210 about an axis of rotation defined by or parallel to the axis of the cross rail 201. The pin 204 extends through an arcuate slot 215 in the bracket 202. The handles 210 are affixed such that actuation of one handle 210 effects a rotation of cross rail 201 and subsequent actuation of the other handle 210 so that the head section may be released by the actuation of a single handle 210. The pin 204 is connected by a linkage 206 to a latch mechanism 207 on each leg 198 and 199. The latch mechanism 207 is illustrated in more detail in Figures 42

and 43. More specifically, the latch mechanism 207 includes a housing 208 in which a ramp mechanism 209 is slidably disposed lengthwise of the housing 208. The ramp mechanism 209 includes a ramp surface 211 against which a pin 212 rests. The pin 212 includes a latch pin 213 that is configured to move laterally into and out of the housing 208. The position located outside the housing is illustrated in Figures 37 and 42. A spring (not illustrated) urges the pin 212 against the ramp surface 211. When the handle 210 is rotated about the axis of rotation corresponding to or parallel to the longitudinal axis of the cross rail 201, the pin 204 is moved from the position illustrated in Figure 39 to the position illustrated in Figure 40 to cause a leftward movement of the linkage 206 in each leg 198 and 199 to cause the pin 212 to shift in its position illustrated in Figure 42 to the position illustrated in Figure 43, namely, a position wherein the latch pin 212 has been retracted laterally into the housing 208 of the latch mechanism 207. A slot 205 in the link 206 is provided which allows independent, passive engagement of the latch pins 213 when the handles 210 are released. This is illustrated in Figure 41. A plurality of holes 214 are provided along the length of the side rails 66 and are configured to receive therein the latch pin 213 when in the extended position thereof as shown in Figure 37. These holes are located such that access to them is not possible, i.e., under a bumper provided on the exterior of the litter rail 66. This is done for protection against inadvertent release, foreign matter, or potential pinching point. When the latch pin is received in an associated hole 214 provided in the side rail 66, the retractable head section will be physically locked to the cot in either the retracted position (Figure 35) or the extended position (Figure 36).

[00109] In a further embodiment of the retractable head section 197, shown in Figures 57-58 and 62, the handles 210 are capable of being locked against rotation about the cross rail 201 to prevent release of the latch mechanism 207. Referring to Figure 57, the safety bar 218 is fixed to a mounting bracket 260 that is pivotally mounted to the cross brace 200. The mounting bracket 260 is biased into an at rest position by a torsion spring 261 mounted on the cross brace 200 and engaging the mounting bracket 260 and the bracket 202. Reference is made to pending patent application serial no. 10/850 144, wherein the safety bar 218 can be rotated upwardly in a counterclockwise fashion, by an attendant, toward the head end of the ambulance cot to clear a hook mounted at the mouth of an ambulance cargo area. In the instant invention, the mounting bracket 260 is configured so that the safety bar 218 can also be rotated upwardly in a clockwise fashion toward the interior of the cot, and function as a "latch disabler" to prevent release of the latch mechanism 207.

[00110] A head portion 262 of the mounting bracket 260 is received on the cross brace 200. The head portion 262 is eccentrically configured about the cross brace 200 such that it includes a ramp portion 264 that extends toward the bracket 202 joining the leg 198 to the head rail 203. The mounting bracket 260 is arranged underneath a shaft 266 formed in the bracket 202. The shaft 266 is formed to extend into a central portion of the arcuate slot 215 that receives the pin 204 when the handle 210 is actuated. The shaft 266 is configured to received a pin 268 surrounded by a compression spring 270. The pin 268 and spring 270 are arranged in the shaft 266 so that the pin is biased out of the arcuate slot 215 by the spring 270. The pin 268 is held within

the shaft 266 by the head portion 262 of the mounting bracket 260.

[00111] In Figures 57-58, the pin 204 is shown in the at rest position, that is wherein the handles 210 are not actuated. In order for the handles 210 to be actuated, the pin 204 must travel along the arcuate slot 215. During certain stages of transport, it is desirable to prevent the retractable head section 197 from changing its status from extended to retracted or vice versa. Therefore, it would be advantageous to prevent the inadvertent actuation of the handles 210. This can be accomplished by preventing the travel of the pin 204 through the arcuate slot 215, such as by pushing the pin 268 into the slot 215 to block the travel of the pin 204.

[00112] Referring to Figure 58, the safety bar 218 has been rotated clockwise about the cross brace 200. As the safety bar 218 rotates from the position shown in Figure 57, the pin 268 rides along the ramp portion 264 of the mounting bracket 260. The ramp portion 264 is eccentrically configured, so that as the mounting bracket 260 rotates about the cross brace 200, the radius of the head portion 262 increases, forcing the pin 268 through the shaft 266 and into a blocking position in the arcuate slot 215 as when the safety bar slides over an existing cot fastening mechanism in an ambulance. The safety bar 218 can rotate so that the pin 268 blocks the arcuate slot 215, preventing the handles 210 from being actuated. Full engagement of the pin 268 occurs when the pin 268 reaches an end 269 of the ramp 264. This occurs prior to a stop 272 of the mounting bracket 260 abutting the shaft 266, which prevents further rotation of the safety bar 218. The torsion springs 261 are mounted one on each side of the safety bar 218, and act in torsion in opposing directions about cross brace 200, urging the brackets 260 and the safety bar 218 to a downward,

neutral position, whereby the latch disabler is disengaged.

[00113] Referring now to Figures 63-64, the retractable head section 197 is configured to engage a portion of a cot fastening mechanism or "antler" system 276 configured for mounting to the floor of the cargo area of an ambulance. The antler system 276 includes a center yoke 278 and a forward yoke 280. Both yokes 278, 280 are mounted to the ambulance cargo area floor, with a centerline of the antler system 276 aligned in the fore-aft direction of the ambulance.

[00114] The center yoke 278 is formed of two rods 282, 283 arranged as mirror images about the centerline of the antler system 276. Each rod 282, 283 includes a longitudinal segment 284, 285 and an outwardly divergent segment 286, 287, each outwardly divergent segment rising to a rearwardly directed hook or "ear" 288, 289.

[00115] The forward yoke 280 includes a central segment 290 secured to the ambulance cargo floor and two outwardly divergent arms 291, 292. The arms each terminate in an "ear" 293, 294 that is joined with a respective ear 288, 289 of the center yoke 278.

[00116] As the ambulance cot 10 is rolled into the ambulance cargo area head end first, as shown by the arrow in Figure 63, the safety bar 218 contacts the center yoke 278. As the cot 10 is rolled further, the center yoke 278 forces the safety bar 218 rearwardly until the safety bar 218 rides on top of the longitudinal segments 284, 285 of the rods 282, 283 of the center yoke 278. Again referring to Figure 58, the latch disabler is activated prior to the stop 272 reaching the shaft 266. This enables use of the cot 10 with an antler system having a lower profile, while still activating the latch disabler. With the safety bar 218 in the rotated position of Figure 64, the latch disabler is activated,

thereby locking the retractable head section 197 in the extended position. The latch disabler will remain activated until the ambulance cot 10 is removed from the antler system 276. As the ambulance cot 10 is pushed further forward, the fixed wheels 216 roll between the ears 288, 289 and 293, 294 of the center and forward yokes 278, 280 and the into the antler system 276.

[00117] It is to be noted that the longitudinal axis of the side rails 66 are inclined to the horizontal at an angle α (see Figure 35) that is in the range of 1 to 10°. In this embodiment, the preferred angle is in the range of 2 to 3°. Thus, when the retractable head section 197 is retracted, the load wheels 216 on the retractable frame of the head section 197 are lifted from the ground surface 217 thereby enabling the cot to roll in any direction on the four castered wheels 14. This is referred to as the "no steer" condition. When the retractable head section 197 is extended to the position illustrated in Figure 36, the load wheels 216 will engage the support surface 217 to provide a steering effect for the cot as it is moved over the surface 217 (a "steer" condition). In this particular embodiment, the load wheels 216 are each rotatable about a fixed horizontal axis of rotation. That is, the wheels 216 are not supported in a castered manner. The head section 197 must be in the extended position of Figure 36 in order to be steered into the ambulance for engagement with the antler system 276.

FOLDED SAFETY BAR

[00118] As is illustrated in Figure 37, the retractable head section 197 includes a safety bar 218. The safety bar is configured to operatively engage a safety hook provided on the floor surface of a cargo area of an ambulance to prevent the cot from rolling completely out of the ambulance without an attendant being there to

handle the head end of the cot. Reference is to be made to pending U.S. Patent Application Serial No. 10/850 144, filed May 20, 2004, the subject matter of which is to be incorporated herein by reference. As is illustrated in Figures 44-46, a modified safety bar 218A can be provided which is foldable between the folded position illustrated in Figure 45 and an unfolded position illustrated in Figure 46. That is, the safety bar 218A includes two sections 219 and 221 interconnected by a pivot axle 222. The safety bar sections 219 and 221 are approximately of the same length so that the pivot axle 222 is oriented at the midlength portion of the extended handle as is illustrated in Figure 46. Releasable locking pins 223 are provided to lock the handle sections 219 and 221 in the respective folded position (Figure 45) and the unfolded position (Figure 46). A push button release or removable pin or other means of release (not illustrated) is provided for facilitating an activation of the locking pins to unlock them and facilitate relative movement between the handle sections 219 and 221.

ACCESSORIES

[00119] Figures 50-56 illustrate two accessories that can, if desired, be incorporated on the ambulance cot 10. The first accessory is depicted in Figures 50-51 and is a hook 239 oriented within the cot perimeter and which, specifically, is secured to the underside of the raisable and lowerable fowler 241 on the ambulance cot 10. The hook 239 consists of a sheet of material formed into a J with the stem of the J being secured to a cross rail 242 on the underside of the fowler 241 and the hook part 243 of the J facing toward the head end (left end) of the cot as depicted in Figures 50-51. The hook 239 facilitates the hanging of various articles therefrom while the cot is in use.

[00120] The second accessory is depicted in Figures 52-56 and is a collapsible pouch 244 secured to and extending between the legs 198, 199 of the head section 197 as well as to and extending between the cross rail 201 on the head section and the cross rail 59 (Figure 5) on the litter frame 17. As is shown in Figure 54, the pouch 244 consists of a planar sheet of fabric 237 to which are sewn plural fasteners 247 and 248 at spaced locations around the perimeter of the fabric sheet 246. The fasteners 247 are looped around the cross rails 59 and 201 while the fasteners 248 are looped around the laterally space legs 198 on the head section. When the head section 197 is in the extended position shown in Figure 52 and 53, the fabric sheet 246 is stretched between the longitudinally spaced cross rails 59 and 201 and laterally spaced legs 198 so as to provide a support surface 249. When the head section 197 is retracted to the position illustrated in Figures 55 and 56, the cross rails 59 and 201 become closely adjacent one another and the fabric sheet 246 is collapsed in an accordion style therebetween.

OPERATION

[00121] While the operative characteristics of the ambulance cot will be apparent to those skilled in the art upon reading the above set forth description and referring to the accompanying drawings, a discussion of the operational characteristics of the ambulance cot are set forth below for convenience.

[00122] When the ambulance cot is in the fully collapsed position, and referring to Figures 4 and 7, an extension of the linear actuator 53 will cause a clockwise (Figure 7) rotation of the bracket 43 about the axis of the fastener 44, the linear actuator being extended in the direction of the arrow 224. The position of the fastener 44 (Figure 4) is determined by the fixed

length linkage members 41. As a result of this geometry, the amount of force in the direction of the arrow 224 is optimal and effects a rapid lifting of the litter 16 from the positions illustrated in Figures 3 and 4 through the mid-height position illustrated in Figure 2 to the full height position of the litter illustrated in Figure 1. As the brackets 43 are lifted with continued extension of the linear actuator 53, the further X frame members 32, 33, 36 and 37 will telescope outwardly to accommodate the changing height of the frame members 22 and 23 from the base 11. In this particular embodiment, the pivot axle 24 for the two brackets 43 extend through the respective X frame members 22, 23 and 32, 33. As a result, it is necessary to provide an elongate slot in each of the further X frame members 26, 27 and 36, 37 in order to accommodate the presence of the pivot axle 24. It is to be recognized that a placement of the pivot axle 24 can be oriented at a location on the bracket 43 which will make it unnecessary to provide an axle receiving hole in each of the X frame members 23 and 33 as well as the elongate slots in the further X frame members 27 and 37. This provides an advantage of increased strength and stiffness of the base. When the litter 16 is lowered to the position illustrated in Figures 3 and 4, mounts 226 (Figure 1) will operatively engage a cross rail provided on the underside of the litter 16 and additional mounts 227 will rest on the cross rail 13 on the base. The mounts 226 and 227 are oriented so that they are not readily accessible by attendants in the region of the ambulance cot and, therefore, pinching issues are avoided.

[00123] Referring to Figure 11, each push button switch 84, 86 on the foot end lift handle assembly 72 requires two sets of switch contacts to be engaged in order to effect the desired command. That is, the set of contacts

228, 229 must both be closed in order to effect, for example, a retraction of the reciprocal rod 56 into the cylinder housing 54. Similarly, the two sets of contacts 231 and 232 of the switch 86 will effect an extension of the reciprocal rod 56 from the cylinder housing 54.

[00124] Turning now to Figures 17-25, the hydraulic circuit operation will now be described. Assuming the ambulance cot is in an ambulance and is now in the process of being removed from the ambulance, it is necessary to deploy the base from the position illustrated in Figure 3 to the position illustrated in Figure 1 and as taught in WO 2004/064698. Normally, the control 158 is in what is referred to as the "sleep" mode. Once a command is presented, such as by depressing the switch 86 to close the contacts 231 and 232, such action is noted by the control 158 to effect a powering up of the circuit to effect an opening of the valve 137 (Valve A) to shift the valve from its Figure 17 position to the Figure 18 position. The control will also make inquiry concerning whether the high top sensors 166 and 167 have been detected (see Figure 25) and, if not, the electric motor 122 is ramped in to effect a driving of the hydraulic pump 124. As soon as the motor reaches its maximum speed, the motor is continued to operate driving the pump at maximum speed until the sensor 167 is detected at which time the speed of the motor is ramped down or gradually slowed until the high top sensor 166 is detected, at which time the motor is brought to a stop. If the contacts 231 and 232 remain closed, the motor will remain stopped until the button 86 has been released by the attendant. Rapid uncontrolled deployment of the base from the Figure 3 position to the Figure 1 position is prevented by the orifice 136 in the valve 134 (Valve F). The attendant can thereafter "jog" the litter further upwardly by pressing the switch. In this case, the

controller will activate the motor for a short interval of time, allowing incremental upward movement of the litter.

[00125] Figure 19 illustrates a lowering of the litter from the Figure 1 position toward the Figure 3 position. In this instance, the switch 84 is actuated to close the contacts 228 and 229 to cause an opening of the valve 146 (Valve B). It will be noted that fluid flows out of the closed end of the linear actuator 53 through the pressure compensated flow control valve 143, through the check valve 144, through the opened Valve B to tank 141. The hydraulic fluid enters the rod end of the linear actuator 53 by sucking same out of the tank 141 through a check valve 153. In this particular situation, operation of the motor 122 is not required and hence is not activated. If the litter of the ambulance cot is lifted (no weight on the base of the ambulance cot), the pressure switch 159 will detect the lifting by reason of a reduced pressure and as long as the switch 84 and the contacts 228 and 229 thereof remain closed, the motor 122 will be activated and driven in the opposite direction of rotation to effect a rapid driving of fluid into the rod end of the linear actuator 53 to rapidly collapse the cot. Prior to this occurring, however, the Valve B will be returned to its initial position illustrated in Figure 17 as will Valve A. Alternatively, a separate switch (not shown) can be provided for effecting the same rapid collapse of the cot. Since less hydraulic fluid is required in the rod end of the linear actuator 53 by reason of the presence of the reciprocal rod 56 than is required at the opposite end of the cylinder housing 54, excess fluid will need to be bled from the closed end of the cylinder housing and this is accomplished through the high pressure side of the pump feeding a pressurized signal to open the check valve 133 and the check valve

139 to facilitate a bleeding of some of the hydraulic fluid to tank during the time that the base frame 11 is rapidly raised by the hydraulic circuit. Once the low position sensor is detected, the speed of the motor is gradually reduced until the lowermost sensor 164 is detected at which time the motor is brought to a halt. If the push button switch 84 remains activated, the motor will remain stopped until the attendant releases the manual engagement of the button 84. The attendant can thereafter "jog" the litter further downwardly by pressing the switch. In this case, the controller will activate the motor for a short interval of time, allowing incremental downward movement of the litter.

[00126] The operative characteristics illustrated in Figure 21 are similar to those depicted in Figure 18. Even when the motor 122 is activated to drive the pump 124, the orifice or throttle 136 limits the amount of fluid that can be driven so that the base unit does not uncontrollably fall away from the litter when it is being lifted by the ambulance attendants.

[00127] In the situation where there is a loss of electrical function, it must be possible to operate the ambulance cot manually. In addition, a weep valve 233 is provided at the rod end of the cylinder housing 54 to cause a pressure relief to occur when the rod is fully extended. That is, hydraulic fluid inside the cylinder housing 54 will communicate with the outlet 127 to limit the pressure buildup inside the cylinder housing 54. In view of the construction of the valves 151 and 157, with weight on the cot 10, the handle 103 and the valve 157 are allowed to operate, as Figure 12-14 and Figure 29 indicate. Since the pressure is high in the chamber 181 of the valve 151, the valve 151 will not shift (as shown in Figure 29) in response to an operative movement of the handle 103 and the litter 16 of the cot 10 will not

lower. On the other hand, when weight on the litter 16 is removed by the attendant or plural attendants lifting the litter 16 away from the base frame 11, the hydraulic pressure in the chamber 181 of the valve 151 is reduced to facilitate an easy movement of the land 186 and the valve seat surface 187 thereon (Figure 31) away from the valve seat surface 188 in order to facilitate the operation of the valve 151 simultaneously with the valve 157 (Figures 28-30, particularly Figure 30). That is, fluid flows from the closed end of the linear actuator 53 to tank through the valve 151 whereas hydraulic fluid is siphoned from the tank 141 into the rod end of the linear actuator 53 to effect a lowering of the litter 16 relative to the base frame 11. Similarly, and assuming that electrical function has still been disrupted and it is desired to deploy the base from the Figure 3 position to the Figure 1 position, the attendants will need to lift the cot while simultaneously operating the handle 103 causing the weight of the base frame 11 to effect a drawing of fluid from the tank into the closed end of the linear actuator 53 while the hydraulic fluid in the rod end of the linear actuator 53 extends through the open valve 157 to tank.

[00128] Although particular preferred embodiments of the invention have been disclosed in detail for illustrative purposes, it will be recognized that variations or modifications of the disclosed apparatus, including the rearrangement of parts, lie within the scope of the present invention.

What is claimed is:

1. An ambulance cot, comprising:

a base frame;

a litter frame;

an elevating mechanism interconnecting said base frame and said litter frame and being configured to effect changes in elevation of said litter frame relative to said base frame, said elevating mechanism comprising a hydraulic circuit having an extendable and retractable hydraulic actuator, said elevating mechanism being connected to and extending between said base frame and said litter frame, a pump and a motor for driving said pump to effect a pumping of hydraulic fluid to said hydraulic actuator, said motor being energized from an electrical energy source; and

a control mechanism, said control mechanism including a first set of manually operable electric controls for controlling a direction of hydraulic fluid flow to said hydraulic actuator to thereby facilitate movement of said litter frame at least one of toward said base frame and away from said base frame.

2. The ambulance cot according to Claim 1, wherein said control mechanism includes a second set of manually operable non-electric controls for overriding said first set of manually operable electric controls at least during a time interval wherein said electrical energy source is incapable of supplying electrical energy to said motor and said electric controls and for facilitating movement of said litter frame at least one of toward said base frame and away from said base frame in response to operation of said manually operable non-electric controls.

3. The ambulance cot according to Claim 2, wherein said non-electric controls include at least one manually operable hydraulic valve having a reciprocal spool therein, said hydraulic valve being oriented in a conduit connecting one end of said hydraulic actuator through said manually operable hydraulic valve to a tank, a weight of said cot and any load thereon causing a fluid pressure to exist at said one end of said hydraulic actuator and act through said conduit on said spool in said hydraulic valve to urge said spool in said hydraulic valve to a closed position.

4. The ambulance cot according to Claim 3, wherein said manually operable hydraulic valve is configured to necessitate a removal of said fluid pressure before said spool can be manually moved through operation of said non-electric controls to open the connection through said conduit of said one end of said hydraulic actuator to a lower pressure part of said hydraulic circuit.

5. The ambulance cot according to Claim 4, wherein said manually operable hydraulic valve is further configured so that said removal of said fluid pressure can only be accomplished by lifting said cot and any load thereon away from a support surface on which rests said base frame.

6. The ambulance cot according to Claim 1, wherein said manually operable electric controls include a plurality of manually operable switches mounted on said litter frame adjacent said foot end thereof and configured to be readily accessible to an attendant oriented adjacent said foot end, and wherein said hydraulic circuit includes a plurality of hydraulic

valves electrically operatively controlled by said manually operable switches.

7. The ambulance cot according to Claim 6, wherein said manually operable electric controls include two sets of a plurality of manually operable switches mounted on said litter frame adjacent said foot end thereof and configured to be readily accessible to an attendant oriented adjacent said foot end as well as being configured to redundantly control the direction of hydraulic fluid flow to said hydraulic actuator.

8. The ambulance cot according to Claim 1, wherein said motor is a direct current motor and said electrical energy source is a battery.

9. The ambulance cot according to Claim 1, wherein said hydraulic circuit includes a hydraulic fluid pressure sensing device oriented intermediate said pump and said hydraulic actuator and configured to provide a signal indicating at least one of the presence of a positive hydraulic fluid pressure and the absence of a positive hydraulic fluid pressure.

10. The ambulance cot according to Claim 1, wherein said manually operable electric controls include a plurality of manually operable switches mounted on said litter frame adjacent said foot end thereof and configured to be readily accessible to an attendant oriented adjacent said foot end, and wherein said hydraulic circuit includes a plurality of hydraulic valves electrically operatively controlled by said manually operable switches, and wherein said control mechanism includes a processor responsive to manual operation of a selected one of said switches and being

configured to effect a selective supply of electrical energy to said motor to effect a pumping of hydraulic fluid to said hydraulic actuator to change the elevation of said litter frame relative to said base frame.

11. The ambulance cot according to Claim 10, wherein said plurality of manually operable switches includes two switches, a first switch for facilitating an increase in a spacing between said litter frame and said base frame and a second switch for facilitating a decrease in the spacing between said litter frame and said base frame.

12. The ambulance cot according to Claim 11, wherein said motor is a direct current motor and said electrical energy source is a battery, said motor including a rotatably supported output shaft connected to a rotatably supported input shaft on said pump, said shafts being configured to be drivingly rotated in opposite directions of rotation, said processor being configured to separately supply electrical energy to said motor causing said motor to rotate in a first direction of rotation in response to an operation of said first switch and supply electrical energy to said motor causing said motor to rotate in a second direction of rotation in response to an operation of said second switch.

13. The ambulance cot according to Claim 12, wherein said hydraulic circuit includes a hydraulic fluid pressure sensor located intermediate said pump and said hydraulic actuator and configured to provide a first signal indicating a positive hydraulic pressure and a second signal indicating an absence of a positive hydraulic pressure, said processor being configured to

monitor said first and second signals in response to an operation of said second switch.

14. The ambulance cot according to Claim 12, wherein said processor includes a ramp circuit for effecting a gradual change in the supply of electrical energy to said motor in response to an operation of at least one of said first and second switches to gradually change a speed of rotation of said shafts.

15. The ambulance cot according to Claim 14, wherein said hydraulic circuit includes a first position detector configured to provide a third signal indicating a presence of said litter frame at a prescribed location relative to said base frame and a fourth signal indicating an absence of said litter frame at said prescribed location, said processor being configured to activate said ramp circuit in response to an activation of at least one of said first and second switches and in response to said fourth signal.

16. The ambulance cot according to Claim 14, wherein said hydraulic circuit includes a hydraulic fluid pressure sensor located intermediate said pump and said hydraulic actuator and configured to provide a first signal indicating a positive hydraulic pressure and a second signal indicating an absence of a positive hydraulic pressure, said processor being configured to monitor said first and second signals in response to an operation of said second switch, and wherein said hydraulic circuit includes a first position detector configured to provide a third signal indicating a presence of said litter frame at a prescribed location relative to said base frame and a fourth signal indicating an absence of said litter frame at said

prescribed location, said processor being configured to activate said ramp circuit in response to an activation of said second switch and in response to said second and fourth signals.

17. The ambulance cot according to Claim 14, wherein said hydraulic circuit includes a first position detector configured to provide a third signal indicating a presence of said litter frame at a prescribed location relative to said base frame and a fourth signal indicating an absence of said litter frame at said prescribed location, said processor being configured to activate said ramp circuit in response to an activation of said first switch and in response to said fourth signal.

18. The ambulance cot according to Claim 14, wherein said hydraulic circuit includes a first position detector configured to provide a third signal indicating a presence of said litter frame at a first prescribed location relative to said base frame and a fourth signal indicating an absence of said litter frame at said first prescribed location, and a second position detector configured to provide a fifth signal indicating a presence of said litter frame at a second prescribed location relative to said base frame and a sixth signal indicating an absence of said litter frame at said second prescribed location, said processor being configured to activate said ramp circuit to effect an increase in response to an activation of said first switch and said fourth and sixth signals, said processor being additionally configured to activate said ramp circuit to effect a decrease in the supply of electrical energy to said motor to gradually decrease the speed of rotation of

said shafts in response to an operation of said first switch and said fourth and fifth signals.

19. The ambulance cot according to Claim 18, the processor further being configured to effect a jog function comprising a stopping of the motor in response to a continued operation of said first switch and said fourth and fifth signals, and to provide a short duration supply of electrical energy upon a release and reactivation of said first switch.

20. The ambulance cot according to Claim 14, wherein said hydraulic circuit includes a first position detector configured to provide a third signal indicating a presence of said litter frame at a first prescribed location relative to said base frame and a fourth signal indicating an absence of said litter frame at said first prescribed location, and a second position detector configured to provide a fifth signal indicating a presence of said litter frame at a second prescribed location relative to said base frame and a sixth signal indicating an absence of said litter frame at said second prescribed location, said processor being configured to activate said ramp circuit to effect an increase in response to an activation of said second switch and said fourth and sixth signals, said processor being additionally configured to activate said ramp circuit to effect a decrease in the supply of electrical energy to said motor to gradually decrease the speed of rotation of said shafts in response to an operation of said second switch and said third and sixth signals.

21. The ambulance cot according to Claim 20, the processor further being configured to effect a jog function comprising a stopping of the motor in response

to a continued operation of said second switch and said third and sixth signals, and to provide a short duration supply of electrical energy upon a release and reactivation of said second switch.

22. A power lifting apparatus for adjusting the height of a patient supporting frame on an ambulance cot, the patient supporting frame having a head end and a foot end as well as a patient support deck with a top surface for holding a person, a base frame containing wheels, and an elevating mechanism for facilitating a varying of the height of said patient supporting frame relative to said base frame, said elevating mechanism comprising:

an electric motor;

a battery connected to said electric motor;

an electric circuit for controlling said electric motor;

a hydraulic fluid circuit comprising at least a hydraulic cylinder body having a reciprocal rod thereon and configured to effect said varying of the height of said patient supporting frame in response to relative movement between said hydraulic cylinder body and said reciprocal rod, said hydraulic cylinder body having first and second ports oriented adjacent opposite ends of said hydraulic cylinder body and through which hydraulic fluid can enter said hydraulic cylinder body;

a hydraulic pump connected between said first and second ports and providing hydraulic fluid to said hydraulic cylinder body to effect movement of said reciprocal rod; and

said electric motor drivingly connected to said hydraulic pump.

23. The apparatus according to Claim 22, wherein said hydraulic pump has third and fourth ports, said hydraulic fluid circuit including a first conduit connecting said first and third ports and a second conduit connecting said second and fourth ports.

24. The apparatus according to Claim 23, wherein said first conduit includes a third conduit connected to a first valve, said first valve providing an open or closed connection of said first conduit to tank through said third conduit.

25. The apparatus according to Claim 24, wherein said second conduit includes a second valve, said second valve providing an open or closed connection between said second and fourth ports.

26. The apparatus according to Claim 25, wherein said third conduit includes a flow controller for regulating a rate of hydraulic fluid flowing therethrough when said first valve is open to tank.

27. The apparatus according to Claim 26, wherein said second conduit includes an orifice or fluid throttle connected in series with said second valve and is oriented between said second and fourth ports.

28. The apparatus according to Claim 27, wherein said first conduit includes a pressure switch for monitoring hydraulic fluid pressure at said first port.

29. The apparatus according to Claim 22, wherein said hydraulic fluid circuit includes a manual release circuit for connecting at least one of said first and second ports to tank.

30. The apparatus according to Claim 29, wherein said manual release circuit includes a manually engageable handle mounted to said patient supporting frame adjacent one end thereof for easy access by an ambulance cot attendant.

31. The apparatus according to Claim 30, wherein said one end is said foot end.

32. The apparatus according to Claim 22, wherein said hydraulic fluid circuit includes a manual release circuit for connecting said first and second ports to tank.

33. The apparatus according to Claim 32, wherein said manual release circuit includes a manually engageable handle mounted to said patient supporting frame adjacent one end thereof for easy access by an ambulance cot attendant.

34. The apparatus according to Claim 33, wherein said one end is said foot end.

35. The apparatus according to Claim 22, wherein said electric motor is a variable speed electric motor.

36. The apparatus according to Claim 22, wherein an output shaft of said electric motor is connected directly to a drive shaft of said pump.

37. The apparatus according to Claim 22, wherein there is provided between said first and second ports a pair of series connected check valves each oriented to

permit only a fluid flow from tank to a respective one of said first and second ports.

38. The apparatus according to Claim 22, wherein there is provided a closed fluid flow circuit between said first and second ports and said pump and a fluid flow compensation circuit connected between said first and second ports and in parallel with said pump for regulating a first volume of fluid flow exiting from an end of said hydraulic cylinder body remote from said reciprocating rod to a second volume entering said pump so that said second volume through said pump is equal to an amount that enters said end of said hydraulic cylinder body whereat said reciprocating rod exits said hydraulic cylinder body.

39. The apparatus according to Claim 38, wherein said second volume is less than said first volume.

40. An ambulance cot, comprising:

a first frame;

a second frame;

an elevation mechanism interconnecting said first and second frames to facilitate moving said first and second frames toward and away from one another; and

a timing device mounted on one of said first and second frames and configured to provide an indication of the elapsed time that said elevation mechanism has been operated.

41. The ambulance cot according to Claim 40, wherein said elevation mechanism includes an electric motor, said timing device being configured for indication of the elapsed time that said electric motor has been operated.

42. The ambulance cot according to Claim 40, wherein said timing device is configured to provide an iconic indication feature to indicate that service is needed to the cot.

43. An ambulance cot comprising:

a wheeled base;

a patient litter disposed above said base;

a support mechanism which supports said patient litter for vertical movement relative to said base, said support mechanism including elongate first and second support elements which each have first and second ends respectively pivotally coupled to said patient litter and to said base, which can each expand and contract in length, and which are pivotally coupled to each other at a location between the ends thereof for pivotal movement about an approximately horizontal pivot axis, said support mechanism further including a fixed-length link member having a first end supported on said base for pivotal movement about a common axis with said second end of said first support element, and having a second end supported on said second support element at a location axially between said pivot axis and said second end thereof for pivotal movement about a further axis which is substantially parallel to said pivot axis; and

an elevating system for selectively raising and lowering the patient litter, the elevating system having at least one extensible and retractable member with first and second ends, said first end being connected to the base for pivotal movement about a common axis with said second end of said first support element and a second end pivotally supported on said second support element at a location axially between said pivot axis and said first end thereof for pivotal movement about a further axis

which is substantially parallel to said pivot axis, said elevating system further comprising selectively actuable locking means for releasably locking said support mechanism so as to respectively permit and prevent vertical movement of said patient litter relative to said base.

44. The ambulance cot according to Claim 43, wherein said first and second support elements each include a tubular outer member having an upper end pivotally coupled to said patient litter, and an inner member telescopically slidably disposed within said outer member and having a lower end pivotally coupled to said base.

45. The ambulance cot according to Claim 44, wherein said tubular outer member includes a non-circular cross-section and said inner member is received in a bushing within said tubular outer member for a low torque sliding connection.

46. The ambulance cot according to Claim 44, wherein said second ends of said support elements pivotally supported on said base remain a predetermined distance from each other on said base in all operational positions of said support mechanism, and wherein said first and second support elements each telescope in length at locations between said pivot axis and said second ends thereof.

47. The ambulance cot according to Claim 46, wherein each said inner member has means defining therein a slot which extends lengthwise thereof and transversely therethrough, and including an axle which extends along said horizontal pivot axis through said outer members of

each of said first and second support elements and through said slots in said inner members thereof.

48. The ambulance cot according to Claim 46, wherein said tubular outer members are pivotally connected by an axle defining said pivot axis and each said inner member comprises an uninterrupted tubular member.

49. The ambulance cot according to Claim 43, wherein said elevating system includes a hydraulic elevating system for selectively raising and lowering the patient litter, the hydraulic elevating system comprising a hydraulic pump and a hydraulic cylinder, the hydraulic cylinder having a first end connected to the base for pivotal movement about a common axis with said second end of said first support element and a second end pivotally supported on said second support element at a location axially between said pivot axis and said first end thereof for pivotal movement about a further axis which is substantially parallel to said pivot axis, said hydraulic elevating system further comprising selectively actuable locking means for releasably locking said support mechanism so as to respectively permit and prevent vertical movement of said patient litter relative to said base.

50. The ambulance cot according to Claim 46, wherein said second end of said link member is secured to said tubular outer member.

51. The ambulance cot according to Claim 44, wherein said second end of said link member is secured to said tubular outer member.

52. The ambulance cot according to Claim 43, wherein said support mechanism includes third and fourth elongate support elements which each have first and second ends respectively pivotally coupled to said patient support and to said base, which can each expand and contract in length, and which are pivotally coupled to each other at locations between the ends thereof for pivotal movement about said horizontal pivot axis, said third and fourth support elements being spaced axially along said pivot axis from said first and second support elements, said first and third support elements pivoting about a common pivot axis at said first ends thereof and about a common pivot axis at said second ends thereof, and said second and fourth support elements pivoting about a common axis at said first ends thereof and about a common axis at said second ends thereof, said support mechanism further including a second fixed-length link member having a first end supported on said base for pivotal movement about a common axis with said second end of said third support element, and having a second end supported on said second support element at a location axially between said pivot axis and said second end thereof for pivotal movement about a further axis which is substantially parallel to said pivot axis.

53. The ambulance cot according to Claim 52, wherein said upper end of said tubular outer members of one of said first and second elongate support elements and one of said third and fourth elongate support elements are pivotally mounted to a timing rod movable on said patient litter parallel to said pivot axis, the timing rod including a pinion gear mounted on each end for rotation therewith, and said patient litter further comprises a pair of toothed racks each configured for engagement by one pinion gear of the timing rod.

