

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

PROVISUR TECHNOLOGIES, INC.,
Petitioner,

v.

WEBER MASCHINENBAU GMBH BRIEDENBACH,
Patent Owner.

Case IPR2024-00258
Patent No. 10,647,013

EXPERT DECLARATION OF MR. MICHAEL JOBIN

Inter Partes Review of U.S. Patent No. 10,647,013
Expert Declaration of Mr. Michael Jobin
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PETITIONER EXHIBIT LIST

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1001	U.S. Patent No. 10,647,013
1002	File Wrapper for U.S. Patent No. 10,647,013
1003	Expert Declaration of Mr. Michael Jobin in Support of Pettition for <i>Inter PARTes</i> Review of U.S. Patent No. 10,647,013
1004	U.S. Patent Pub. No. 2016/0023370 (“Müller”)
1005	U.S. Patent No. 3,848,757 (“Jordan”)
1006	U.S. Patent No. 4,253,597 (“Waffner”)
1007	U.S. Patent No. 5,697,573 (“Fukuchi”)
1008	U.S. Patent No. 2,921,753 (“Lahti”)
1009	U.S. Patent No. 3,310,249 (“Bryer”)
1010	U.S. Patent No. 4,583,435 (“Fessler”)
1011	Roisum, D., <i>The Mechanics of Web Handling</i> (1998) (Excerpts)
1012	U.S. Patent No. 5,979,308 (“Kägi”)
1013	U.S. Patent No. 6,752,056 (“Weber 056”)
1014	U.S. Pub. No. 2009/0159631 (“DePoi”)
1015	Eggen, T., “Get a Grip on Your Web” (2009)
1016	U.S. Pub. No. 2012/0073249 (“Pryor 249”)
1017	U.S. Pub. No. 2012/0222528 (“Kröhnert”)
1018	Omega High Accuracy Metric Pressure Transducers (2015)

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EX	Description
1019	Segovia, V. and Theorin, A., “History of Control: History of PLC and DCS” (2013)
1020	U.S. Pub. No. 2015/0053057 (“Dreier”)
1021	U.S. Patent No. 9,044,872 (“Pryor 872”)
1022	GEA “DualSlicer” Video (2016)
1023	U.S. Patent No. 9,399,531 (“Pryor 531”)
1024	Weber “Slicer 604” Video (2016)
1025	U.S. Patent No. 11,014,258 (“GEA 258”)
1026	Website of David R Roisum, Ph.D.
1027	Roisum, D. <i>et al.</i> , <i>The Web Handling Handbook</i> (2021) (Excerpts)
1028	“Roisum Library”
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1030	Declaration of Domenic Rizzolo in Support of Authenticity of EX1022
1031	Declaration of Domenic Rizzolo in Support of Authenticity of EX1024
1032	Curriculum Vitae of Mr. Michael Jobin
1033	<i>Provisur v. Weber III</i> , Sept. 5, 2023 Hearing Tr. (Excerpt)

I, Michael Jobin, hereby declare as follows:

1. My name is Michael Jobin. I am currently the Director of Product Development at 908 Devices in Boston, Massachusetts. I have 32 years of experience in product and technology development as a mechanical engineer, consultant and entrepreneur. I have summarized below my professional background, educational background, and patents that I have received. My full curriculum vitae is provided as EX1032. I was asked to provide an analysis of U.S. Patent No. 10,6478,013 (the “’013 patent”) for this proceeding.

I. SUMMARY OF OPINIONS

2. The ’013 patent describes a web-handling apparatus that unrolls from a store a material web, such as paper, and provides the web to a cutting region. Between the store and the cutting region, the apparatus forms a loop of the material.

3. The patent describes that the apparatus determines the length of the loop using a detection device. The detection device detects changes in pressure in (or airflow through) one or more vacuum chambers that contact the paper loop. The basic principle of this detection and determination is: as the loop length changes, it changes airflow into the vacuum chamber; the device detects this as a pressure drop, changed pressure differential, or changed flow condition; the device then determines the loop size based on this detected change.

4. In the initial examination of Application No. 16/025,612—which led to the '013 patent—the Examiner explained that the basis of allowance was that “use of vacuum measurement as a proxy for loop size is not seen in the loop formation arts.”¹

5. Contrary to the Examiner’s impression, use of a vacuum measurement as a proxy for loop size has been known in the web handling arts for decades prior to the '013 patent as shown by the long record in this proceeding. The prior art taught and rendered obvious all of the features claimed in the challenged claims of the '013 patent. In particular, I have analyzed two “grounds,” (1) the combination of U.S. Pub. No. 2016/0023370 (“Müller”) with U.S. Patent No. 4,253,597 (“Waffner”) and (2) the combination of U.S. Patent No. 3,848,757 (“Jordan”) with U.S. Patent No. 5,697,573 (“Fukuchi”).

6. A person of ordinary skill in the art (“POSA”) would have been motivated to combine the discussed references for several reasons, to allow for high-speed operation and avoid breaking or damaging the paper. A person of ordinary skill in the art would have had a reasonable expectation of success in combining the prior art because, for example, the prior art all relates to similar technologies (e.g., paper-handling technology), and the prior art identifies common, well-known

¹ EX1002, p. 512 (File History, '013 Patent).

arrangements of routine components and techniques. A person of ordinary skill would have expected success in combining the elements based on basic known engineering, design, and mechanical principles before the time of invention. In short, there were several known devices that determined loop length based on a pressure detection and several known or obvious ways to implement vacuum-measurement loop detectors, including as claimed.

II. BACKGROUND AND QUALIFICATIONS

A. Educational Background

7. I received two degrees from the University of Michigan in 1991, a Bachelor of Science, Engineering with a focus on mechanical engineering, and a Bachelor of Fine Arts, Industrial Design with a focus on product development, both cum laude. I was the recipient of the Kiefer Award for excellence in Industrial Design.

B. Career History

8. After my undergraduate degrees, I was hired as a program manager by Design 4 Plastics, Inc. I leveraged my industrial design and engineering education to develop a wide range of products. My projects included a heavy emphasis on plastic part design (including injection molding, rotational molding, vacuum and pressure forming) and sheet metal fabrication (stamping, forming). While there, I designed fluid pumps for laboratory and industrial fluid dispensing applications and

a custom impeller pump for insufflation of the abdomen during laparoscopic surgery.

I also designed a custom device for scanning trade show badges.

9. Next, in 1996, I joined Proteus, Inc. as Senior Mechanical Engineer. There, I focused on product design and engineering of products for consumer, medical, and laboratory applications. For example, I developed a disposable cartridge for laboratory analysis of blood samples. Precision vacuum control was used to move samples through calibrated tubing to analyze blood clotting characteristics. I also designed consumer products such as water filters and electric fans. *See, e.g.*, U.S. Pat. No. D425,979.

10. I founded Boston Innovation in 1998, focusing on developing precision fluidic dispensing instruments for pharmaceutical research applications that leveraged a novel pressure activated valve technology that I invented. In these instruments, sample fluid was stored in small sealed reservoirs, and precision low volumes dispensed by the translation of a needle and application of a rinse fluid and/or air pressure. *See, e.g.*, U.S. Pat. Nos. 6,085,773 and 6,706,538.

11. In 2000, I joined Arthur D. Little, where I led mechanical engineering of a next-generation network storage product, integrating contributions of mechanical, software, hardware and industrial designers. I developed cooling systems integrating fans and temperature sensors.

12. I founded MicroBioSciences in 2001. There, I invented and developed novel disposable fluid handling cartridges for high throughput screening in pharmaceutical research. Precision controlled pressure and vacuum was used to deliver and retrieve samples.

13. Later in 2001, I joined Altitude, Inc., a product development consulting firm, first as Engineering Manager, and then I was promoted to Director of Engineering in 2005. I performed design and engineering activities, and led a team of designers and engineers to develop a wide range of consumer products, medical devices and instrumentation.

14. In 2008 I founded Aston Technology Advisors, and continued with product development and consulting activities.

15. In 2012, I cofounded 908 Devices Inc. to develop portable chemical detection instrumentation based on mass spectroscopy. Here I have developed various instruments with applications in pharmaceutical research, forensics and hazardous material identification at the point of need. These instruments include complex fluid handling, motion control and pressure control systems, custom vacuum pumps, pressure regulators and pressure sensors. *See* U.S. Pat. Nos. D703,074; D703,075; 9,093,253; 9,502,226; 9,698,000; 9,978,574; 10,438,787.

C. Machines and Equipment – General Background

16. In my career, I have designed, developed, and/or analyzed many different types of machines and automation equipment.

17. I developed a range of mechanical and electric consumer products including desktop and stand fans, oscillating tower fans, heaters and humidifiers.

18. I developed the first integrated ice shaving and blending frozen drink appliances for home use. These products included a reservoir for ice, a robust motor and rotary ice shaving blade, a blender and electronic controls.

19. I developed a wine preservation and dispensing system for home use. The product stored multiple wine bottles at the user-selected optimum temperature using thermoelectric chiller technology, and used valves and air pressure for dispensing, and vacuum for preservation.

20. I developed an instrument that uses sound to measure wind. This included patented custom speakers and a novel heating system for melting snow. I developed manufacturing fixtures using vacuum bagging for assembly of custom laminated structures. *See* U.S. Pat. Nos. 8,958,269 and 9,279,821.

21. I developed a handheld eye medication dispenser. This product included a custom disposable fluid cartridge and ultrasonic dispensing technology. *See* U.S. Pat. Nos. D597,206; 8,545,463; 8,012,136.

22. Throughout my professional career, I have designed products that have won various awards, including: Industrial Designers Society of America (IDSA) IDEA Awards, R&D 100, The Scientist Top 10 Innovations, and The Instrument Business Outlook Industrial Design Gold Award.

D. Patents

23. I am a named inventor on nineteen issued utility patents and six issued design patents, listed in my CV.² These patents range in technologies from consumer products to medical devices to instrumentation, and address technical issues like precision fluid handling, heating systems, and compact mass spectroscopy.

E. Other Relevant Qualifications

24. I have served as an expert in multiple cases. For example, in *Keurig, Inc. v. Kappos*, I was hired on behalf of the United States Patent & Trademark Office as an expert regarding technical concepts related to a USPTO Examiner's rejection of patent claims around Keurig's K-Cup coffee pods, including analysis of relevant prior art. Key issues included high volume manufacturing of thermoformed plastic pods, forming and assembly of filter baskets and fluid flow through the system under high pressure. Ultimately, the USPTO Examiner's rejection was affirmed on appeal.

² EX1032.

III. MATERIALS CONSIDERED AND METHODOLOGY

25. I reviewed and considered all materials listed or referenced anywhere within the body of this report, including all exhibits cited by Petitioner in this proceeding.

26. My current *curriculum vitae* is provided in EX1032.

27. I am being compensated for my time in connection with this expert analysis at my standard consulting rate of \$350 per hour. Expenses are billed at cost. My compensation does not depend in any way on the content of my testimony and it is not affected by the outcome of the case. Furthermore, I have no financial ties to Provisur, and I will not financially benefit from any outcome in this case beyond my hourly consulting fee.

28. When called upon as an expert witness in a patent matter, I employ a rigorous methodology to arrive at my conclusions. This includes reviewing all the relevant materials including file history, the patents, prior art references and other relevant documents, analyzing all issues in detail and formulating conclusions.

29. In preparing this declaration, I may include certain demonstrative illustrations or annotated images. My intent with these illustrations is to aid in the understanding of the machines disclosed in the '013 patent or prior art references. These illustrations focus on what I determine to be the relevant components of the

system represented, and do not show, for example, every component or part of such a system, the precise arrangement of components or parts in that system, or the relative scale of components or parts in that system. The illustrations simply help to clarify certain conclusions about the '013 patent, prior art references, and the prior art combinations in the grounds.

IV. LEGAL STANDARDS

30. I am not an attorney, and I am not offering any opinions on the law in this proceeding. Counsel for Petitioner has generally informed me of the following legal standards that are relevant to my analysis. I have considered these standards in arriving at my conclusions.

31. I generally understand that *Inter Partes Review* (“IPR”) is an administrative proceeding before the United States Patent & Trademark Office (“Patent Office”) for evaluating the patentability of an issued patent claim. IPR essentially allows the Patent Office to reconsider a patent claim that the Patent Office has already issued as patentable and to reconsider if it is still patentable.

32. I understand that a patent claim is a legal description of the scope of the intellectual property patent right (akin to a proverbial fence or deed around a piece of real property). At least one patent claim is included at the end of each patent and includes numbered sets of claim language. I have been told that the specific language

or parts of each patent claim may be referred to as claim features, elements, and/or limitations depending on the context.

33. I am informed that there are two types of U.S. patent claims: (1) independent claims, and (2) dependent claims. Independent claims include only the elements expressly stated in the properly interpreted independent claim. Dependent claims include the elements expressly stated in that dependent claim and any elements expressly stated in any other claim(s) from which that claim depends.

34. I understand that the meaning of a patent's claims is construed by courts as a question of law. I understand that in an IPR, the Court applies the same standard in construing claims as does a district court. This is referred to as the *Phillips* standard. Under the *Phillips* standard, the Court will give primary consideration to "intrinsic" evidence, including the patent claims, the patent specification, and the patent file history. The Court will give secondary consideration to "extrinsic" evidence, such as expert testimony or dictionary definitions.

35. I understand that a patent claim may be expressed as a means or step for performing a specified function, without the recital of structure, material or acts in support of that function. In such a case, the claim shall be construed to cover the corresponding structure, material, or acts described in the specification (and equivalents). I understand that this may be referred to as "means plus function"

claiming or 35 U.S.C. ¶ 112 (f) claiming. I understand that a claim does not necessarily have to use the term “means for” to indicate a means plus function claim. Other so-called “nonce” words that do not describe sufficient structure, such as a “device for” may indicate means plus function claiming.

36. For IPRs, I understand that the Patent Office may consider whether earlier publications and patents, generally referred to as prior art or references, disclose claim features of the patent at issue. I understand prior art may act to make a patent claim unpatentable for two reasons relevant here, referred to by the legal concepts of: (a) anticipation under the 35 U.S.C. § 102 statute, and (b) obviousness under the 35 U.S.C. § 103 statute.

37. I understand that the prior art must be viewed from the hypothetical perspective of a person having ordinary skill in the art (“POSA”) at the time of the invention.

38. I understand a patent claim is unpatentable as anticipated when a single prior art reference discloses every element in the claim.

39. In general, I understand that one or more prior art references that individually disclose fewer than all elements of a patent claim may be relied upon, collectively, to render a patent claim obvious. A patent claim may be obvious if, based on the collective teachings of the prior art, the subject matter of the patent

claim would have been obvious to a POSA at the time of the invention. A POSA may rely on their personal judgment and common sense to reach conclusions that do not explicitly require explanation in a reference.

40. I further understand that a patent claim may be obvious if a POSA would have (1) been motivated to combine the references in a manner that would (2) result in the claimed invention with a reasonable expectation of success. I have also been told that the analysis of whether a claim would have been obvious to a POSA at the time of the invention requires an analysis of four criteria known as the *Graham* factors. The *Graham* factors, from a past U.S. Supreme Court case, are: (1) the level of ordinary skill in the art; (2) the scope and content of the prior art; (3) the differences between the prior art and the claims-at-issue; and (4) objective evidence of non-obviousness, such as commercial success of an invention; a long-felt need that was solved by an invention; copying of an invention by others; praise of an invention; or a surprising result an invention achieved.

41. Also, I understand that the prior art might teach away from the claimed invention if it would discourage a POSA from following the path set out in a reference or would be led in a direction opposite from the path that was taken by the patent's applicant.

42. I understand that when using references in an obviousness rejection under 35 U.S.C. § 103, the cited art must be “analogous art.” In other words, the references must be from the same field of endeavor *or* must be reasonably pertinent to the problem faced by the inventor.

V. LEVEL OF ORDINARY SKILL IN THE ART

43. I understand that for the purposes of this proceeding, Petitioner applies the Board’s prior finding of the level of ordinary skill for a related case. That definition is that a POSA would typically have had (1) a bachelor’s degree (or equivalent) in mechanical engineering (or a similar field) and at least two years of experience working as an engineer (or similar role) on food processing and/or packaging systems (or in a similar field); or (2) at least seven years of experience working as an engineer (or similar role) on food processing and/or packaging systems (or in a similar field). *See Weber v. Provisur*, No. IPR2022-00599, Paper 65, *10-11 (P.T.A.B. Aug. 23, 2023).

44. Further, the Board recognized a POSA would have had knowledge of the technical literature concerning food processing and packaging systems, including conveyor mechanisms (in both food processing and packaging machines, as well as other conveying machines) and may have worked as part of a multidisciplinary team and drawn upon not only her or his own skills, but of others on the team, *e.g.*, to

solve a given problem. In my experience, a POSA would have had access to consulting with subject matter experts, such as in the fields of hygiene, software programming, and web handling.

VI. BACKGROUND IN THE ART AS OF JULY 3, 2017

45. The '013 Patent claims priority to two Foreign Applications: DE102017114761.6, dated July 3, 2017 and DE102017118934.3, dated August 18, 2017. This Technology Background section describes the state of the art before the earliest possible priority date, July 3, 2017.

46. The '013 Patent describes a single or multitrack device in which food products are “cut into slices and interleaved sheets are introduced which are cut off from the provided interleaved sheet material in the cutting region, having a material store; and having a removal device which is configured for a removal of a material web from the material store, wherein a loop store in which the material web forms a loop is provided for the material web.”³

47. It is beneficial to provide interleaved sheets between food slices to facilitate separation of the slices by the customer. “Interleavers, for example pieces of paper, are placed between two slices of food, for example, in order to reduce the

³ EX1001, Abstract ('013 patent).

adhesion thereof to one another...”⁴ Providing these interleaved sheets reliably becomes more difficult at high speeds:

With a high-performance slicer, cutting speeds of between 600 and some thousand cuts per minute are possible. Consecutive slices are thus cut off from the product at a very short time interval in each track. In the small length of time which is available between two consecutive cuts, not only the respective product has to be guided by means of the corresponding product feed device, but an interleaved sheet also optionally has to be provided. The interleaved sheet should therefore be able to be conveyed in a relatively short length of time.⁵

48. Food slicing machines that provide interleaved sheets are not new, they have been known for decades, as the examples shared below will show. Furthermore, the technology behind interleaved sheets is not exclusive to the food slicing industry. Advances made in other paper or web handling applications are highly relevant to enhancing the performance of food slicer interleavers.

A. Web handling is a field of mechanics involving the feed or transport of long, thin “webs” of material.

49. Each of the loop formation patents discussed above relate to a field of mechanics known as “web handling.” Common web materials include paper, film, foil, textiles, tissue, and laminates of those materials.⁶ Web handling is the process

⁴ EX1004, [0002] (Müller).

⁵ EX1020, Col. 1:61-2:3 (Dreier).

⁶ EX1027, p. 16 (Excerpts from the Web Handling Handbook) (The Web Handling Handbook is not prior-art to the ’013, and I do not rely on it for any element, motivation to combine, or expectation of success. Rather, I cite it only for convenient definitions of web handling terminology.)

technology of moving webs through a machine or web line.⁷ It is a collection of arts used to maximize productivity and minimize waste. The principle subject areas of web handling include controls for tension, guiding, rollers and nips, and winding.⁸

50. By the time of the '013 patent it was known that web handling is applicable to many industries. These include, for example:

- Food slicing and paper interleaving, such as disclosed in Bader, Müller, Pryor 872, Pryor 531, Dreier, Weber, Fessler, and Jordan;⁹
- Cigarette making, such as disclosed in Fukuchi;¹⁰
- Printing, such as disclosed in Waffner and Kröhnert;¹¹
- Magnetic tape systems, such as disclosed in Lahti and Bryer;¹²

51. At the time of the '013 patent, web handling was a well-developed field.

Peer reviewed scientific articles and papers in the web handling arts date back more than fifty years.¹³ Textbooks on the art of web handling date back more than thirty

⁷ EX1027, p. 16 (Excerpts from the Web Handling Handbook) (The Web Handling Handbook is not prior-art to the '013, and I do not rely on it for any element, motivation to combine, or expectation of success. Rather, I cite it only for convenient definitions of web handling terminology.)

⁸ EX1011, p. 9-11 (Excerpts from The Mechanics of Web Handling).

⁹ EX1025 (Bader); EX1004 (Müller); EX1021 (Pryor 872); EX1023; (Pryor 531); EX1020 (Dreier); EX1013 (Weber); EX1010 (Fessler); EX1005 (Jordan).

¹⁰ EX1007 (Fukuchi).

¹¹ EX1006 (Waffner); EX1017 (Kröhnert).

¹² EX1008 (Lahti); EX1009 (Bryer).

¹³ See, EX1028 (Roisum Library) (referencing, e.g., Smith, J.O. and Liu Chang Keng "Stresses Due to Tangential and Normal Loads on an Elastic Solid," *J. of Applied Mechs.*, vol. 18 (Jan. 1, 1951); Parish, GJ, "Apparent Slip Between Metal and Rubber Covered Pressure Rollers," *British J. of Applied Phys.*, vol. 9 (Sept. 1, 1958)).

years.¹⁴ At least fifteen books, most of which were in-print at the time of the '013 patent, exist dedicated to web handling.¹⁵ A freely available online “library” directs artisans to over 4,000 articles, books, columns, conference papers, and other publications on this subject.¹⁶ Versions of this library have existed for over a decade:¹⁷

Welcome to the **Roisum Library**. Feel free to use the general search (top) or individual terms (below) Help

Search all columns:

Keywords	Title	Abstract	Pub_Date	Author	Reference	Type	Link
paper; fillers; cof	The effect of fillers on paper friction properties	filler types included hydrous kaolin, calcined kaolin, talc, and synthetic precipitated silica and silicate (PSS) pigments	01-Apr-91		TAPPI JOURNAL, April 1991, Vol. 74(4)	magazine	h C
drive; design; application; shortcourse	Paper Machine Drives Shortcourse Notes		14-Mar-95		TAPPI Shortcourse	Book	
roller; bearing; temperature; lubrication; design	Roller Bearing, Life in High Temperatures		01-May-11		Pulp and Paper International, pp 35-39, May 2011	magazine	h st
guide; edge; sensor	Fiber-optic web-position sensing: edge, line/contrast position measurement via		01-Jul-16	Seshadri, Aravind	Converting Quarterly, qtr 3, 2016	magazine	

Keywords Title Abstract From Year Author Reference Type Link

2016

Showing 1 to 3,981 of 3,981 entries (filtered from 4,056 total entries)

Updated December 2016 © Copyright 2012-16 [Abbott Apps](#)

Screen capture of <https://www.stevenabbott.co.uk/abbottapps/RL/index.html>, accessed Dec, 5, 2023.

¹⁴ See, EX1028 (Roisum Library) (referencing, e.g., Hashimoto, Hiromu *Theory and Application of Web Handling* (July 9, 1905); Weiss, Herbert L., *Control Systems fir Web-Fed Machinery* (Jan. 1, 1983); Roisum, David R., *The Mechanics of Web Handling* (Jan. 1, 1998)).

¹⁵ See, EX1028 (Roisum Library).

¹⁶ See, EX1028 (Roisum Library).

¹⁷ The “Roisum Library” is hosted at <https://www.stevenabbott.co.uk/abbottapps/RL/index.html> and bears an inscription of “Updated December 2016 © Copyright 2012-16 Abbott Apps.” Using the filters available, I note that 3,981 entries have publication dates before 2017.

There are currently active web handling experts that have consulted on these arts since at least 1991.¹⁸

52. An ordinarily skilled person in the food processing industry would be aware of web handling techniques. Interleaver systems typically deliver the sheet and pause for the cutting operation. As cutting speeds increase to 600+ cuts per minute, each sheet must be delivered in <100 ms. This requires the interleaver web to accelerate and decelerate very quickly at the delivery end. If not properly handled, the web can break or jam. High speed web handling techniques from other applications are relevant to solving these challenges.

B. It was known in the web handling arts to use a vacuum measurement as a proxy for loop size.

53. In 1960, a patent to A. A. Lahti *et al.* on a “Tape Transport System” (“Lahti”) issued as U.S. Patent No. 2,921,753.¹⁹ This patent teaches four “vacuum operated switch[es]” that served as short and long loop length sensors.²⁰ Lahti teaches that “[w]here slack loops are employed in a tape transport system, some means must be provided ... to keep the slack loops at an optimum length.”²¹ Lahti teaches sensors that actuate a microswitch in response to changes in vacuum pressure

¹⁸ EX1026 (Roium Website) (<https://www.davidroium.com/what-we-do>).

¹⁹ EX1008 (Lahti).

²⁰ EX1008, Col. 6:75-7:29, Fig. 1 (Lahti).

²¹ EX1008, Col. 1:45-50 (Lahti).

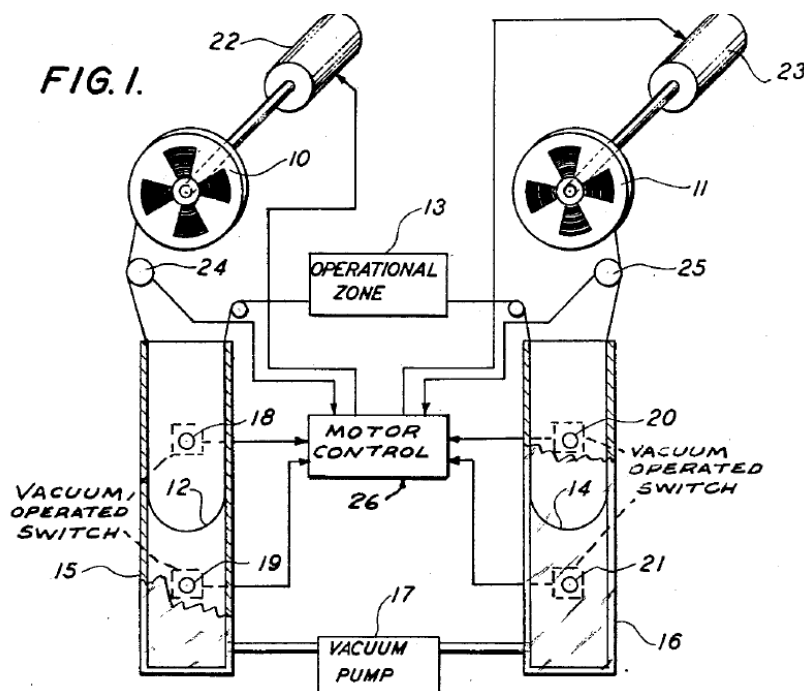
as a slack loop of web material changes size.²² Lahti explains that this arrangement is “simple of construction and reliable in operation.”²³ Of note, Lahti teaches that using a vacuum sensor is interchangeable with other techniques for measuring loop length, such as a “light source [] and a photocell” or a pivoting “extension” in contact with two microswitches.²⁴ And Lahti teaches that the techniques described are not limited to “magnetic tape recording systems,” but “may be used to advantage in any transport system in which a flexible material, such as tape, is to be moved past an operational zone.”²⁵ A POSA would understand Lahti to teach using a vacuum measurement as a proxy for loop size in a web-handling apparatus.

²² EX1008, Col. 6:75-7:29, Fig. 1 (Lahti).

²³ EX1008, Col. 1:58-65 (Lahti).

²⁴ EX1008, Col. 7:36-64 (Lahti).

²⁵ EX1008, Col. 8:16-24 (Lahti).



EX1008, "Lahti" at Fig. 1

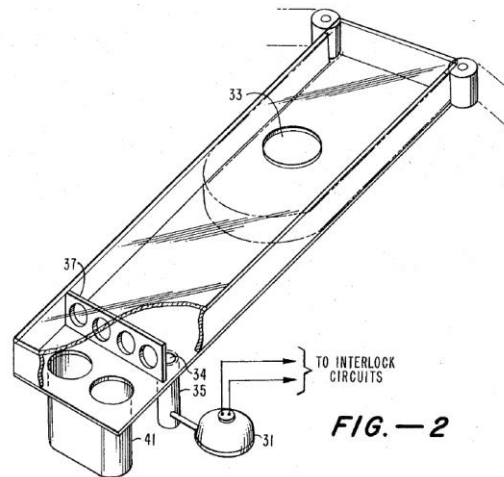
54. In 1967, a patent to Philip S. Bryer *et al.* for a "Loop Fault Sensing Means for Web Transport Systems" ("Bryer") issued as U.S. Patent No. 3,310,249.²⁶ Bryer teaches the use of a "sensor 31," which comprises a "pressure sensitive device."²⁷ Bryer further teaches that, "the pressure at the sensor 31 is raised toward atmosphere to an approximately equal extent whether the extremely long loop or extremely short loop condition exists."²⁸ Bryer teaches that in the known art, "long and short loop safety sensing devices are usually in the form of pressure sensitive

²⁶ EX1009 (Bryer).

²⁷ EX1009, Col. 2:12-31; 3:9-16; 3:17-4:66 (Bryer), Fig. 1, Fig. 2 (Bryer).

²⁸ EX1009, Col. 3:43-47 (Bryer).

switches.”²⁹ A POSA would understand Bryer to teach using a vacuum measurement as a proxy for loop size in a web-handling apparatus. A POSA would further understand that Bryer taught that using a vacuum measurement as a proxy for loop size in web handling apparatus was the “usual” technique.



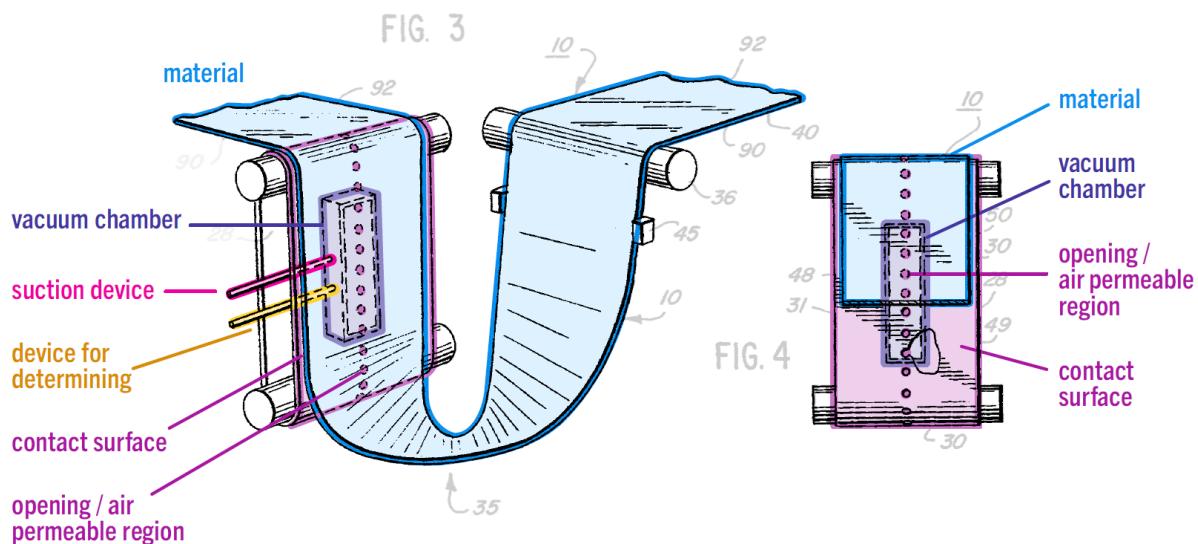
EX1009, “Bryer” at Fig. 2

55. In 1981, a patent to William D. Waffner for a “Loose Loop Feed Control Apparatus” (“Waffner”) issued as U.S. Patent No. 4,253,597. Waffner disclosed a loose loop feed control apparatus which “is utilized to control the infeed speed of a continuous web so that a loose loop is formed and maintained in the web so as to substantially eliminate damage to the web.”³⁰ At the entry to the loose loop, the web passes over a continuous belt with apertures that communicate with a vacuum chamber. The “degree of vacuum in the chamber 50 will depend upon the

²⁹ EX1009, Col. 1:63-65 (Bryer).

³⁰ EX1006, 2:59-62. Fig. 1 (Waffner).

number of apertures 30 in the belt 28 which are covered by the downwardly descending portion of the loop”³¹ The vacuum level in the chamber changes depending upon the level of the loop, and this change in pressure is used to adjust the infeed speed to control the loop length. A POSA would understand Waffner to teach using a vacuum measurement as a proxy for loop size in a web-handling apparatus.



EX1006, “Waffner” at Fig. 3, 4 (annotated)

56. Waffner, which serves as a reference for Ground 1, is discussed in additional detail in Section XI.A below.

57. In 1997, a patent to Junichi Fukuchi *et al.* for an “Apparatus for Stably Transferring Belt-Like Material” (“Fukuchi”) issued as U.S. Patent No. 5,697,573.

³¹ EX1006, 5:13-20, Fig. 3 (Waffner).

Fukuchi disclosed an apparatus for “stably transferring belt-like material, which can be instantaneously started at high speed and stopped”.³² The apparatus comprises reels for supplying and receiving belt-like material, and dual “reserving chambers” to accept loops of the belt-like material. These chambers have means “for detecting the internal pressure of the pressure detecting chamber changing in accordance with the amount of absorbing and feeding belt-like material absorbed and fed to the reserving chamber so as to convert the detected internal pressure to an electrical signal.”³³ A POSA would understand Fukuchi to teach using a vacuum measurement as a proxy for loop size in a web-handling apparatus.

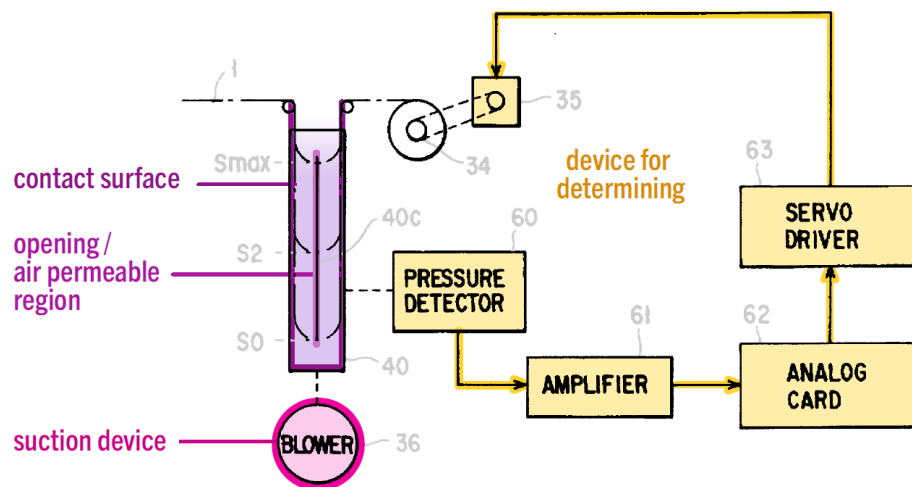


FIG. 8

EX1007, “Fukuchi” at Fig. 8 (annotated)

³² EX1007, 2:23-27 (Fukuchi).

³³ EX1007, 3:14-18, Fig. 8 (Fukuchi).

58. Although Fukuchi’s primary embodiment is for “forming fine holes” in “chip paper,” Fukuchi explicitly teaches that the invention applies to “an apparatus for printing or processing wrapping paper cut to a predetermined size.”³⁴ A POSA would recognize that Fukuchi’s techniques could be applied to paper-cutting systems. Common to both hole-forming and paper-cutting, Fukuchi discusses complications raised when paper material must be “started at high speed” and “instantaneously stopped.”³⁵ Namely, “there is [a] possibility that [] paper will be broken.”³⁶ Fukuchi teaches that loop “control... based on the internal pressure of a pressure detecting chamber changing in accordance with the amount of [loop] material” is a technique that allows “the operation of the apparatus [to] be instantaneously started or stopped at high speed.”³⁷ With this technique “breakage of the belt-like material can be prevented.”³⁸

59. Fukuchi, which serves as a reference for Ground 2, is discussed in additional detail in Section XII.A below.

³⁴ EX1007, Col. 1:13-34, 2:17-20 (Fukuchi).

³⁵ EX1007, Col. 2:6-16 (Fukuchi).

³⁶ EX1007, Col. 2:6-16 (Fukuchi).

³⁷ EX1007, Col. 3:56-4:8 (Fukuchi).

³⁸ EX1007, Col. 3:56-4:8 (Fukuchi).

C. It was known in the web handling arts to use a vacuum to increase friction on the web material leaving the loop.

60. In 2009, a patent application to DePoi *et al.* for “Tension Control for a Sheet Material Feeder” (“DePoi”) published as U.S. Pub. No. 2009/0159631. DePoi disclosed a sheet material feeder with features designed to control tension in the sheet material web in applications with rapid start/stop motions.³⁹ The invention relates to “a sheet material feeder comprising a sheet material web, a vacuum box applying a tension force to a portion of the sheet material web extending into the vacuum box, a second drive pulling the sheet material web out of the vacuum box, and a system for applying a braking force to the sheet material web proximate to the vacuum box only during a decelerating movement of the sheet material web at the second drive.”⁴⁰ In one embodiment, the brake is an intermittent vacuum force that pulls the web against the wall of the vacuum box when needed.⁴¹

³⁹ EX1014, (DePoi).

⁴⁰ EX1014, [0005], Fig. 3 (DePoi).

⁴¹ EX1014, [0029], Fig. 3 (DePoi).