54. The ambulance cot according to Claim 43, wherein said patient litter includes a frame having a fixed member and includes a movable member which is movably supported on said frame, wherein said first end of said first support member is pivotally supported on said fixed member and said first end of said second support member is pivotally supported on said movable member.

55. An ambulance cot comprising:

a wheeled base; and

a patient litter disposed above and supported for adjustable vertical movement on said base by a support mechanism, the patient litter comprising:

a pair of longitudinally extending side rails, the side rails configured to extend from a head end to a foot end of the patient litter;

a retractable, generally U-shaped head section, the head section having a pair of parallel legs connected by a cross rail, the legs being configured to be slidably received into the interior of the respective longitudinally extending side rails, a pair of brackets connecting the legs to a head rail, a cross rail pivotally received by the brackets, at least one handle pivotally mounted for movement about an axis corresponding to or parallel to the axis of the cross rail, the handle being connected to a pin configured for rotation about the axis of rotation defined by or parallel to the axis of the cross rail.

56. The ambulance cot according to Claim 55, wherein the at least one handle comprises first and second handles, the first and second handles being affixed to the cross rail such that actuation of either

of the first and second handles effects a rotation of the cross rail and actuation of the other handle.

57. The ambulance cot according to Claim 56, further comprising a locking mechanism for selectively fixing the position of the head section in one of an extended and a retracted position, the locking mechanism configured for actuation by the first and second handles.

58. The ambulance cot according to Claim 57, further comprising a locking mechanism deactivation mechanism for preventing the locking mechanism from becoming disengaged by the actuation of the first or second handle.

59. The ambulance cot according to Claim 58, further comprising the safety bar being configured to engage the locking mechanism deactivation mechanism.

60. The ambulance cot according to Claim 57, further comprising a pin extending from each handle into the interior of a respective bracket for engaging a first end of a locking mechanism linkage, the linkage having a second end for engaging the locking mechanism, the locking mechanism comprising a retractable pin configured to engage one of a plurality of receivers within the side rail for fixing the position of the head section relative to the side rail.

61. The ambulance cot according to Claim 60, wherein the plurality of receivers within the side rail are covered so as to be inaccessible from outside the side rail.

62. The ambulance cot according to Claim 60, wherein the locking mechanism deactivation mechanism operates by preventing movement of the pin extending from each handle into the respective bracket.

63. The ambulance cot according to Claim 55, further comprising the head section including a pair of steering wheels.

64. The ambulance cot according to Claim 63, further comprising the steering wheels being mounted for rotation about a fixed axis (i.e. non-castered).

65. The ambulance cot according to Claim 63, further comprising the steering wheels being mounted such that they are in contact with the ground only when the litter is in the lowered position and the head section is in the extended position to create a "steer" condition.

66. The ambulance cot according to Claim 55, further comprising the patient litter being supported by the support mechanism at an angle α relative to a support surface, the angle α being between 1°-10°.

67. The ambulance cot according to Claim 66, further comprising the angle α being between 2°-3°.

68. The ambulance cot according to Claim 66, further comprising the head section including a pair of steering wheels mounted such that they are in contact with the ground only when the litter is in the lowered position and the head section is in the extended position.

69. An ambulance cot comprising:

a wheeled base;

a patient litter disposed above said base;

a support mechanism which supports said patient litter for vertical movement relative to said base, said support mechanism including elongate first and second support elements which each have first and second ends respectively pivotally coupled to said patient litter and to said base, which can each expand and contract in length, and which are pivotally coupled to each other at locations between the ends thereof for pivotal movement about an approximately horizontal pivot axis, said support mechanism further including a fixed-length link member having a first end supported on said base for pivotal movement about a common axis with said second end of said first support element, and having a second end supported on said second support element at a location axially between said pivot axis and said second end thereof for pivotal movement about a further axis which is substantially parallel to said pivot axis;

a hydraulic elevating system for selectively raising and lowering the patient litter, the hydraulic elevating system comprising an electrically operated hydraulic pump and a hydraulic cylinder, the hydraulic cylinder having a first end connected to the base for pivotal movement about a common axis with said second end of said first support element and a second end pivotally supported on said second support element at a location axially between said pivot axis and said first end thereof for pivotal movement about a further axis which is substantially parallel to said pivot axis; and

a control system for said hydraulic elevating system, said control system comprising a first switch assembly and a second switch assembly, the first and second switch assemblies being electrically connected to

the control system, each of the first and second switch assemblies comprising at least two operating buttons for raising and lowering the patient litter respectively, the first and second switch assemblies being physically remote from one another.

70. The ambulance cot according to Claim 69, wherein the switch assemblies are configured to require actuation of two switch contacts to effect a raising or lowering of the patient litter.

71. The ambulance cot according to Claim 70, wherein the switch assemblies are configured to enable actuation of the two switch contacts simultaneously by manual actuation of a single operating button.

72. The ambulance cot according to Claim 71, wherein the two switch contacts are contained in a single membrane-style button, configured such that light depression of the button actuates a first of the two switch contacts to initiate a power on condition of the ambulance cot and full depression of the button actuates a second of the two switch contacts to initiate the raising or lowering of the patient litter.

73. The ambulance cot according to Claim 69, the first and second switch assemblies each further comprising a shroud shielding the buttons from inadvertent actuation.

74. The ambulance cot according to Claim 69, the first and second switch assemblies further comprising low profile membrane design buttons.

75. An ambulance cot comprising:

a wheeled base; and

a patient litter disposed above and supported for adjustable vertical movement on said base by a support mechanism, the patient litter comprising:

a pair of longitudinally extending side rails, the side rails configured to extend from a head end to a foot end of the patient litter;

a retractable, generally U-shaped head section, the head section having a pair of parallel legs connected by a cross rail, the legs being configured to be slidably received by the respective longitudinally extending side rails, and at least one handle pivotally mounted for movement about an axis of the cross rail, a latch mechanism for selectively fixing the position of the head section in at least one of an extended and a retracted position, the latch mechanism configured for operation by the at least one handle, and

a latch disabler configured to prevent the operation of the latch mechanism by the at least one handle.

76. The ambulance cot according to Claim 75, the head section further comprising a safety bar connected by a mounting bracket for pivotal movement about the axis of the cross rail, the mounting bracket including a head portion eccentrically disposed about the axis of the cross rail.

77. The ambulance cot according to Claim 76, the head portion further comprising a ramp portion configured for displacing a blocking pin within one of the parallel legs to block the link pin.

78. The ambulance cot according to Claim 77, the at least one handle further comprising a first handle and

a second handle, each associated with a respective parallel leg and corresponding latch mechanism within the respective parallel leg.

79. The ambulance cot according to Claim 78, further comprising a pair of latch disablers, each associated with a respective parallel leg, handle and latch mechanism.

80. The ambulance cot according to Claim 78, the first and second handles being affixed to the cross rail such that actuation of either of the first and second handles effects a rotation and actuation of the other handle.

81. The ambulance cot according to Claim 75, further comprising the handle including a link pin extending into the interior of a respective leg for engaging a first end of a latch mechanism linkage, the linkage having a second end for engaging the latch mechanism, and the latch mechanism comprising a retractable latch pin configured to engage one of a plurality of receivers within the side rail for fixing the position of the head section relative to the side rail.

82. The ambulance cot according to Claim 81, further comprising the latch disabler preventing the movement of the handle about the axis of the cross rail by blocking the link pin.

83. An ambulance cot, comprising:

a base frame;

a litter frame;

an elevating mechanism interconnecting said base frame and said litter frame and being configured to effect changes in elevation of said litter frame relative to said base frame; and

a control mechanism including a cot antenna and a separate tool configured for at least one of cot programming, remote control and cot diagnostics and having a tool antenna, said control mechanism and said tool being configured for wireless communication so that said tool can execute diagnostic analysis of said control mechanism and report the results thereof.

84. The ambulance cot according to Claim 83, wherein said litter frame includes a patient support deck having a head section, a seat section and a foot section, said cot antenna being oriented beneath said seat section.

85. A combination of an ambulance cot and a load system onboard an ambulance for facilitating a loading and unloading of said ambulance cot, comprising:

said ambulance cot including a base frame, a litter frame and an elevating mechanism interconnecting said base frame and said litter frame and being configured to effect changes in elevation of said litter frame relative to said base frame, said elevating mechanism comprising an extendable and retractable actuator connected to and extending between said base frame and said litter frame, an onboard control circuit for controlling an operation of said extendable and retractable actuator;

said load system onboard said ambulance having thereon a load system control circuit and a device for effecting a coupling of said ambulance cot to said load system;

a cot antenna mounted on said ambulance cot and connected in circuit with said onboard control circuit;

a load system antenna mounted on said ambulance and connected in circuit with said load system circuit; and

a separate tool configured for at least one of cot programming, remote control and cot diagnostics and load system diagnostics, said tool having a tool antenna, said tool being configured for wireless communication so that said tool can execute at least one of cot programming, remote control and diagnostic analysis of said control circuit onboard said cot and said load system circuit separately and/or together.

86. The combination according to Claim 85, wherein said litter frame includes a patient support deck having a head section, a seat section and a foot section, said cot antenna being oriented beneath said seat section, and wherein said load system further comprises a trolley, said load system antenna being oriented on said trolley.

87. The combination according to Claim 86, wherein said trolley includes a load arm having said device thereon for facilitating a coupling of said load arm to said ambulance cot, wherein said load system antenna is oriented on said load arm.

88. An ambulance cot, comprising:

a base frame;

a litter frame;

an elevating mechanism interconnecting said base frame to said litter frame and being configured to effect changes in elevation of said litter frame relative to said base frame;

a motor for driving said elevating mechanism;

a computerized control system for monitoring a state of said cot and regulating operation of said motor, said control system including a transceiver configured to communicate data concerning said cot with a computerized monitoring and diagnostic system; and

an electrical energy source for energizing said motor and said computerized control system.

89. The ambulance cot according to Claim 88, wherein said motor is one of an electrical motor, a hydraulic pump, and a pneumatic pump.

90. The ambulance cot according to Claim 88, wherein said computerized control system further includes memory for retaining operation and usage statistics concerning said cot.

91. The ambulance cot according to Claim 90, wherein said computerized control system further includes a user interface configured to display at least one of a monitored state of said cot and usage statistic of said cot.

92. The ambulance cot according to Claim 88, wherein said computerized monitoring and diagnostic system comprises a separate tool that can be selectively configured to monitor at least one operating state of said cot and conduct diagnostic tests on said cot.

93. The ambulance cot according to Claim 92, wherein said tool includes a transceiver configured to wirelessly communicate data with said cot computerized control system.

94. The ambulance cot according to Claim 92, wherein said tool operates in one of a variety of modes, including:

a passive mode whereby said tool observes wireless communication activity between said cot computerized control system and a second wireless device;

a two-way active communications mode, whereby said tool interacts with said cot computerized control system; and

a multi-way active communications mode whereby said computerized tool interacts with at least two cot computerized control systems, or interacts with at least one cot computerized control system and a second wireless device.

95. The ambulance cot according to Claim 92, wherein said tool is configured to automatically enter a predetermined monitoring mode or diagnostic mode based upon:

a type of data wirelessly detected by said tool;

a number of active participants wirelessly detected by said tool; or

a combination of type of data wirelessly detected by said tool as well as number of active participants wireless detected by said tool.

96. The ambulance cot according to Claim 88, wherein said cot computerized control system wirelessly transmits a series of digital signals, with each said signal comprising a predetermined number of bits.

97. The ambulance cot according to Claim 96, wherein said predetermined number of bits include at least one bit for error correction and a plurality of bits representing cot data.

98. The ambulance cot according to Claim 96:

wherein at least a portion of said predetermined number of bits represents a diagnostic code when said cot computerized control system operates in a diagnostic mode; and

wherein each individual bit of at least a portion of said predetermined number of bits acts as an independent flag representing a specific state or condition of said cot when said cot computerized control system operates in a monitoring mode.

99. An ambulance cot system for facilitating the transport of a patient, comprising:

a cot for supporting and transporting said patient to and from an ambulance, said cot comprising:

a base frame,

a litter frame,

an elevating mechanism interconnecting said base frame to said litter frame and being configured to effect changes in elevation of said litter frame relative to said base frame,

a motor for driving said elevating mechanism,

a computerized control system for monitoring a state of said cot and regulating operation of said motor, said control system including a transceiver configured to wirelessly communicate data concerning said cot, and

an electrical energy source for energizing said motor and said computerized control system;

a load system mounted upon an interior surface of said ambulance and configured to selectively secure said cot within said ambulance, said load system comprising:

a guide track for guiding movement of said cot into and out of said ambulance,

a device for securing said cot relative to said guide track, and

a load system control circuit for selectively monitoring and controlling one or more states of said load system, said load system control circuit including a transceiver configured to wirelessly communicate data concerning said load system; and

a separate tool that can be selectively configured to monitor one or more operating states of at least one of said cot computerized control system and load system control circuit, as well as at least one of execute remote control commands and conduct diagnostic tests on at least one of said cot computerized control system and load system control circuit, said tool including a transceiver configured to wirelessly communicate data with at least one of said cot computerized control system and load system control circuit.

100. The ambulance cot system according to Claim 99, wherein said motor is one of an electrical motor, a hydraulic pump, and a pneumatic pump.

101. The ambulance cot system according to Claim 99, wherein said cot computerized control system further includes a user interface configured to display at least one of a monitored state of said cot and usage statistic of said cot.

102. The ambulance cot system according to Claim 99, wherein said tool operates in one of a variety of modes, including:

a passive mode whereby said tool observes wireless communication activity between said cot computerized control system and said load system control circuit;

a two-way active communications mode, whereby said tool interacts with one of said cot computerized control system and load system control circuit; and

a multi-way active communications mode whereby said computerized tool interacts with at least two cot computerized control systems, or interacts with at least one cot computerized control system and at least one load system control circuit.

103. The ambulance cot system according to Claim 99, wherein said tool is configured to automatically enter a predetermined monitoring mode or diagnostic mode based upon:

a type of data wirelessly detected by said tool;

a number of active participants wirelessly detected by said tool; or

a combination of type of data wirelessly detected by said tool as well as number of active participants wireless detected by said tool.

104. The ambulance cot system according to Claim 99, wherein at least one of said cot computerized control system and load system control circuit wirelessly transmits a series of digital signals, with each said signal comprising a predetermined number of bits.

105. The ambulance cot system according to Claim 104, wherein said predetermined number of bits include at least one bit for error correction and a plurality of bits representing either cot data or load system data.

106. The ambulance cot system according to Claim 104:

wherein at least a portion of said predetermined number of bits represents a diagnostic code when said cot

computerized control system or load system control circuit transmitting said signal operates in a diagnostic mode; and

wherein each individual bit of at least a portion of said predetermined number of bits acts as an independent flag representing a specific state or condition of said cot or load system when said cot computerized control system or load system control circuit transmitting said signal operates in a monitoring mode.

107. An ambulance cot, comprising:

a base frame;

a litter frame; and

an X-frame support mechanism interconnecting said base frame and said litter frame and being configured to support said litter frame in one of a plurality of positions relative to said base frame, said support mechanism including at least one pair of frame members pivotally secured to each other proximate the mid-length thereof, said frame members each having opposite ends respectively secured to one of said base frame and said litter frame, at least one of said pair of frame members having a first mount oriented between said mid-length thereof and said base, said at least one of said pair of frame members having a second mount oriented between said mid-length thereof and said litter frame, said first and second mounts being configured to respectively engage said base frame and said litter frame in response to said litter frame becoming proximate said base frame.

108. An ambulance cot, comprising:

a base frame;

a litter frame; and

an elevating mechanism interconnecting said base frame and said litter frame and being configured to

effect changes in elevation of said litter frame relative to said base frame, said elevating mechanism being configured to detect a presence and an absence of a force urging a change in elevation of said litter frame relative to said base frame to cause said base frame and said litter frame to become oriented closer together.

109. An ambulance cot, comprising:

a base frame;

a litter frame; and

an elevating mechanism interconnecting said base frame and said litter frame and being configured to effect changes in elevation of said litter frame relative to said base frame, said elevating mechanism including at least one pair of frame members pivotally secured to each other proximal the mid-length thereof to form a X-frame, said frame members each having opposite ends respectively secured to one of said base frame and said litter frame, an end of said frame members adjacent at least one of said base frame and said litter frame including thereon a rotational pivot mechanism having an axis of rotation that extends co-extensively with a longitudinal axis of said frame member, said rotational pivot mechanism being configured to pivotally connect said frame members to said base frame so that relative movement between said base frame and said frame members occurs about said axis of rotation.

110. An ambulance cot, comprising:

a base frame;

a litter frame;

an elevating mechanism interconnecting said base frame and said litter frame and being configured to effect changes in elevation of said litter frame relative to said base frame; and

a control system for said elevating mechanism, said control system comprising a first switch assembly and a second switch assembly, said first and second switch assemblies being electrically connected to said control system and configured to be functionally redundant of one another, each of said first and second switch assemblies comprising at least two operating buttons for raising and lowering said litter frame respectively.

111. The ambulance cot according to Claim 110, wherein said first and second switches are physically remote from one another and mounted on a foot end of said litter frame.

112. An ambulance cot, comprising:

a base frame;

a litter frame;

an elevating mechanism interconnecting said base frame and said litter frame;

a first control system configured to effect changes in distance between said litter frame and said base frame; and

a second control system comprising a manually engageable handle operatively connected to said elevating mechanism and configured to usurp said first control system and only effect at least one of an increase and a reduction in distance between said litter frame and said base frame.

113. The ambulance cot according to Claim 112, wherein said elevating mechanism includes a cot low height detection mechanism oriented adjacent an end of travel of said elevating mechanism.

114. An ambulance cot, comprising:

a base frame;

a litter frame;

an elevating mechanism interconnecting said base frame and said litter frame and being configured to effect changes in distance between said litter frame and said base frame, said elevating mechanism including an adjustable height limiting mechanism for facilitating a customized in-ambulance adjustment of the height of said litter frame relative to said base frame to correspond to a configuration of an ambulance with which said ambulance cot is being used.

115. The ambulance cot according to Claim 114, wherein said adjustable height limiting mechanism includes a cot low height detection mechanism oriented adjacent an end of travel of said elevating mechanism.

116. The ambulance cot according to Claim 115, wherein said cot low height detection mechanism is a limit switch.

117. The ambulance cot according to Claim 115, wherein said cot low height detection mechanism is a Hall effect mechanism.

118. The ambulance cot according to Claim 115, wherein said cot low height detection mechanism is a programmable LVDT mechanism.

119. An ambulance cot, comprising:

a base frame;

a litter frame;

a variable speed elevating mechanism interconnecting said base frame and said litter frame and being

configured to effect changes in distance between said litter frame and said base frame, said elevating mechanism including a first adjustable height detecting mechanism for facilitating a customized adjustment of the height of said litter frame relative to said base frame, said elevating mechanism additionally having a second adjustable height detecting mechanism oriented intermediate said first adjustable height detecting mechanism and a remote end of travel location of said elevating mechanism and being configured to effect a change in speed of said variable speed elevating mechanism.

120. The ambulance cot according to Claim 119, wherein said first adjustable height mechanism is oriented adjacent an end of travel of said elevating mechanism and is configured to effect a halting of movement of said elevating mechanism, and wherein said second adjustable height mechanism is configured to effect a slowing of said speed of said variable speed elevating mechanism.

121. An ambulance cot, comprising:

a base frame;

a litter frame;

an elevating mechanism interconnecting said base frame and said litter frame and being configured to effect changes in distance between said litter frame and said base frame, said elevating mechanism including at least one of a variable and a selectable multiple speed drive mechanism for facilitating a driving of a change in distance operation at variable speeds, said elevating mechanism additionally including a cot height detection mechanism oriented adjacent an end of travel of said

elevating mechanism and being configured to ramp down the speed of operation of said drive mechanism.

122. The ambulance cot according to Claim 121, wherein said cot height detection mechanism includes at least one limit switch.

123. The ambulance cot according to Claim 121, wherein said cot height detection mechanism is a Hall effect mechanism.

124. The ambulance cot according to Claim 121, wherein said cot height detection mechanism is a programmable LVDT mechanism.

125. The ambulance cot according to Claim 121, wherein said cot height detection mechanism includes a plurality of spaced sensors each configured to effect a change in speed of operation of said drive mechanism, a first of said sensors being configured to selectively slow the speed of operation while a second of said sensors being configured to halt the speed of operation.

126. The ambulance cot according to Claim 125, wherein said first and second sensors are proximity switches.

127. The ambulance cot according to Claim 125, wherein said first and second sensors are Hall effect sensors.

128. The ambulance cot according to Claim 125, wherein said first and second sensors are LVDT mechanisms.

129. An ambulance cot, comprising:

a base frame;

a litter frame;

an elevating mechanism interconnecting said base frame and said litter frame and being configured to effect changes in elevation of said litter frame relative to said base frame, said elevating mechanism including a variable speed drive mechanism for facilitating a driving of a change in elevation operation at variable speeds, said elevating mechanism additionally including a control circuit configured to ramp up the speed of operation of said variable speed drive mechanism to cause a smooth acceleration of said change in elevation operation.

130. A combination of an ambulance cot and an ambulance having a cargo area, comprising:

a base frame and a litter frame on said ambulance cot;

an elevating mechanism interconnecting said base frame and said litter frame and being configured to effect changes in elevation of said litter frame relative to said base frame; and

an in-ambulance device configured to operatively detect a presence and absence of said ambulance cot in said cargo area, a component of said cot being configured to operatively couple with said in-ambulance device to deactivate said elevating mechanism.

131. The combination according to Claim 130, wherein said component of said cot is said elevating mechanism that includes at least one cot height detection mechanism configured to deactivate said elevating mechanism solely in response to said cot being operatively coupled in said in-ambulance device.

132. The combination according to Claim 131, wherein said in-ambulance device includes a magnet, said cot height detection mechanism is a Hall effect sensor configured to detect the presence and absence of said magnet.

133. The combination according to Claim 132, wherein said Hall effect sensor is a cot low height detection sensor.

134. A combination of an ambulance cot and a load system onboard an ambulance for facilitating a loading and unloading of said ambulance cot, comprising:

said ambulance cot including a base frame, a litter frame and an elevating mechanism interconnecting said base frame and said litter frame and being configured to effect changes in distance between said base frame and said litter frame, said elevating mechanism comprising an extendable and retractable actuator connected to and extending between said base frame and said litter frame, an onboard control circuit for controlling an operation of said extendable and retractable actuator;

said load system onboard said ambulance having thereon a load system control circuit and a device for effecting a coupling of said ambulance cot to said load system;

a cot antenna mounted on said ambulance cot and connected in circuit with said onboard control circuit; and

a load system antenna mounted on said ambulance and connected in circuit with said load system circuit, said onboard control circuit being configured for a first mode of operation when communication between antennas is present and a second mode of operation when communication between antennas is not present.

135. The combination according to Claim 134, wherein said load system includes a radio frequency identification device oriented within a communication envelop defined between said cot antenna and said load system antenna, said onboard control circuit being configured to be responsive to communication received from said radio frequency identification device that results from said radio frequency identification device communicating with said cot antenna.

136. The combination according to Claim 134, wherein said radio frequency identification device is configured to record diagnostic/statistics relating to an interface between said load system and said cot.

137. An ambulance cot, comprising:

a base frame;

a litter frame;

an elevating mechanism interconnecting said base frame and said litter frame and being configured to effect changes in elevation of said litter frame relative to said base frame, said elevating mechanism comprising a hydraulic circuit having an extendable and retractable hydraulic actuator, said elevating mechanism being connected to and extending between said base frame and said litter frame, and a drive mechanism coupled through conduits to said hydraulic actuator for effecting a pumping of hydraulic fluid to said hydraulic actuator; and

a velocity fuse device connected in circuit with said hydraulic actuator and through which hydraulic fluid flows to at least one of extend and retract said extendable and retractable hydraulic actuator, said velocity fuse being configured to permit a maximum

hydraulic fluid flow rate in an event of a ruptured conduit to thereby regulate a speed of at least one of extension and retraction of said extendable and retractable hydraulic actuator to thereby regulate a speed of descent of said litter frame toward said base frame.

138. The ambulance cot according to Claim 137, wherein said velocity fuse is integral with said hydraulic actuator.

139. An ambulance cot comprising:

a base frame and a litter frame;

a deployment mechanism interconnecting said base frame and said litter frame and being configured to effect changes in distance between said litter frame and said base frame, said deployment mechanism having a detection device configured to detect a presence and an absence of a force urging a change in distance between said litter frame and said base frame to cause said base frame and said litter frame to become oriented closer together; and

a control mechanism on said ambulance cot, said control mechanism including a manually operable device for controlling said deployment mechanism, said control mechanism being configured to effect a rapid movement of said deployment mechanism in response to said detection device detecting an absence of said force and in response to an operation of said manually operable device, whereby when said ambulance cot is lifted away from a support surface, causing said detection device to detect an absence of said force, and said manually operable device is operated, said base frame will be rapidly drawn toward said litter frame by said deployment mechanism.

140. The ambulance cot according to Claim 139, wherein said deployment mechanism includes a hydraulic element and said detection device is further configured to detect a change in pressure of a hydraulic fluid in the hydraulic element.

141. The ambulance cot according to Claim 139 in combination with an ambulance having a cargo area, the ambulance comprising a loading mechanism configured to couple to said ambulance cot and lift said ambulance cot away from the support surface, the movement of said base frame away from said support surface causing said detection device to detect the absence of said force.

142. An ambulance cot, comprising:

a base frame;

a litter frame adjustably supported on said base frame and including an

extendable and retractable head section; and

a pouch mounted on said extendable and retractable head section.

143. The ambulance cot of Claim 142, further comprising the pouch being further mounted to said litter frame and collapsible as said head section is placed in a retracted position.

144. An ambulance cot, comprising:

a base frame;

a litter frame adjustably supported on said base frame and including a fowler pivotally connected thereto; and

an accessory hook mounted to said fowler.

145. The ambulance cot according to Claim 144, further comprising the accessory hook being mounted to an underside of the fowler for access with the fowler in a raised position.

146. The ambulance cot according to Claim 145, wherein said accessory hook is configured to orient objects thereon within a perimeter of said cot.

147. The ambulance cot according to Claim 145, further comprising an extendable and retractable head section, and a collapsible pouch connected between the litter frame and the head section, wherein the accessory hook is suspended over the pouch with the head section in an extended position.

148. An ambulance cot, comprising:

a base frame;

a litter frame;

an elevating mechanism interconnecting said base frame and said litter frame and being configured to effect changes in elevation of said litter frame relative to said base frame, said elevating mechanism comprising a hydraulic circuit having an extendable and retractable hydraulic actuator, said elevating mechanism being connected to and extending between said base frame and said litter frame, and a drive mechanism coupled through conduits to said hydraulic actuator for effecting a pumping of hydraulic fluid to said hydraulic actuator; and

said hydraulic actuator having a cylinder body and a piston movably supported in said cylinder body, said piston having an elongate rod mounted thereto for movement therewith;

a weep valve and a connection connecting an interior of said cylinder body to a port on said hydraulic body that is adjacent an end of said cylinder body that said elongate rod exits said cylinder body, said connection being oriented on a side of said piston oriented at said end remote from said end so that when said piston is at said end, hydraulic fluid will be permitted to flow from said interior of said cylinder body through said weep valve to prevent a pressure build up in said cylinder body.

149. An ambulance cot and docking (antler) system, the system comprising:

an ambulance cot having an extendable and retractable head end, a latch mechanism for selectively releasing said head end for movement between a retracted position and an extended position, and a pair of steering wheels rotatably mounted to the head end; and

a docking system configured for mounting to an ambulance cargo area floor and configured for receiving the ambulance cot between a pair of outwardly and rearwardly extending projections.

150. The ambulance cot and docking system according to Claim 149, further comprising the docking system including a center yoke and a forward yoke, each yoke being mounted to the ambulance cargo floor, with a centerline of the yokes aligned in the fore-aft direction of the ambulance, and

the center yoke being formed of two rods arranged as mirror images about the centerline of the antler system, each rod including a longitudinal segment and an outwardly divergent segment, each outwardly divergent segment terminating in the rearwardly extending projections,

wherein the ambulance cot is configured for rolling into the ambulance cargo area, a portion the ambulance cot engages the center yoke, and the cot is rolled further until the forward end of the cot engages the divergent segments of the antler system between the rearwardly extending projections.

151. The system according to Claim 149, further comprising the ambulance cot having a latch mechanism disabler operably connected to a depending safety bar.

152. The system according to Claim 151, further comprising the safety bar positioned on the ambulance cot to engage the docking system in order to activate the latch mechanism disabler when the ambulance cot is received in the docking system.

153. The system according to Claim 151, further comprising the safety bar being pivotally mounted to the ambulance cot and biased by a torsion spring toward a neutral position wherein the latch mechanism disabler is disengaged.

AMBULANCE COT AND HYDRAULIC ELEVATING MECHANISM THEREFOR

ABSTRACT OF THE DISCLOSURE

An ambulance cot is disclosed and the ambulance cot has, if desired, a wheel supported base and a litter raisable and lowerable by a powered elevating mechanism oriented between the base and the litter. The ambulance cot also has wireless communication capability to facilitate communication between the ambulance cot and a loading system on an ambulance as well as facilitating wireless troubleshooting via a handheld wireless unit. The ambulance cot also has a longitudinally extendable head section. The ambulance cot also has several accessories, such as an accessory hook mounted to the underside of the fowler, and a collapsible pouch accessory fastened to the retractable head section and the litter frame.

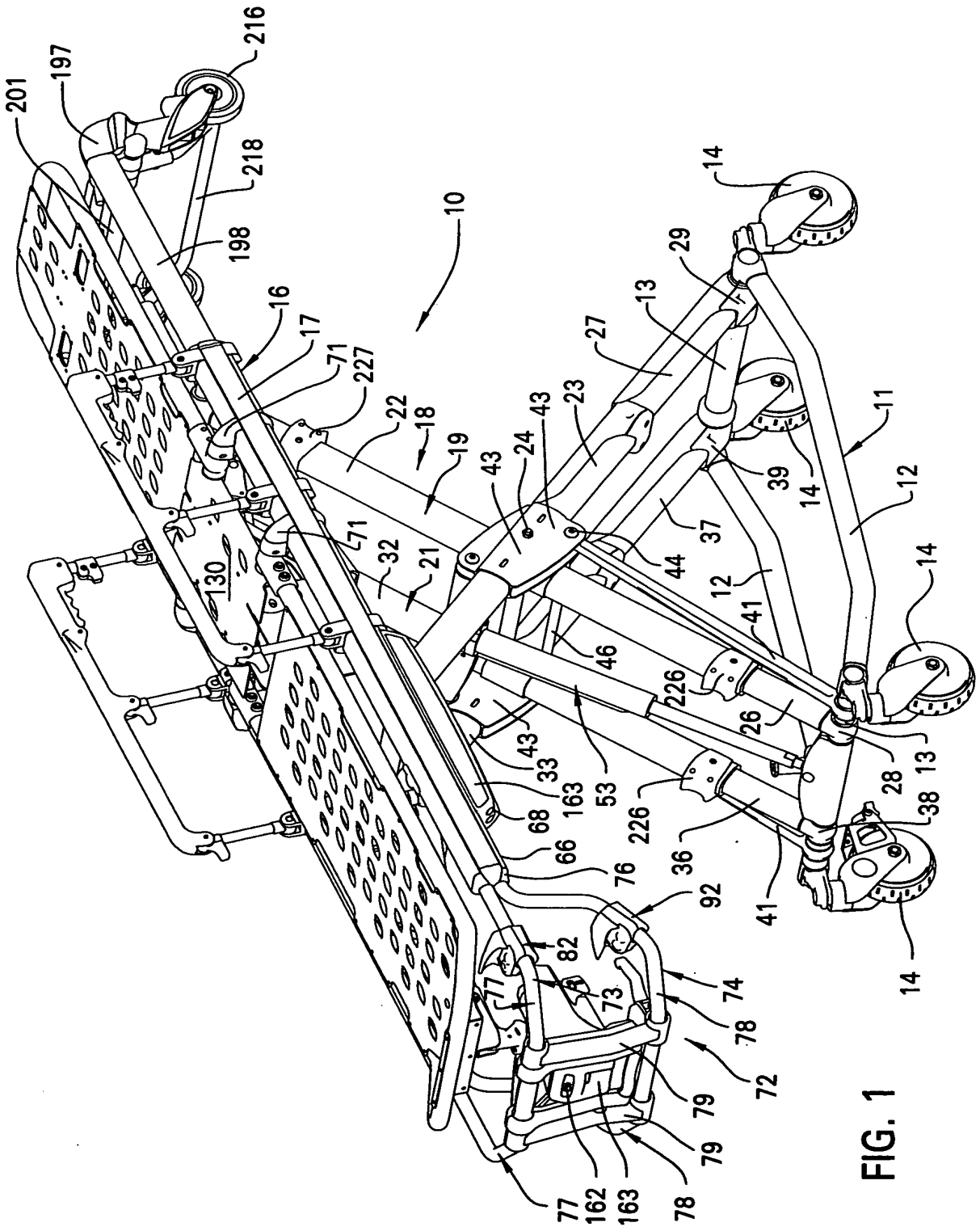

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FIG. 1

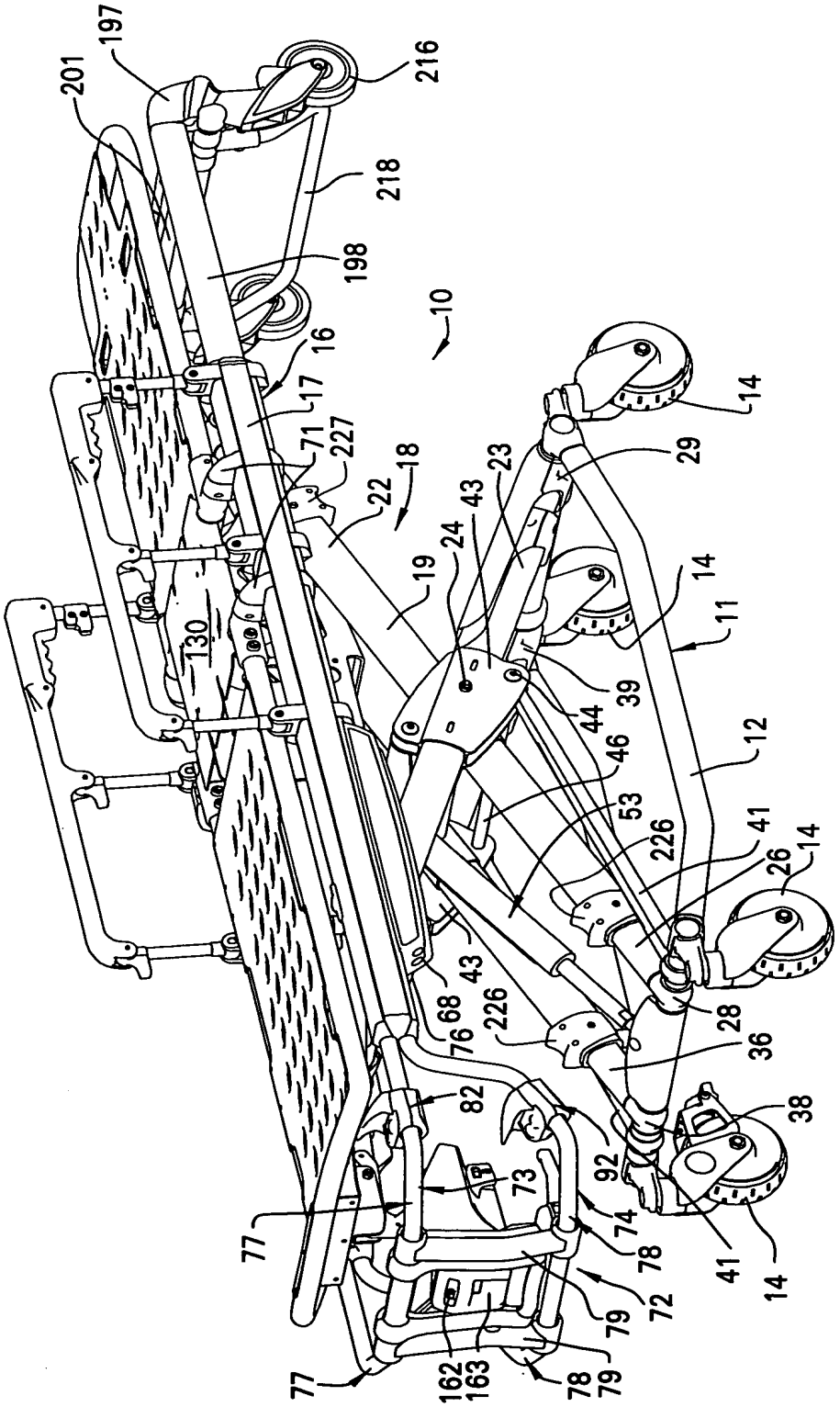

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FIG. 2

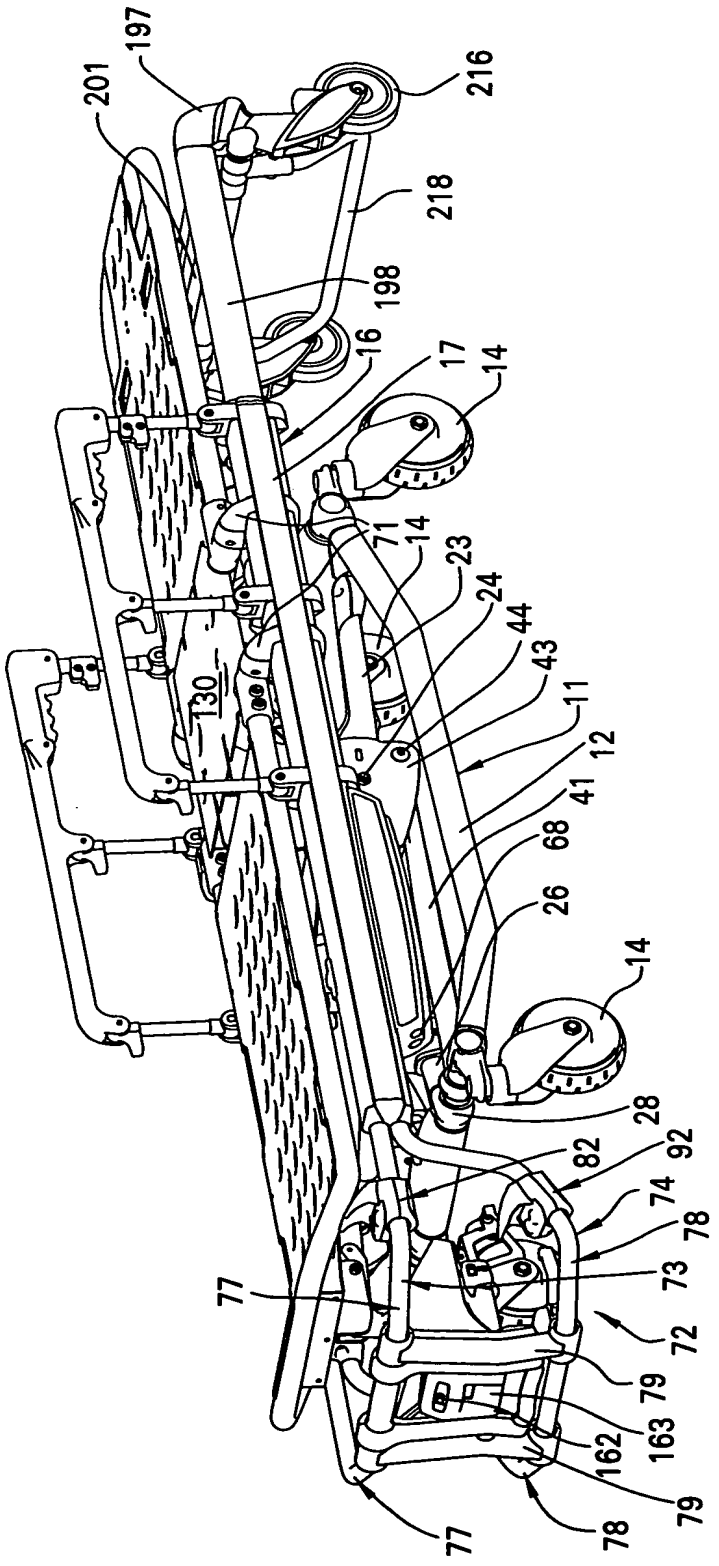

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FIG. 3

FIG. 15

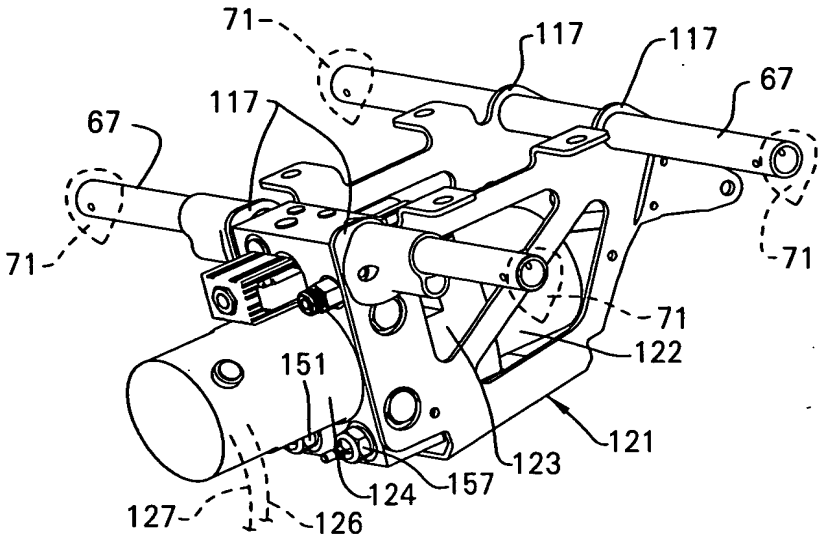
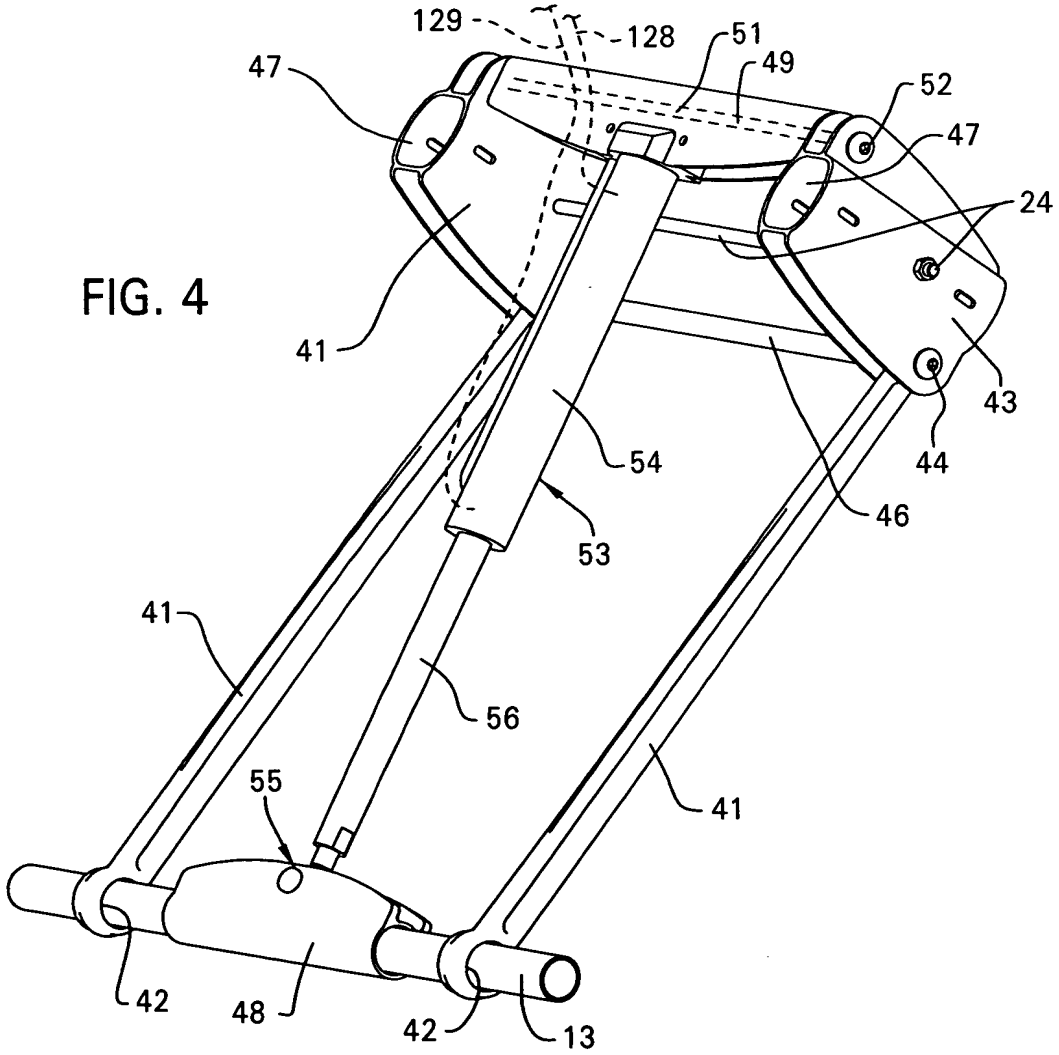

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FIG. 4


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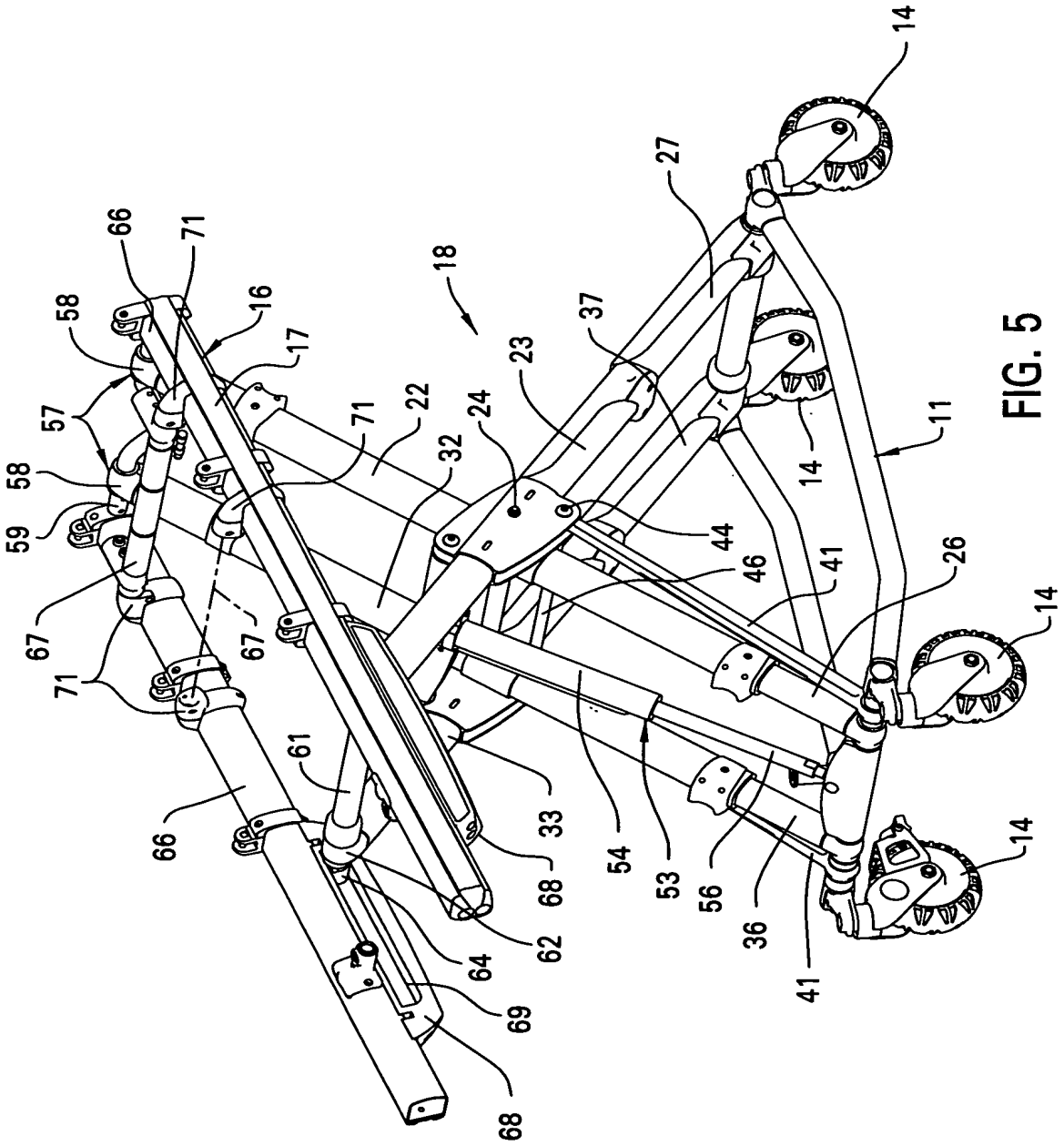

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FIG. 5

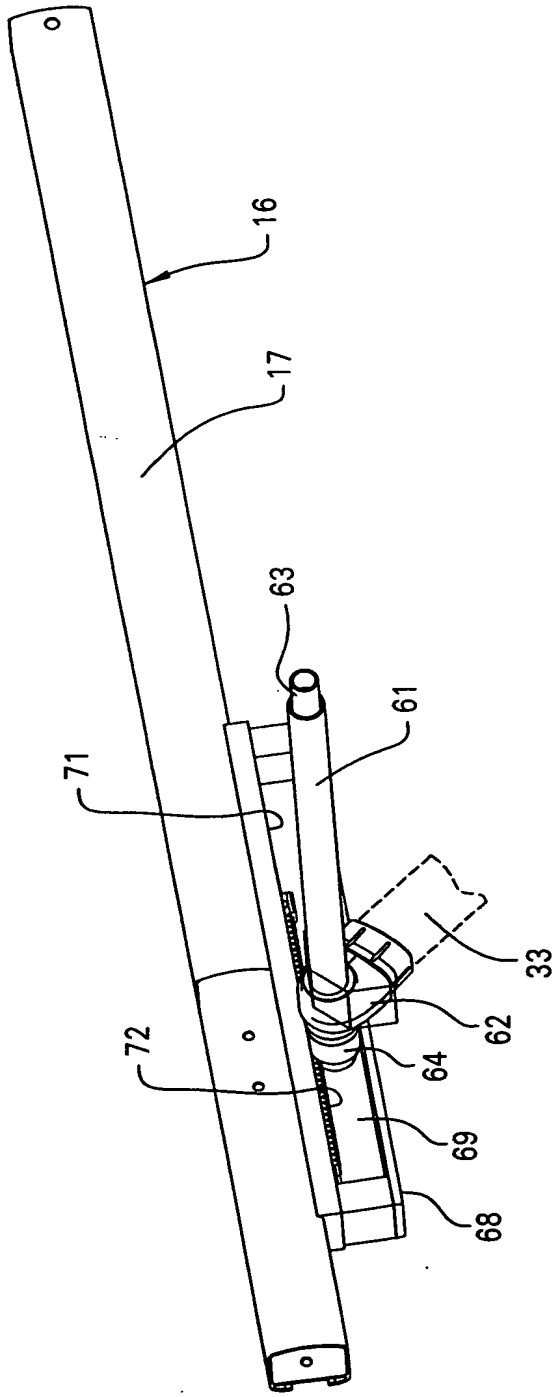


FIG.6

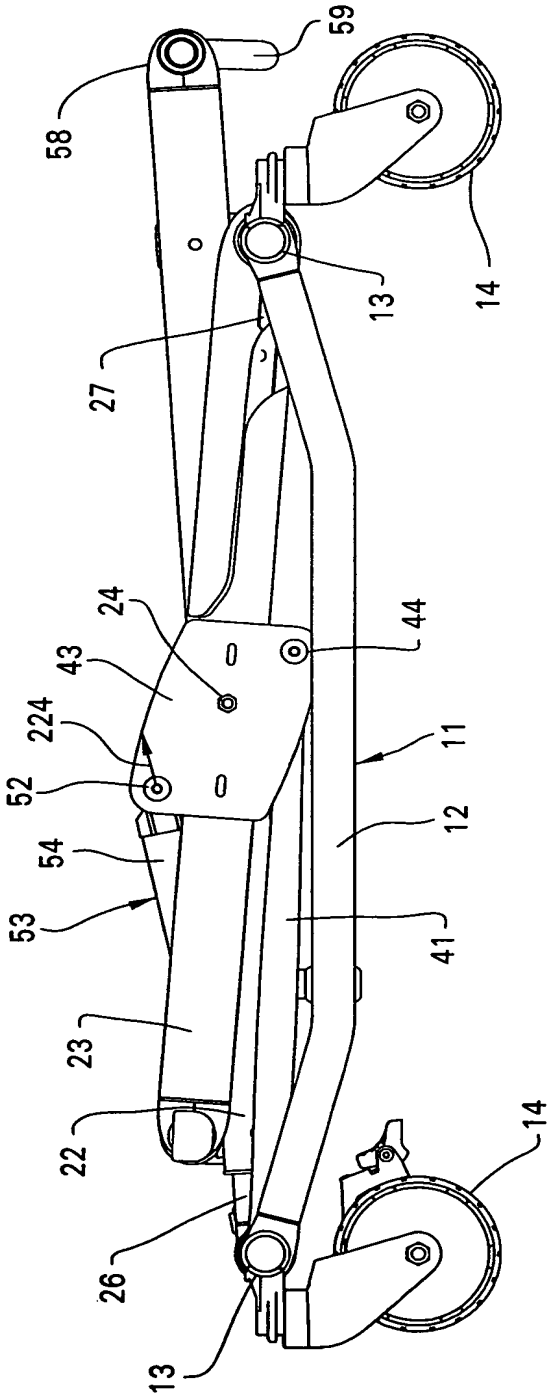


FIG. 7

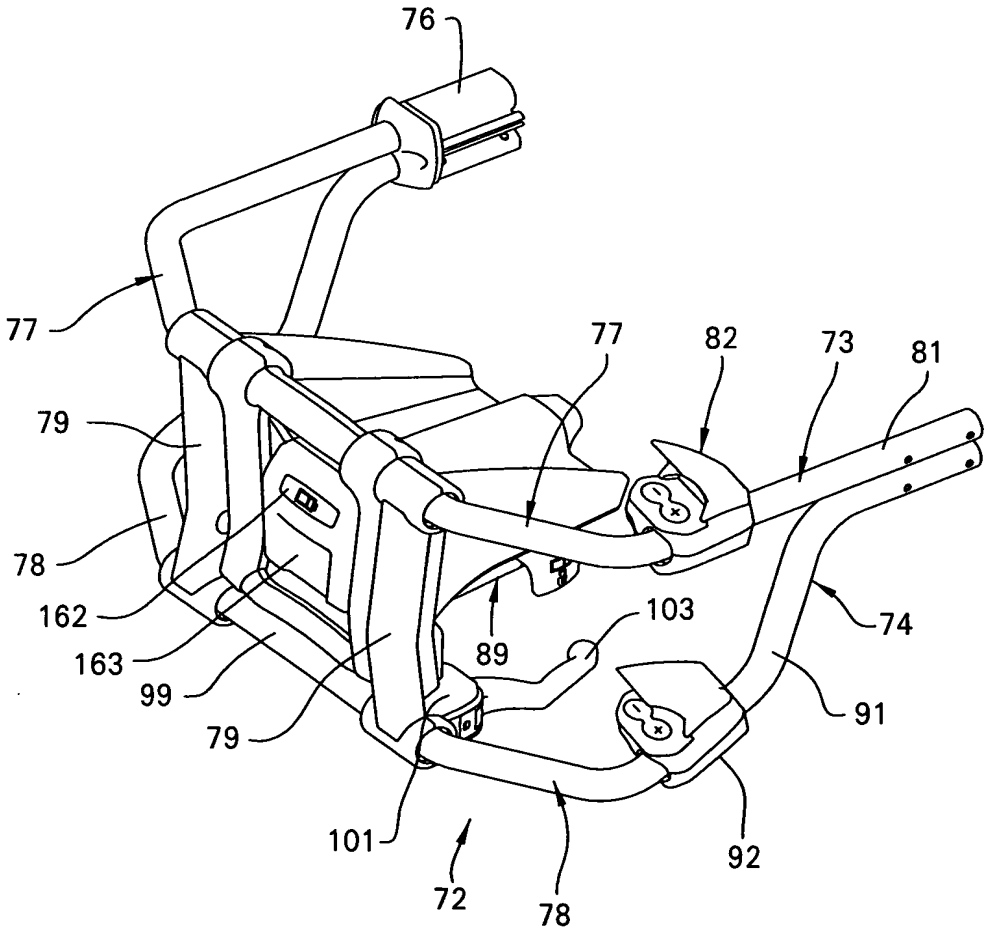


FIG. 8

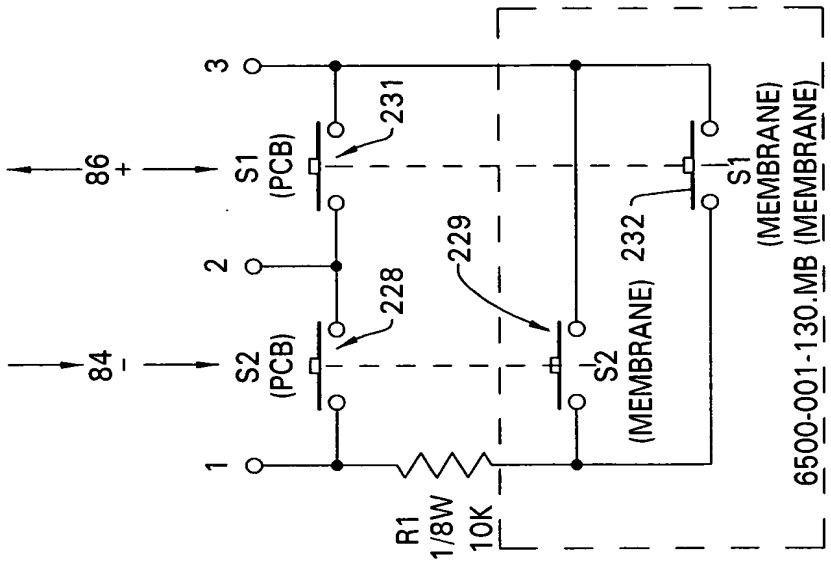

3
2
1
86
84
S1 (PCB)
S2 (PCB)
231
228
229
232
S1 (MEMBRANE)
S2 (MEMBRANE)
R1 1/8W 10K
6500-001-130.MB (MEMBRANE)

FIG. 11

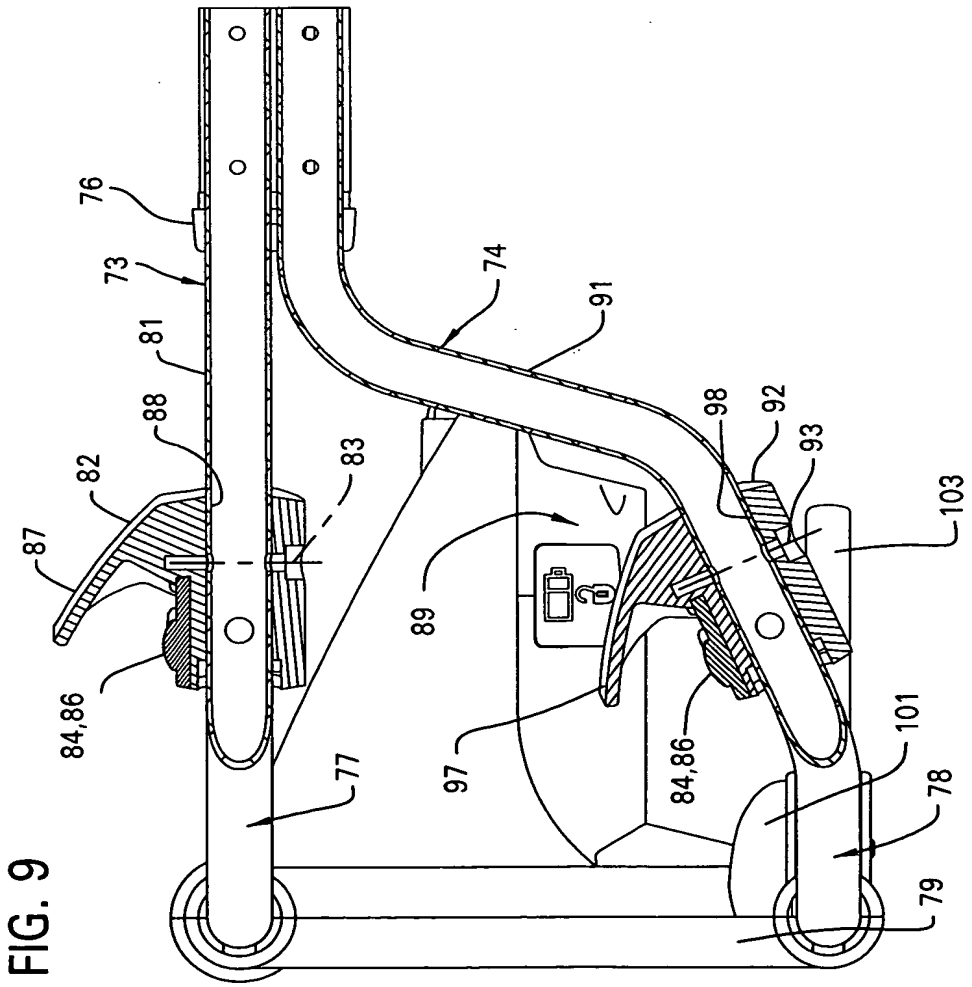

76
73
81
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87
84,86
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91
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97
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98
92
93
103
84,86
101
78
79