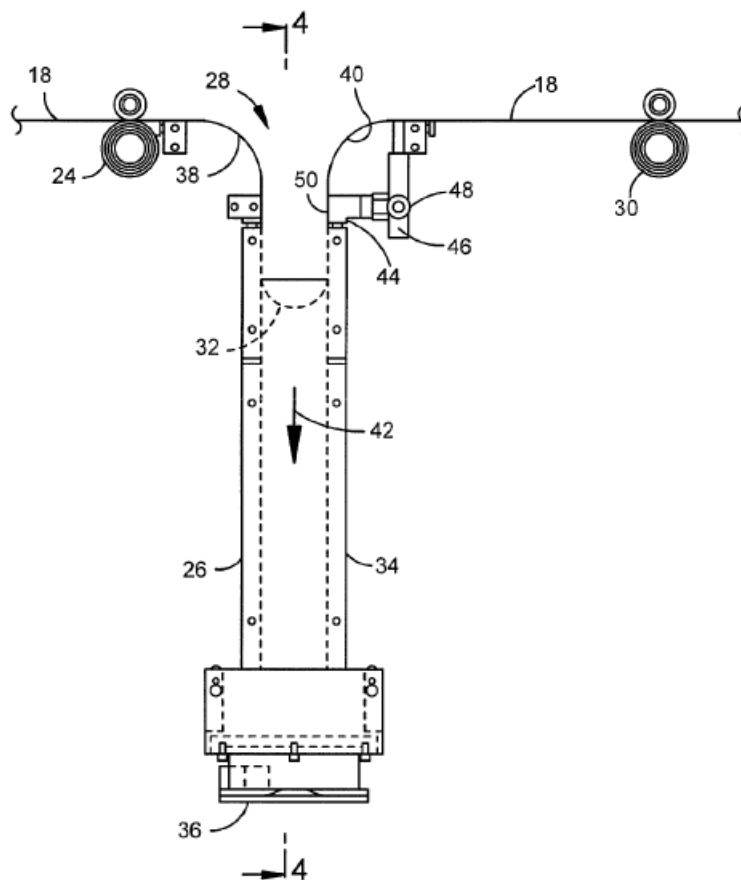


FIG.3

EX1014, “DePoi” at Fig. 3

61. In 2012, a patent application to Kröhnert *et al.* for a “Device for Cutting Paper Webs” (“Kröhnert”) published as U.S. Pub. No. 2012/0222528. Kröhnert disclosed a device for cutting paper webs, comprising “a substantially continuously operated region of a paper supply, a discontinuously operated region of transverse severing for transversely separating the paper web, and a buffer region (15) for

coupling the continuously and discontinuously operating regions.”⁴² Additionally, a “...braking zone is provided by virtue of a negative pressure being generated along, for example below, the paper webs emerging from the receptacle or receptacles, so as to thus prevent an uncontrolled paper movement.”⁴³

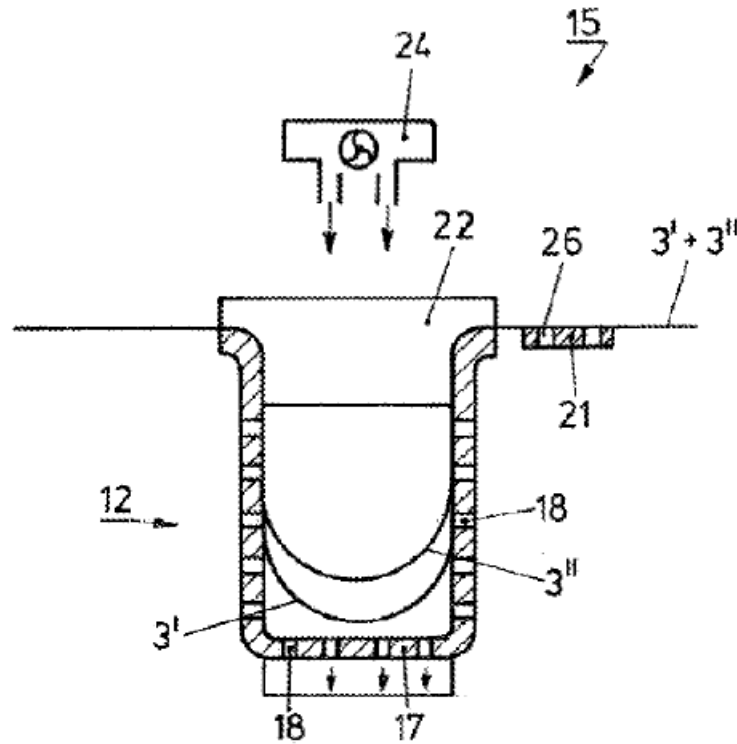


FIG. 3a

EX1017, “Kröhnert” at Fig. 3a

⁴² EX1017, Abstract (Kröhnert).

⁴³ Ex. 100K, [0020], Fig 3a (Kröhnert).

D. Food slicers with interleavers were known.

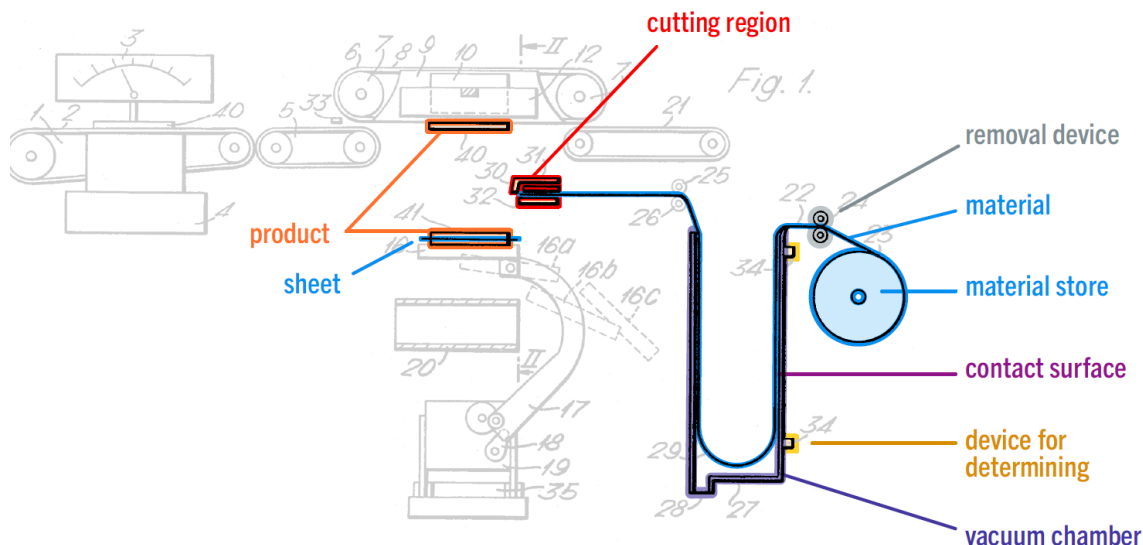
62. The inventors of the '013 patent recognized that slicers with interleavers were “generally known in the field of the slicing of food products.”⁴⁴ Having reviewed prior art materials, I agree with this characterization. The use of a web-handling “interleaver” in the field of slicing food products appears to have been generally known by that time.

63. In 1974, a patent to Ingo Jordan for “Sorting and Stacking of Food Slices” (“Jordan”) issued as U.S. Patent No. 3,848,757. Jordan disclosed a device for the conveying, sorting and stacking of food slices, designed to be combined with known high-speed slicing machines. The device included a paper feed and cutting arrangement that “...enables sheets of paper to be interleaved between the individual slices...”⁴⁵ Jordan disclosed a loop formed in the web between feed and take-up rollers, noting “It has been found that the paper can be fed in at high speed in this way.”⁴⁶

⁴⁴ EX1001, Col. 1:38-40 ('013 patent).

⁴⁵ See EX1005, Col. 1:53-55, Fig. 1 (Jordan).

⁴⁶ EX1005, Col. 3:35-39, Fig. 1 (Jordan).



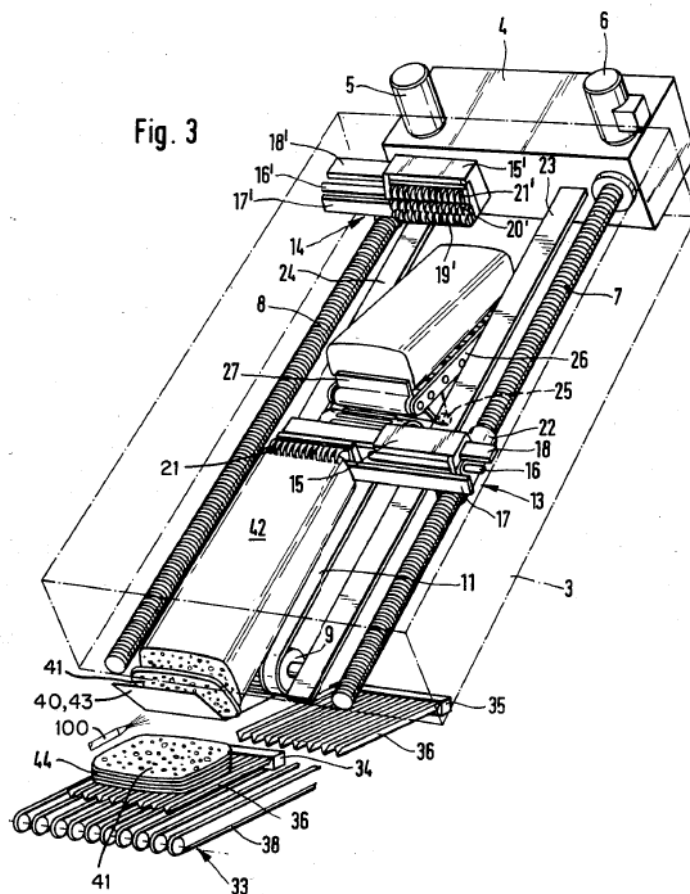
EX1005, “Jordan” at Fig. 1 (annotated)

64. Jordan, which serves as a reference for Ground 2, is discussed in additional detail in Section XII.A below.

65. In 1986, a patent to Ewald Fessler for a “Slab Cutting Machine” (“Fessler”) issued as U.S. Patent No. 4,583,435.⁴⁷ Here, “the front end of the paper web is disposed near the lower front edge of the slab so that, simultaneously with cutting the slices, sheets of paper are also severed from the paper web to facilitate subsequent separation of the slices. An exact positioning of the severed sheets on the slices is facilitated by an air jet nozzle which blows the front advanced end of the paper web against the cut face of the slab.”⁴⁸

⁴⁷ See EX1010 (Fessler).

⁴⁸ EX1010, 3:22-30, Fig. 3 (Fessler).

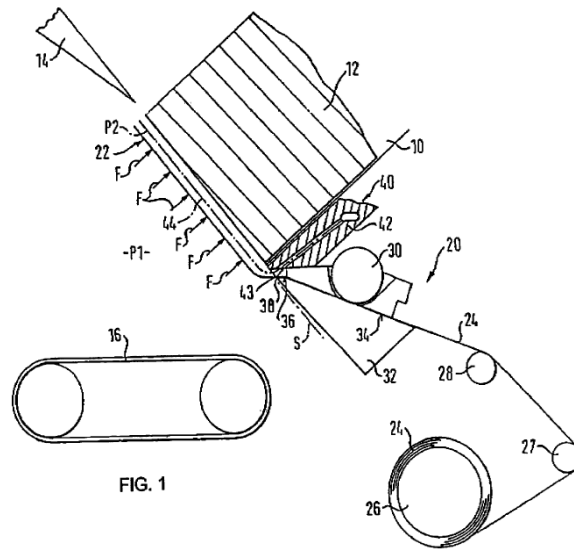


EX1010, “Fessler” at Fig. 3,

66. In 2004, a patent to Guenther Weber for an “Intercalated Sheet Feeding Device for a Cold Cuts Slicer” (“Weber 056”) issued as U.S. Patent No. 6,752,056. Weber disclosed a device for food slicing with an improved interleaver delivery system.⁴⁹ This device delivers compressed air between the food product and the sheet, which “has the effect that the pressure becomes lower in this region between the continuous strip and the food product than the air pressure outside this region

⁴⁹ See EX1013 (Weber 056).

and thus also the air pressure at the other side of the continuous strip. The continuous strip is thereby sucked toward the surface of the product located in the cutting plane. The continuous strip can, however, not contact the product since the continuously supplied air prevents this.”⁵⁰



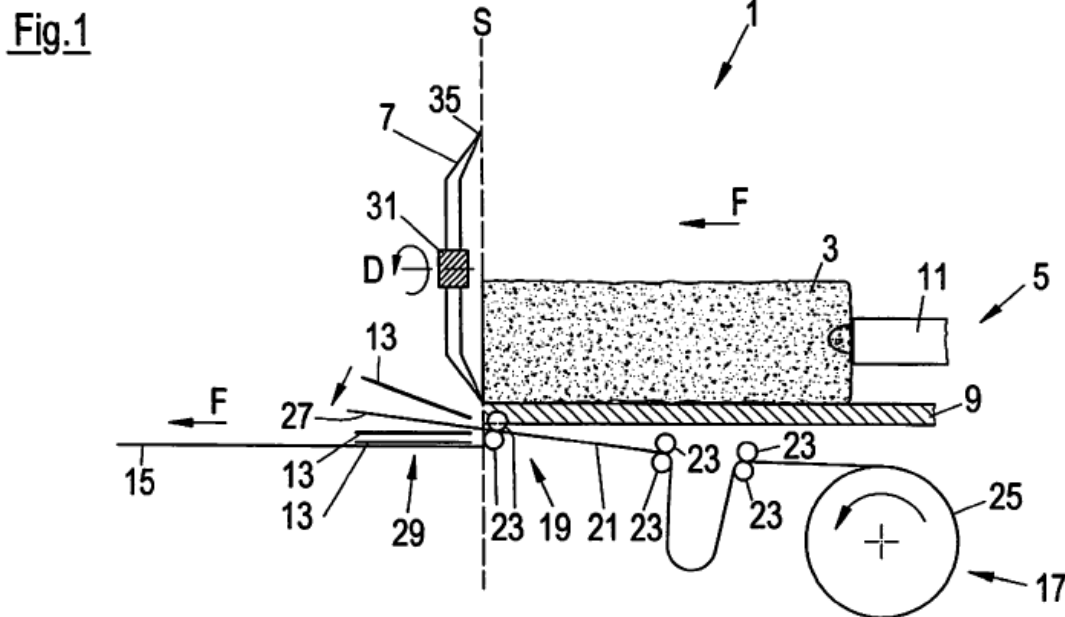
EX1013, "Weber 056" at Fig. 1

67. In 2015, a patent application to Dreier *et al.*, for an “Apparatus for Slicing Food Products and Method of Providing Intermediate Sheets” (“Dreier”) published as U.S. Pub. No. 2015/0053057.⁵¹ Dreier taught a combined slicing-and-interleaving apparatus, where food product and material web were each advanced

⁵⁰ EX1013, 1:29-37, Fig 1 (Weber 056).

⁵¹ EX1020 (Dreier).

along a “plurality of tracks” to a “cutting plane.”⁵² Dreier teaches the material web forming a loop between the supply and the cutting region:



EX1020, “Dreier” at Fig. 1.

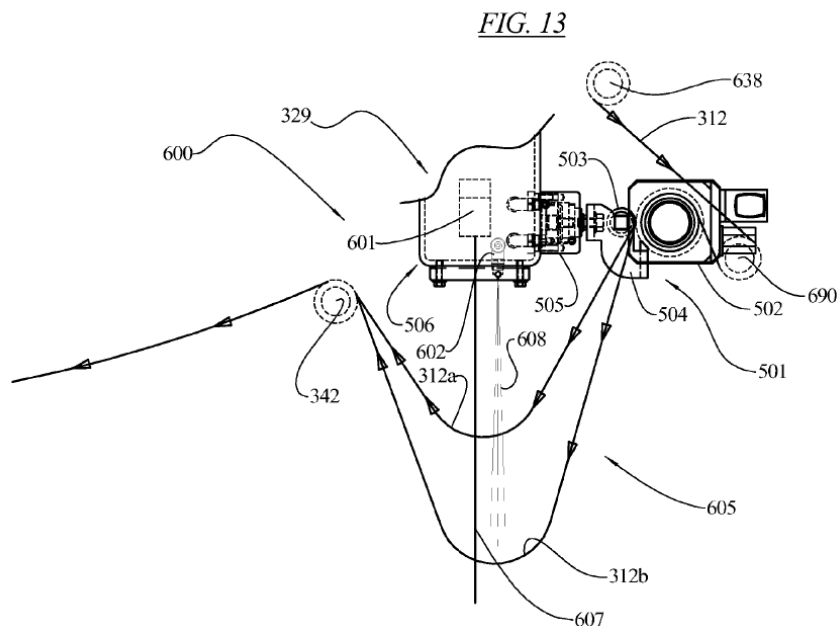
68. In 2015, a patent to Pryor *et al.* for an “Interleaver System for High Speed Slicing Machine” (“Pryor 872”) issued as U.S. Patent No. 9,044,872.⁵³ The interleaver system includes a servomotor that “...can be controlled to interleave a sheet between every cut slice, or only interleave sheets between some cut slices but not others.”⁵⁴ Further, Pryor directs “an air stream onto a side of the slackened length

⁵² EX1020, Abstract (Dreier).

⁵³ See EX1021, (Pryor 872).

⁵⁴ EX1021, 3:44-47 (Pryor 872).

to maintain a tension on the slackened length of web material in the accumulation station.”⁵⁵



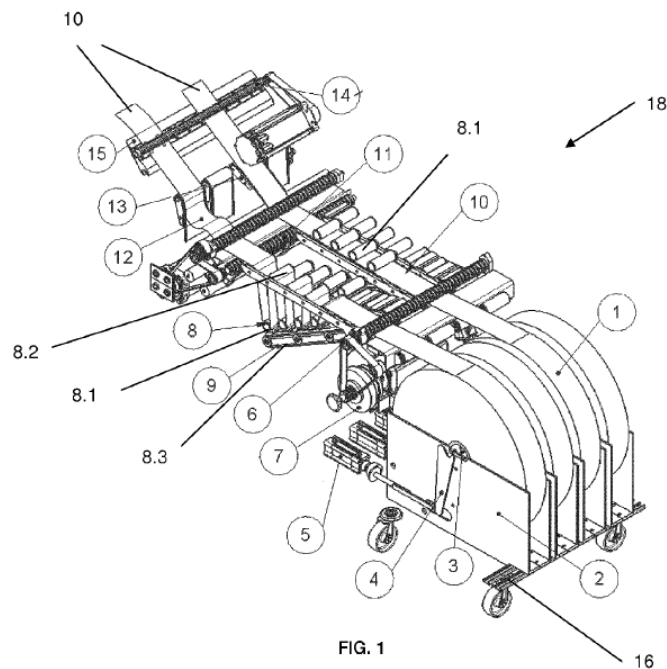
EX1021, “Pryor” at Fig. 13

69. In 2016, a patent application to Ralf-Peter Müller for an “Unreeling Device for an Interleaver Reel, and System Consisting of a Slitting Devices and the Unreeling Device” (“Müller”) published as U.S. Pub. No. 2016/0023370. Müller disclosed a multitrack interleaver reel system for use with high-speed slicers in which each track can operate independently.⁵⁶ The system includes two buffers for the interleaver. The first is a loop that “preferably buffers only as much interleaver

⁵⁵ EX1021, 3:56-58, Fig. 13 (Pryor 872).