FIG. 9

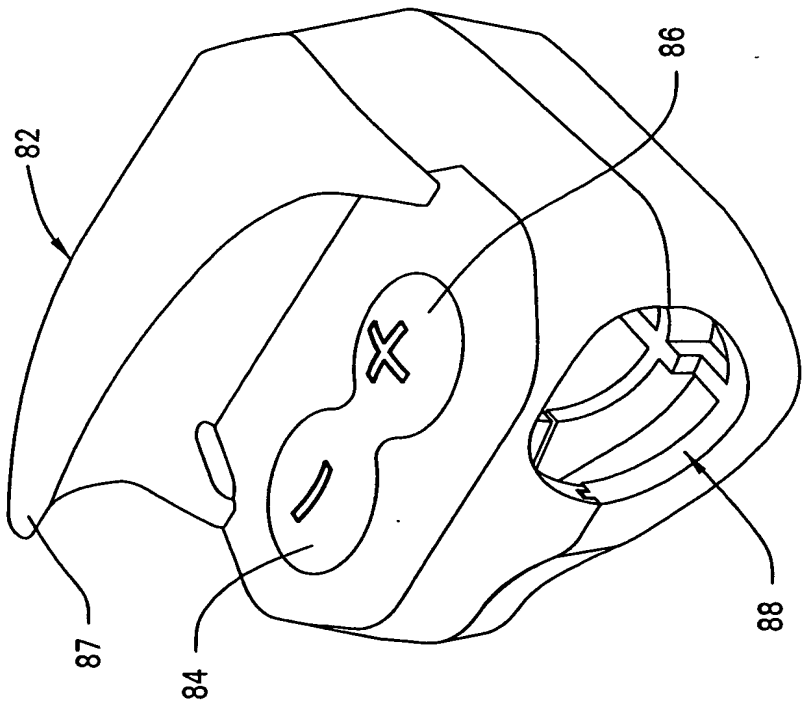


FIG. 10

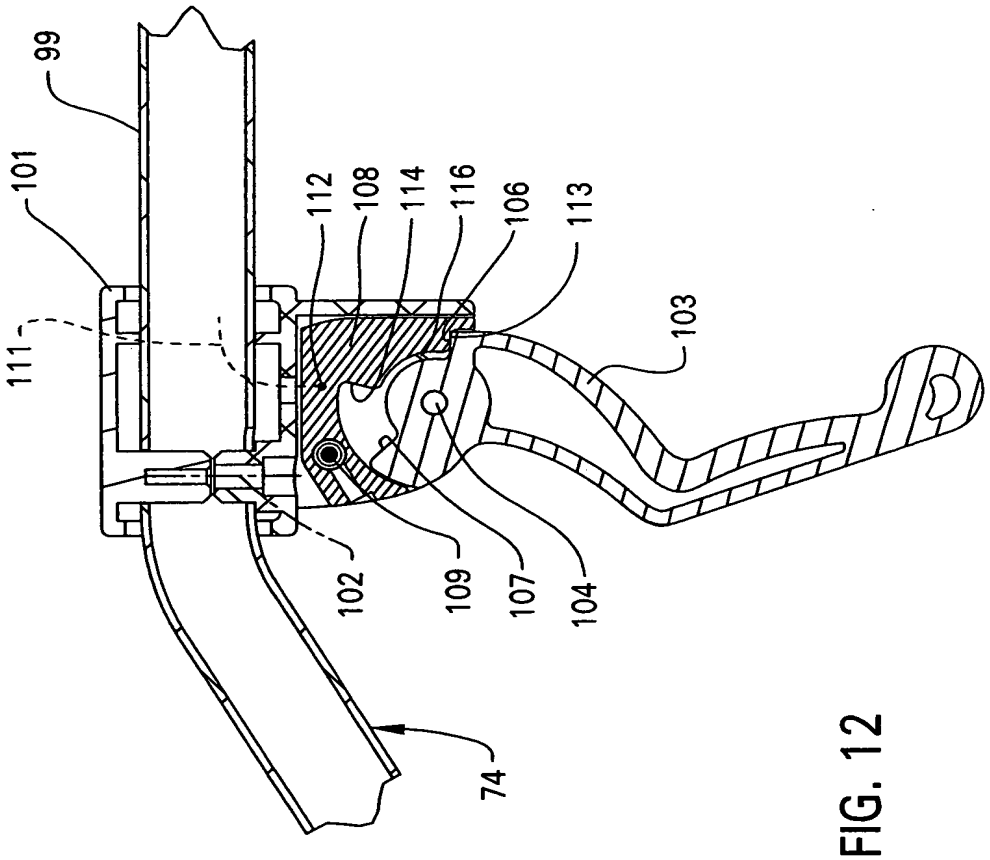


FIG. 12

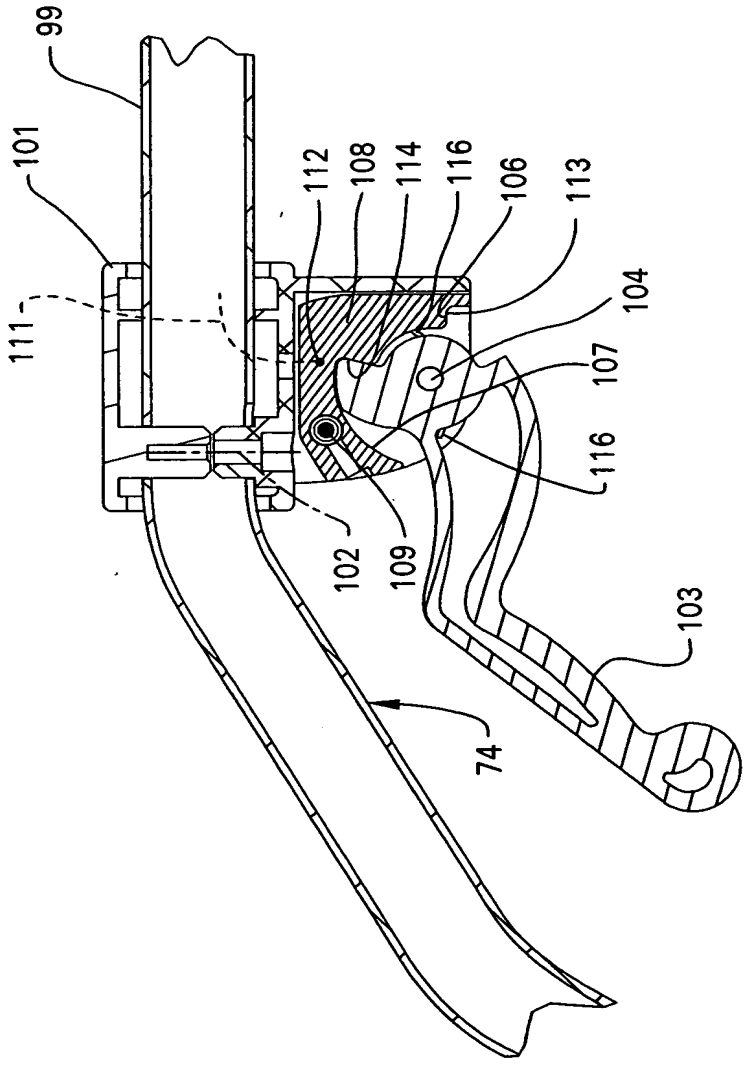


FIG. 13

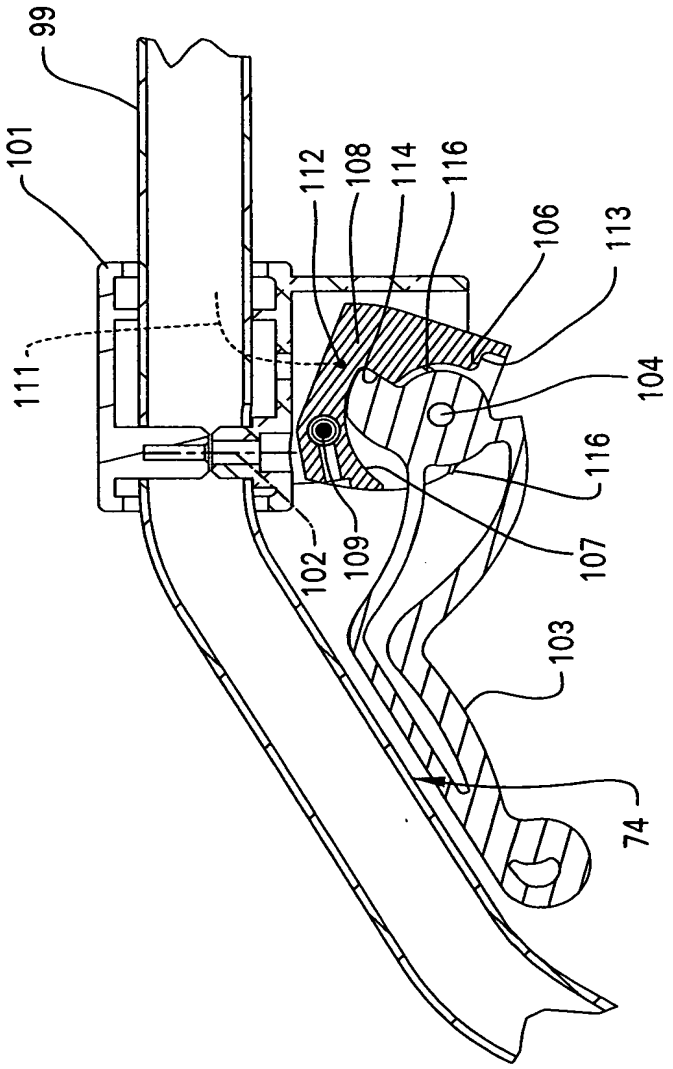


FIG. 14

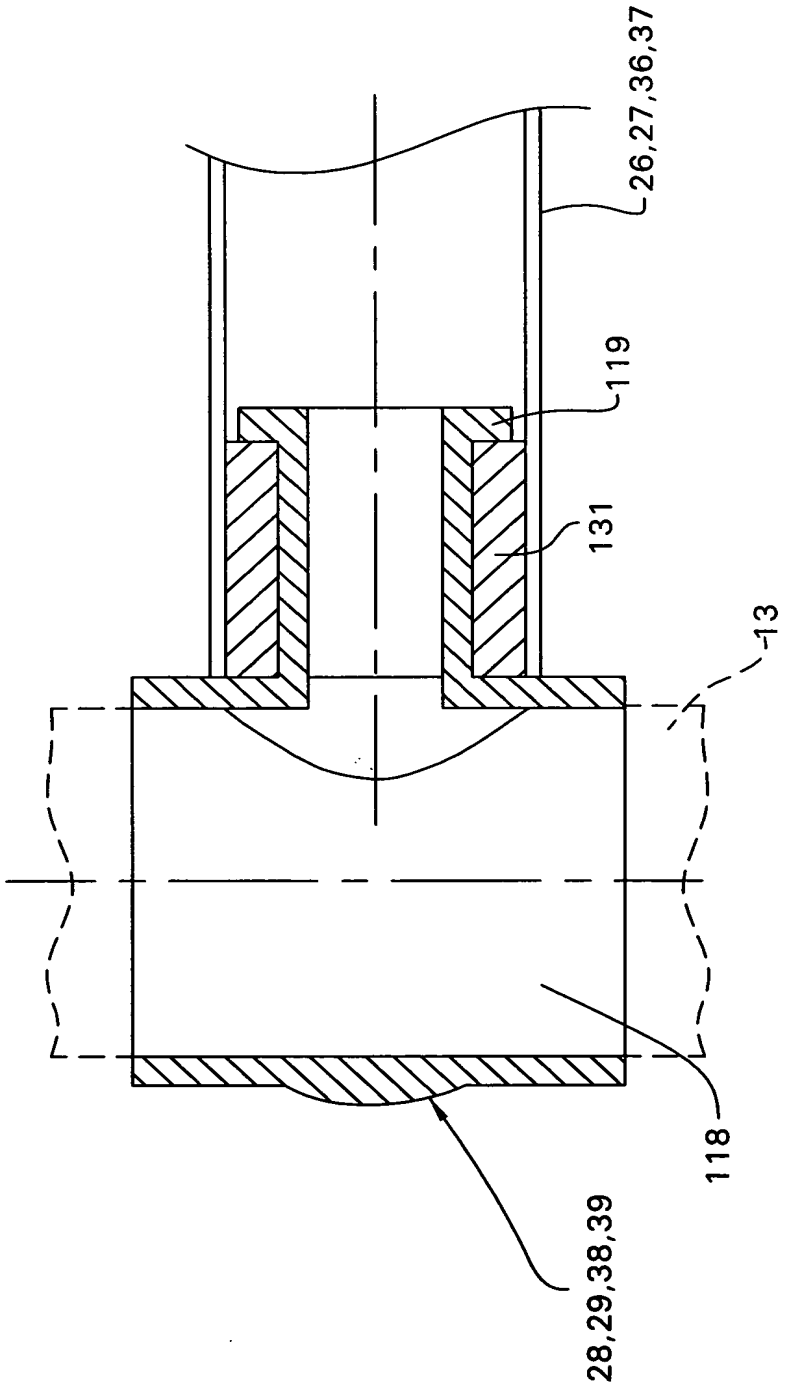


FIG. 16

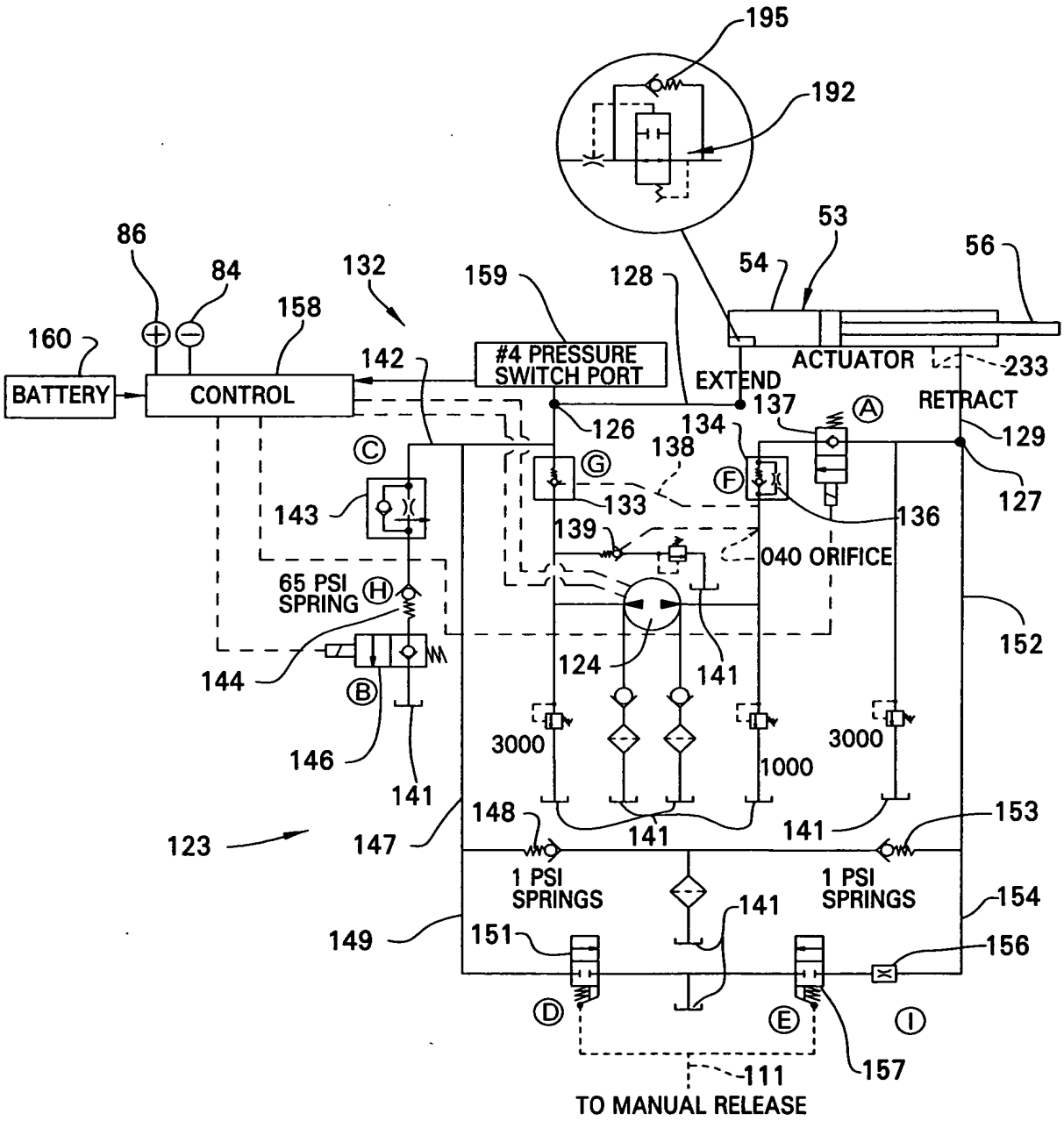

195
192
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86
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132
159
128
158
160
142
#4 PRESSURE SWITCH PORT
ACTUATOR
233
BATTERY
CONTROL
EXTEND
137
RETRACT
126
134
129
138
143
133
136
127
139
040 ORIFICE
65 PSI SPRING
152
144
124
141
146
3000
1000
3000
141
148
153
123
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141
1 PSI SPRINGS
1 PSI SPRINGS
154
149
151
141
156
157
111
TO MANUAL RELEASE

FIG. 17

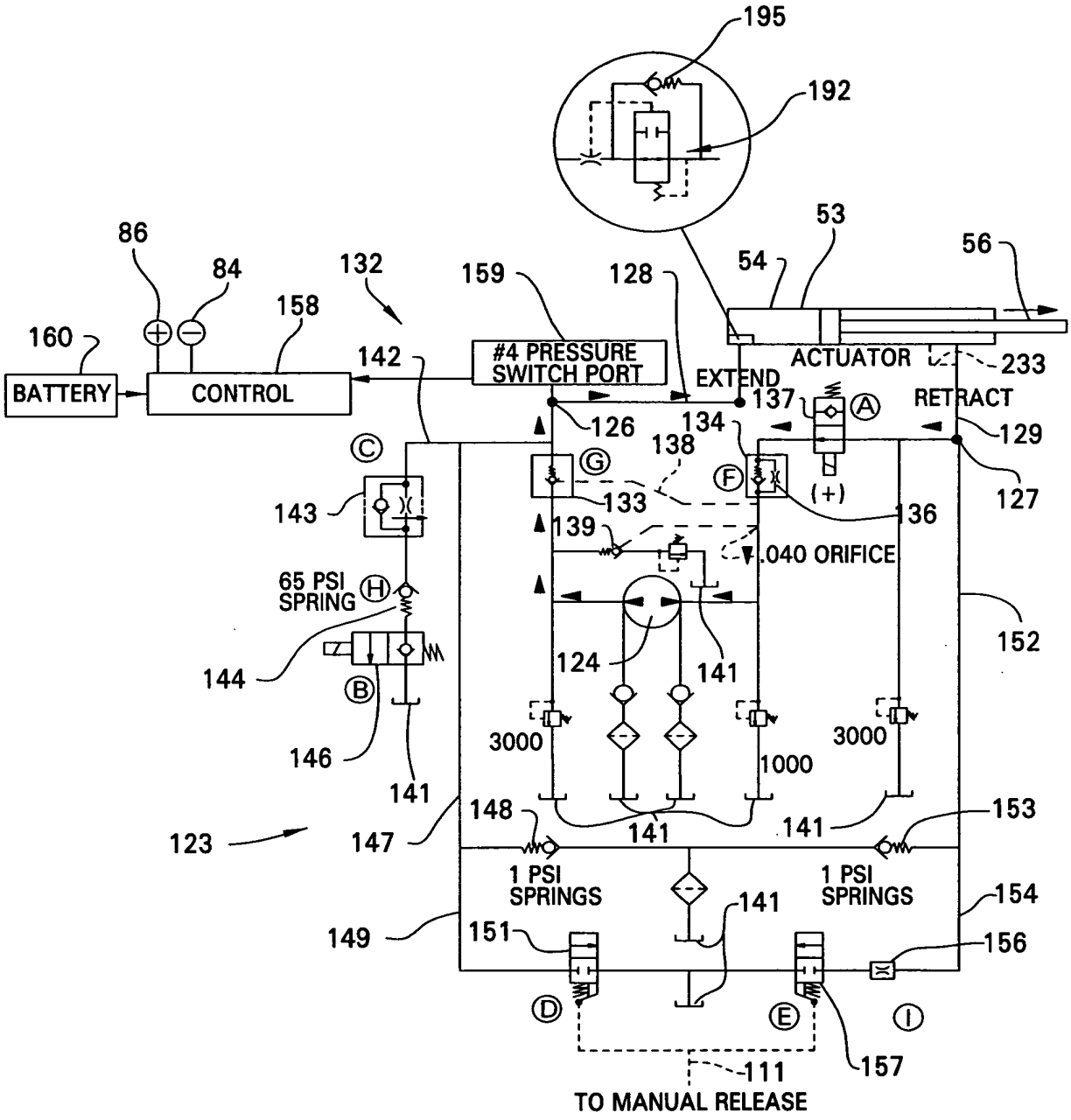

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#4 PRESSURE SWITCH PORT
ACTUATOR
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BATTERY
CONTROL
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TO MANUAL RELEASE

FIG. 18

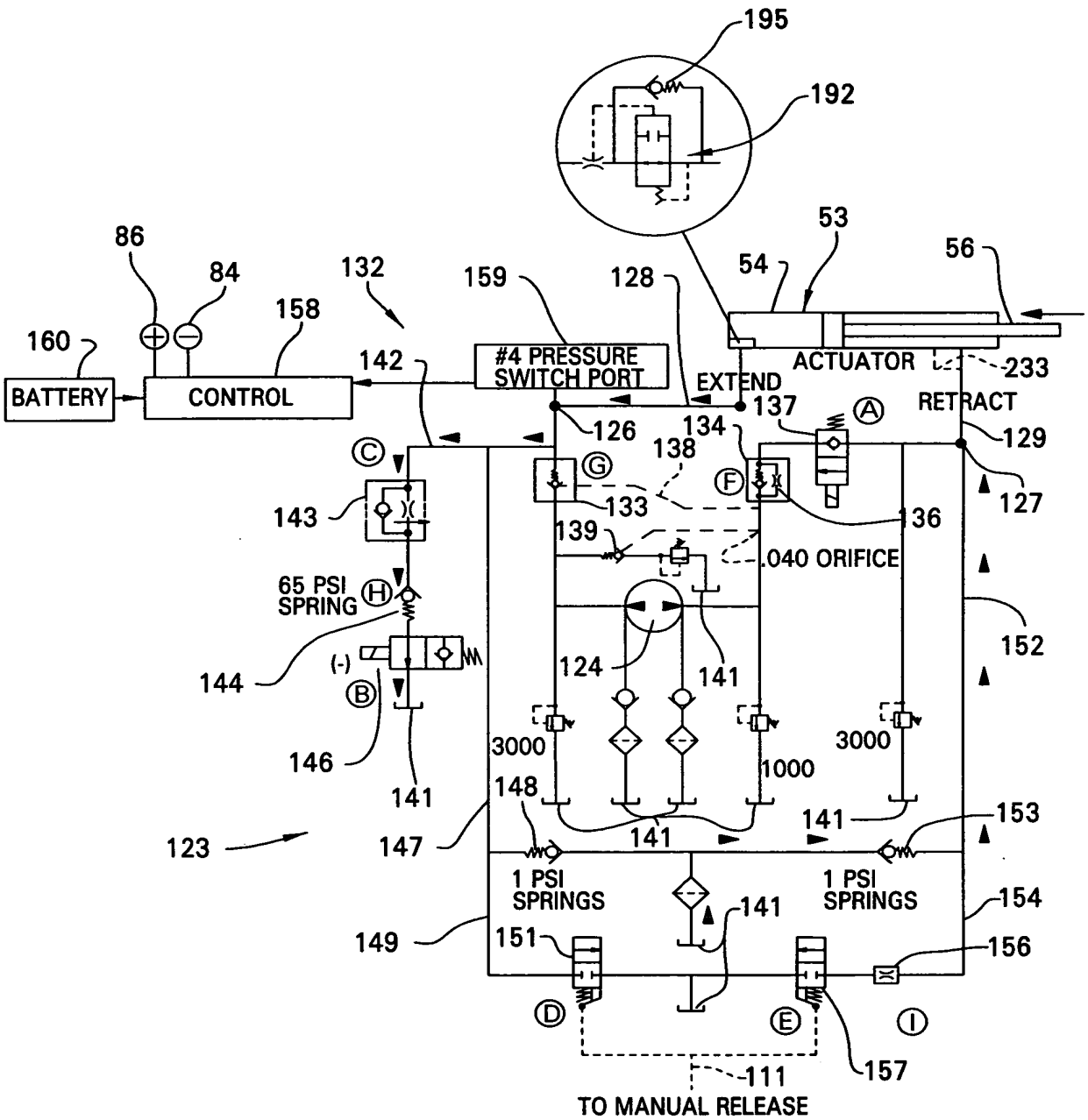

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#4 PRESSURE SWITCH PORT
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.040 ORIFICE
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TO MANUAL RELEASE

FIG. 19

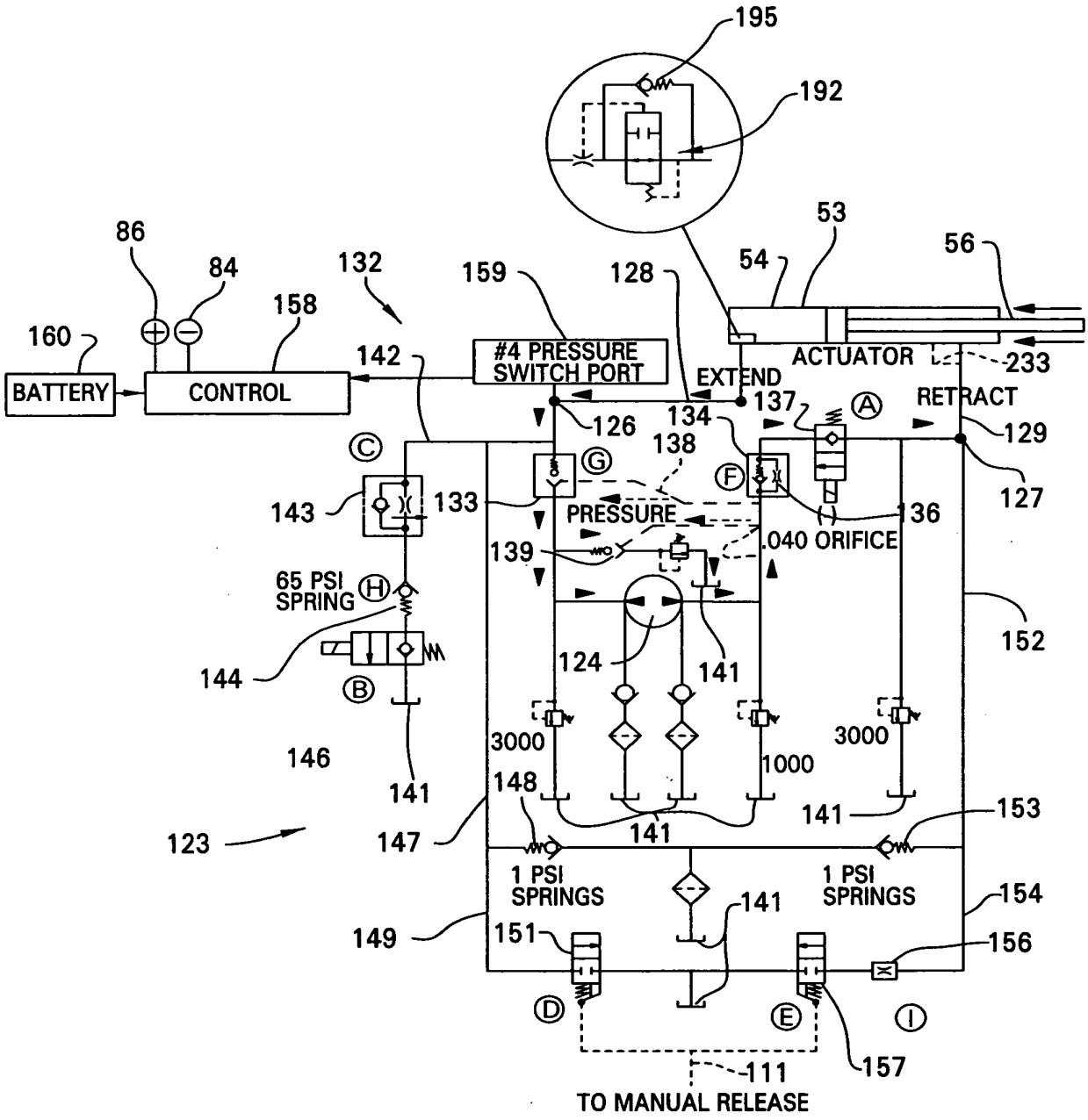

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#4 PRESSURE SWITCH PORT
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.040 ORIFICE
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TO MANUAL RELEASE

FIG. 20

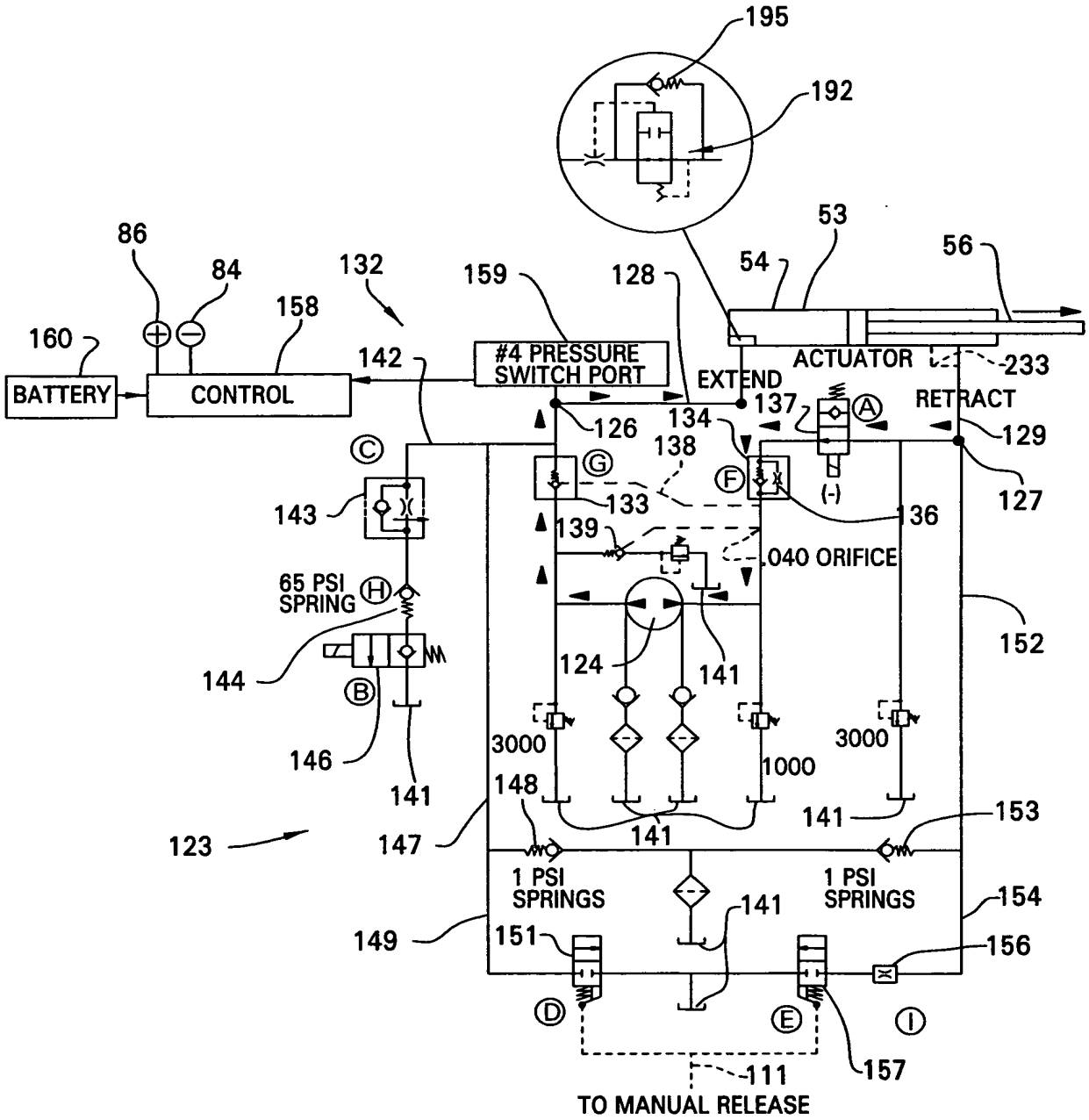

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#4 PRESSURE SWITCH PORT
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1 PSI SPRINGS
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TO MANUAL RELEASE

FIG. 21

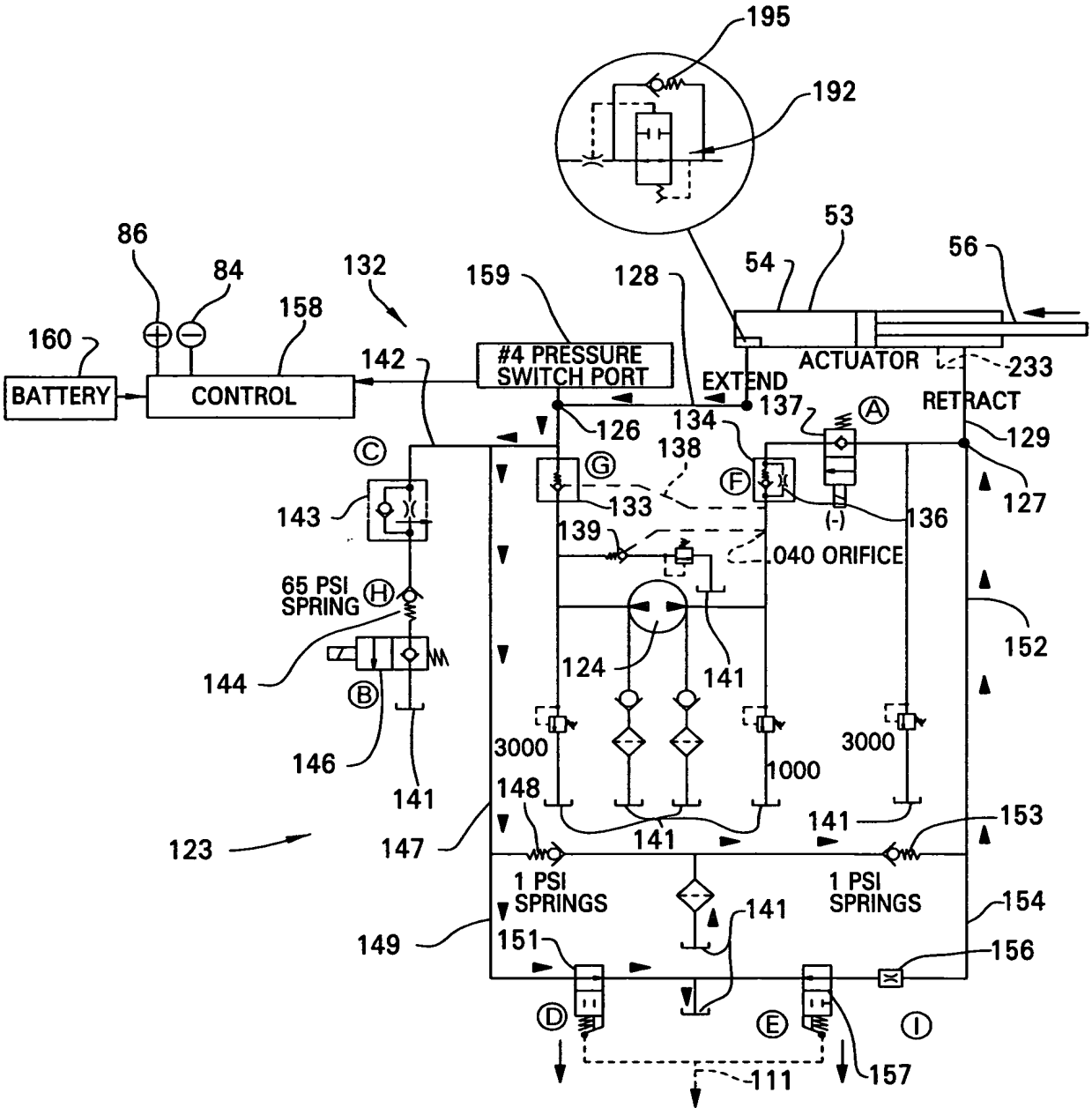

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#4 PRESSURE SWITCH PORT
ACTUATOR
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BATTERY
CONTROL
EXTEND
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RETRACT
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040 ORIFICE
65 PSI SPRING
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1 PSI SPRINGS
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TO MANUAL RELEASE

FIG. 22

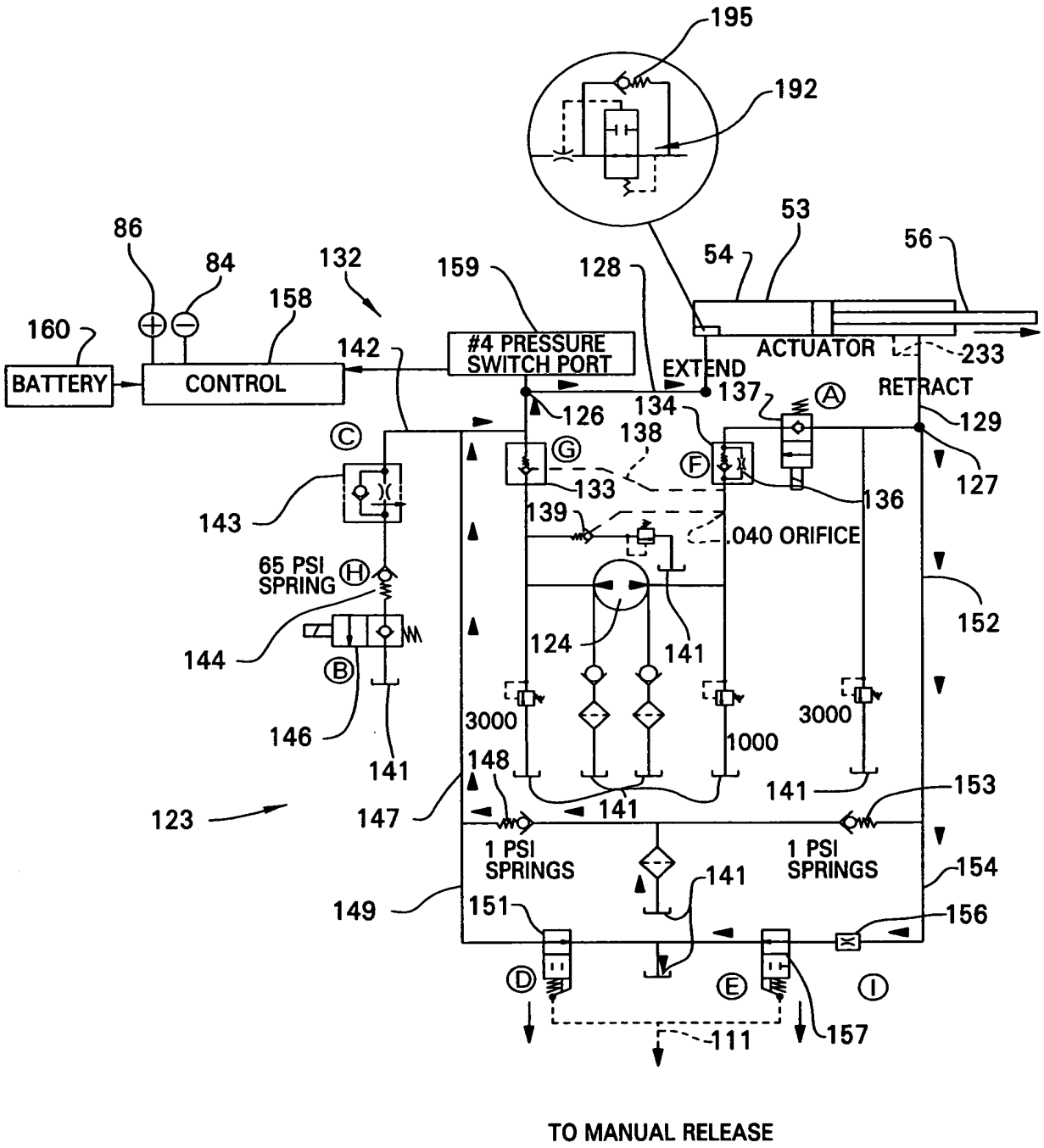

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#4 PRESSURE SWITCH PORT
EXTEND
ACTUATOR
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BATTERY
CONTROL
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RETRACT
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.040 ORIFICE
65 PSI SPRING
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141
1 PSI SPRINGS
1 PSI SPRINGS
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141
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111
TO MANUAL RELEASE

FIG. 23

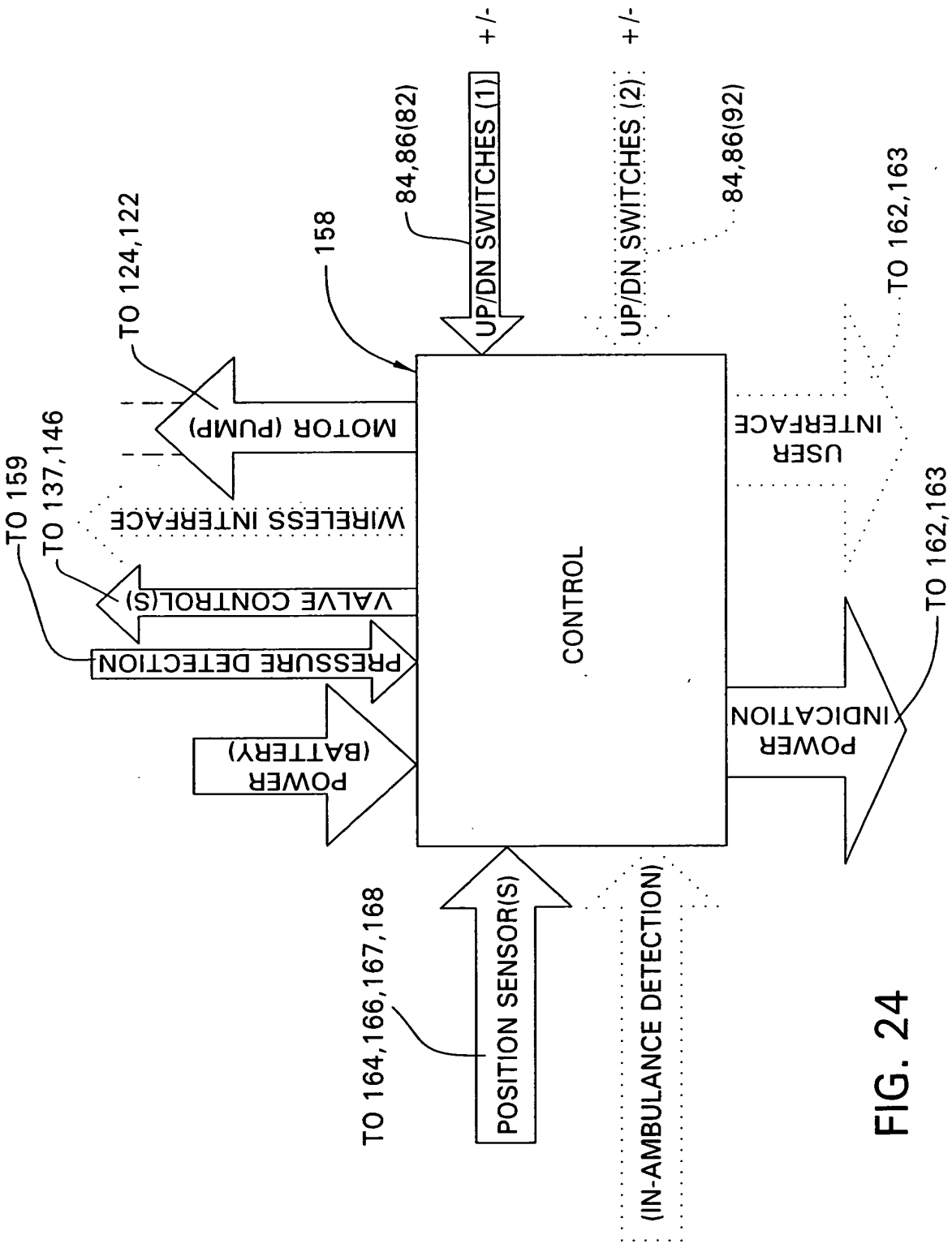

+/-
+/-
84,86(82)
UP/DN SWITCHES (1)
UP/DN SWITCHES (2)
84,86(92)
TO 162,163
158
TO 124,122
MOTOR (PUMP)
USER INTERFACE
TO 159
TO 137,146
WIRELESS INTERFACE
VALVE CONTROL(S)
CONTROL
TO 162,163
PRESSURE DETECTION
POWER INDICATION
POWER (BATTERY)
TO 164,166,167,168
POSITION SENSOR(S)
(IN-AMBULANCE DETECTION)

FIG. 24

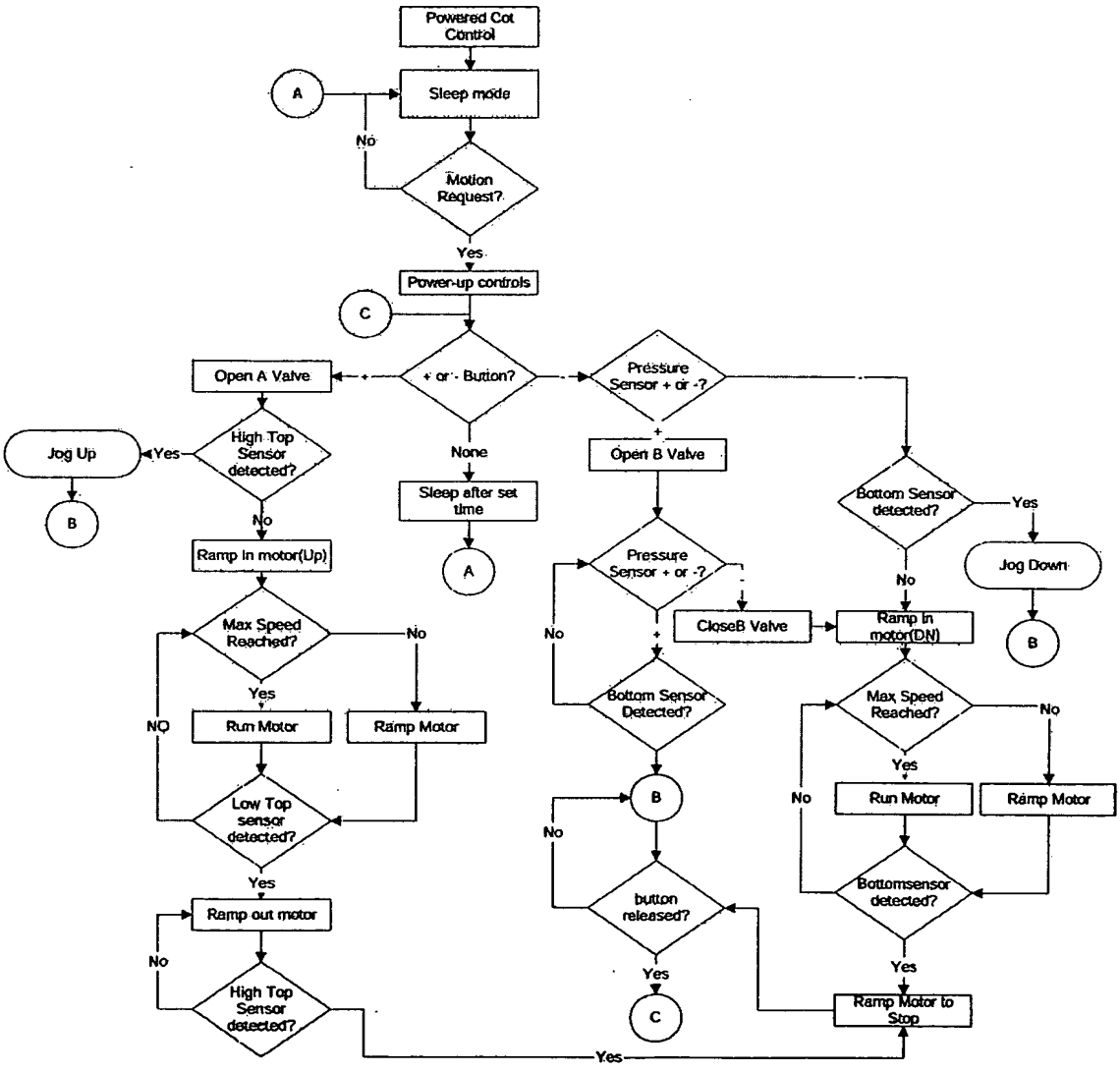

Powered Cot Control
A
Sleep mode
No
Motion Request?
Yes
Power-up controls
C
+ or - Button?
Open A Valve
Jog Up
Yes
High Top Sensor detected?
B
No
Ramp in motor(Up)
Max Speed Reached?
No
Yes
NO
Run Motor
Ramp Motor
Low Top sensor detected?
Yes
Ramp out motor
No
High Top Sensor detected?
Yes
None
Sleep after set time
A
Pressure Sensor + or -?
+
Open B Valve
Pressure Sensor + or -?
No
+
CloseB Valve
Bottom Sensor Detected?
B
No
button released?
Yes
C
Bottom Sensor detected?
Yes
Jog Down
B
No
Ramp in motor(DN)
Max Speed Reached?
No
Yes
No
Run Motor
Ramp Motor
Bottomsensor detected?
Yes
Ramp Motor to Stop

FIG. 25

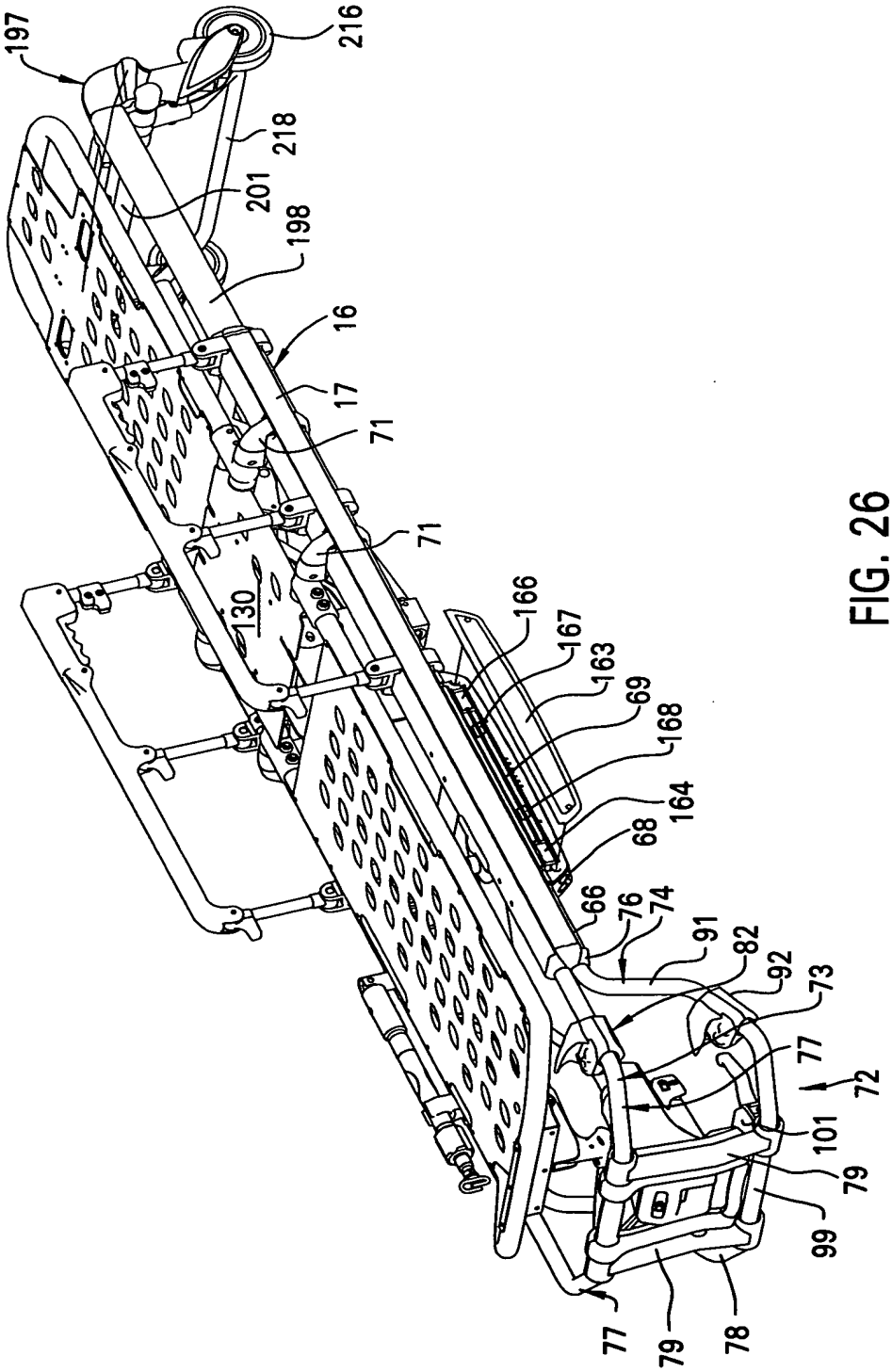

197
216
218
201
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17
71
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130
166
167
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FIG. 26

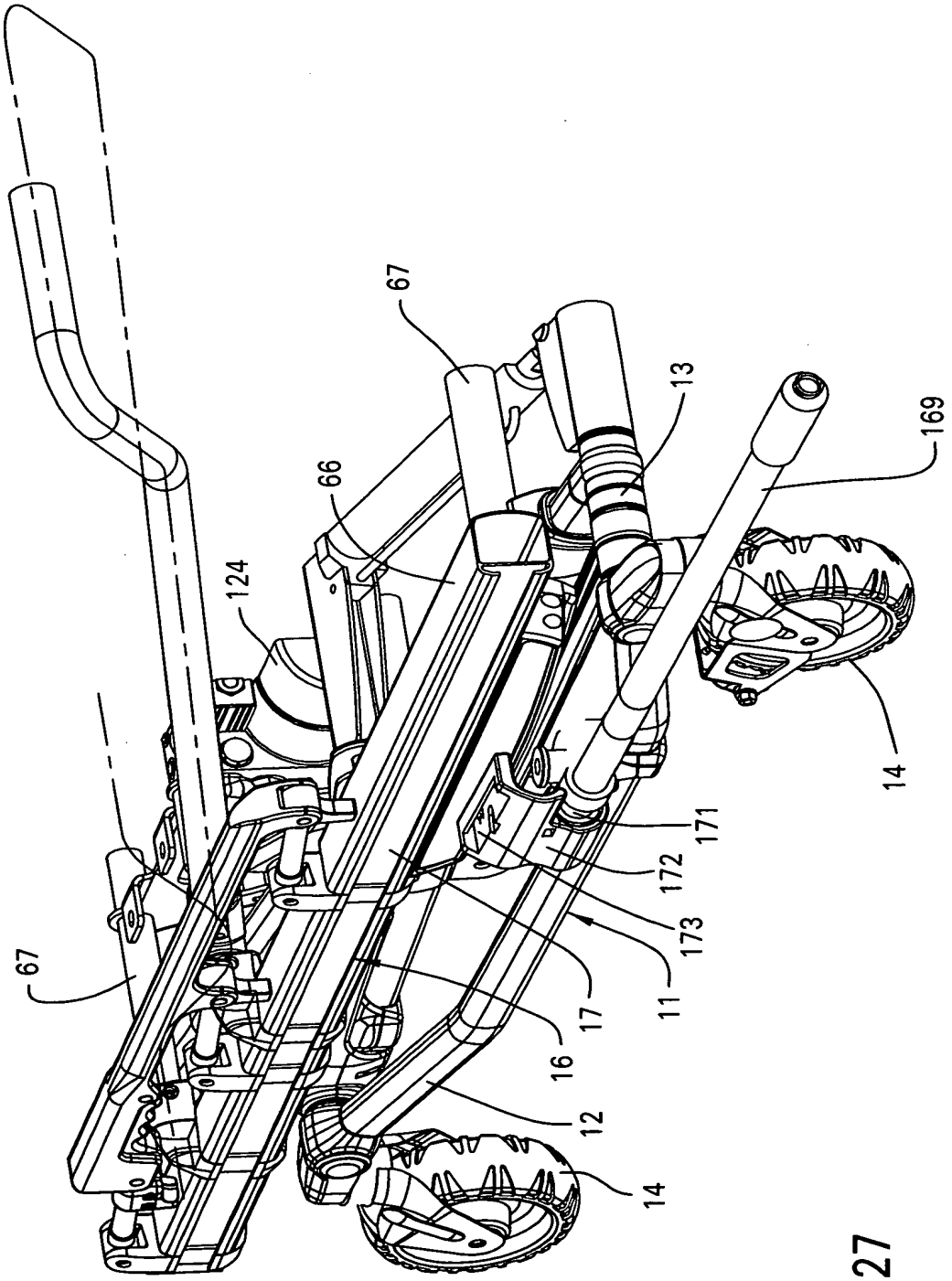


FIG. 27

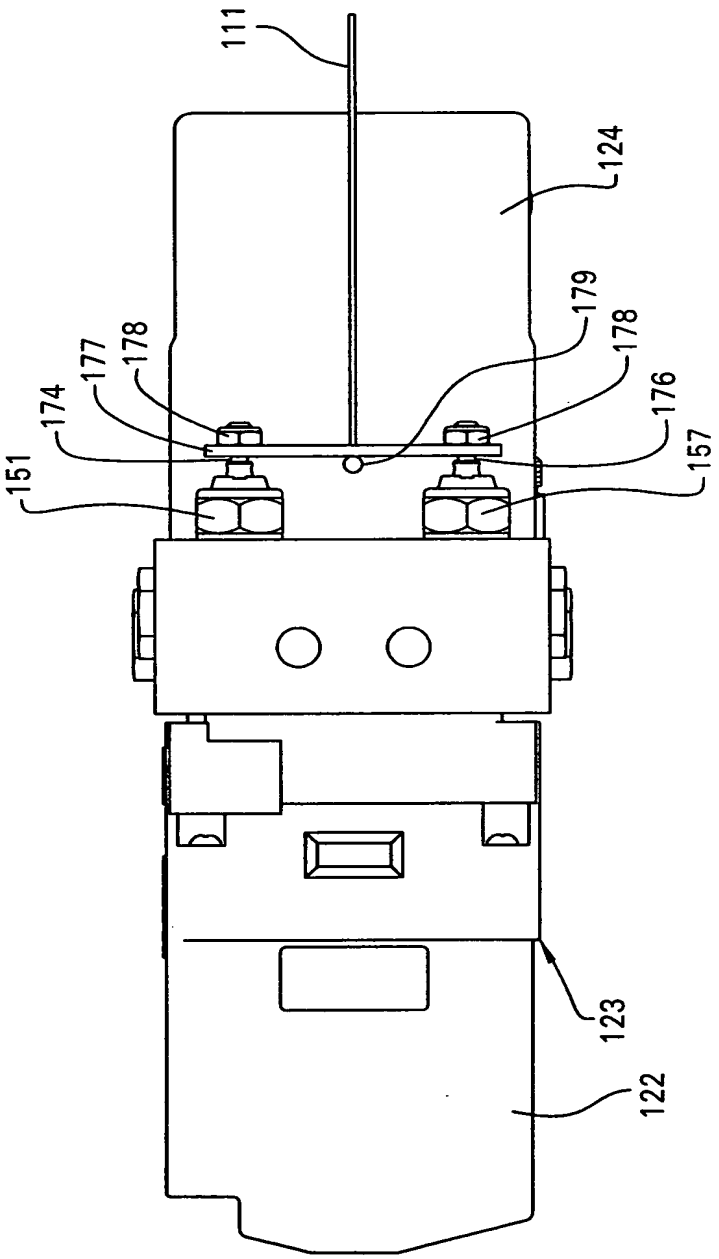


FIG. 28

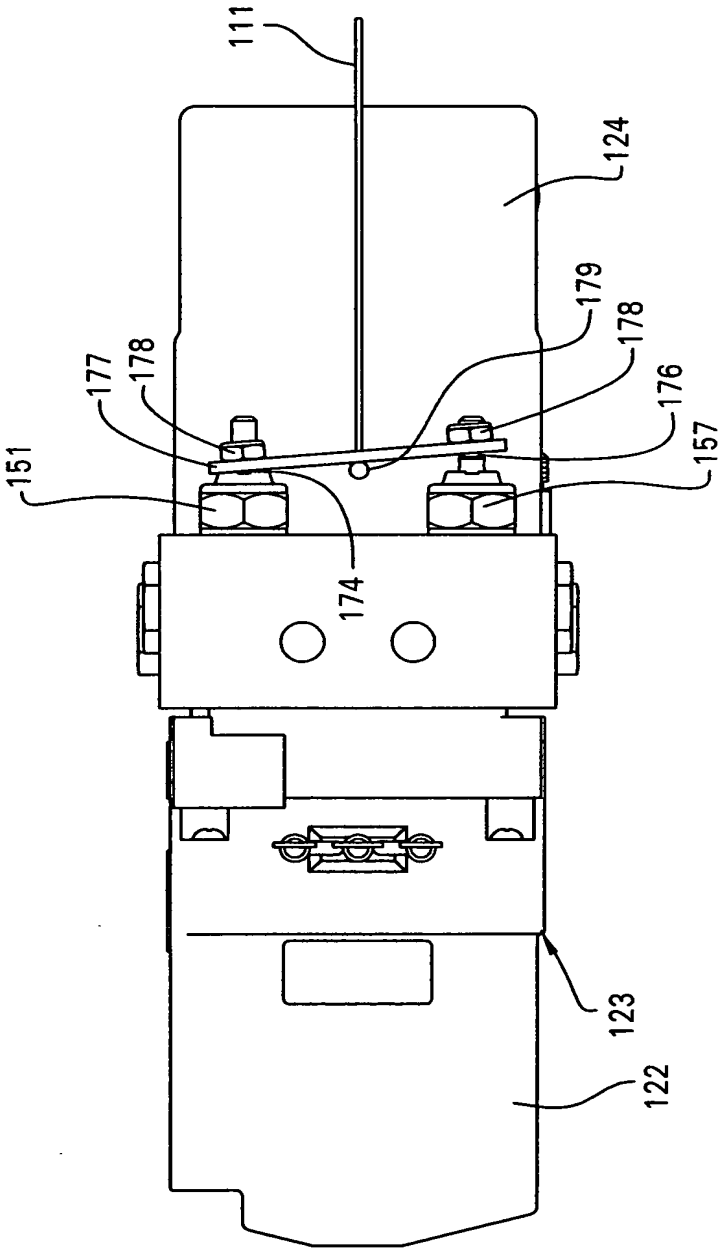


FIG. 29

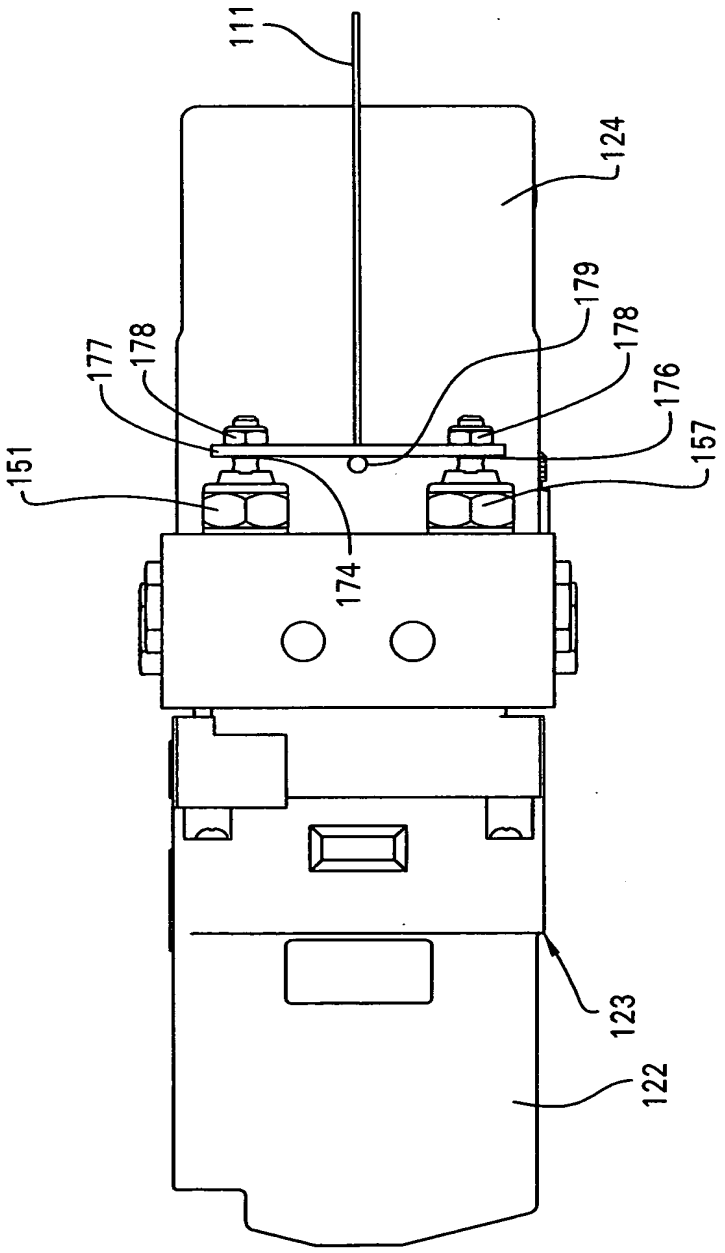


FIG. 30

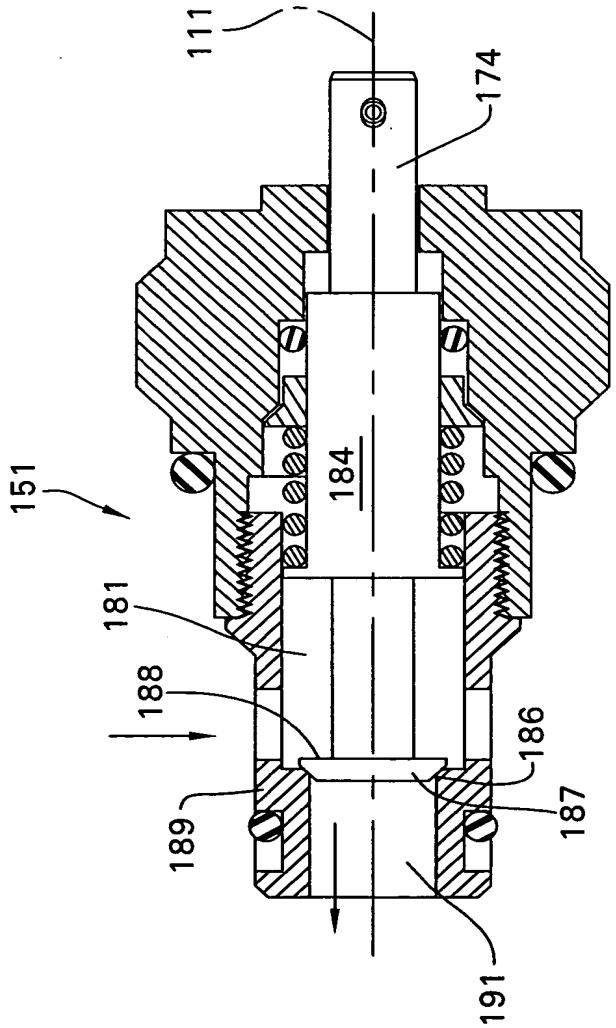


FIG. 31

FIG. 32

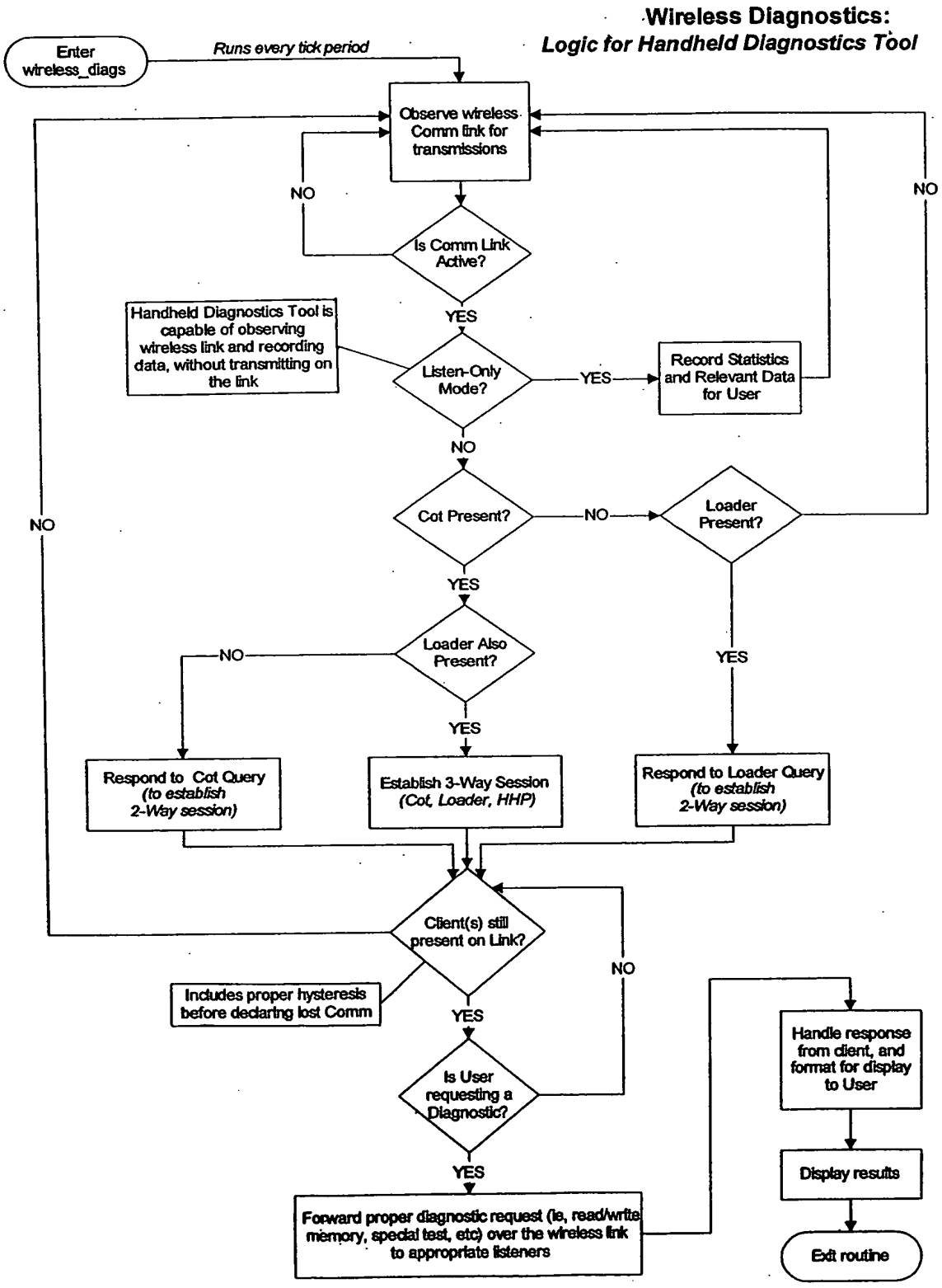

Wireless Diagnostics:
Logic for Handheld Diagnostics Tool
Enter wireless_diags
Runs every tick period
Observe wireless Comm link for transmissions
NO
Is Comm Link Active?
YES
Handheld Diagnostics Tool is capable of observing wireless link and recording data, without transmitting on the link
Listen-Only Mode?
YES
Record Statistics and Relevant Data for User
NO
Cot Present?
NO
Loader Present?
NO
YES
Loader Also Present?
NO
YES
YES
Respond to Cot Query (to establish 2-Way session)
Establish 3-Way Session (Cot, Loader, HHP)
Respond to Loader Query (to establish 2-Way session)
Client(s) still present on Link?
NO
Includes proper hysteresis before declaring lost Comm
YES
Is User requesting a Diagnostic?
YES
Forward proper diagnostic request (ie, read/write memory, special test, etc) over the wireless link to appropriate listeners
Handle response from client, and format for display to User
Display results
Exit routine

FIG. 33

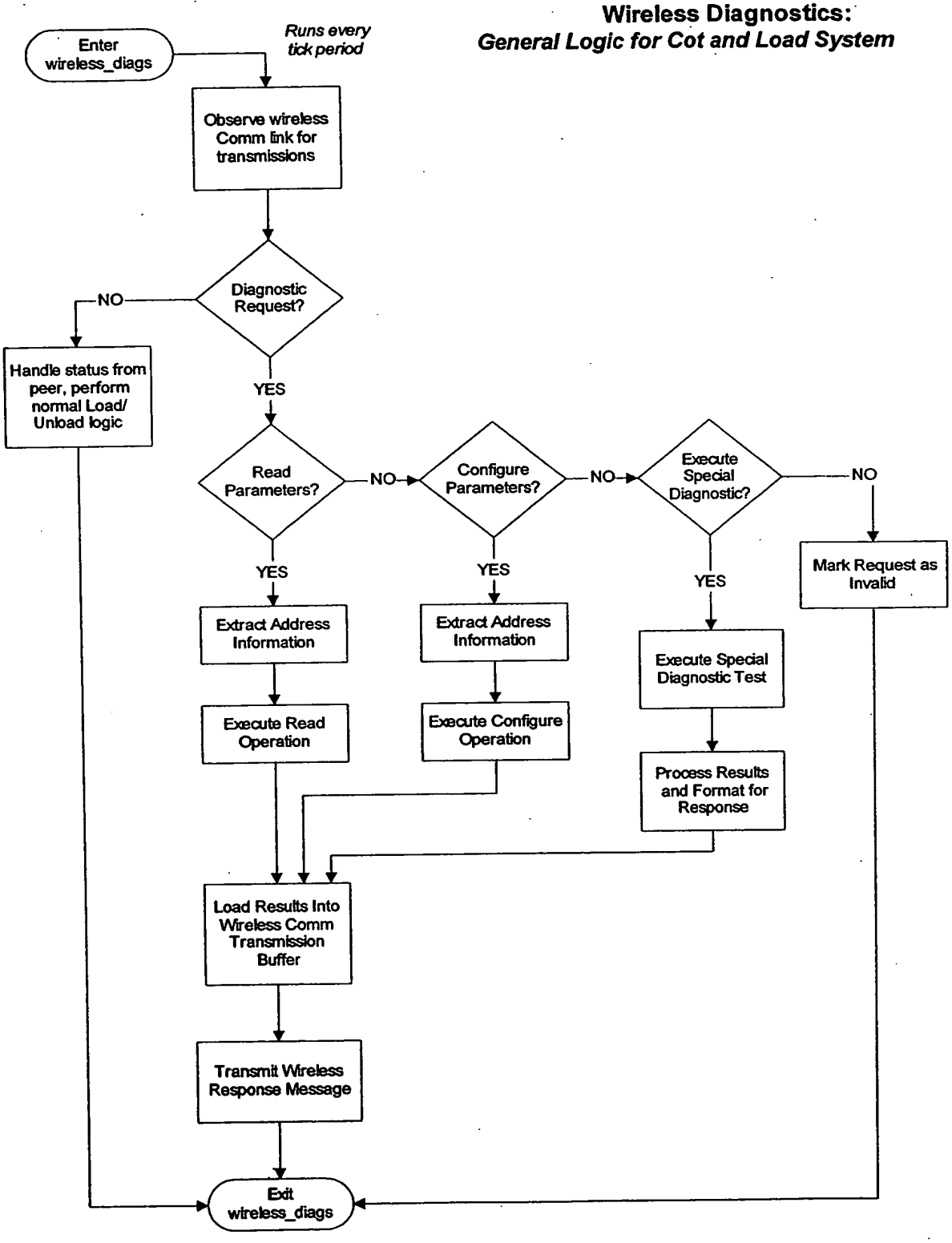
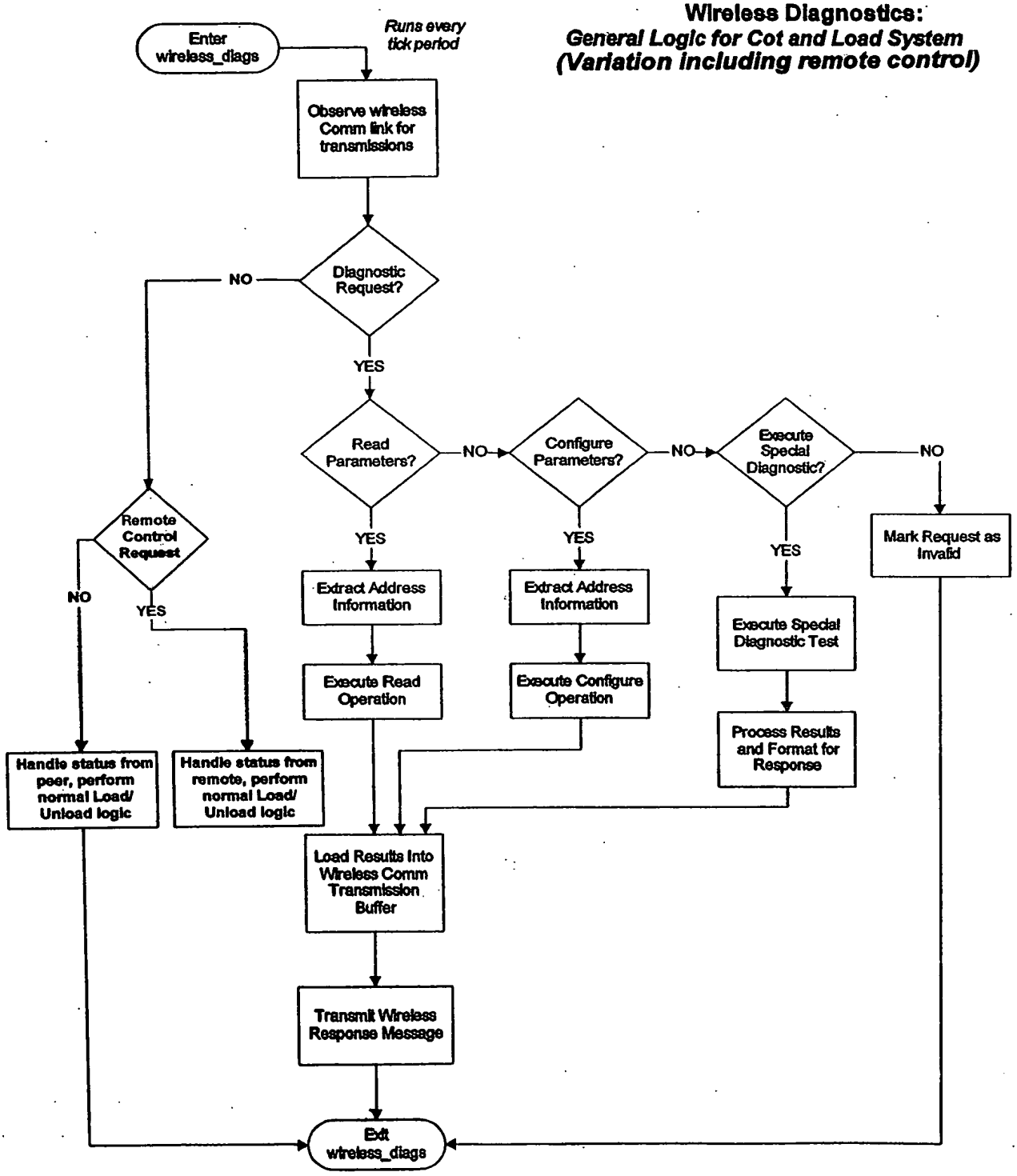