⁵⁶ See EX1004 (Müller).

as is needed for the ejection of an interleaver.”⁵⁷ The second larger buffer is a combination of stationary and movable rollers, which allows the reels to be operated at lower accelerations.⁵⁸



EX1004, “Müller” at Fig. 1

70. Müller, which serves as a reference for Ground 1, is discussed in additional detail in Section XI.A below.

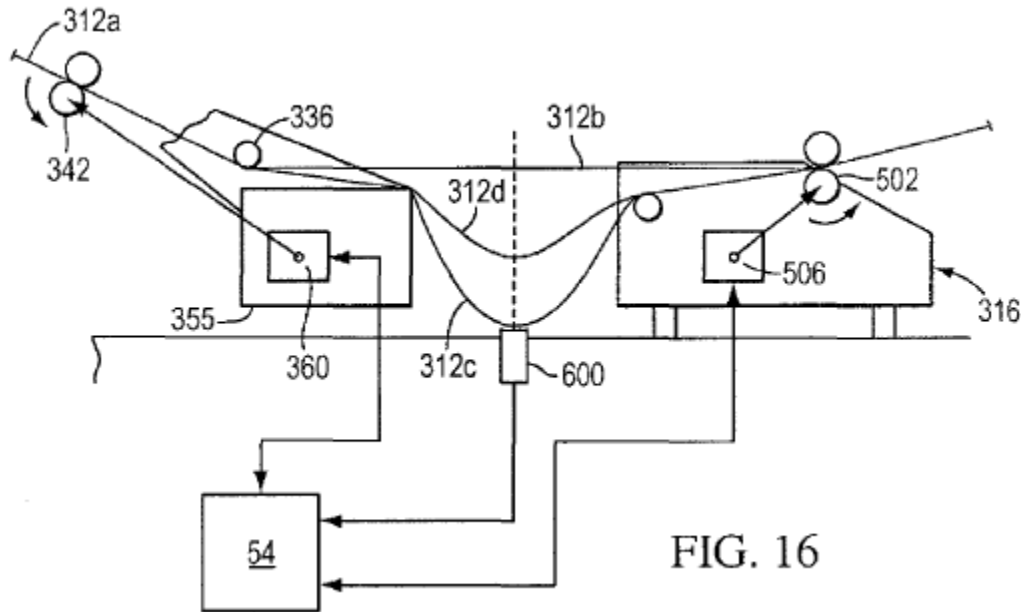
71. In 2016, a patent to Pryor *et al.*, for a “Sheet Interleaver for Slicing Apparatus (“Pryor 531”) issued as U.S. Patent No. 9,399,531.⁵⁹ Pryor 531 taught a

⁵⁷ EX1004, [0048], Fig. 1 (Müller).

⁵⁸ EX1004, [0048], Fig. 1 (Müller).

⁵⁹ EX1023 (Pryor 531).

combined slicing-and-interleaving apparatus, with “a slicing plane for slicing an elongated food product and a sheet from a web material.”⁶⁰ Pryor 531 teaches the material web forming a loop between the supply and the cutting region:



EX1023, “Pryor 531” at Fig. 16.

72. In 2021, a patent to Bader *et al.*, for a “Delay Unit, Unrolling Device, Cutting Machine and Method for Providing Separating Material” (“GEA 258”) issued as U.S. Patent No. 11,014,258.⁶¹ GEA is an example of what was known by a POSA around the time of the ’013 patent. GEA 258 taught a combined slicing-

⁶⁰ EX1023, Abstract (Pryor 531).

⁶¹ EX1025 (GEA 258).

and-interleaving machine with a “knife” that “severs foodstuff” and cuts “separating material” in a “cutting region.”⁶²

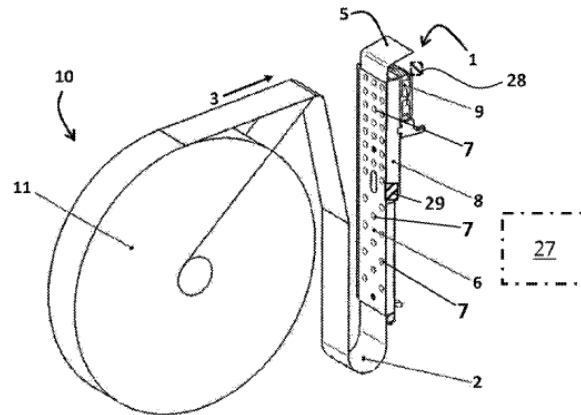


Fig. 1

EX1025, “GEA 258” at Fig. 1

73. In addition to these patent publications, I have determined based on my review of the record that food slicers with paper interleavers were manufactured and offered for sale in the industry and were part of the knowledge in the art before the ‘013 patent. For example, GEA published a video of its “DualSlicer” slicing a cheese product along with a paper interleaver material in order to create interleaved stacks of cheese slices and paper leaves.⁶³ For further example, Weber published a video of its Slicer 604 slicing a cheese product along with a paper interleaver

⁶² EX1025, Abstract (GEA 258).

⁶³ EX1022 (GEA DualSlicer Video) (<https://video.gea.com/gea-dualslicer>); EX1030 (showing May 30, 2016 publication date of GEA DualSlicer Video).

material in order to create interleaved stacks of cheese slices and paper leafs.⁶⁴ Based on metadata associated with these videos, I understand that the GEA DualSlicer Video was published by May 30, 2016 and the Weber Slicer 604 Video was published by August 25, 2016. A POSA would have been aware that these slicers with interleavers represented the state of the art at the time of the '013 patent.



EX1022, “GEA DualSlicer Video”; EX1024, “Weber Slicer 604 Video”

74. I also note that many of the patent publications I reviewed were assigned to companies engaged in the manufacture and sale of high-speed slicers. For example, Müller and Bader were assigned to GEA. Dreier and Weber were assigned to Weber. And Pryor 531 and Pryor 872 were assigned to Provisur.

⁶⁴ EX1024 (Weber Slicer 604 Video) (https://www.youtube.com/watch?v=caL_C4AqnyA); EX1031 (showing Aug. 25, 2016 publication date of Weber Slicer 604 video).

75. It is my opinion that at the time of the '013 patent, the “basic principle of an interleaver” was known to a POSA.⁶⁵ From my review of the prior art, these “basic principles” include, at the very minimum: using a web-handling apparatus to feed paper or other material from a material store to a cutting plane; using a slicing apparatus with product feeds to feed food products along tracks to the same cutting plane; and using a single blade to slice the food product and sever an interleaf from the paper, resulting in stacks of interleaved food slices and paper leaves. And as discussed below, it was also conventional to apply web-handling techniques, such as a loop store, to improve this process.

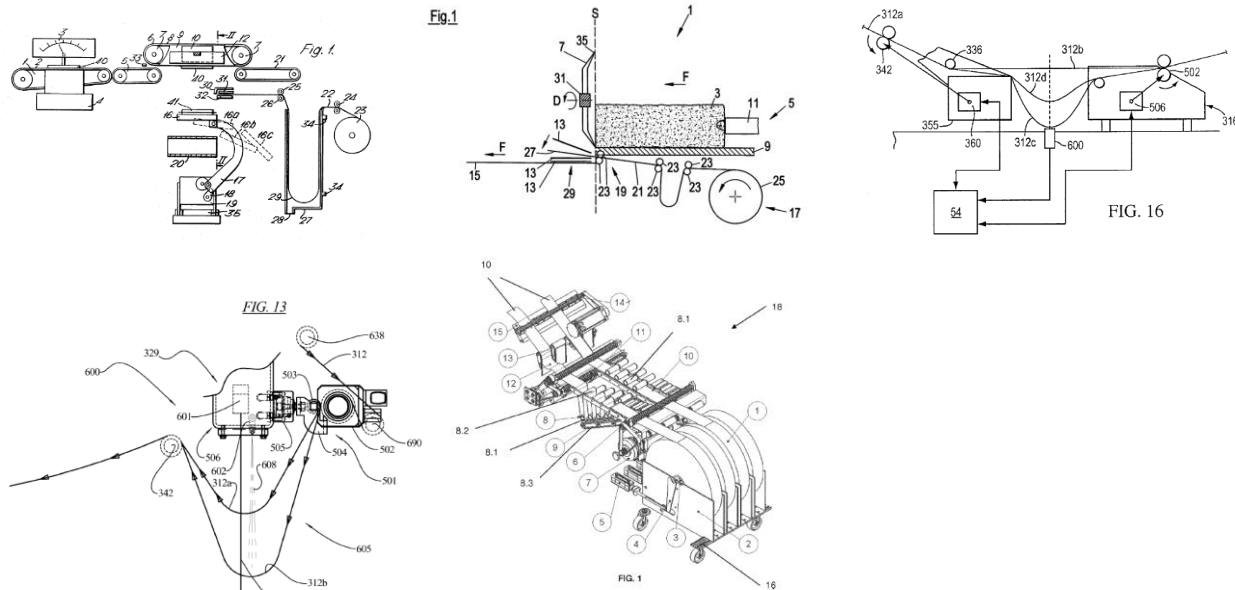
E. The known food slicers with interleavers used web handling techniques.

76. From my review of these prior-art food slicers with interleavers, as well as based on my experience, I have noticed a number of web handling techniques being applied.

77. For example, many of these earlier interleavers used a loose loop of web as a buffer. As I explain above, this technique is taught in Jordan, Dreier, Pryor 531, Pryor 872, and Müller.⁶⁶

⁶⁵ See EX1001, Col. 8:31-34 ('013 patent).

⁶⁶ EX1005, 3:35-39, Fig. 1 (Jordan); EX1020, Fig. 1 (Dreier); EX1023, Fig. 16 (Pryor 531); EX1021, Fig. 13 (Pryor 872); EX1004, Fig. 1 (Müller).



78. For another example, many of these earlier interleavers used suction, vacuum, or compressed air to control a loop of web in the buffer. As I explain above, this technique is taught in Jordan, Pryor 531, and Pryor 872, and GEA 258.⁶⁷ And while the Weber interleaver does not disclose a loop of web in a buffer, it does disclose the use of compressed air to control the web handling.⁶⁸

79. For another example, many of these earlier interleavers used a sensor to detect and determine the amount of web material in the loop. Each of Jordan,

⁶⁷ EX1005, 3:35-39, Fig. 1 (Jordan); EX1023, Fig. 16 (Pryor 531); EX1021, Fig. 13 (Pryor 872); EX1025, Fig. 1 (GEA 258).

⁶⁸ EX1013, 1:29-37, Fig 1 (Weber).

Müller, Pryor 531, and Pryor 872 taught detecting and determining the length of web material looped in the loop store.⁶⁹

F. Sophisticated machine control technology existed the time of the '013 patent.

80. At the time of the '013 patent, sophisticated machine control technology would have been known to a POSA. Based on my experience designing machines in this time period, a POSA would have known to use a common machine control to accept data from electronic (analog or digital) sensors and send output to electronically-controlled (analog or digital) motors, such as servo motors.

81. I note that several of the references that form the Grounds in this IPR were published at a time when machine control technology was much less sophisticated than today. For example, the Jordan application was filed in 1971.⁷⁰ The Waffner application was filed in 1979.⁷¹ This helps explain why neither Jordan nor Waffner expressly mention a central, electronic machine control.

82. However, it is my opinion that at the time of the '013 patent, a POSA would read Jordan and Waffner in the context of the state-of-the-art, and a POSA would understand Jordan and Waffner as teaching, or at least suggesting, a machine

⁶⁹ EX1004, [0048] (Müller); EX1005, 3:35-39, Fig. 1 (Jordan); EX1023, Fig. 16 (Pryor 531); EX1021, Fig. 13 (Pryor 872).

⁷⁰ EX1005 (Jordan).

⁷¹ EX1006 (Waffner).

control. For example, a POSA would understand that where Jordan refers to some components controlled by “an electronic computer,” and other components controlled by “photocells,” the Jordan reference would be read by a POSA in view of the state-of-the-art as teaching a central machine control that received electronic signals from the photocells (and other sensors) and sent electronic control signals to the motors of the cutting machine, conveying device and paper infeed.⁷² Similarly, where Waffner refers to a vacuum signal in a vacuum “chamber **50**” being amplified by a “transducer-amplifier **54**”⁷³ in order to change the position of a “piston” in a “Bellofram” cylinder in order to “change the pitch of [a] ‘Verisheave’ sheave **22**, and hence, the speed of rotation of the pulley **16**,” the Waffner reference would be read by a POSA in view of the state-of-the-art as teaching a central machine control that received electronic signals from an electronic (analog or digital) pressure sensor that detected pressure in the vacuum chamber **50** (and other sensors) and sent electronic control signals to the motors driving roll **14** (and other motors). I also note that the PTAB, in a prior final written decision finding claims of a patent on a slicing-and-interleaving system unpatentable, that “the correct timeframe for an ordinarily skilled artisan to form an understanding of Jordan is the time of the

⁷² See EX1005, Col. 2:65-3:2, 3:64-4:24, 6:4-9 (Jordan).

⁷³ See EX1006, Col. 4:22-5:05 (Waffner).

invention” and “programmable logic controllers were widely used with well-known benefits in the food processing industry” by that time.⁷⁴ The PTAB said that even before the time of the ’013 patent, a POSA “would understand Jordan to disclose or at least suggest a computer that controls” more components, such as sensors and rollers, than Jordan explicitly describes as connected to the computer.⁷⁵ Similarly, a POSA reading the references cited herein at the time of the patent (2017), would understand that those references (including Jordan and Waffner) teach or at least suggest a digital machine control, such as a programmable logic controller, connected to and controlling the sensors and motors of the systems.

83. Electronic pressure sensors, such as digital and analog manometers, pressure gauges, and pressure sensitive switches were a commodity item by the time of the ’013 patent. For example, I was able to efficiently locate a “High Accuracy Metric Pressure Transducer” sold by Omega®, which has been available since at least 2013.⁷⁶ This “PXM409-350HGV” transducer was not unique, and a POSA would have understood that similar sensors would be readily available. Similar to my analysis above, I understand that a POSA reading the references cited herein at

⁷⁴ EX1029, pp. 25-26 (IPR2019-01464 Final Written Decision).

⁷⁵ See EX1029, pp. 25 (IPR2019-01464 Final Written Decision).

⁷⁶ EX1018 (Omega High (0.08%) Accuracy Metric Pressure Transducers).

the time of the patent (2017) would understand that those references (including Waffner and Fukuchi) teach or at least suggest an electronic pressure sensor.

VII. BACKGROUND OF THE '013 PATENT-AT-ISSUE

A. The Specification

84. The inventors of the '013 patent describe the invention as “relat[ing] to an apparatus for a single-track or multitrack provision of web-like interleaved sheet material at a cutting region in which supplied products are cut into slices and interleaved sheets are introduced which are cut off from the provided interleaved sheet material in the cutting region.”⁷⁷ Although the claims “relate” to such a slicing-and-interleaving machine, the inventors recognized that they had not invented such a machine. Rather:

Such apparatus are generally known in the field of the slicing of food products and are also called interleavers.⁷⁸

And:

The design and the mode of operation of such slicers and also the basic principle of an interleaver are sufficiently known to the skilled person so that it is not necessary to look at them in any more detail in the following.⁷⁹

⁷⁷ EX1001, Col. 1:12-16 ('013 patent).

⁷⁸ EX1001, Col. 1:38-40. ('013 patent).

⁷⁹ EX1001, Col. 8:31-35 ('013 patent).

In fact, the summary of a slicing-and-interleaving machine that the inventors provide at the beginning of the specification is an accurate description of known prior-art slicing-and-interleaving machines, such as those available to a POSA in videos published before the date of the '013 patent.⁸⁰

85. At a high level, the web-handling system described in the '013 patent provides “sheet material” from “material roll **17**” to a “loop store **61**” and then to an “output device **71**.”⁸¹ The movements of the system are controlled by “control device **39**,” which also controls aspects of the product slicing.⁸²

86. Removal of the material comprises (1) “rolling off the material web **19** by means of a roll-off drive **21**” and (2) “conveying [] material web **19** into the loop store **61** by means of a conveying device **23**.”⁸³

87. The material then forms a loop in the loop store.⁸⁴

88. Finally, the material is “pulled from the loop store” and “simultaneously advanced into the cutting region.”⁸⁵

⁸⁰ Compare EX1001, Col. 1:12-37. 1:60-2:10 ('013 patent); with, EX1022 (GEA “DualSlicer” Video); EX1024 (Weber “Slicer 604” Video).

⁸¹ EX1001, Col. 8:51-57 ('013 patent).

⁸² EX1001, Col. 9:29-38 ('013 patent).

⁸³ EX1001, Col. 8:58-65 ('013 patent).

⁸⁴ EX1001, Col. 8:66-9:3 ('013 patent).

⁸⁵ EX1001, Col. 9:13-21 ('013 patent).

89. The inventors do not claim to have invented the concept of withdrawing material from a store, inserting the material into a loop, and ejecting the material into a cutting region of a slicer. Rather, the inventors acknowledge that what they believed to have been their invention was much narrower. The inventors identified “a problem with the known interleavers... that the ejection of the material web into the cutting region is a highly dynamic process which is the more difficult to manage, the greater the cutting speed is.”⁸⁶ The inventor’s purported solution was “to provide a sufficiently large web length at all times” in a loop store “so that it is ensured that the material web does not have to be removed from a sluggish material store, such as a material roll, at any point in time.”⁸⁷ The inventors acknowledge that the object of their invention was to improve the apparatus providing web-like material to the interleaver by using means to “reliably decouple” ejection of the web from removal of the web from the material store.⁸⁸

90. To accomplish this, the inventors disclose a so-called “invention” wherein:

- Slicing and provision of web material are controlled by common device;⁸⁹

⁸⁶ EX1001, Col. 2:24-34 (’013 patent).

⁸⁷ EX1001, Co. 2:24-34 (’013 patent).

⁸⁸ EX1001, Col. 2:35-40, 3:10-15 (’013 patent).

⁸⁹ EX1001, Col. 7:1-5 (’013 patent).