Wireless Diagnostics:
General Logic for Cot and Load System
Enter wireless_diags
Runs every tick period
Observe wireless Comm link for transmissions
Diagnostic Request?
NO
Handle status from peer, perform normal Load/ Unload logic
YES
Read Parameters?
NO
Configure Parameters?
NO
Execute Special Diagnostic?
NO
Mark Request as Invalid
YES
Extract Address Information
Execute Read Operation
YES
Extract Address Information
Execute Configure Operation
YES
Execute Special Diagnostic Test
Process Results and Format for Response
Load Results Into Wireless Comm Transmission Buffer
Transmit Wireless Response Message
Exit wireless_diags

FIG. 33A


Wireless Diagnostics:
General Logic for Cot and Load System
(Variation including remote control)
Enter wireless_diags
Runs every tick period
Observe wireless Comm link for transmissions
Diagnostic Request?
NO
YES
Read Parameters?
NO
Configure Parameters?
NO
Execute Special Diagnostic?
NO
Mark Request as Invalid
YES
YES
YES
Extract Address Information
Extract Address Information
Execute Special Diagnostic Test
Execute Read Operation
Execute Configure Operation
Process Results and Format for Response
Remote Control Request
NO
YES
Handle status from peer, perform normal Load/ Unload logic
Handle status from remote, perform normal Load/ Unload logic
Load Results Into Wireless Comm Transmission Buffer
Transmit Wireless Response Message
Exit wireless_diags

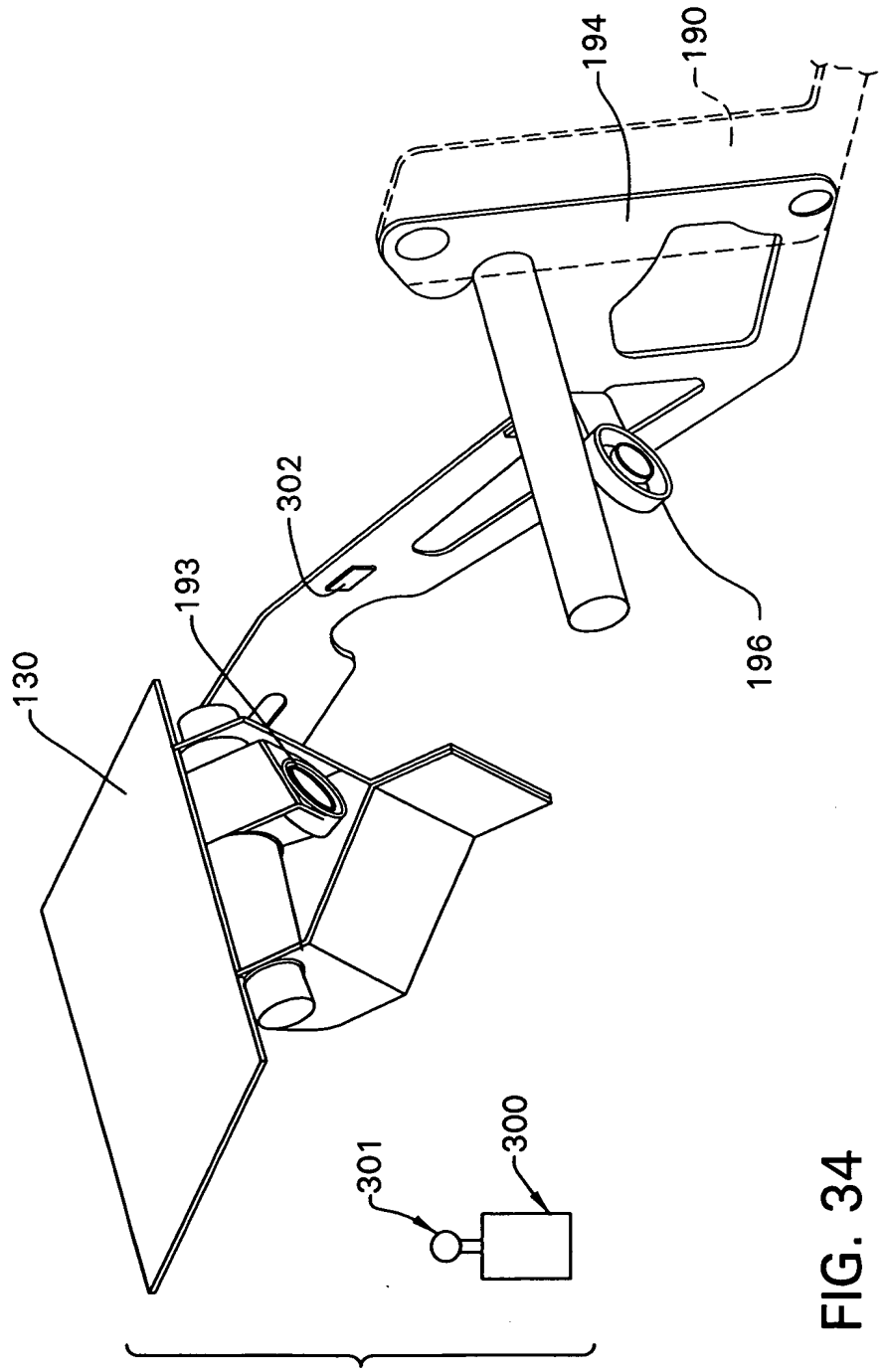


FIG. 34

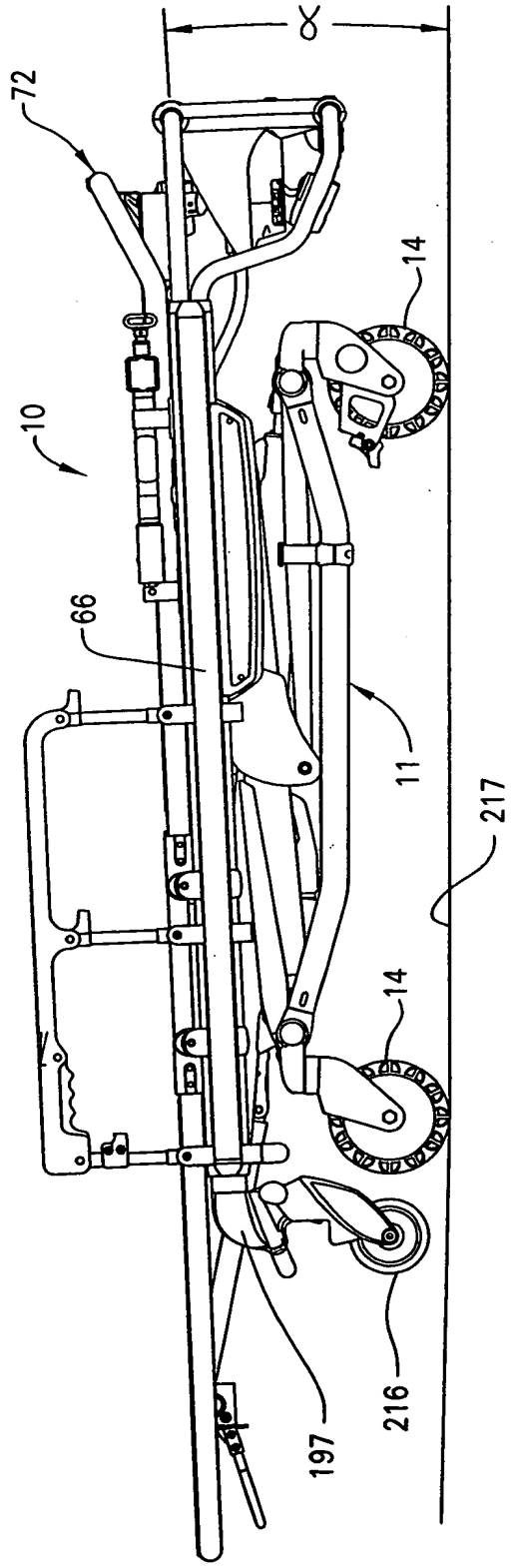


FIG. 35

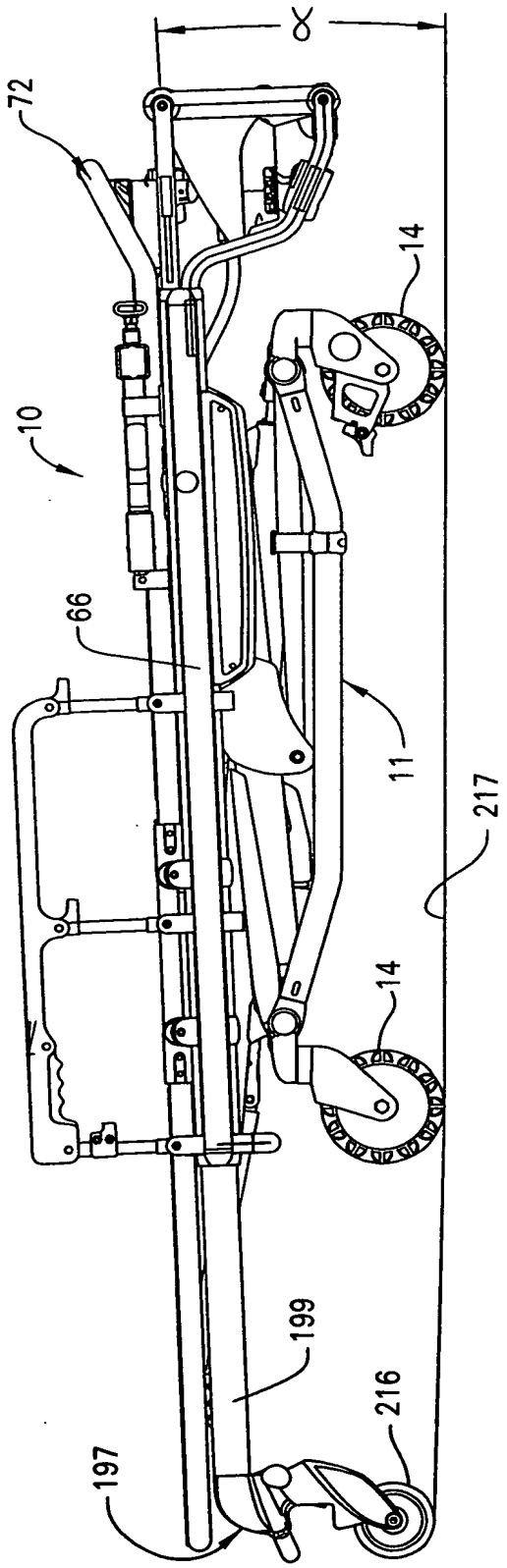


FIG. 36

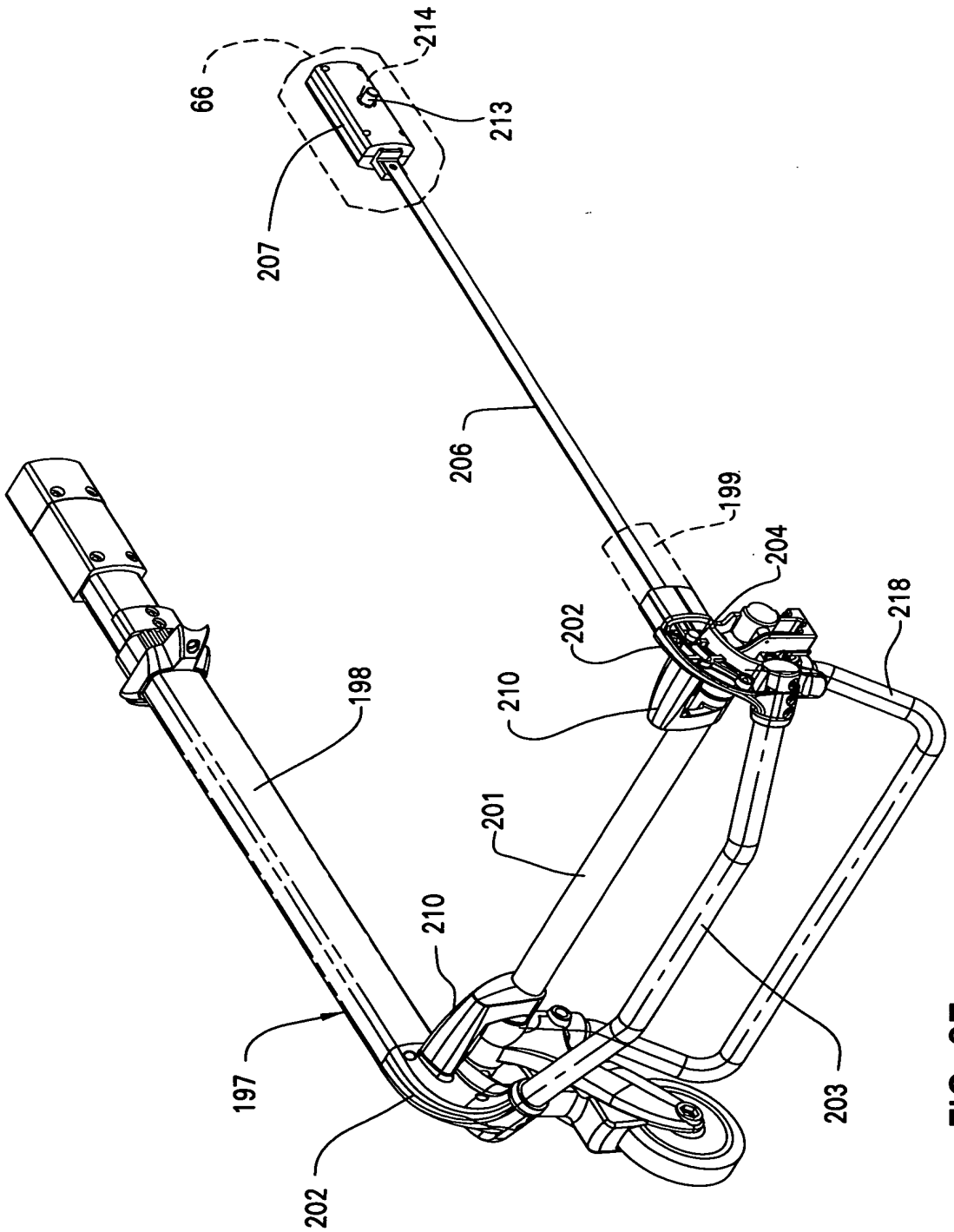


FIG. 37

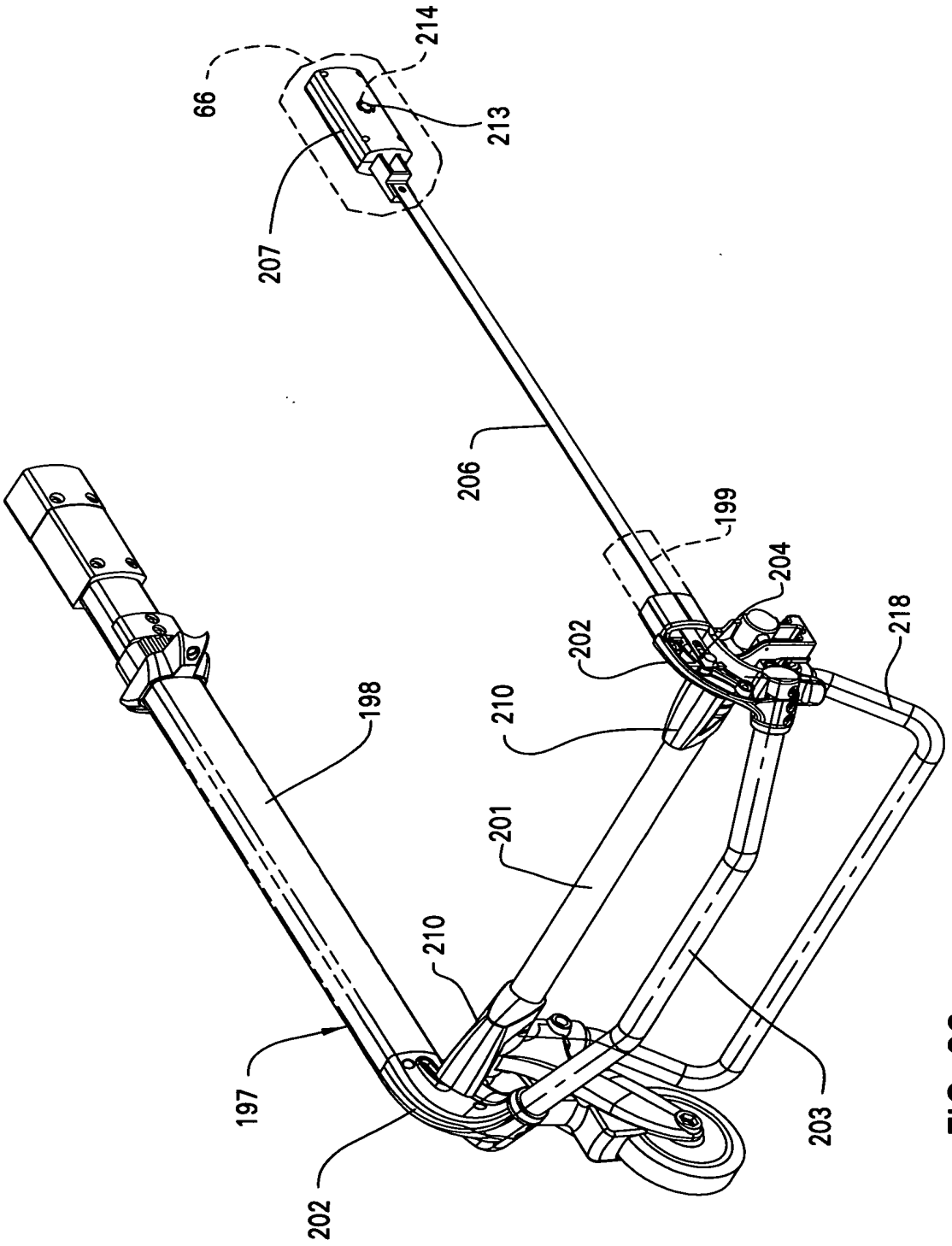


FIG. 38

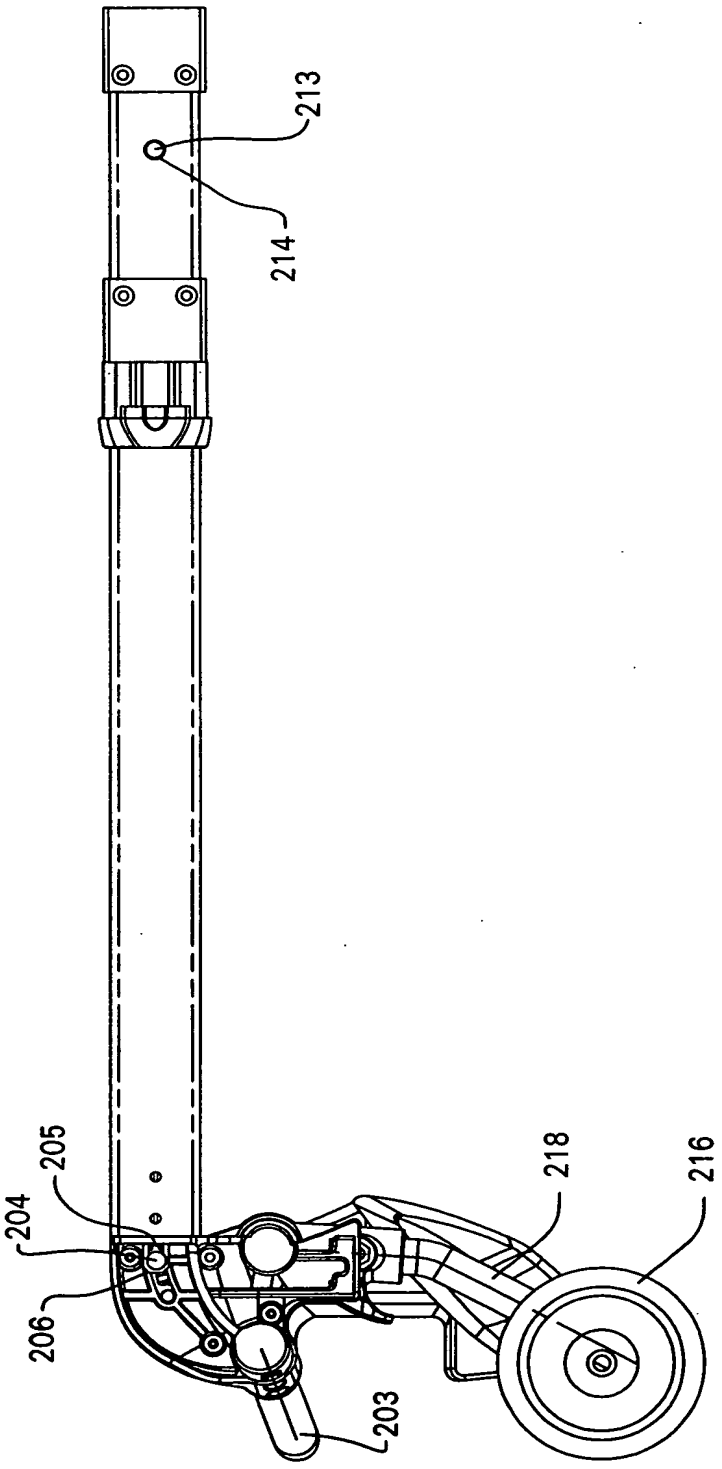


FIG. 39

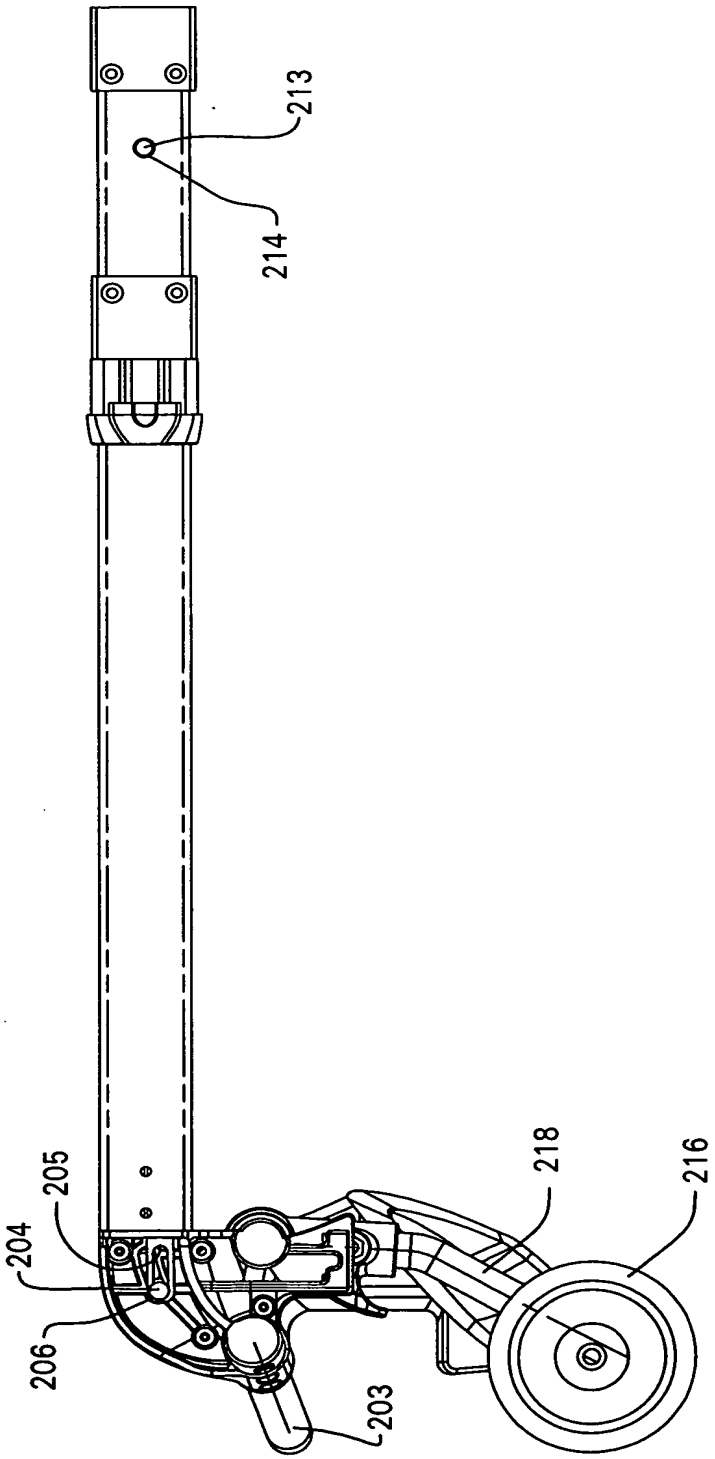


FIG. 40

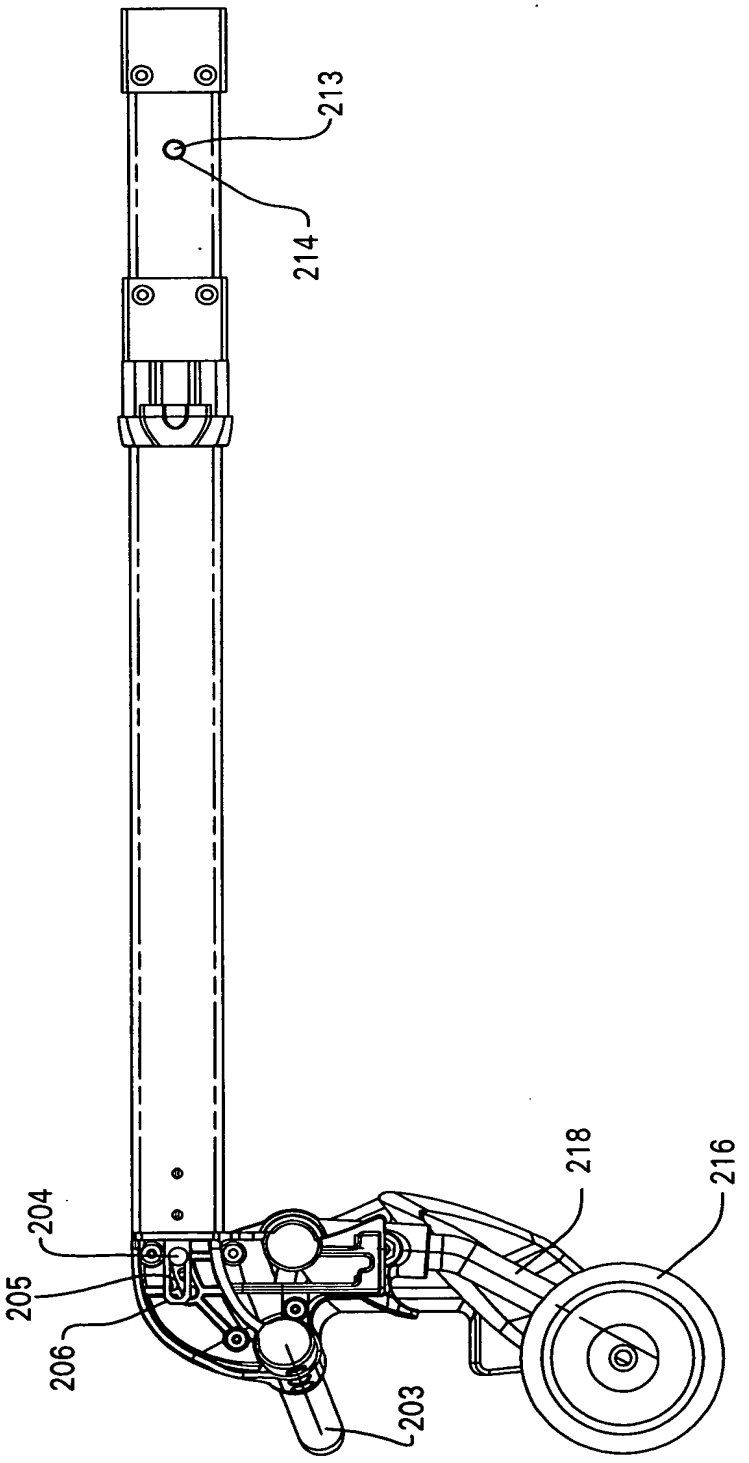


FIG. 41

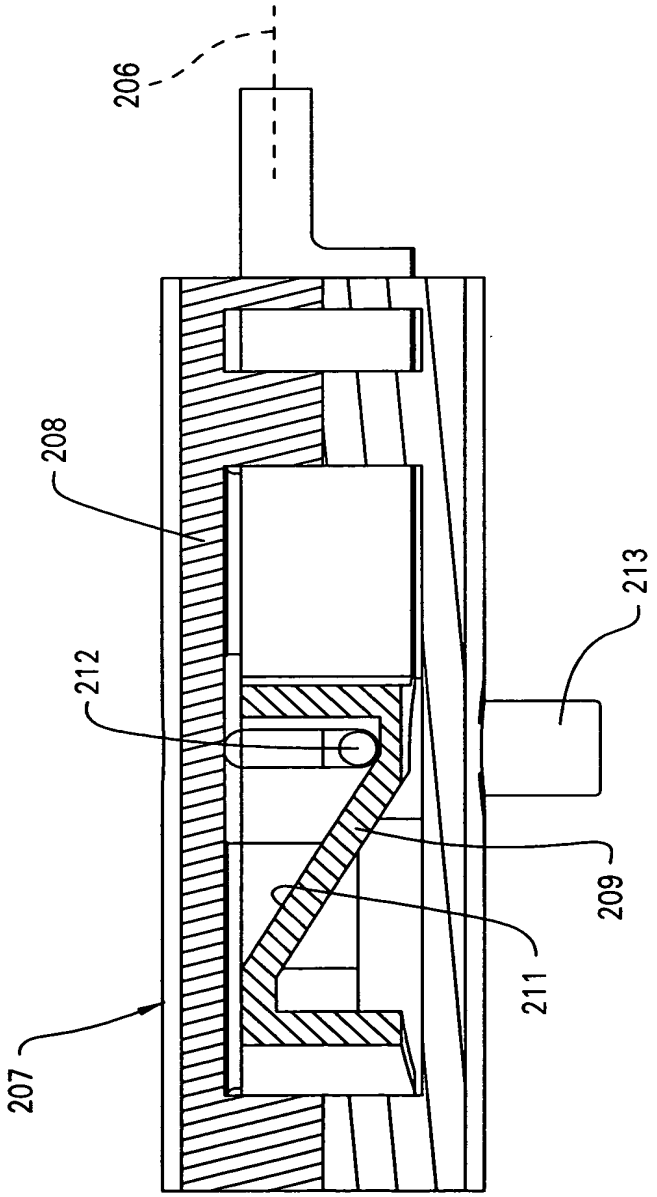


FIG. 42

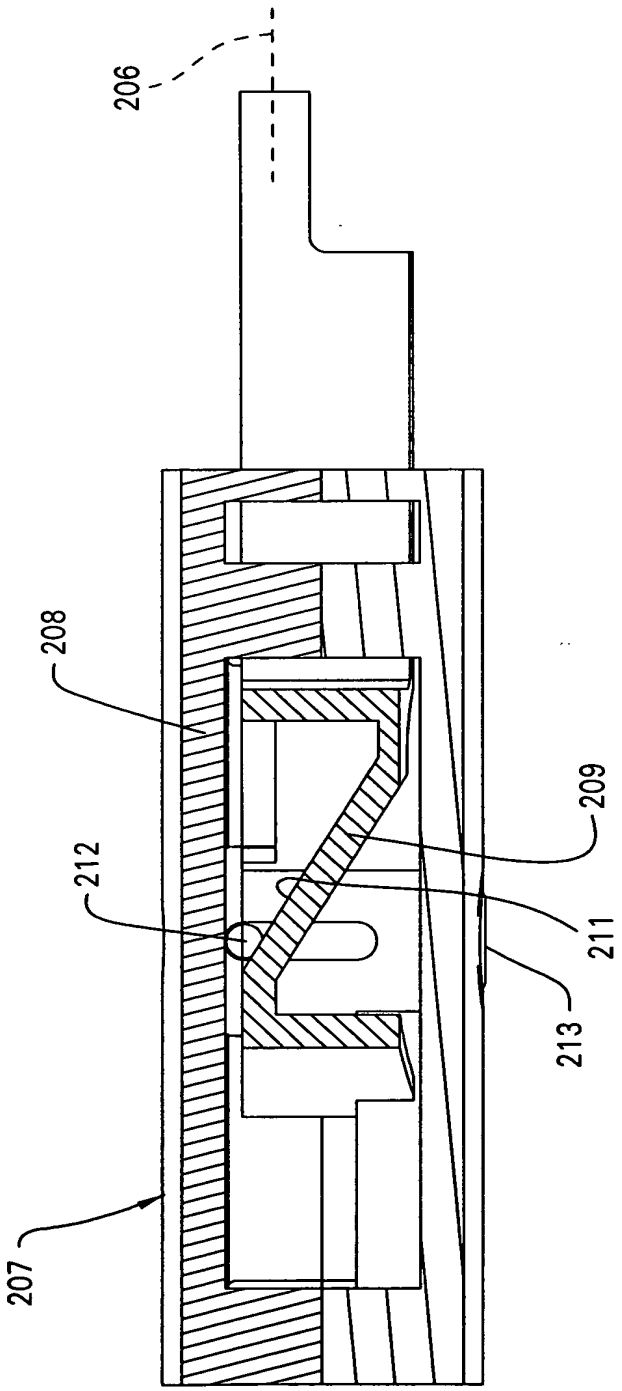


FIG. 43

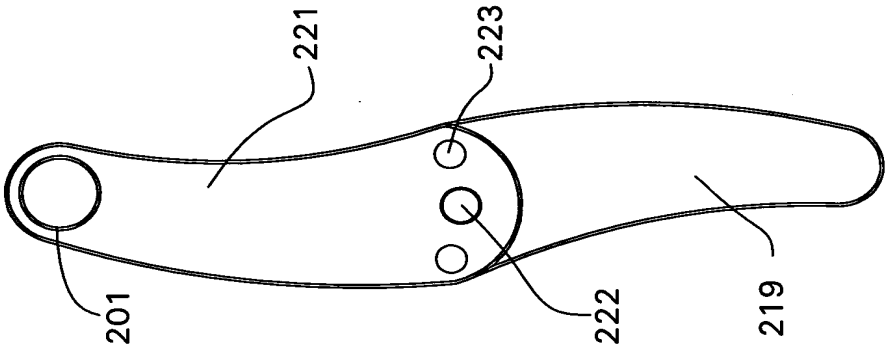


FIG. 46

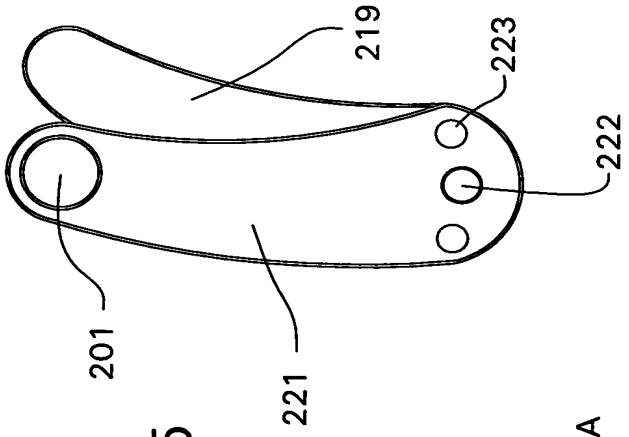


FIG. 45

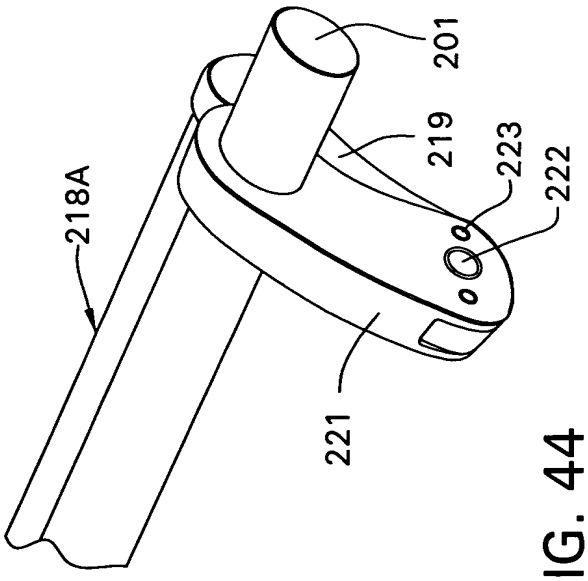


FIG. 44

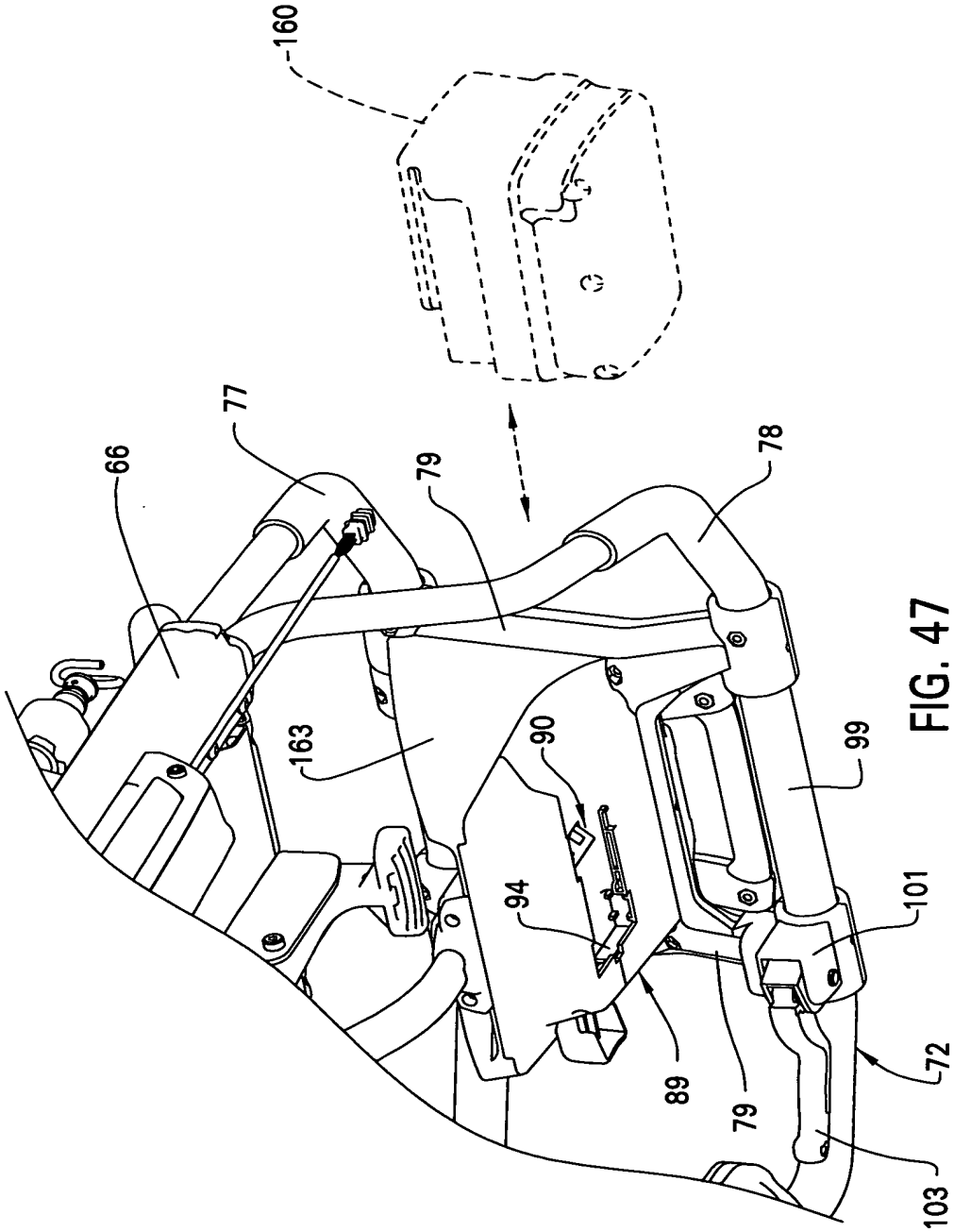


FIG. 47

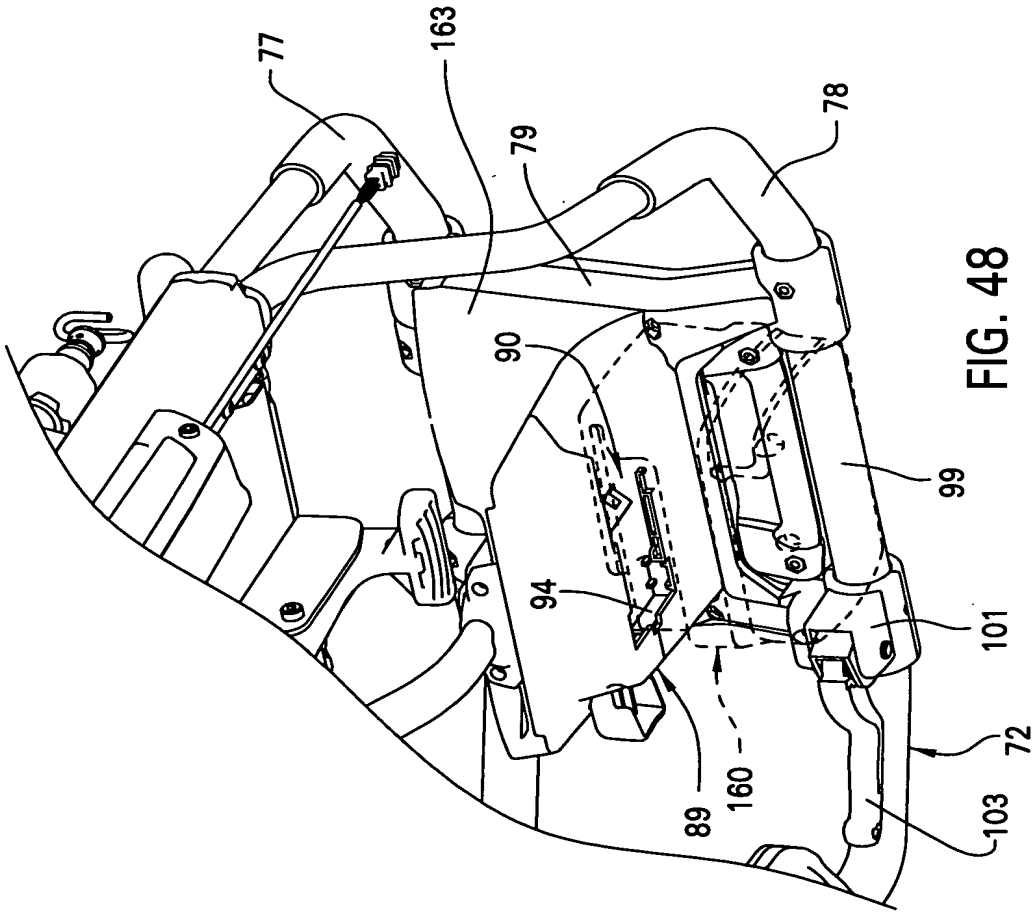


FIG. 48

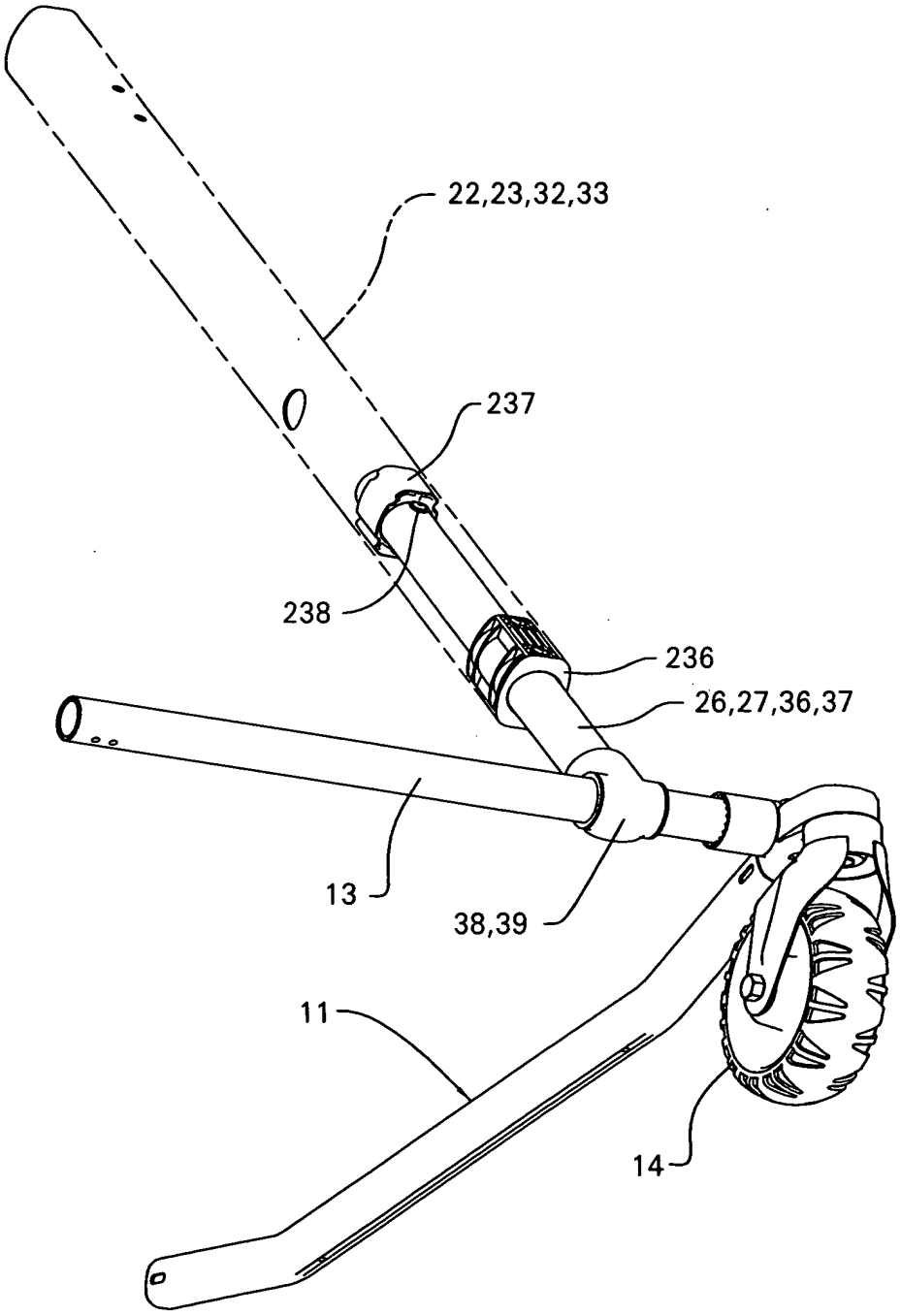


FIG. 49

FIG. 50

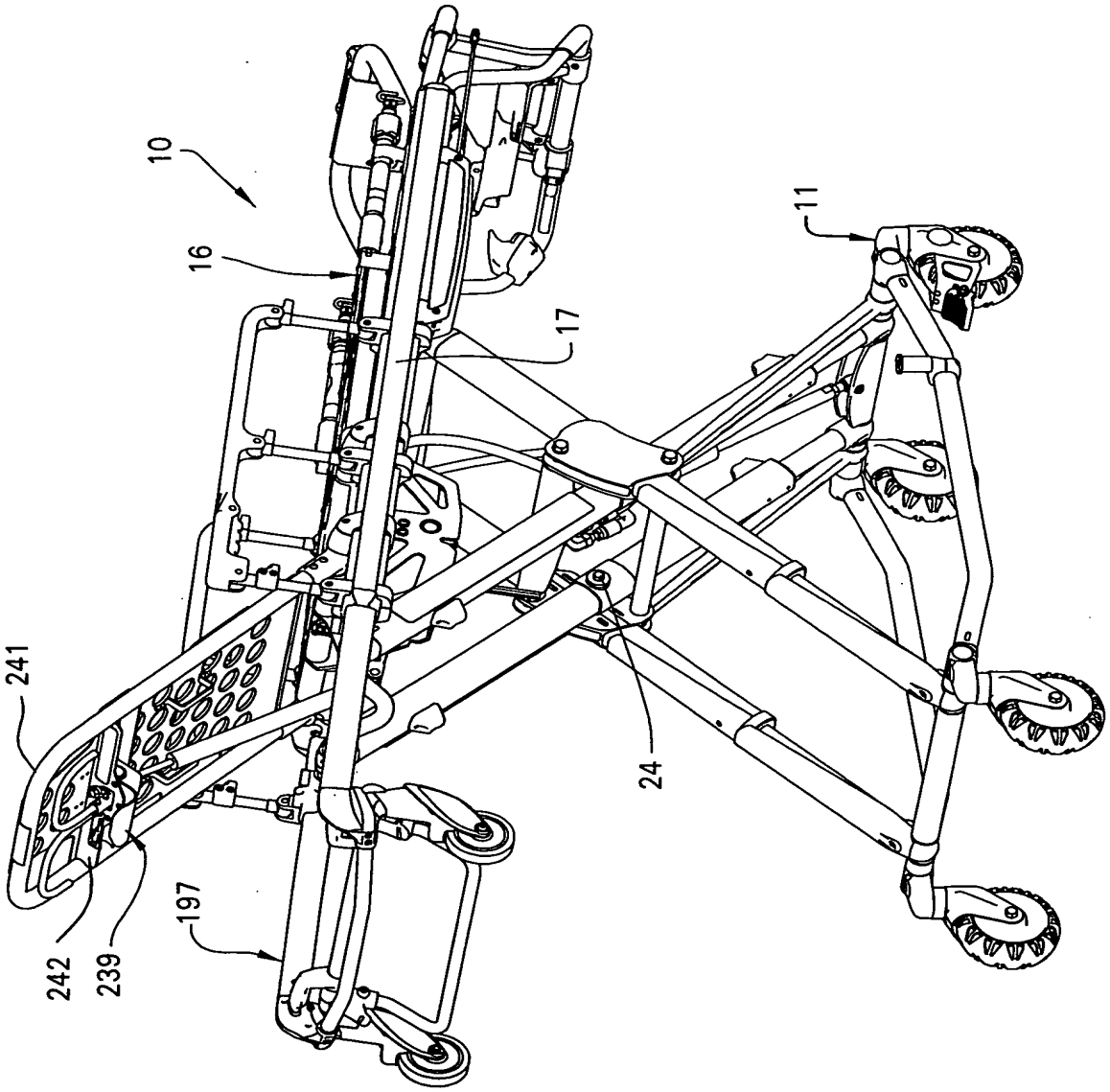
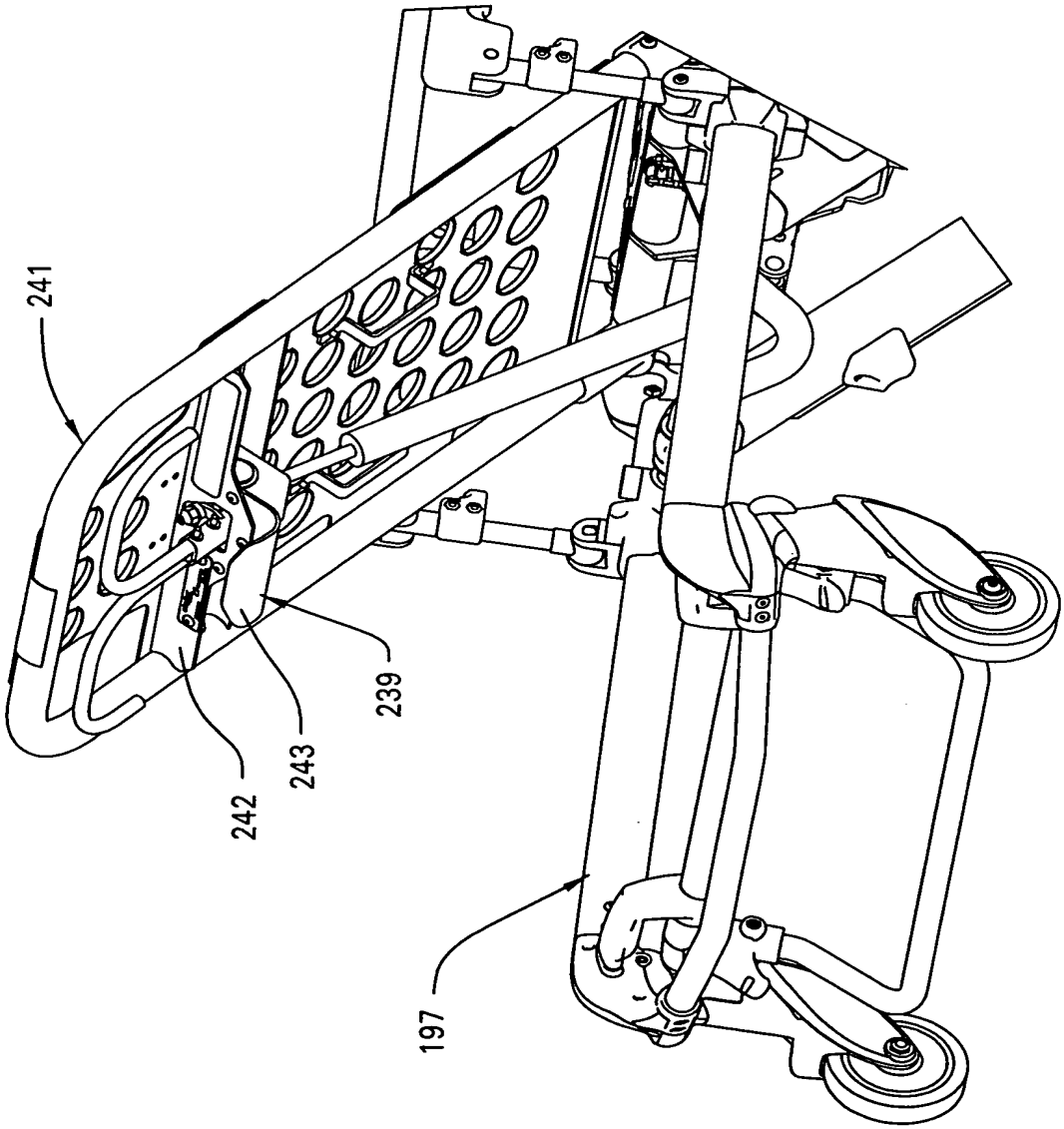


FIG. 51



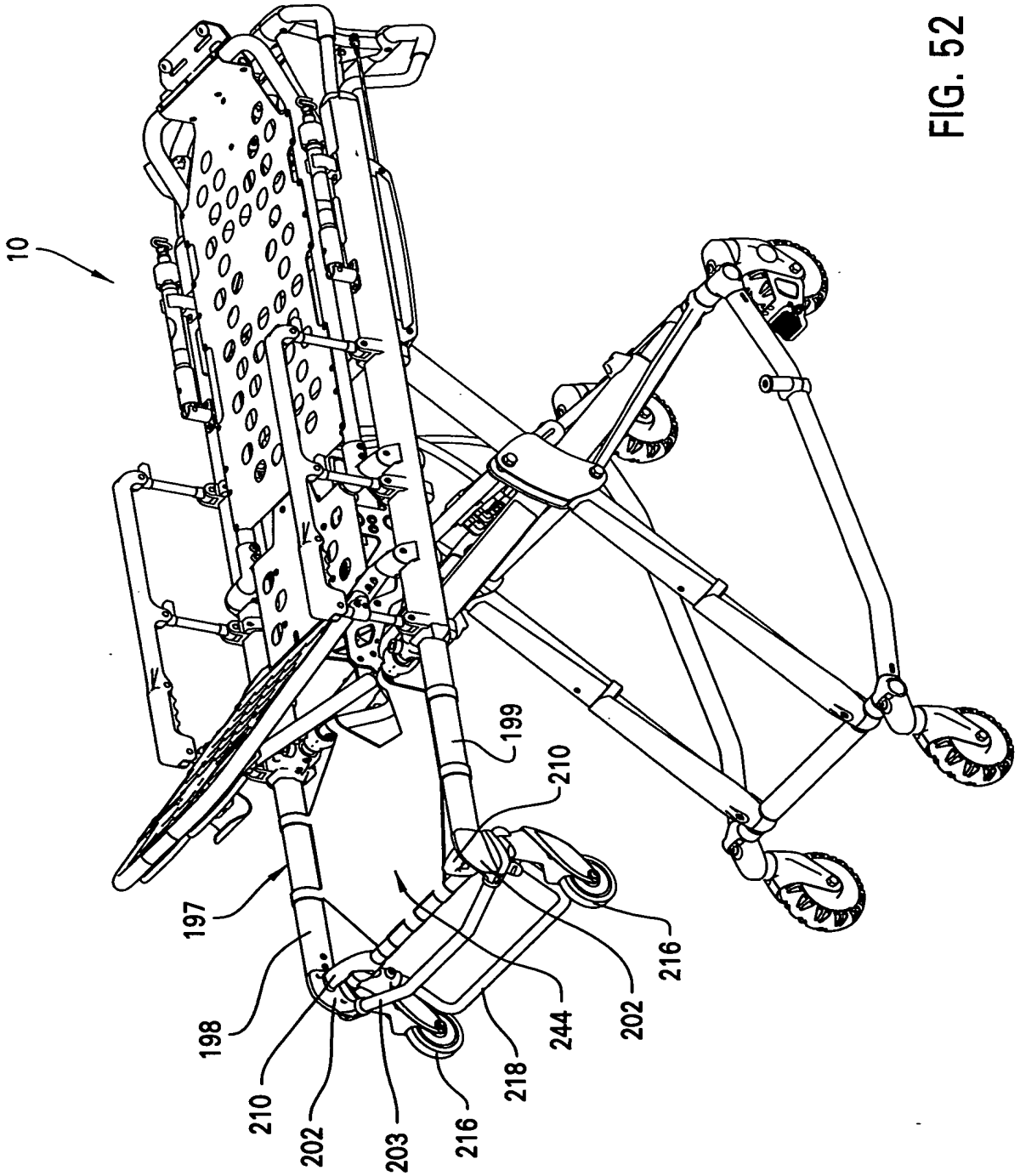


FIG. 52

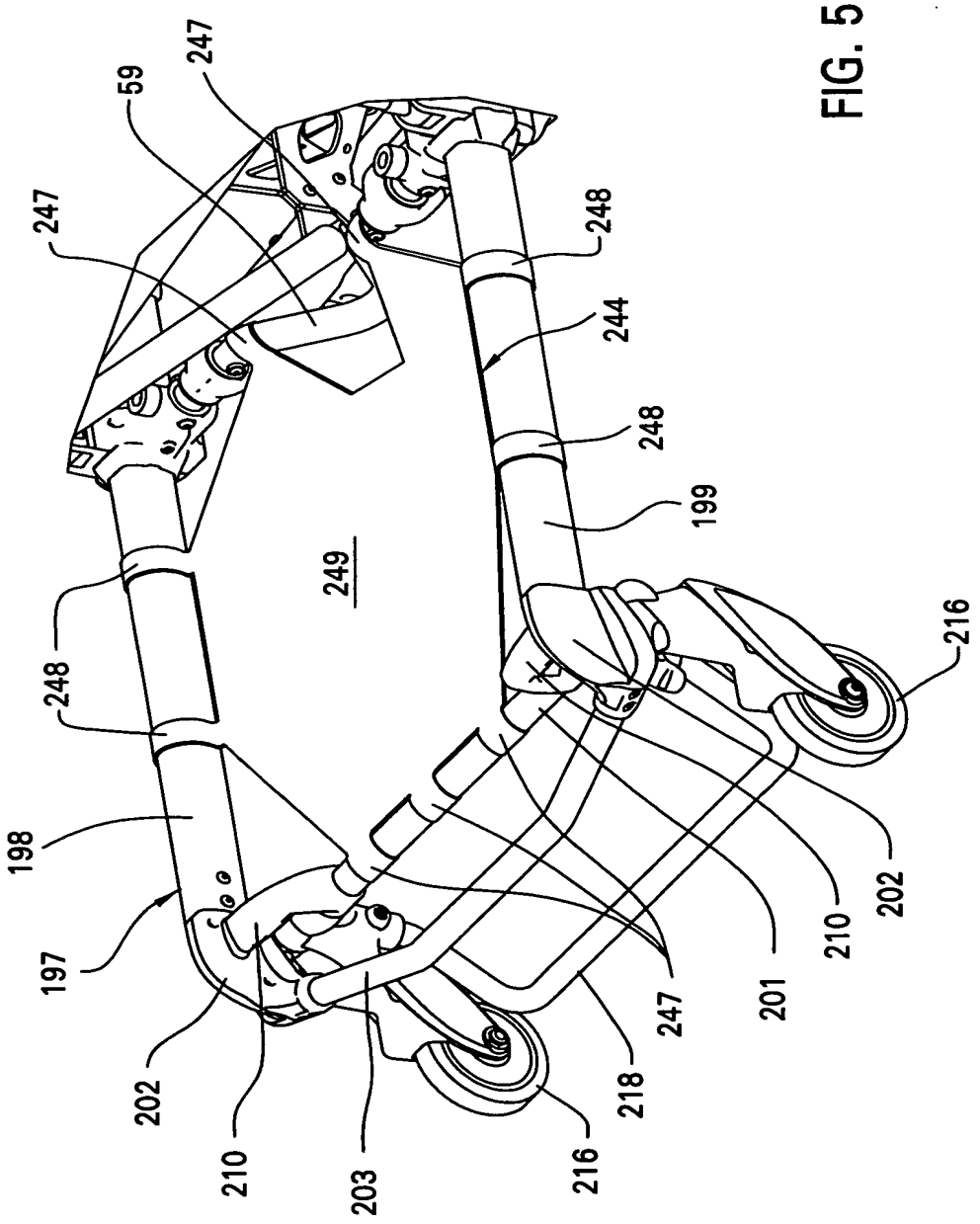

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FIG. 53

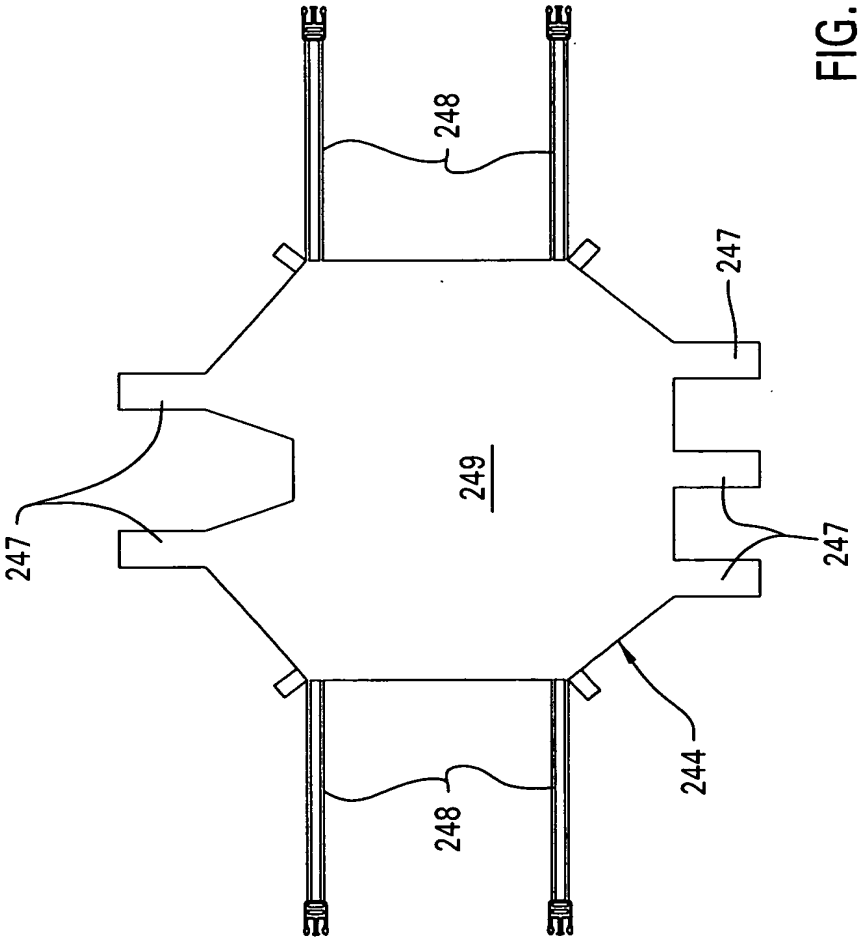


FIG. 54

FIG. 55

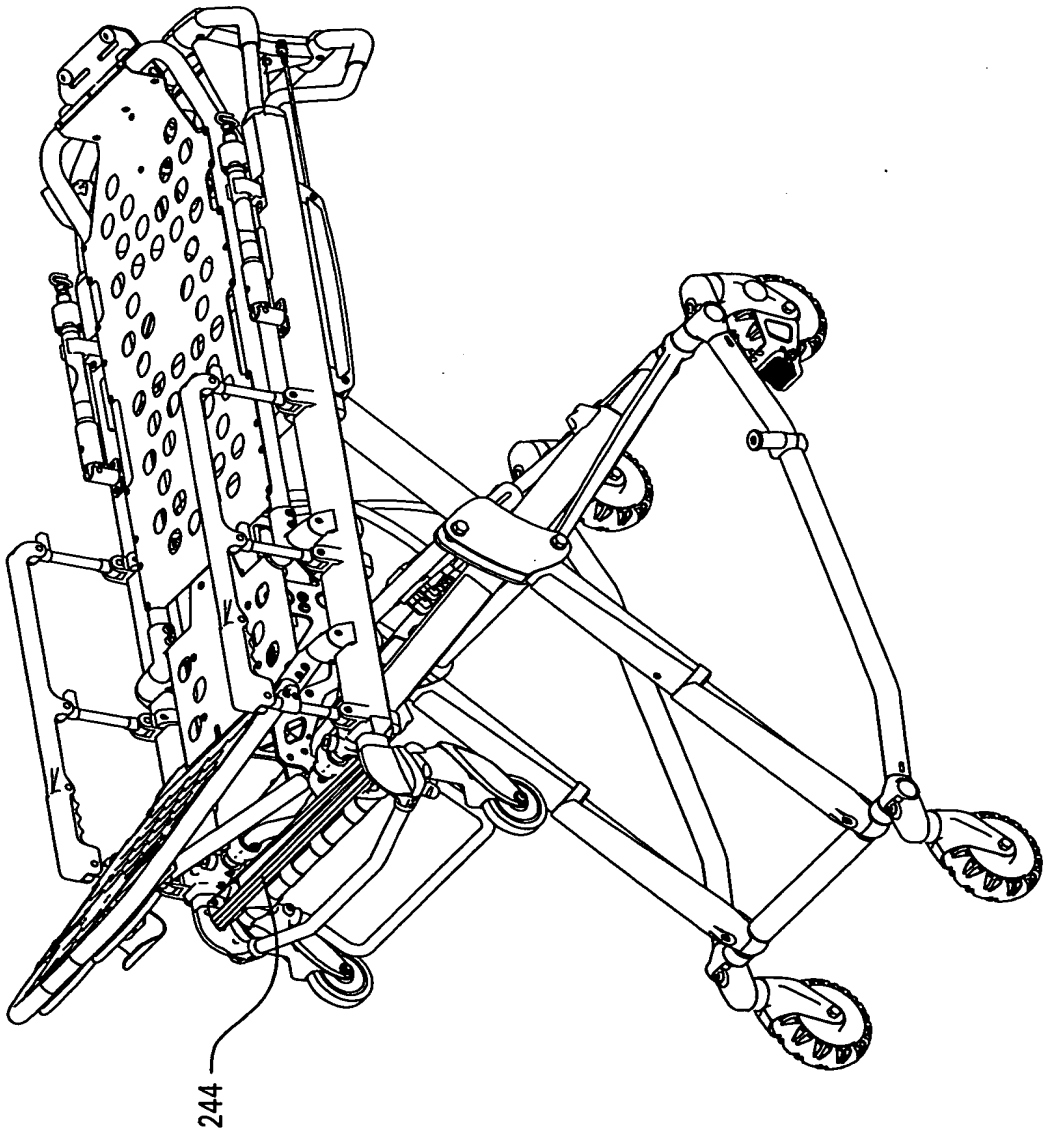
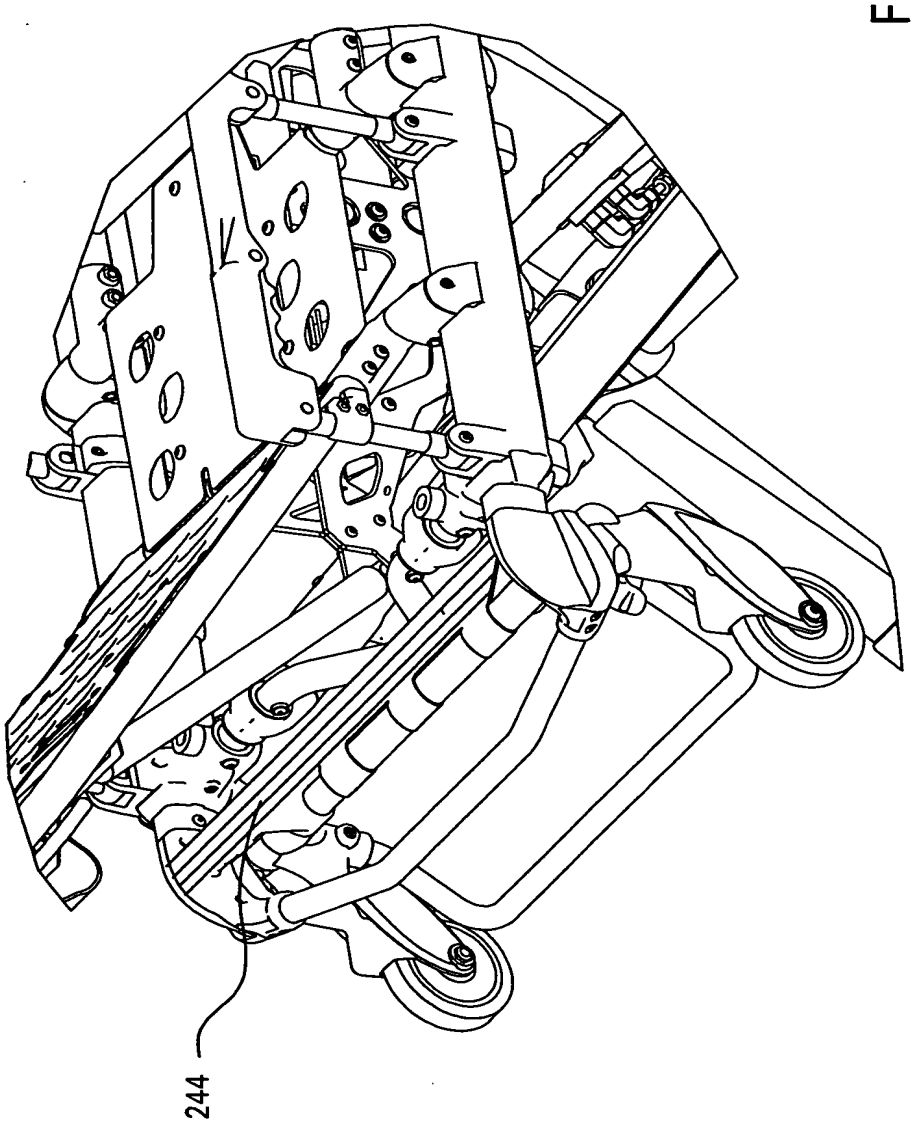