- Web material form a loop (or loops) in a loop store;⁹⁰
- The loop is sufficiently big to provide a “web length” required in the cutting region without delay;⁹¹
- The loop store has a contact surface to guide the paper in the loop;⁹²
- The loop is tensioned by a brake;⁹³
- The contact surface is part of the brake;⁹⁴
- The contact surface is curved;⁹⁵
- The braking effect is provided by suction;⁹⁶
- The loop is influenced by a suction device;⁹⁷
- The loop is influenced by a blowing device;⁹⁸
- The blowing device and suction device belong to a common air circuit;⁹⁹
- The air circuit is controllable in dependence on loop size;¹⁰⁰
- The air circuit has a fan;¹⁰¹
- A device determines the size of the loop;¹⁰²
- The device is a contact sensor, that senses when the web contacts the contact surface;¹⁰³
- The size of the loop is controlled by changing the speed of web entering or leaving the loop, based on the loop size;¹⁰⁴

⁹⁰ EX1001, Col. 2:43-50 ('013 patent).

⁹¹ EX1001, Col. 2:51-55 ('013 patent).

⁹² EX1001, Col. 3:32-35 ('013 patent).

⁹³ EX1001, Col. 2:56-58 ('013 patent).

⁹⁴ EX1001, Col. 3:36-48 ('013 patent).

⁹⁵ EX1001, Col. 3:49-63 ('013 patent).

⁹⁶ EX1001, Col. 2:64-65 ('013 patent).

⁹⁷ EX1001, Col. 2:59-63 ('013 patent).

⁹⁸ EX1001, Col. 2:66-3:9 ('013 patent).

⁹⁹ EX1001, Col. 3:16-19 ('013 patent).

¹⁰⁰ EX1001, Col. 3:20-23, 3:64-4:16 ('013 patent).

¹⁰¹ EX1001, Col. 3:24-31 ('013 patent).

¹⁰² EX1001, Col. 4:17-22, 5:28-46 ('013 patent).

¹⁰³ EX1001, Col. 5:47-6:15, 6:46-67 ('013 patent).

¹⁰⁴ EX1001, Col. 4:22-56 ('013 patent).

- The size of the loop is determined using an air pressure or flow sensor.¹⁰⁵

91. In other words, the inventors explained that their invention related to the loop store used to buffer a loop of interleaver material. This loop store is described in the specification.¹⁰⁶ For example, within the loop store, the web passes over a “contact surface **67**,” which communicates with “vacuum chambers **69**.”¹⁰⁷ As web is “sucked toward the contact surface,” it experiences a braking effect and is kept under light tension.¹⁰⁸ Simultaneously, a “control device **39** can recognize by means of pressure sensors in the vacuum chambers **69** which vacuum chamber **69** is covered by the material web **19** and which is not.”¹⁰⁹ This allows the control device to derive a “measure for the current size of the material loop.” (*Id.*)

B. Representative Claim 2

92. The claims of the '013 patent all describe a loop store where the length of web in the loop is determined by sensors that detect changes in pressure, pressure differential, or air flow as the loop size changes.

93. Claim 2 recites:

[2.Pre] An apparatus for a single-track or multitrack provision of web-like interleaved sheet material at a cutting region in which products supplied on one track or on multiple tracks are cut

¹⁰⁵ EX1001, Col. 4:57-5:27, 6:16-45 ('013 patent).

¹⁰⁶ *E.g.* EX1001, Col. 12:27-13:33, 16:64-17:38 ('013 patent).

¹⁰⁷ EX1001, Col. 12:58-65 ('013 patent).

¹⁰⁸ EX1001, Col. 12:66-13:14 ('013 patent).

¹⁰⁹ EX1001, Col. 13:15-24 ('013 patent).

into slices and interleaved sheets are introduced which are cut off from the provided interleaved sheet material in the cutting region, the apparatus comprising:

[2.1] a material store;

[2.2] a removal device for a removal of a material web from the material store;

[2.3] a loop store defining a space for the removed material web to form a loop, the loop store located between the material store and the cutting region;

[2.4] at least one vacuum chamber, the at least one vacuum chamber having at least one opening located adjacent a path of the loop; and

[2.5] a device for determining a size of the loop formed in the loop store based on the detection of a pressure drop within the at least one vacuum chamber when the opening is at least partially covered by the loop.

94. Claim 2 is identical to claim 17, other than as to the preamble and elements [2.4] and [2.5]. [2.Pre] does not explicitly list an apparatus for slicing or a rotating blade (as in [17.Pre]), but an apparatus for slicing and a rotating blade or similar can be inferred by the remainder of [2.Pre]. I have considered the differences between claims 2 and 17, and do not believe those differences are material to my analysis on patentability here.¹¹⁰ Nevertheless, I have addressed claim 2 separately from claim 17 below.

¹¹⁰ The '013 patent specification, for example, is consistent in describing its detection “device” as a pressure sensor. EX1001, Col. 5:1-27, 6:22-23, 6:35-36, 12:55-57, 13:14-20, 17:8-38 ('013 Patent). However, claim element [2.D] is potentially broader than this disclosure, as other devices such as flow rate sensors could theoretically be used to detect “changes in ... flow condition.” I have not needed to address this potential claim construction issue, as the prior art references I analyzed, and which are referenced in the ground below, disclose pressure sensing devices, such as can detect a “pressure drop” (element [1.D]) or a “change in ... a pressure differential” (element [2.D]).

95. Claim 19 is identical to claim 2, other than as to the preamble. [19.Pre] is identical to [17.Pre]. Because all elements of claim 19 are identical to elements of other challenged claims, I have addressed the elements of claim 19 together with the other claims in some cases.

96. As discussed above in section VII.A, the inventors of the '013 patent describe the inventive aspect as the specific features of the loop control, such as a device for determining the loop size based on a detection of a pressure change. As I show below and throughout, even these features were not inventive. However, I point out that these specific features of the loop control are claimed in elements [2.4] and [2.5]. Conversely, the preamble and elements [2.1], [2.2], and [2.3] claim only a generic slicing-and-interleaving system, a generic material store, a generic removal device, and a generic loop store.

C. The Prosecution History

97. The '013 patent issued from U.S. Application No. 16/025,612.¹¹¹ The Examiner issued a single office action, a non-final rejection issued September 17, 2019.¹¹² I am not a patent lawyer, but I have reviewed and considered the prosecution history as part of analysis to inform my understanding of the issues.

¹¹¹ EX1001 ('013 Patent).

¹¹² EX1002, pp. 449-466 (File History, '013 Patent).

98. In the office action, the Examiner rejected all pending claims. However, he noted that “[r]egarding claims 46 and 47—the use of vacuum measurement as a proxy for loop size is not recognized in the prior art.”¹¹³ If the claims are amended to overcome the indefiniteness issues noted above, they would possibly be allowable.”¹¹⁴

99. Patent Owner responded by addressing the indefiniteness issues in its December 10, 2019 remarks.¹¹⁵ Patent Owner further amended its pending claims to ensure that each independent claim included vacuum-measurement elements.¹¹⁶ For example:

- Patent Owner amended claims 26 (which issued as claim 1) and 49 (which issued as claim 17), to include elements requiring a “vacuum chamber” and a “device for determining a size of the loop formed ... based on the detection of a pressure drop;”
- Patent Owner amended claim 47 (which issued as claim 2), to make it an independent claim requiring a “contact surface ... that is air permeable” and a “device for determining a size of the loop formed ... detecting changes in at least one of a pressure differential and a flow condition;” and
- Patent Owner added new claim 51 (which issued as claim 19) and included the preamble of claim 49 and the elements of claim 47.

¹¹³ As noted above and throughout, use of vacuum measurement as a proxy for loop size was *well* recognized in the prior art. However, the relevant references were not before the Examiner.

¹¹⁴ EX1002, p. 464 (File History, '013 Patent).

¹¹⁵ EX1002, pp. 490-495 (File History, '013 Patent).

¹¹⁶ EX1002, pp. 496-501 (File History, '013 Patent).

After these amendments, all issued claims required a “device for determining a size of the loop formed.”

100. On January 13, 2020, the PTO issued a notice of allowance.¹¹⁷ The Examiner was explicit that the claims were allowed because:

[t]he use of vacuum measurement as a proxy for loop size is not seen in the loop formation arts. Loops are known to be controlled, as seen in the cited references, but not in the manner claimed using the pressure in vacuum as the control indicia for that system.¹¹⁸

101. In my opinion, the claims of the '013 patent would not have issued had the Examiner been aware of the references cited in this Petition, which control loops by use of a vacuum measurement as a proxy for loop size. References available to a POSA, such as Waffner and Fukuchi, directly contradict the Examiner's belief that “use of vacuum measurement as a proxy for loop size is not seen in the loop formation arts.”

VIII. PRIORITY DATE

102. I understand the earliest possible priority date that the '013 patent can claim the benefit of is the date of the first German patent application from which the '013 patent claims priority: July 3, 2017.¹¹⁹

¹¹⁷ EX1002, pp. 511-512 (File History, '013 Patent).

¹¹⁸ EX1002, p. 512 (File History, '013 Patent).

¹¹⁹ EX1001, Cover Page ('013 Patent).

IX. CLAIM CONSTRUCTION SUMMARY

103. Again, I am not an attorney, but I understand that to determine if a claim is patentable the Patent Office must determine or construe the meaning of the patent claims at issue. I have been informed that the Patent Office in IPR construes claim terms according to their ordinary and customary meaning as understood by a POSA in view of the patent and associated file history of communications with the Patent Office.

104. I have applied the plain and ordinary meaning of the claim terms in view of the specification and prosecution history. I am not aware of any claim terms that require an explicit construction to resolve any issues. I understand that Provisur proposes three claim constructions in the district court to help resolve the infringement issues in that forum. I copy these constructions below along with the proposed constructions from Patent Owner Weber in the district court.

Claim Limitation	Provisur's District Court Construction	Weber's District Court Construction
A removal device for a removal of a material web from the material store. Claims [1.2]; [2.2]; [17.2]; [19.2].	The removal device has two parts: (1) a roll-off drive driving material off the material roll, and (2) a conveying roller providing the material to the loop store.	Plain and ordinary meaning

	In addition, this phrase may be covered by 35 U.S.C. §112(f).	
A device for determining a size of the loop formed in the loop store... Claims [1.5]; [2.5]; [17.5]; [19.5].	The claimed “device...” is a pressure sensor, called a manometer, connected to a control device. In addition, this phrase may be covered by 35 U.S.C. §112(f).	Plain and ordinary meaning
“determining... detect[ing/ion]...” “determination” Claims [1.5]; [2.5]; [16]; [17.5]; [19.5].	Plain and ordinary meaning (which requires actually determining and detecting, rather than merely being capable of determining or detecting)	Plain and ordinary meaning

105. In any case, in my opinion, the cited prior art meets the claim terms under each of Provisur’s and Weber’s district court proposed constructions, as described in my declaration. Thus, I understand Provisur applies the same understanding of the claims in this proceeding before the Board and the district court.

X. SUMMARY OF THE GROUNDS

106. I understand Petitioner requests *Inter Partes* Review of claims 2, 3, 9, 10, 12, 13 and 16–20 of the ’013 patent and requests that the Board find these claims to be invalid and unpatentable based on the following specific statutory grounds and prior art.

107. Ground 1: US 2016/0023370 (“Müller”) (EX1004) in combination with US 4,253,597 (“Waffner”) (EX1006) renders obvious claims 2, 3, 9, 10, 12, 13, and 16–20 under § 103 (post-AIA).

108. Ground 2: US 3,848,757 (“Jordan”) (EX1005) in combination with US 5,697,573 (“Fukuchi”) (EX1007) renders obvious claims 2, 3, 9, 12, 13 and 16–20 under § 103 (post-AIA).

109. The below table summarizes the grounds for unpatentability addressed in my declaration. A POSA would have known of the below identified prior art, and also would have been aware of the state of the art I discussed in Section VIII.A–C. The discussion of the state of the art is relevant to the entire discussion in my declaration.

Ground	Claims Challenged	35 U.S.C. §	References
1	2, 3, 9, 10, 12, 13, and 16–20	103	Müller, Waffner
2	2, 3, 9, 12, 13, and 16–20	103	Jordan, Fukuchi.

110. During prosecution, neither the patentee nor the examiner cited or applied Waffner or Fukuchi. Further, unlike art analyzed in my declaration and

included in the Petition, none of the art applied during examination disclosed the use of vacuum measurement as a proxy for loop size, the basis of allowance.

XI. GROUND 1: CLAIMS 2, 3, 9, 10, 12, 13, AND 16-20 WOULD HAVE BEEN OBVIOUS OVER MÜLLER IN VIEW OF WAFFNER.

111. It is my opinion that claims 2, 3, 9, 10, 12, 13, and 16–20 would have been obvious to a POSA over Müller in view of Waffner. Below, I explain how Müller and Waffner disclose and make obvious each and every limitation of these claims.

A. Overview of the References

112. It is my opinion that together, Müller and Waffner teach every element of the challenged claims of the '013 patent.

113. I have prepared a chart to summarize this:

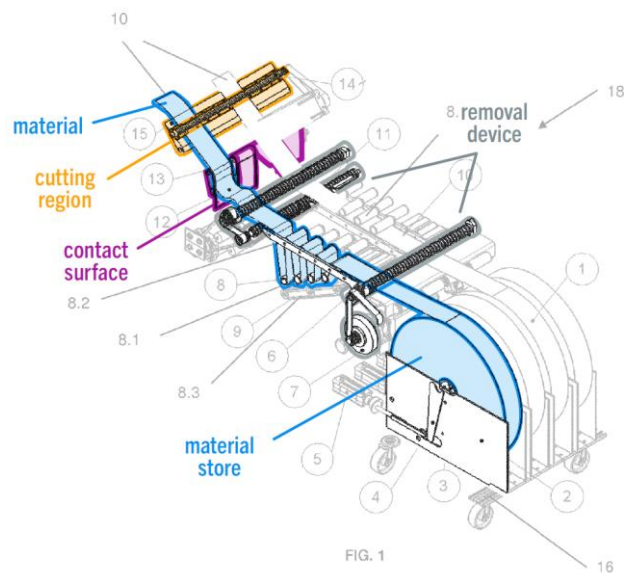
'013 Patent Claim Element	Exemplary Disclosure in Müller and Waffner
Apparatus for ... provision	“System” 18 (Müller)
Material	“Interleaver strip” 10 (Müller) “Web 10 ” (Waffner)
Sheets	“Interleaver” (Müller)
Cutting region	“Cutting plane” (Müller)
Cutting blade	“Cutting knife” (Müller)
Apparatus for... slicing	“Cutting device” (Müller)
Products	“Product”, such as “food” (Müller)
Product feed	“Drive that transports the product” (Müller)
Tracks	“Tracks” (Müller)
Slices	“Slices of food” (Müller)
Material store	“Interleaver reel” 1 (Müller) “Supply roll” (Waffner)

'013 Patent Claim Element	Exemplary Disclosure in Müller and Waffner
Removal device	“Unreeling device” 18 including “drives 6, 7 ” and drive 11. ” (Müller) “Feed roll 14 ” and “belt 28 ” (Waffner)
Loop store	“Buffer” 12 (Müller) “Belt 28 ” and “outfeed roll 36 ” (Waffner)
Vacuum chamber	“Vacuum chamber 50 ” (Waffner)
Suction device	“Source of vacuum 48 ” (Waffner)
Contact surface	“Strip guide” 13 (Müller) “Belt 28 ” (Waffner)
Opening	“Apertures 30 ” (Waffner)
Air permeable portion	The portion of “belt 28 ” having “apertures 30 ” (Waffner)
Loop	“Loop” (Müller) “Loop 35 ” (Waffner)
Path	Path taken by interleaver material as it enters and exits the “loop” (Müller) Path taken by web material as it enters and exits the “loop 35 ” (Waffner)
Device for determining a size of the loop	“control system” and “contacting sensor” (Müller) Device using a “vacuum signal” to “change... the speed of rotation of... roll 14 ” (Waffner)
Pressure drop	Increased “degree of vacuum” (Waffner)
Changes in ... a pressure differential	“Changes in” the “vacuum chamber” (Waffner)
Changes in ... a flow condition	“Leakage of atmospheric air into the chamber 50 ” (Waffner)
Influence of the material loop	“Changes” when all of the “apertures 30 are covered by the portion 33 of the loop 35 of the web 10 ” (Waffner)
Position determination	“Vacuum signal” (Waffner)
Control device	“Control system” (Müller)

In the section below, I provide an overview with additional detail on where a POSA would locate the elements of the '013 patent in the references. In Section C below, I address the challenged claims element by element.

1. Apparatus for ... Provision

114. Müller teaches an apparatus for provision, as claimed in the '013 patent.



EX1004, “Müller” at Fig. 1 (annotated)

115. Müller’s apparatus is “system” **18**. Müller’s “invention relates to an unreeling device with which an interleaver strip is unreeled from an interleaver.”¹²⁰ The “invention relates to an unreeling device for a plurality of interleaver reels.”¹²¹ This system “comprises a cutting device and the unreeling device **16**.”¹²² The system

¹²⁰ EX1004, [0001] (Müller).

¹²¹ EX1004, [0007] (Müller).

¹²² EX1004, [0048] (Müller).

allows “for a so-called ‘interleaver’ to be placed between two slices” of sliced food product.¹²³ To accomplish this, “interleaver is provided as interleaver strip **10**, which are preferably inserted intermittently into the cutting plane of the knife which severs the respective interleaver from the interleaver strip.”¹²⁴ Müller teaches “[a]n interleaver strip is provided for each track” (and Müller discloses an exemplary four-track slicing apparatus).¹²⁵ In Müller:

This interleaver is preferably cut off, by the same knife which exits off the slices of food, from an interleaver strip which, for this purpose, is preferably inserted intermittently into the cutting place as soon, as the knife is no longer located in the area of the interleaver strip outlet. This insertion must then be completed at the latest when the knife enters the area of the interleaver strip outlet again. The insertion of the interleaver strip is preferably carried out individually for each track of the cutting device.¹²⁶

2. Material

116. Müller teaches material, as claimed in the '013 patent.

117. Müller’s material is “interleaver strip” **10**. This strip is “for example, paper, in particular coated paper or a film, which reduced the adhesive forces between two slices of food.”¹²⁷ A knife “severs the respective interleaver from the interleaver strip.”¹²⁸

¹²³ EX1004, [0048] (Müller).

¹²⁴ EX1004, [0048] (Müller).

¹²⁵ EX1004, [0048] (Müller).

¹²⁶ EX1004, [0022] (Müller).

¹²⁷ EX1004, [0048] (Müller).

¹²⁸ EX1004, [0048] (Müller).

118. Waffner likewise teaches material, as claimed in the '013 patent.

119. Waffner's material is a "web **10**." Waffner's apparatus "is utilized to control the feeding of a web **10** to a desired destination."¹²⁹ "The web **10** is made of paper although it could, of course, be made of other materials."¹³⁰

3. Sheets

120. Müller teaches sheets, as claimed in the '013 patent.

121. Müller's sheets are "interleavers." Müller explains that its system allows "for a so-called 'interleaver' to be placed between two slices" of sliced food product.¹³¹ This interleaver is "for example, paper, in particular coated paper or a film, which reduced the adhesive forces between two slices of food."¹³² The "interleaver," for example a piece of paper, is arranged respectively between two slices of food and/or between portion and a support, in order to reduce the adhesion between the slices of food and/or a package."¹³³ A knife "severs the respective interleaver from the interleaver strip."¹³⁴

122. Müller explains that inserting sheets between slices was known in the art: "Interleavers, for example pieces of paper, are placed between two slices or food,

¹²⁹ EX1006, Col. 3:36-45 (Waffner).

¹³⁰ EX1006, Col. 3:36-45 (Waffner).

¹³¹ EX1004, [0048] (Müller).

¹³² EX1004, [0048] (Müller).

¹³³ EX1004, [0021] (Müller).

¹³⁴ EX1004, [0048] (Müller).

for example, in order to reduce the adhesion thereof to one another, and are known from the prior art, for example from BP 1 940 685 Bl.”¹³⁵

4. Cutting Region

123. Müller teaches a cutting region, as claimed in the '013 patent.

124. Müller’s cutting region is a “cutting plane.” Müller’s “invention relates to a system comprising a cutting device...”¹³⁶ Müller’s interleaver strip is “inserted intermittently into the cutting plane of the knife which severs the respective interleaver from the interleaver strip” while a “slice” of product “is being cut off.”¹³⁷ Müller’s “cutting knife interacts with what is known as a cutting edge, which functions as an opposing knife and, together with the cutting knife, defines the so-called cutting plane.”¹³⁸ In Müller:

The slices of food that are cut off are configured to form portions of a plurality of slices of food, wherein the slices of food of a portion at least partly overlap. For instances, the slices of food are stacked or shingled. An interleaver, for example a piece of paper, is arranged respectively between two slices of food and/or between portion and a support, in order to reduce the adhesion between the slices of food and/or a package.¹³⁹

And:

¹³⁵ EX1004, [0002] (Müller).

¹³⁶ EX1004, [0001] (Müller).

¹³⁷ EX1004, [0048] (Müller).

¹³⁸ EX1004, [0019] (Müller).

¹³⁹ EX1004, [0021] (Müller).

This interleaver is preferably cut off, by the same knife which exits off the slices of food, from an interleaver strip which, for this purpose, is preferably inserted intermittently into the cutting place as soon, as the knife is no longer located in the area of the interleaver strip outlet. This insertion must then be completed at the latest when the knife enters the area of the interleaver strip outlet again. The insertion of the interleaver strip is preferably carried out individually for each track of the cutting device.¹⁴⁰

125. Müller explains that this simultaneous slicing (of food product) and cutting (of interleaver material) is known “generally” in the prior art:

This insertion is carried out generally as a product is cut up into a multiplicity of slices of food, by the interleaver being cut off from an interleaver strip, preferably substantially simultaneously with the respective slices of food. The interleaver then falls together with the respective slice of food, for example onto a deposit table, on which a plurality of slices of food are configured to form a portion.¹⁴¹

5. Cutting Blade

126. Müller teaches a cutting blade, as claimed in the '013 patent.

127. Müller’s cutting blade is a “cutting knife.” Müller explains that products are transported along product tracks “in the direction of a cutting knife, for example a rotating cutting knife.”¹⁴² The knife “severs slices of food from the front end of the product.”¹⁴³ The knife likewise “severs the respective interleaver from the interleaver strip.”¹⁴⁴ In this way, “[t]he interleaver that is cut off falls onto the

¹⁴⁰ EX1004, [0022] (Müller).

¹⁴¹ EX1004, [0002] (Müller).

¹⁴² EX1004, [0048] (Müller).

¹⁴³ EX1004, [0048] (Müller).

¹⁴⁴ EX1004, [0048] (Müller).

deposit table together with the slice that is being cut off.”¹⁴⁵ For this purpose Müller explains that “the cutting device has, for example, a rotating cutting knife, which severs the slices of food from the front end of the block of food.”¹⁴⁶ Müller’s “cutting knife is arranged on a rotor.”¹⁴⁷

6. Apparatus for ... Slicing

128. Müller teaches an apparatus for slicing, as claimed in the '013 patent.

129. Müller’s apparatus for slicing is a “cutting device.” A subject of Müller’s “invention is a system comprising a cutting device, in which a knife severs slices of food from a block of food, which slices are arranged, at least partly overlapping, to form a portion of a plurality of slices of food.”¹⁴⁸ The invention further relates “to a cutting device with which blocks of food, for example blocks of cheese, sausage and/or ham, are cut up into slices of food.”¹⁴⁹ Müller explains that these apparatuses for slicing were “normally” used in the art:

Nowadays, the cutting devices are normally provided in multi-track form, i.e. a plurality of products are at least partly cut up simultaneously, so that an interleaver strip has to be provided per track.¹⁵⁰

¹⁴⁵ EX1004, [0048] (Müller).

¹⁴⁶ EX1004, [0019] (Müller).

¹⁴⁷ EX1004, [0019] (Müller).

¹⁴⁸ EX1004, [0018] (Müller).

¹⁴⁹ EX1004, [0018] (Müller).

¹⁵⁰ EX1004, [0002] (Müller).

7. Products

130. Müller teaches products, as claimed in the '013 patent.

131. Müller's products are "product," such as "food." A subject of Müller's "invention is a system comprising a cutting device, in which a knife severs slices of food from a block of food, which slices are arranged, at least partly overlapping, to form a portion of a plurality of slices of food."¹⁵¹ The invention further relates "to a cutting device with which blocks of food, for example blocks of cheese, sausage and/or ham, are cut up into slices of food."¹⁵² Müller explains that products are transported along product tracks "in the direction of a cutting knife, for example a rotating cutting knife."¹⁵³ The knife "severs slices of food from the front end of the product."¹⁵⁴ "The slices cut off fall, for example, onto a deposit table and are configured there to form portions of a plurality of slices."¹⁵⁵

8. Product Feed

132. Müller teaches a product feed, as claimed in the '013 patent.

133. Müller's product feed is a "drive that transports the product." "The cutting device has a plurality of tracks, which each have a dedicated drive that

¹⁵¹ EX1004, [0018] (Müller).

¹⁵² EX1004, [0018] (Müller).

¹⁵³ EX1004, [0048] (Müller).

¹⁵⁴ EX1004, [0048] (Müller).

¹⁵⁵ EX1004, [0048] (Müller).

transports the product to be cut up in the direction of the cutting knife. With this forward drive, the thickness of the respective slice of food to be cut off is determined, corresponding to the forward drive of the respective product between two cuts.”¹⁵⁶ “The forward drive can be different for each track, so that the respective products can also be cut up at different speeds.”¹⁵⁷ It is “respectively possible to insert a product” into the tracks so that the product can be “transported in the direction of a cutting knife.”¹⁵⁸ “The cutting speed of the respective product in the respective track can be the same or different.”¹⁵⁹

9. Tracks

134. Müller teaches tracks, as claimed in the '013 patent.

135. Müller’s tracks are “tracks.” In Müller, the “cutting device in the present case has four tracks.”¹⁶⁰ It is “respectively possible to insert a product” into the tracks so that the product can be “transported in the direction of a cutting knife.”¹⁶¹ In each track “a product, for example a block of sausage, cheese or ham is respectively cut up.”¹⁶²

¹⁵⁶ EX1004, [0019] (Müller).

¹⁵⁷ EX1004, [0019] (Müller).

¹⁵⁸ EX1004, [0048] (Müller).

¹⁵⁹ EX1004, [0008] (Müller).

¹⁶⁰ EX1004, [0048] (Müller).

¹⁶¹ EX1004, [0048] (Müller).

¹⁶² EX1004, [0008] (Müller).

10. Slices

136. Müller teaches slices, as claimed in the '013 patent.

137. Müller's slices are "slices of food." A subject of Müller's "invention is a system comprising a cutting device, in which a knife severs slices of food from a block of food, which slices are arranged, at least partly overlapping, to form a portion of a plurality of slices of food."¹⁶³ The invention further relates "to a cutting device with which blocks of food, for example blocks of cheese, sausage and/or ham, are cut up into slices of food."¹⁶⁴ A knife "severs slices of food from the front end of the product."¹⁶⁵ "The slices cut off fall, for example, onto a deposit table and are configured there to form portions of a plurality of slices."¹⁶⁶ In Müller:

138. The slices of food that are cut off are configured to form portions of a plurality of slices of food, wherein the slices of food of a portion at least partly overlap. For instances, the slices of food are stacked or shingled. An interleaver, for example a piece of paper, is arranged respectively between two slices of food and/or between portion and a support, in order to reduce the adhesion between the slices of food and/or a package.¹⁶⁷

¹⁶³ EX1004, [0018] (Müller).

¹⁶⁴ EX1004, [0018] (Müller).

¹⁶⁵ EX1004, [0048] (Müller).

¹⁶⁶ EX1004, [0048] (Müller).

¹⁶⁷ EX1004, [0021] (Müller).

11. Material Store

139. Müller teaches a material store, as claimed in the '013 patent.

140. Müller's material store is "interleaver reel" **1**. Müller's "invention relates to an unreeling device with which an interleaver strip is unreeled from an interleaver reel."¹⁶⁸ In Müller's system, the unreeling device "has a multiplicity of cartridges, in which an interleaver reel is rotably mounted in each case and the interleaver reel rotates as it is unreeled."¹⁶⁹ "The interleaver reel preferably has a paperboard core, which rotates on a rigid shaft, in particular an aluminum shaft."¹⁷⁰

141. Waffner likewise teaches a material store, as claimed in the '013 patent.

142. Waffner's material store is a "supply roll." In Waffner, "[i]nitially, as indicated by the portion **12**, the web **10** is drawn from a conventional supply roll."¹⁷¹

12. Removal Device

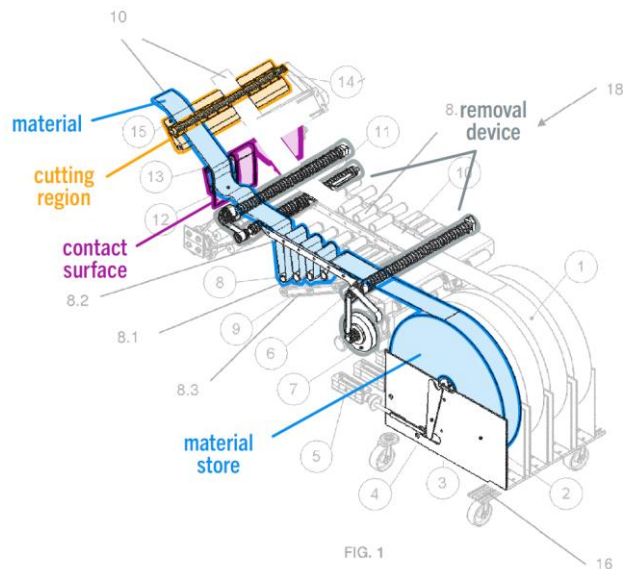
143. Müller teaches a removal device, as claimed in the '013 patent.

¹⁶⁸ EX1004, [0001] (Müller).

¹⁶⁹ EX1004, [0005], [0007] (Müller).

¹⁷⁰ EX1004, [0012] (Müller).

¹⁷¹ EX1006, Col. 3:46-47 (Waffner).



EX1004, “Müller” at Fig. 1 (annotated)

144. Müller’s removal device is an “unreeling device” **18** including “drives **6, 7**” and drive **11**.” Müller’s “invention relates to an unreeling device with which an interleaver strip is unreeled from an interleaver reel.”¹⁷² “[T]he interleaver reel is [] not mounted with as little friction as possible; instead a certain friction is desired.”¹⁷³ “The drive for the interleaver reels ... is preferably provided by the cutting device.”¹⁷⁴ “Preferably, the cutting device has a drive for all the interleaver reels, wherein, particularly preferably, the respective interleaver reel can be connected individually to this drive.”¹⁷⁵ In Müller:

¹⁷² EX1004, [0001] (Müller).

¹⁷³ EX1004, [0011] (Müller).

¹⁷⁴ EX1004, [0017] (Müller).

¹⁷⁵ EX1004, [0017] (Müller).

Preferably, the cutting device has a drive for the interleaver reels, which it rotates in order to unreel the interleaver strip. Particularly preferably, the number of drive means is smaller than the number of interleaver reels which have to be driven. Quite particularly preferably, only one drive is provided for all the interleaver reels. Preferably, between the drive and the respective interleaver reel there is provided a coupling, which can be activated as desired and with which the respective interleaver reel can optionally be driven. As a result, the time period and/or the speed at which the respective interleaver reel is driven can be adjusted individually.¹⁷⁶

145. In particular, Müller's removal device has two parts. First, there are "drives **6, 7** of the interleaver reels" which are "preferably provided on the cutting device."¹⁷⁷ "[E]ach reel can be driven individually."¹⁷⁸ Second, a "drive **11** can set the stationary rollers **8.1** rotating."¹⁷⁹ This would feed the material web further through the system, and in particular into buffer **12**. Although Müller states that this second drive is "advantageous in particular when threading a new interleaver strip," a POSA reading Müller would understand that such a second drive could be used throughout operation of the paper feed.¹⁸⁰ For example, Müller explains that buffer **12** "preferably buffers only as much interleaver material as is needed for the ejection of an interleaver."¹⁸¹ A POSA would understand that in order to form and control

¹⁷⁶ EX1004, [0025] (Müller).

¹⁷⁷ EX1004, [0048] (Müller).

¹⁷⁸ EX1004, [0048] (Müller).

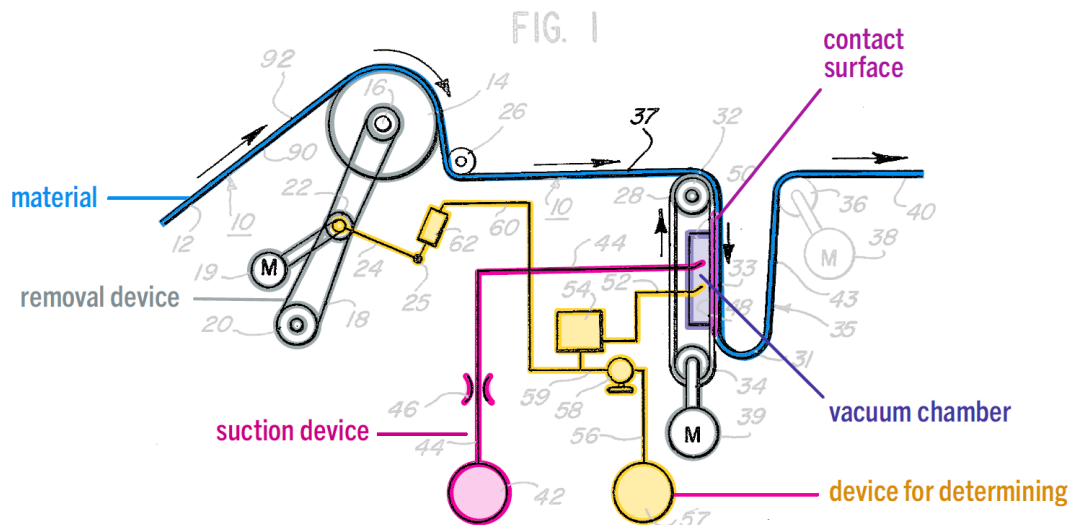
¹⁷⁹ EX1004, [0048] (Müller).

¹⁸⁰ See EX1004, [0048] (Müller).

¹⁸¹ EX1004, [0048] (Müller).

this buffer loop, drive **11** could be used to drive interleaver material into buffer **12**. Thus, the removal device has two parts: (1) a roll-off drive driving material off the material roll, and (2) a conveying roller providing the material to the loop store.

146. Likewise, Waffner teaches a removal device as claimed by the '013 patent.



EX1006, "Waffner" at Fig. 1 (annotated)

147. Waffner's removal device is "feed roll **14**" and a "belt **28**." In Waffner:

The web infeed speed is regulated by a variable speed feed roll **14**. A pulley **16** is mounted on the roll **14** and is driven by an endless belt **18** which is, in turn, driven by a pulley **20** connected to a constant speed motor **19**. The speed of the rotation of the pulley **16**, and thus the feed roll **14**, is varied by a conventional variable pitch sheave **22**, known in the art as a "Varisheave", which is operated and controlled, in a conventional manner, by a pair of rods **24**.¹⁸²

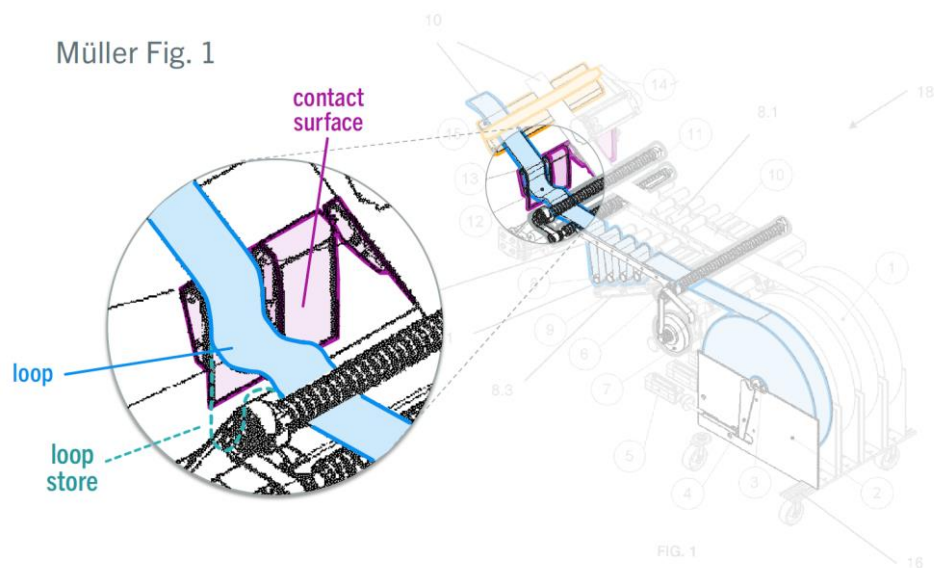
¹⁸² EX1006, Col. 3:47-56 (Waffner).

In Waffner, belt **28** draws material into the loop store.

148. In particular, Waffner's removal device has two parts. First, feed roll **14** draws material from the material store. Second, belt **28** inserts drawn material into a loop.