FIG. 56



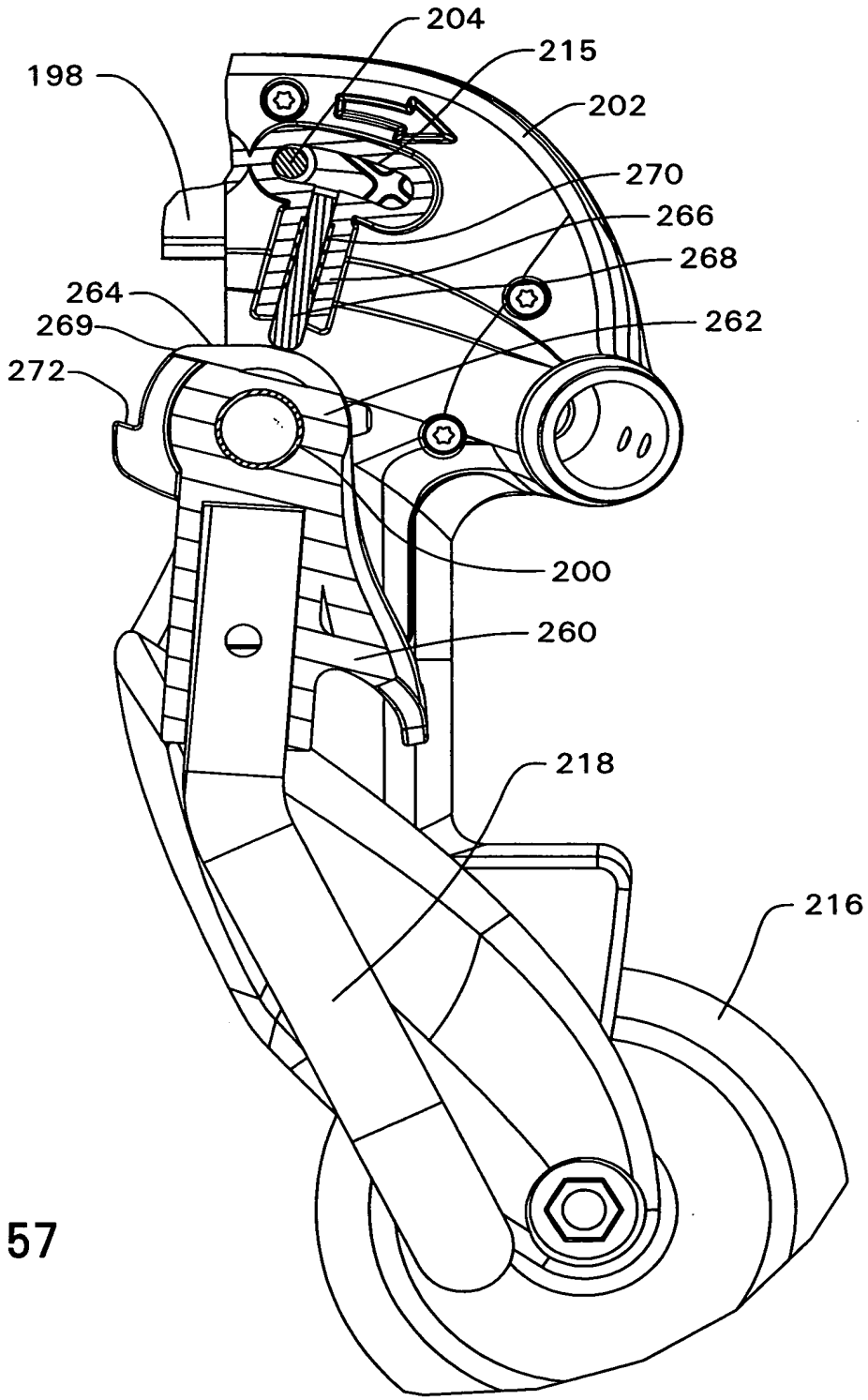


FIG. 57

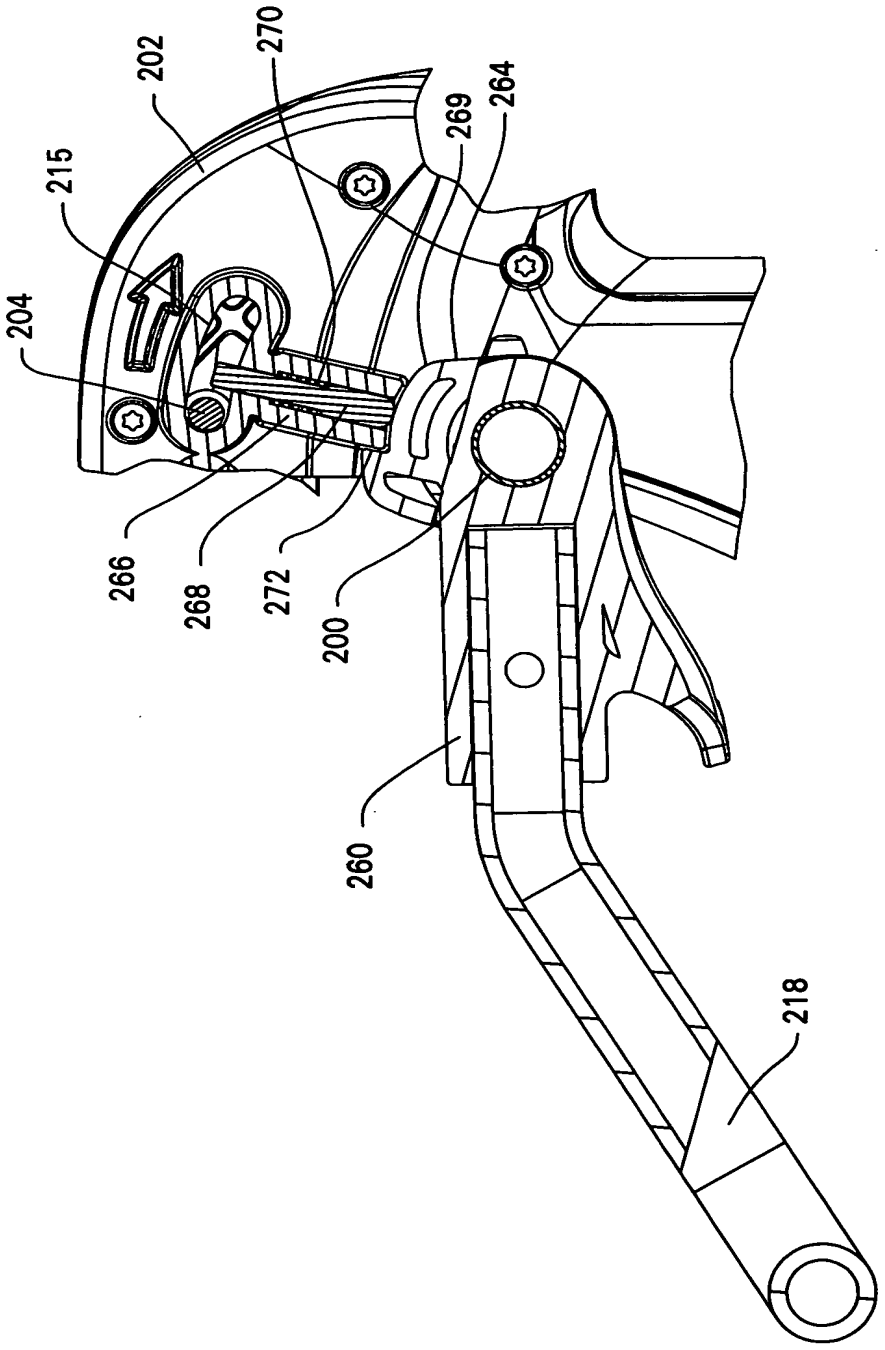


FIG. 58

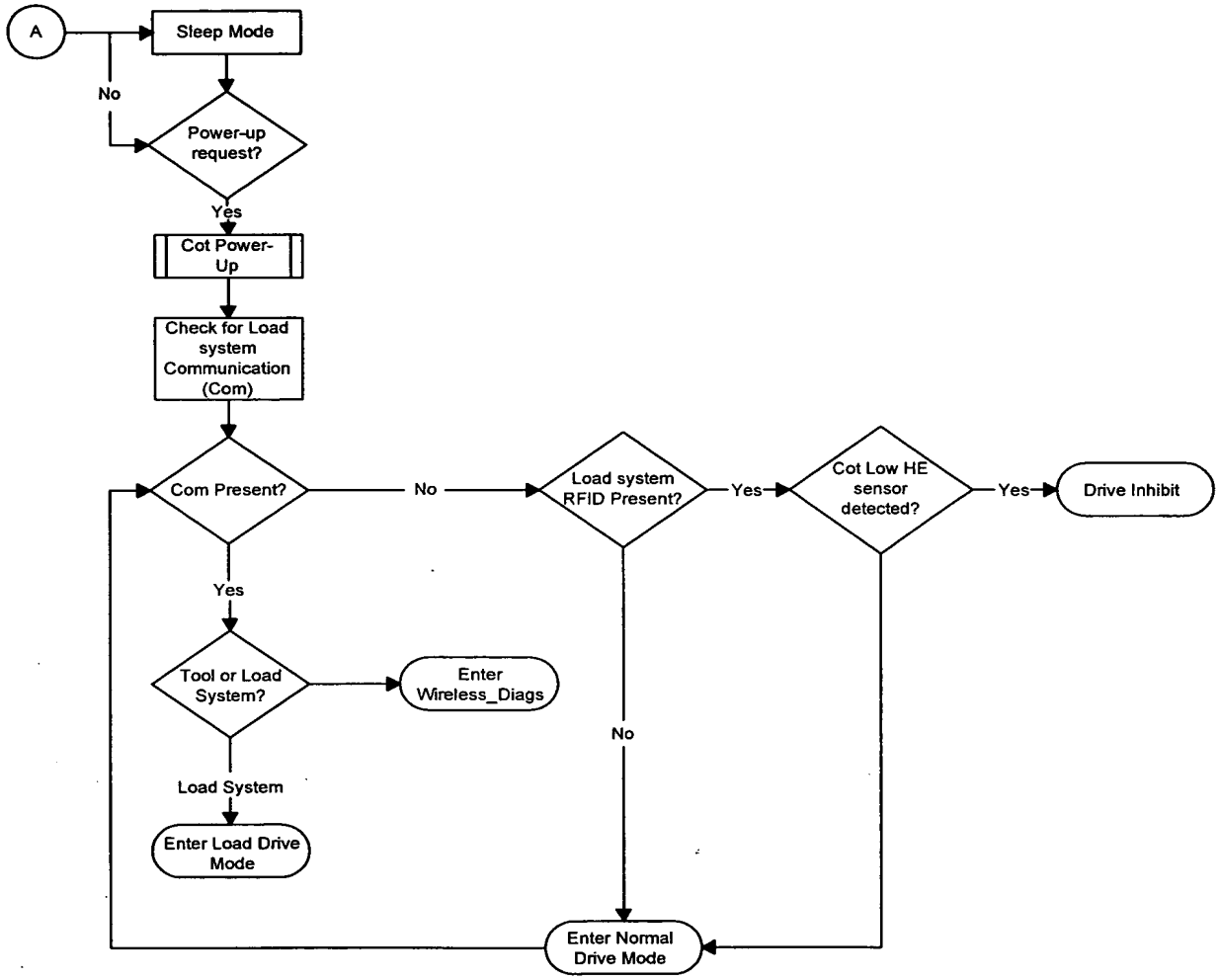

A
Sleep Mode
No
Power-up request?
Yes
Cot Power-Up
Check for Load system Communication (Com)
Com Present?
No
Load system RFID Present?
Yes
Cot Low HE sensor detected?
Yes
Drive Inhibit
Yes
Tool or Load System?
Enter Wireless_Diags
Load System
Enter Load Drive Mode
No
Enter Normal Drive Mode

FIG. 59

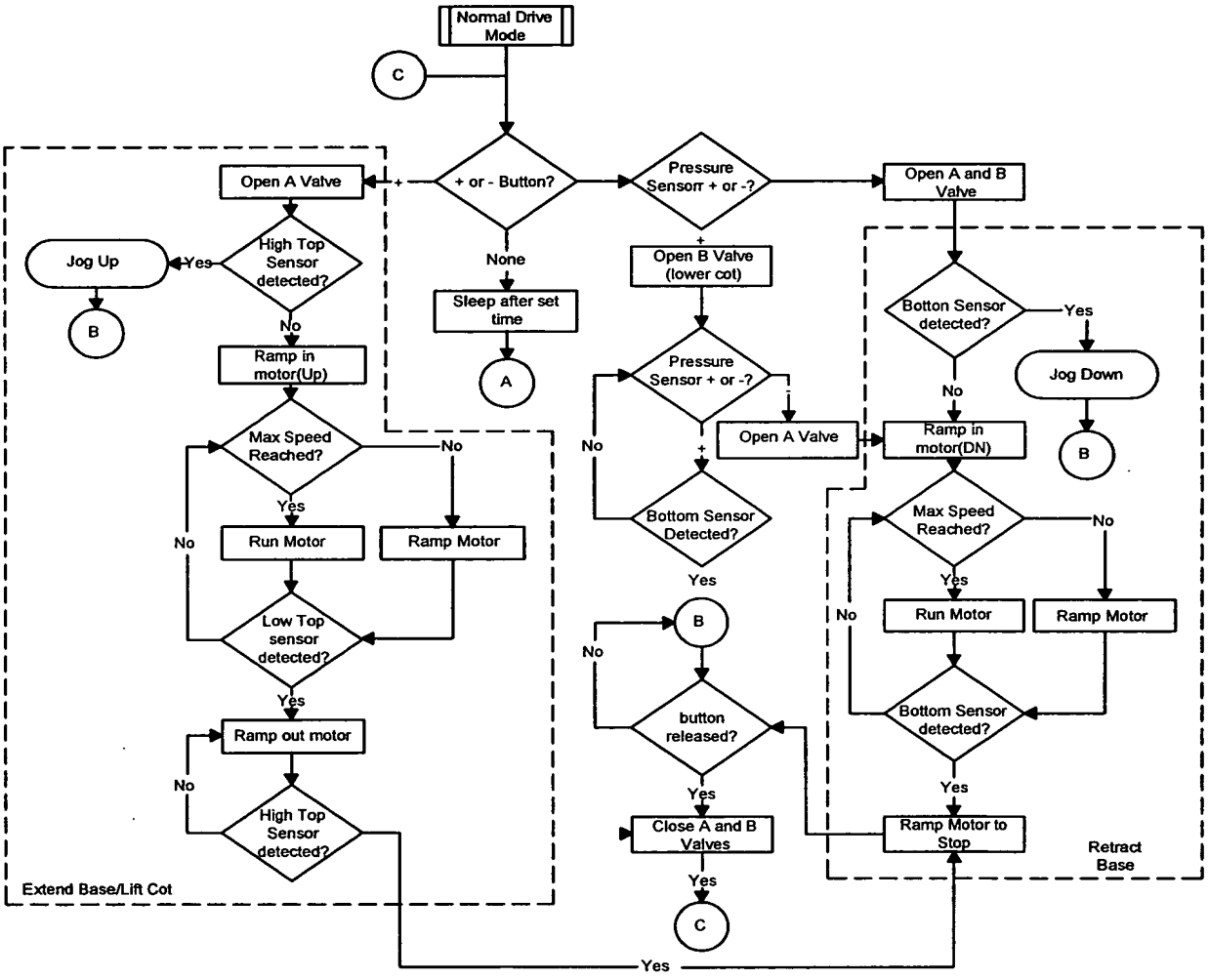

Normal Drive Mode
C
+ or - Button?
Pressure Sensor + or -?
Open A and B Valve
Open A Valve
High Top Sensor detected?
Jog Up
Yes
B
No
Ramp in motor(Up)
Max Speed Reached?
No
Yes
Run Motor
Ramp Motor
Low Top sensor detected?
Yes
Ramp out motor
High Top Sensor detected?
No
Extend Base/Lift Cot
None
Sleep after set time
A
Open B Valve (lower cot)
Pressure Sensor + or -?
Open A Valve
Bottom Sensor Detected?
Yes
B
button released?
Yes
Close A and B Valves
Yes
C
Botton Sensor detected?
Yes
Jog Down
B
No
Ramp in motor(DN)
Max Speed Reached?
No
Yes
Run Motor
Ramp Motor
Bottom Sensor detected?
Yes
Ramp Motor to Stop
Retract Base
Yes

FIG. 60

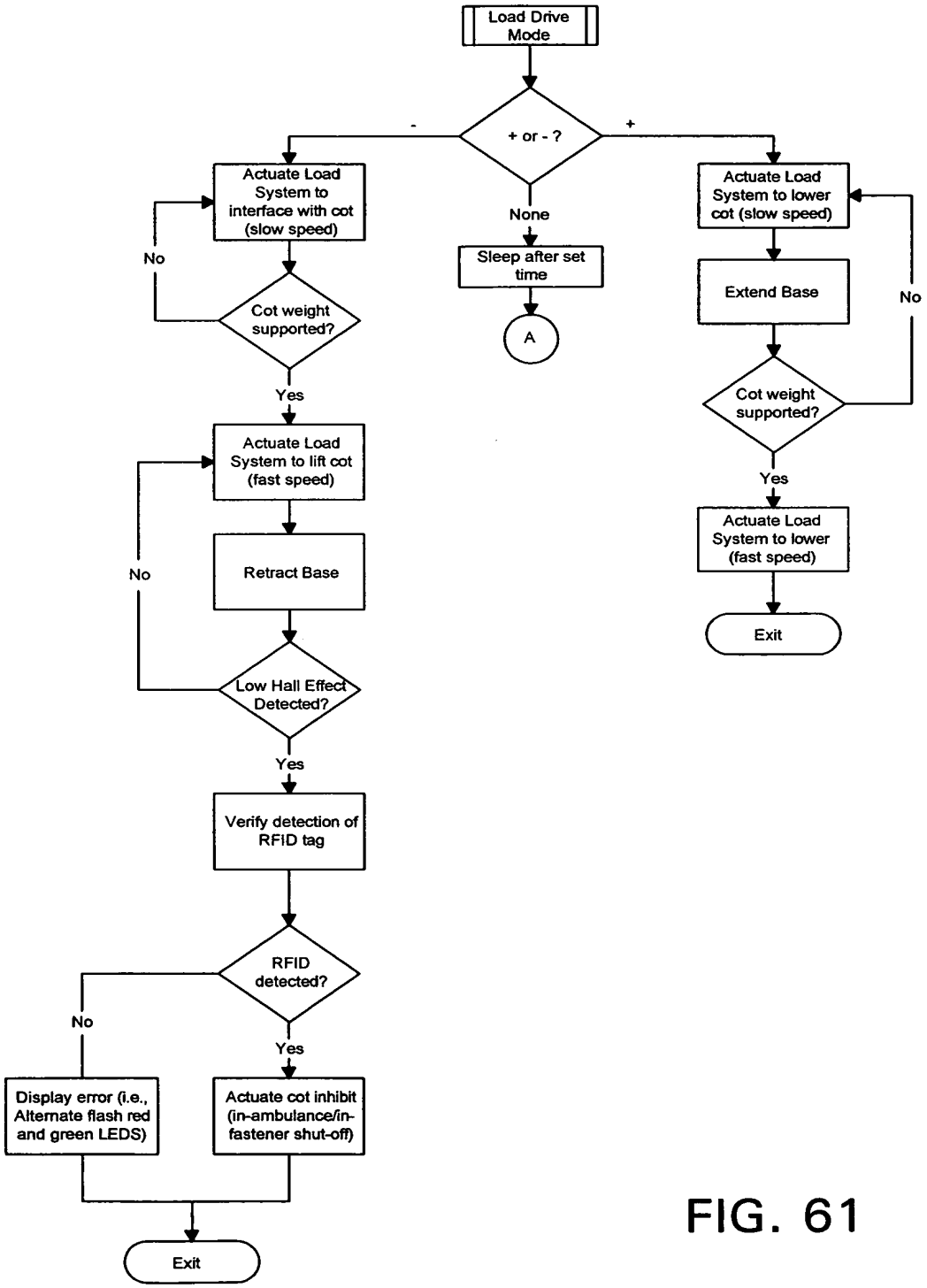

Load Drive Mode
+ or - ?
-
+
None
Actuate Load System to interface with cot (slow speed)
No
Cot weight supported?
Yes
Actuate Load System to lift cot (fast speed)
No
Retract Base
Low Hall Effect Detected?
Yes
Verify detection of RFID tag
RFID detected?
No
Yes
Display error (i.e., Alternate flash red and green LEDS)
Actuate cot inhibit (in-ambulance/in-fastener shut-off)
Exit
Sleep after set time
A
Actuate Load System to lower cot (slow speed)
Extend Base
No
Cot weight supported?
Yes
Actuate Load System to lower (fast speed)
Exit

FIG. 61

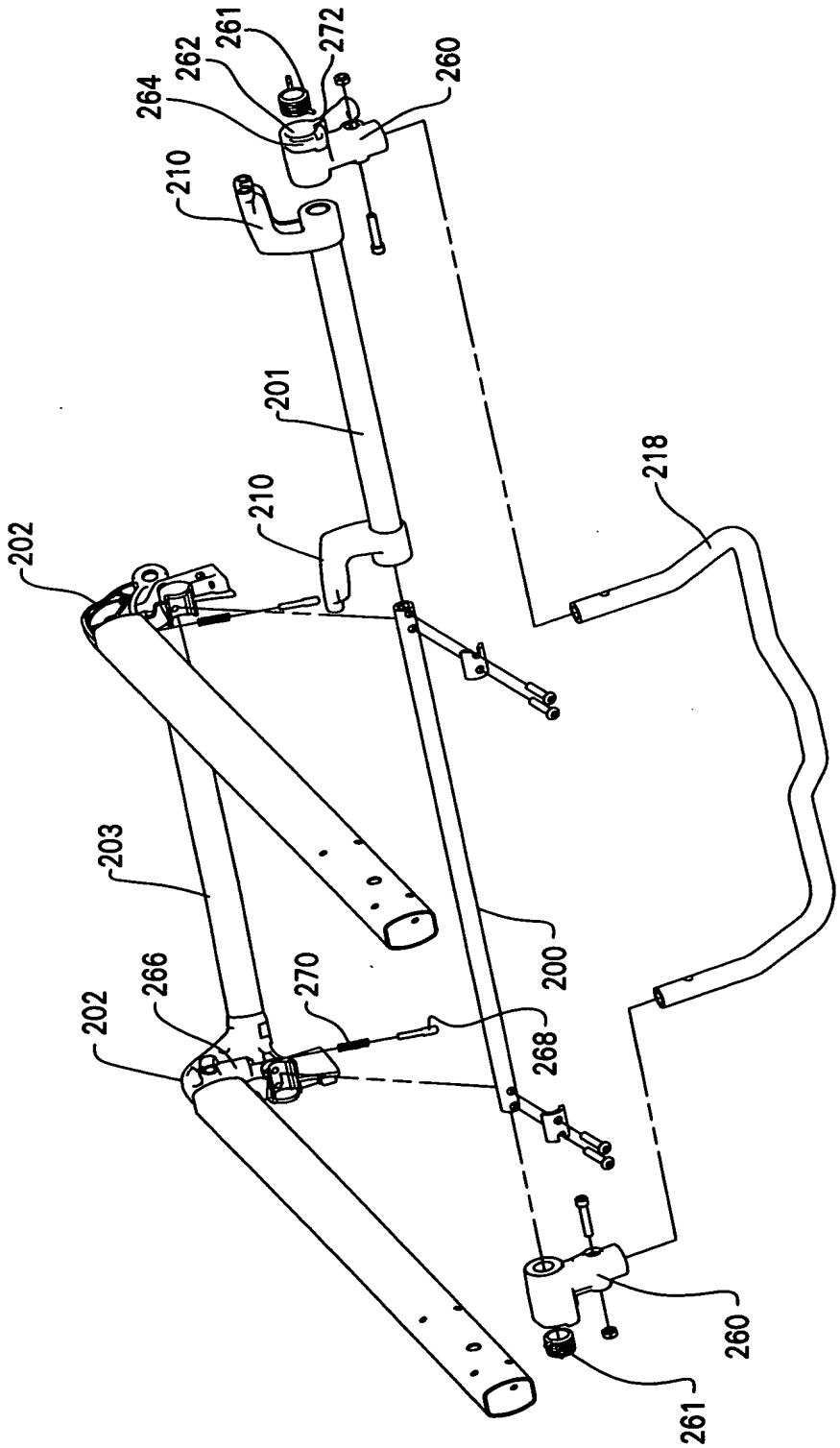

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FIG. 62

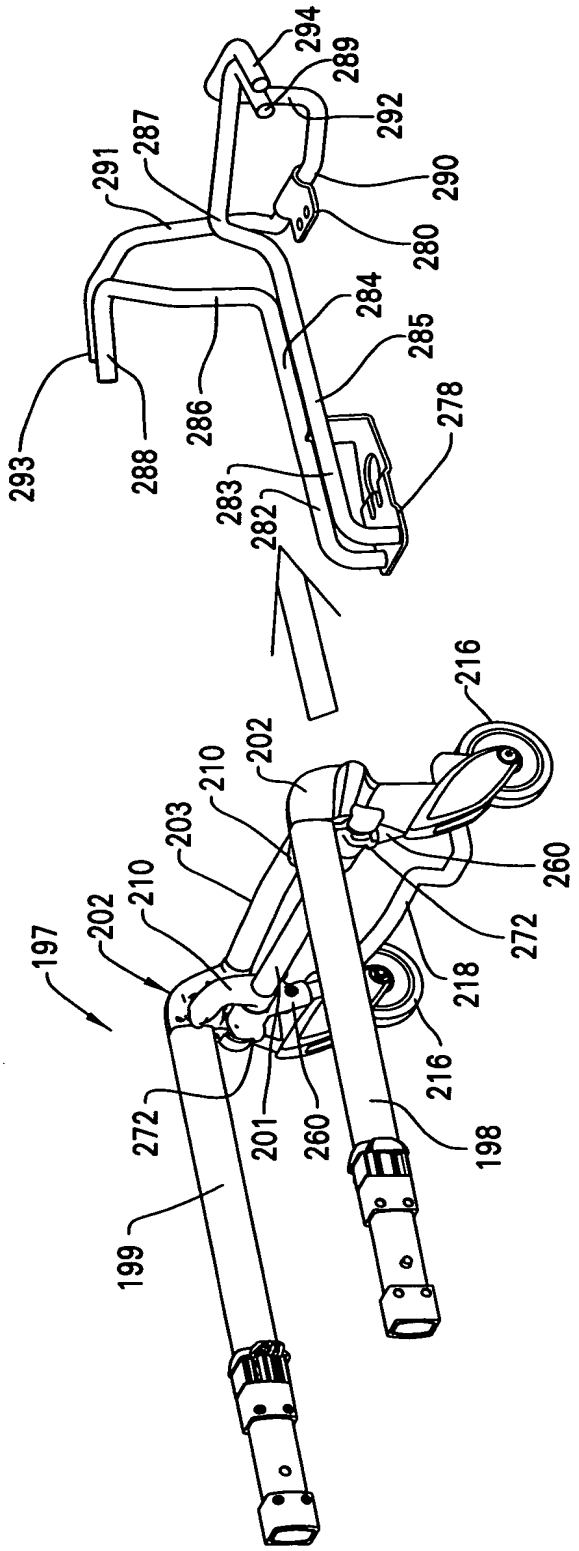

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FIG. 63

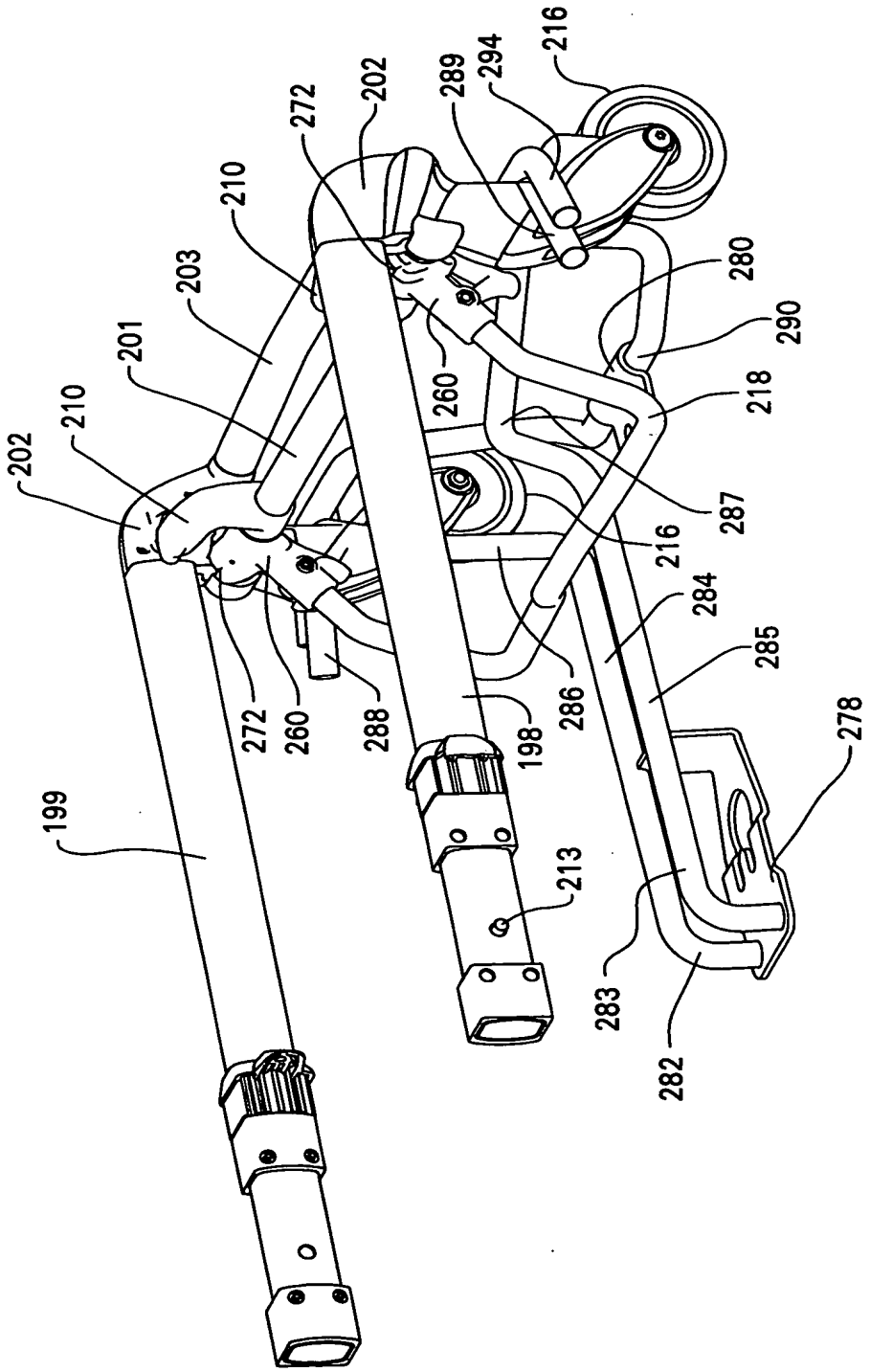

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FIG. 64

PTO/SB/06 (12-04)
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PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 11172434

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	300
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	500
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	200
TOTAL CLAIMS (37 CFR 1.16(i))	153 minus 20 =	* 133	x =		OR	x =	6650
INDEPENDENT CLAIMS (37 CFR 1.16(h))	28 minus 3 =	* 25	x =			x 200 =	5000
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $250 ($125 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).						250
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))			N/A			N/A	
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	12900

APPLICATION AS AMENDED – PART II

AMENDMENT A

	(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 ($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE ($)
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))					N/A		OR	N/A	
					TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

AMENDMENT B

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)	OR	RATE ($)	ADDITIONAL FEE ($)
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))					N/A		OR	N/A	
					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 number found in the appropriate box in column 1.

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.**

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