13. Loop Store

149. Müller teaches a loop store, as claimed by the '013 patent.



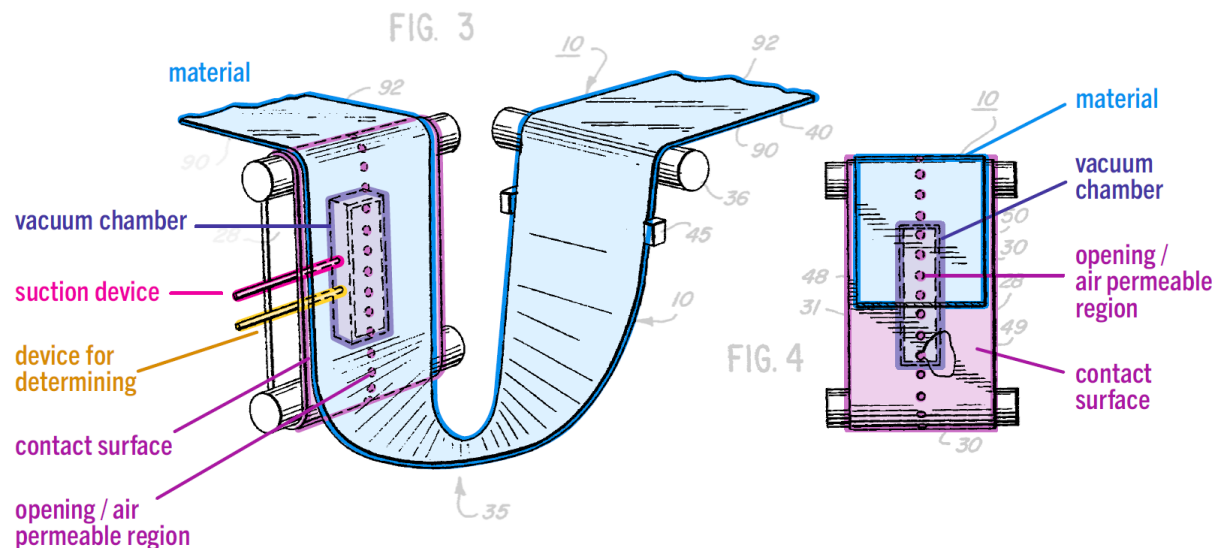
EX1004, "Müller" at Fig. 1 (annotated)

150. Müller's loop store is a "buffer **12**." In Müller, "[p]rovided downstream of the first buffer **8** is a further buffer **12**, a loop here, which preferably has a substantially lower capacity than the buffer **8** and preferably buffers only as much interleaver material as is needed for the ejection of an interleaver."¹⁸³ Müller's

¹⁸³ EX1004, [0048] (Müller).

“buffer **12** preferably has an interleaver strip guide **13**, which is provided so as to be movable and which is able to enlarge or reduce the path of the interleaver strip.”¹⁸⁴ And a “drive **11** can set the stationary rollers **8.1** rotating,” which would feed the material web further through the system, and in particular into buffer **12**.¹⁸⁵ Buffer **12**, as defined by strip guide **13** and drive **11** is located between the material store and the cutting region.¹⁸⁶

151. Waffner likewise teaches a loop store as claimed by the '013 patent.



EX1006, “Waffner” at Figs. 3-4 (annotated)

152. Waffner’s loop store is defined by “belt **28**” and “outfeed roll **36**.”

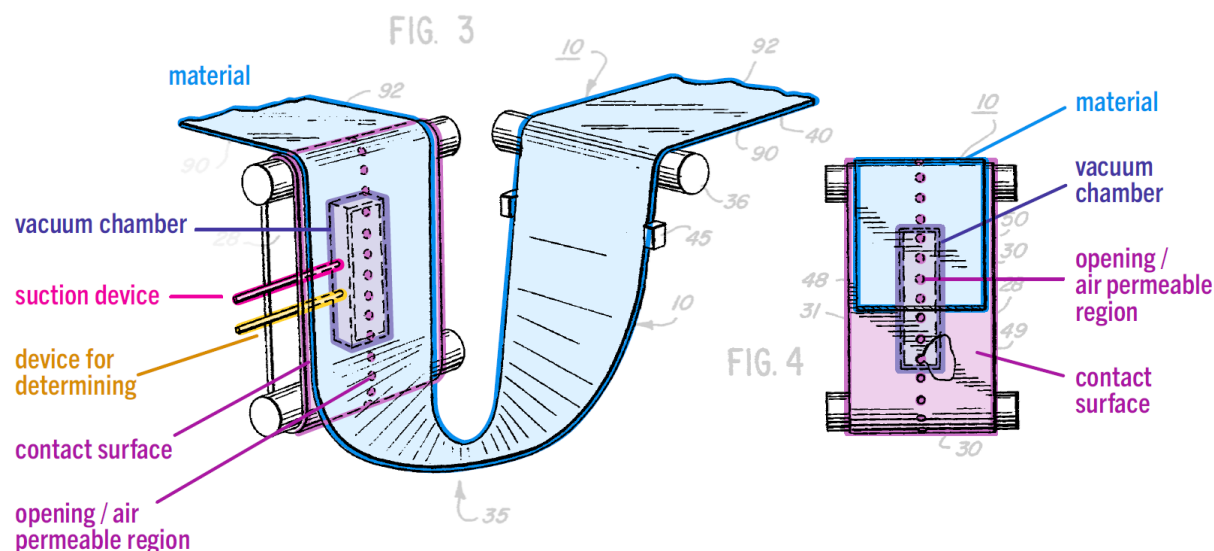
¹⁸⁴ EX1004, [0048] (Müller).

¹⁸⁵ EX1004, [0048] (Müller).

¹⁸⁶ EX1004, FIG. 1 (Müller).

14. Vacuum Chamber

153. Waffner discloses a vacuum chamber, as claimed by the '013 patent.



EX1006, “Waffner” at Figs. 3-4 (annotated)

154. Waffner’s vacuum chamber is a “vacuum chamber 50.” In Waffner, “[a] source of vacuum, diagrammatically shown at 42 in FIG. 1, is preferably of the conventional blower type and is connected, through a vacuum line 44 to a vacuum chamber 50 disposed adjacent to a portion 95 of the belt 28 and the pulleys 32 and 34.¹⁸⁷ “The vacuum chamber 50 is provided with longitudinal edges 48 which define a longitudinal extending opening 49 therein facing the portion 95 of the belt 28. The chamber 50 is constructed so that the portion 95 of the belt 28 is maintained in tight contact with the edges 48 by the vacuum in chamber 50.”¹⁸⁸

¹⁸⁷ EX1006, Col. 4:10-21 (Waffner).

¹⁸⁸ EX1006, Col. 4:15-21 (Waffner).

15. Suction Device

155. Waffner discloses a suction device, as claimed by the '013 patent.

156. Waffner's suction device is a "source of vacuum" **48**. In Waffner, "[a] source of vacuum, diagrammatically shown at **42** in FIG. 1, is preferably of the conventional blower type and is connected, through a vacuum line **44** to a vacuum chamber **50** disposed adjacent to a portion **95** of the belt **28** and the pulleys **32** and **34**."¹⁸⁹

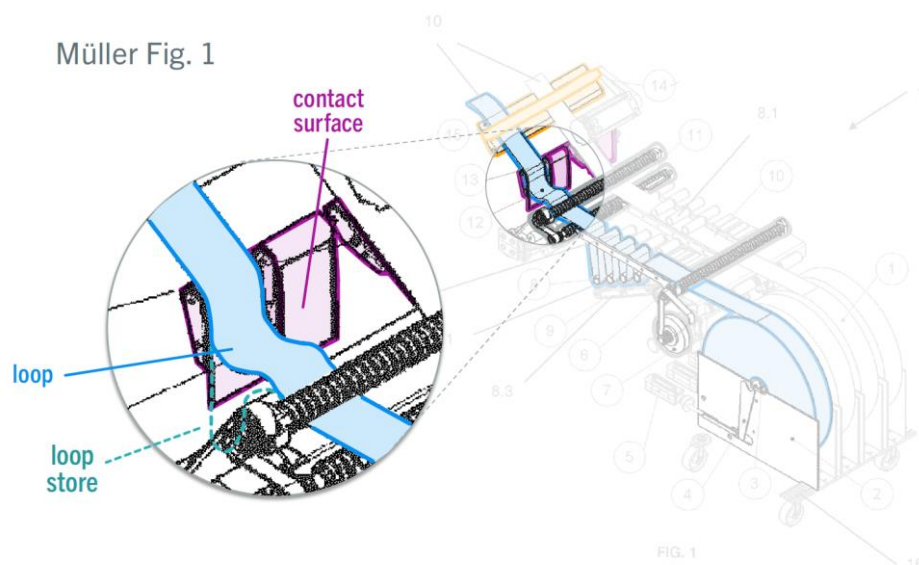
157. Waffner's suction device includes "[a] vacuum restriction valve **46** disposed in the line **44**."¹⁹⁰

16. Contact Surface

158. Müller teaches a contact surface, as claimed by the '013 patent.

¹⁸⁹ EX1006, Col. 4:10-21 (Waffner).

¹⁹⁰ EX1006, Col. 4:14-15 (Waffner).



EX1004, “Müller” at Fig. 1 (annotated)

159. Müller’s contact surface is a “strip guide.” Müller explains:

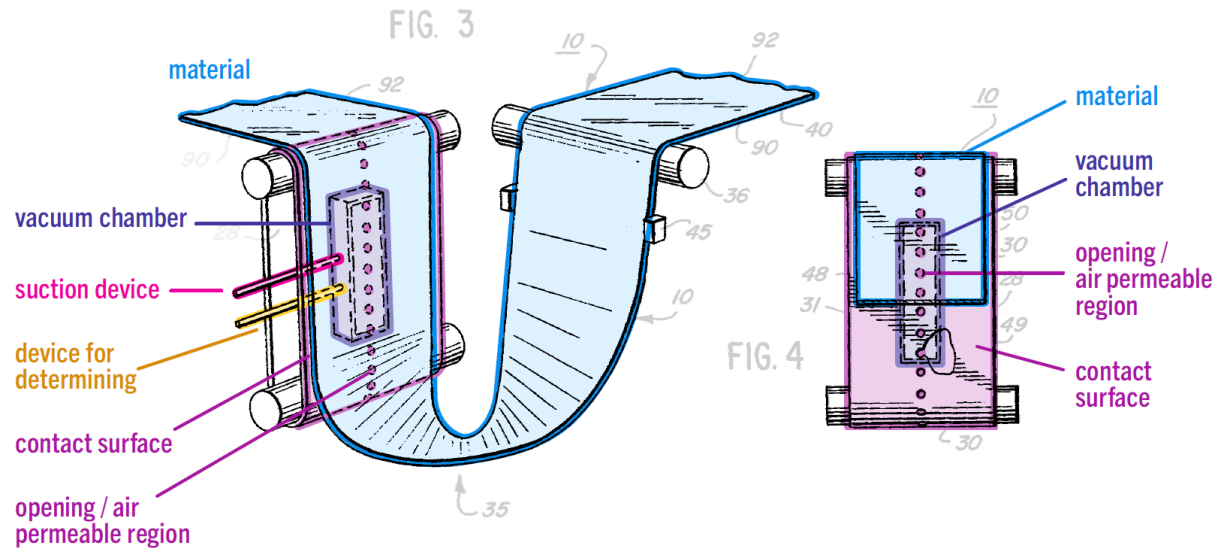
As a rule, the system, in particular the cutting device, has a guide for the interleaver strip, along which said strip is guided on its path from the interleaver reel as far as the insertion area. Preferably, this interleaver strip guide is provided so as to be partially movable, in particular pivotable, so that the length thereof can be changed. This change is made, in particular, in the area of the first buffer. As a result, the path of the interleaver strip can be lengthened or shortened. Preferably, the interleaver guide is shortened, is particular when threading the interleaver strip, and then lengthened again.¹⁹¹

Müller’s “buffer 12 preferably has an interleaver strip guide 13, which is provided so as to be movable and which is able to enlarge or reduce the path of the interleaver strip. In the present case, this guide is a plane, which is provided such that it can rotate on the cutting device and which can be moved from a buffering position ... to

¹⁹¹ EX1004, [0031] (Müller).

a non-buffering position.”¹⁹² Figure 1 of Müller shows that the top edge of the contact surface is rounded (i.e. arcuate) where interleaver material leaves the loop.¹⁹³

160. Likewise, Waffner teaches a contact surface as claimed by the '013 patent.



EX1006, “Waffner” at Figs. 3-4 (annotated)

161. Waffner’s contact surface is “belt 28.” Waffner’s web 10 “passes ... over an endless belt 28.”¹⁹⁴ In Waffner, the “belt 28 includes a plurality of evenly spaced, uniform diameter apertures 30 disposed along its longitudinal center-line.”

¹⁹⁵ In Waffner, “the degree of vacuum in chamber 50 will depend upon the number

¹⁹² EX1004, [0048] (Müller).

¹⁹³ EX1004, Fig. 1 (Müller).

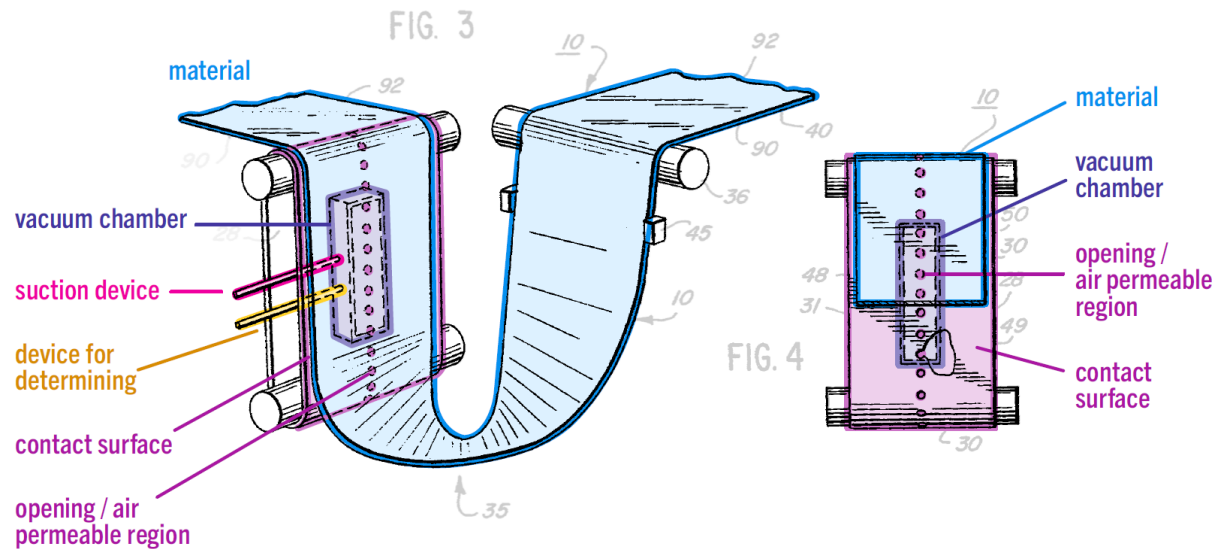
¹⁹⁴ EX1006, Col. 3:58-61 (Waffner).

¹⁹⁵ EX1006, Col. 3:61-63 (Waffner).

of apertures **40** in the belt **28** which are covered by the downwardly descending portion **33** of the loop **35** of the web **10**.”¹⁹⁶

17. Opening

162. Waffner teaches an opening, as claimed by the '013 patent.



EX1006, “Waffner” at Figs. 3-4 (annotated)

163. Waffner’s opening is “apertures **30**.” In Waffner, the “belt **28** includes a plurality of evenly spaced, uniform diameter apertures **30** disposed along its longitudinal center-line.”¹⁹⁷ In Waffner, “the degree of vacuum in chamber **50** will depend upon the number of apertures **40** in the belt **28** which are covered by the downwardly descending portion **33** of the loop **35** of the web **10**.”¹⁹⁸ Waffner

¹⁹⁶ EX1006, Col. 5:13-17 (Waffner).

¹⁹⁷ EX1006, Col. 3:61-63 (Waffner).

¹⁹⁸ EX1006, Col. 5:13-17 (Waffner).

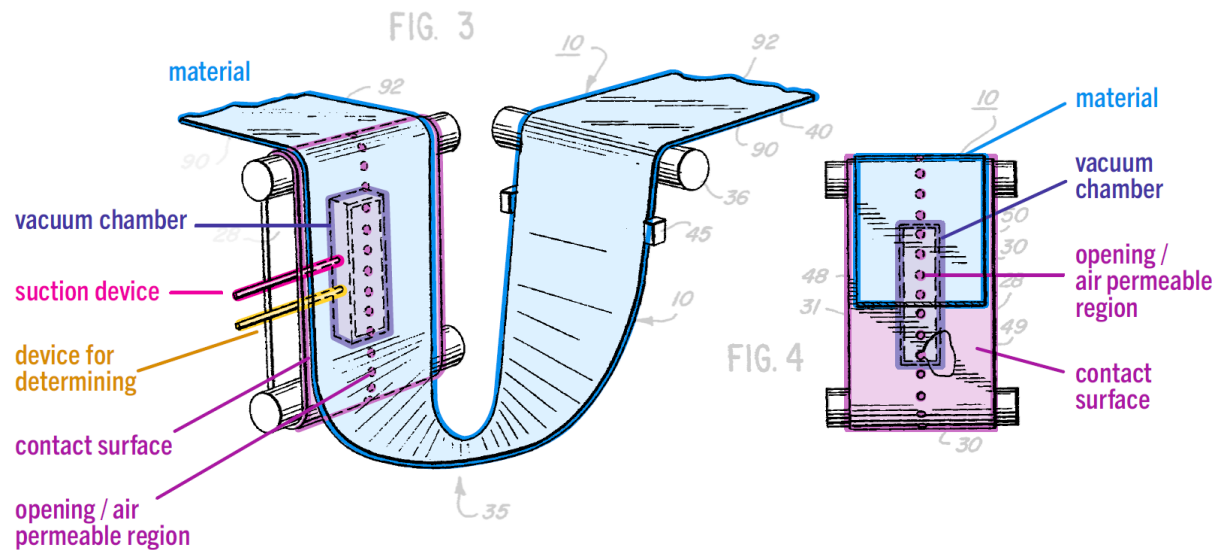
describes how the apertures are an opening between the vacuum chamber and atmosphere:

When all of the apertures **30** are covered by the portion **33** of the loop **35** of the web **10**, such as, for example, shown in FIG. 3, the vacuum in the chamber **50** will be relatively high because there is very little leakage of atmospheric air into the chamber **50**. However, if the outspeed of the outgoing portion **40** of the web **10** becomes greater than the inspeed of the portions **12** of the web, the loop **35** will shorten. Consequently and as shown in FIG. 4, some of the apertures **30** in the belt **28** will become uncovered to the atmosphere. This permits more air, at atmospheric pressure, to enter the chamber **50**, and thus decreases the vacuum in the chamber **50**. When all of the apertures **30** are uncovered by the web loop **35**, the vacuum in the chamber **50** will be relatively low because there is the maximum leakage of atmospheric air into the chamber **50**.¹⁹⁹

18. Air Permeable Portion

164. Waffner teaches an air permeable portion, as claimed by the '013 patent.

¹⁹⁹ EX1006, Col. 5:20-35 (Waffner).



EX1006, “Waffner” at Figs. 3-4 (annotated)

165. Waffner’s air permeable portion is the portion of “belt **28**” with “apertures **30**.” In Waffner, the “belt **28** includes a plurality of evenly spaced, uniform diameter apertures²⁰⁰ **30** disposed along its longitudinal center-line.” In Waffner, “the degree of vacuum in chamber **50** will depend upon the number of apertures **40** in the belt **28** which are covered by the downwardly descending portion **33** of the loop **35** of the web **10**.”²⁰¹ The apertures are permeable to air, and allow “leakage of atmospheric air” where “air at atmospheric pressure, [] enter[s] the chamber.”²⁰² Waffner describes this flow of air:

When all of the apertures **30** are covered by the portion **33** of the loop **35** of the web **10**, such as, for example, shown in FIG. 3, the vacuum in

²⁰⁰ EX1006, Col. 3:61-63 (Waffner).

²⁰¹ EX1006, Col. 5:13-17 (Waffner).

²⁰² EX1006, Col. 5:8-35 (Waffner).

the chamber **50** will be relatively high because there is very little leakage of atmospheric air into the chamber **50**. However, if the outspeed of the outgoing portion **40** of the web **10** becomes greater than the inspeed of the portions **12** of the web, the loop **35** will shorten. Consequently and as shown in FIG. 4, some of the apertures **30** in the belt **28** will become uncovered to the atmosphere. This permits more air, at atmospheric pressure, to enter the chamber **50**, and thus decreases the vacuum in the chamber **50**. When all of the apertures **30** are uncovered by the web loop **35**, the vacuum in the chamber **50** will be relatively low because there is the maximum leakage of atmospheric air into the chamber **50**.²⁰³

166. The apertures in Waffner are evenly spaced around the belt: “belt **28** includes a plurality of evenly spaced, uniform diameter apertures **30** disposed along its longitudinal center-line.”²⁰⁴ Consequently, the entire belt **28**, including the portions that curve around “pulleys **32** and **34**” is air permeable.

19. Loop

167. Müller teaches a loop, as claimed by the '013 patent.

168. Müller's loop is a “loop.” In Müller, “[p]rovided downstream of the first buffer **8** is a further buffer **12**, a loop here, which preferably has a substantially lower capacity than the buffer **8** and preferably buffers only as much interleaver material as is needed for the ejection of an interleaver.”²⁰⁵

169. Likewise, Waffner teaches a loop as claimed by the '013 patent.

²⁰³ EX1006, Col. 5:20-35 (Waffner).

²⁰⁴ EX1006, Col. 3:61-63 (Waffner).

²⁰⁵ EX1004, [0048] (Müller).

170. Waffner's loop is a "loop" 35. In Waffner "[t]he infeed and outfeed speeds of the web 10 are initially set so that a loop, generally indicated at 35, is formed in the web 10."²⁰⁶

20. Path

171. Müller teaches a path, as claimed by the '013 patent.

172. Müller's path is the path taken by interleaver material as it enters and exits the loop formed in buffer 12. In Müller, "[p]rovided downstream of the first buffer 8 is a further buffer 12, a loop here, which preferably has a substantially lower capacity than the buffer 8 and preferably buffers only as much interleaver material as is needed for the ejection of an interleaver."²⁰⁷

173. Likewise, Waffner teaches a loop as claimed by the '013 patent.

174. Waffner's loop is the path taken by the web material as it enters and exists the loop 35.

21. Device for Determining a Size of the Loop

175. Müller teaches a device for determining a size of the loop.

176. Müller's device for determining a size of the loop includes a "contacting sensor" and "control system." In Müller, "[t]he length of the loop is

²⁰⁶ EX1006, Col. 3:67-4:4 (Waffner).

²⁰⁷ EX1004, [0048] (Müller).

preferably monitored, in particular by a contact sensor.”²⁰⁸ And buffer 12 “preferably buffers only as much interleaver as is needed for the ejection of an interleaver.”²⁰⁹ A POSA would understand that Müller’s “control system” accepts an input signal from the sensor and sends control signals to the drives (i.e. drive 11) to determine the length of paper in the loop in order to maintain the loop at this size.

177. Müller does not teach the specific form of “contacting sensor” to be used.

178. Waffner teaches a device for determining a size of the loop as claimed in the ’013 patent. Waffner teaches a pressure sensor, called a manometer, connected to a control device. Waffner teaches actually determining and detecting, rather than merely being capable of determining or detecting.

179. Waffner’s device for determining a size of the loop is a device that uses a “vacuum signal” to “change... the speed of rotation of... roll 14”. An object of Waffner’s invention is:

to provide an improved loose loop feed control apparatus wherein a vacuum signal, which varies as the length of the descending portion of the web loop increases or decreases, operates, through a transducer-amplifier, a ratio changing device, such as a variable pitch sheave, to automatically change the web’s infeed speed to match the web’s

²⁰⁸ EX1004, [0048] (Müller).

²⁰⁹ EX1004, [0048] (Müller).

outfeed speed, without the necessity of manually adjusting the speeds or providing complicated electronic means to do so.²¹⁰

“The transducer-amplifier 54 serves, in effect, to convert a low pressure vacuum signal into high pressure compressed air signal which, in turn, is used to control the length of the downward portion 33 of the loop 35.”²¹¹ Waffner controls the length of the loop by using the vacuum signal to “change... the speed of rotation of the pulley 16, which drives the roll 14.”²¹² In Waffner, “a vacuum line 52 connects the vacuum chamber 50 with a transducer-amplifier 54. The amount of vacuum existing in line 52 will be determined by the vacuum present in the vacuum chamber 50.”²¹³ “The vacuum line 52 is connected to a bore 80 in the base 64 of the transducer-amplifier 54. The bore 80 communicates with a passage 82 in the base 64. The passage 82, in turn, communicates with the interior of the bellows 72.”²¹⁴ This allows the vacuum strength to be transmitted as a vacuum signal:

Such a change in the vacuum is transmitted, as a vacuum signal, through the vacuum line 52 to the transducer-amplifier 54. This vacuum signal causes the position of the bellows 72 to change with respect to the orifice 70 in the tube 64.²¹⁵

²¹⁰ EX1006, Col. 2:63-3:4 (Waffner).

²¹¹ EX1006, Col. 6:23-26 (Waffner).

²¹² EX1006, Col. 5:2-5 (Waffner).

²¹³ EX1006, Col. 4:22-26 (Waffner).

²¹⁴ EX1006, Col. 4:49-53 (Waffner).

²¹⁵ EX1006, Col. 5:43-48 (Waffner).

180. Waffner's device allows for a "loop 35 of a predetermined length" to be maintained in the loop store.²¹⁶ In Waffner:

For example, when the degree of the vacuum in the chamber 50 increases (because the web outfeed speed has decreased with respect to the web infeed speed so as to lengthen the portion 33 of the loop 35 and cover more apertures 30 in the belt 28), the change in the vacuum signal from the chamber 50 will cause the bellows 72 to more restrict the orifice 70. Such increased restriction will cause the air pressure in the conduits 59 and 60 to increase since a similar volume of compressed air will be bled through the orifice 70. When the air pressure in the conduits 59 and 60 increases, the piston 84 of the cylinder 62 will be forced outwardly against the bias of the spring 88. Such movement of the piston 84 causes the connecting rods 24 to move around the pivot 25 so as to change the position of the Verisheave sheave 22. This repositioning of the sheave 22 causes the speed of the pulley 16 and roller 14, and thus the infeed speed of the web 10, to be decreased so that the downwardly descending portion 33 of the loop 35 again shortens and exposes more of the apertures 30 in the belt 28.

When the degree of the vacuum in the chamber 50 decreases, due to an increase in the web outfeed speed relative to the web infeed speed, the opposite occurs: namely, the bellows 72 expands and permits increased compressed air to bled from the conduits 59 and 60. Thus the piston 84 will be moved under the bias of the spring 88, and this movement of the piston 84 changes the position of the rods 24, and thus the sheave 22, is changed so as to increase infeed speed of the web 10.²¹⁷

181. Further, as I discuss above in section VI.F, a POSA reading Waffner at the time of the '013 patent would understand that Waffner teaches a state-of-the-art device for converting a vacuum signal into a speed adjustment to a motor. According

²¹⁶ EX1006, Col. 5:55-60 (Waffner).

²¹⁷ EX1006, Col. 5:61-6:22 (Waffner).

to the state-of-the-art at the time of the '013 patent, a POSA would understand that Waffner teaches using an electronic (digital or analog) vacuum sensor to send the vacuum signal to a central machine controller, which in turn sends control signals to a motor to adjust the speed of roll **14**. Thus, Waffner teaches, a pressure sensor, called a manometer, connected to a control device.

22. Pressure Drop

182. Waffner teaches a pressure drop, as claimed by the '013 patent.

183. In Waffner, the pressure drop is an increase in the “degree of vacuum.” Waffner explains that “because the belt **28** passes over the opening **49** in the vacuum chamber **50** and is maintained in a tight, sealing relationship with the edges **48** of the vacuum chamber **50**, the degree of vacuum in the chamber **50** will depend upon the number of apertures **30** in the belt **28** which are covered by the downwardly descending portion **33** of the loop **35** of the web **10**.”²¹⁸ Waffner describes how the pressure drops (or rises) in relation to the length of the material loop in the loop store:

When all of the apertures **30** are covered by the portion **33** of the loop **35** of the web **10**, such as, for example, shown in FIG. 3, the vacuum in the chamber **50** will be relatively high because there is very little leakage of atmospheric air into the chamber **50**. However, if the outspeed of the outgoing portion **40** of the web **10** becomes greater than the inspeed of the portions **12** of the web, the loop **35** will shorten. Consequently and as shown in FIG. 4, some of the apertures **30** in the

²¹⁸ EX1006, Col. 5:10-17 (Waffner).

belt **28** will become uncovered to the atmosphere. This permits more air, at atmospheric pressure, to enter the chamber **50**, and thus decreases the vacuum in the chamber **50**. When all of the apertures **30** are uncovered by the web loop **35**, the vacuum in the chamber **50** will be relatively low because there is the maximum leakage of atmospheric air into the chamber **50**.²¹⁹

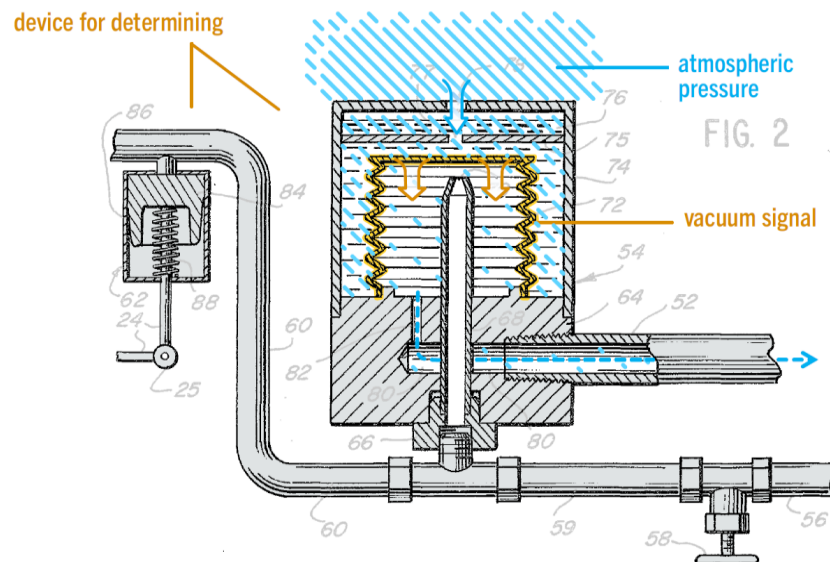
In particular, “[w]hile the outfeed and infeed speeds of the web **10** are relatively constant and remain in a selected, desired relationship, the vacuum, in the chamber **50** will remain generally unchanged because the length of the portion **33** of the loop **35** will remain the same.”²²⁰

23. Changes in ... a Pressure Differential

184. Waffner teaches changes in a pressure differential, as claimed in the '013 patent.

²¹⁹ EX1006, Col. 5:20-35 (Waffner).

²²⁰ EX1006, Col. 5:36-43 (Waffner).



EX1006, "Waffner" at Fig. 2 (annotated)

185. Waffner's changes in a pressure differential are the "change[s] in the vacuum chamber." Waffner explains that "because the belt **28** passes over the opening **49** in the vacuum chamber **50** and is maintained in a tight, sealing relationship with the edges **48** of the vacuum chamber **50**, the degree of vacuum in the chamber **50** will depend upon the number of apertures **30** in the belt **28** which are covered by the downwardly descending portion **33** of the loop **35** of the web **10**."²²¹ Waffner describes how the pressure drops (or rises) in relation to the length of the material loop in the loop store:

When all of the apertures **30** are covered by the portion **33** of the loop **35** of the web **10**, such as, for example, shown in FIG. 3, the vacuum in the chamber **50** will be relatively high because there is very little leakage of atmospheric air into the chamber **50**. However, if the

²²¹ EX1006, Col. 5:10-17 (Waffner).

outspeed of the outgoing portion **40** of the web **10** becomes greater than the inspeed of the portions **12** of the web, the loop **35** will shorten. Consequently and as shown in FIG. 4, some of the apertures **30** in the belt **28** will become uncovered to the atmosphere. This permits more air, at atmospheric pressure, to enter the chamber **50**, and thus decreases the vacuum in the chamber **50**. When all of the apertures **30** are uncovered by the web loop **35**, the vacuum in the chamber **50** will be relatively low because there is the maximum leakage of atmospheric air into the chamber **50**.²²²

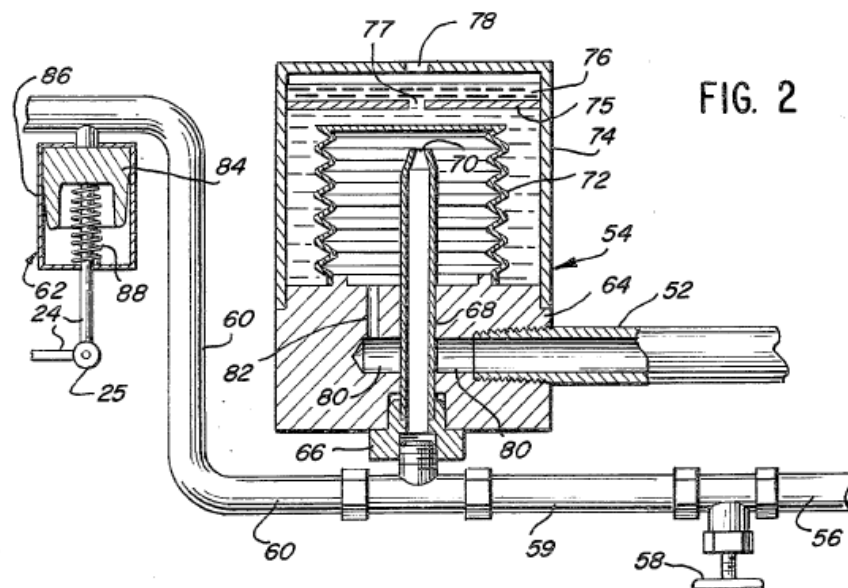
186. In particular, “[w]hile the outfeed and infeed speeds of the web **10** are relatively constant and remain in a selected, desired relationship, the vacuum, in the chamber **50** will remain generally unchanged because the length of the portion **33** of the loop **35** will remain the same.”²²³ The strength of the vacuum is compared to atmospheric air:

An expandable bellows **72** is secured to the base **64** of the transducer-amplifier about the tube **68** and is moved longitudinally by changes in vacuum/pressure acting on its walls. The exterior portion of the walls of the bellows **72** is subjected to the atmospheric pressure of the fluid **76** contained in the exterior casing **74** of the transducer-amplifier **54**. The casing **74** also contains an orifice plate **75** having an opening **77** which damps the motion of the fluid **74**. Since the casing **74** has an opening **78** in its upper end, atmospheric pressure will act on the fluid **76**, and thus the exterior of the bellows **72**.²²⁴

²²² EX1006, Col. 5:20-35 (Waffner).

²²³ EX1006, Col. 5:36-43 (Waffner).

²²⁴ EX1006, Col. 4:37-48 (Waffner).



EX1006, "Waffner" at FIG. 2

In Waffner:

For example, when the degree of the vacuum in the chamber **50** increases (because the web outfeed speed has decreased with respect to the web infeed speed so as to lengthen the portion **33** of the loop **35** and cover more apertures **30** in the belt **28**), the change in the vacuum signal from the chamber **50** will cause the bellows **72** to more restrict the orifice **70**. Such increased restriction will cause the air pressure in the conduits **59** and **60** to increase since a similar volume of compressed air will be bled through the orifice **70**. When the air pressure in the conduits **59** and **60** increases, the piston **84** of the cylinder **62** will be forced outwardly against the bias of the spring **88**. Such movement of the piston **84** causes the connecting rods **24** to move around the pivot **25** so as to change the position of the Verisheave sheave **22**. This repositioning of the sheave **22** causes the speed of the pulley **16** and roller **14**, and thus the infeed speed of the web **10**, to be decreased so that the downwardly descending portion **33** of the loop **35** again shortens and exposes more of the apertures **30** in the belt **28**.

When the degree of the vacuum in the chamber **50** decreases, due to an increase in the web outfeed speed relative to the web infeed speed, the opposite occurs: namely, the bellows **72** expands and permits increased

compressed air to bled from the conduits **59** and **60**. Thus the piston **84** will be moved under the bias of the spring **88**, and this movement of the piston **84** changes the position of the rods **24**, and thus the sheave **22**, is changed so as to increase infeed speed of the web **10**.²²⁵

24. Changes in ... a Flow Condition

187. Waffner teaches changes in a flow condition, as claimed in the '013 patent.

188. Waffner's changes in the flow condition are changes in "leakage of atmospheric air into the chamber **50**." Waffner explains that "because the belt **28** passes over the opening **49** in the vacuum chamber **50** and is maintained in a tight, sealing relationship with the edges **48** of the vacuum chamber **50**, the degree of vacuum in the chamber **50** will depend upon the number of apertures **30** in the belt **28** which are covered by the downwardly descending portion **33** of the loop **35** of the web **10**."²²⁶ Waffner describes how the pressure drops (or rises) in relation to the length of the material loop in the loop store:

When all of the apertures **30** are covered by the portion **33** of the loop **35** of the web **10**, such as, for example, shown in FIG. 3, the vacuum in the chamber **50** will be relatively high because there is very little leakage of atmospheric air into the chamber **50**. However, if the outspeed of the outgoing portion **40** of the web **10** becomes greater than the inspeed of the portions **12** of the web, the loop **35** will shorten. Consequently and as shown in FIG. 4, some of the apertures **30** in the belt **28** will become uncovered to the atmosphere. This permits more air, at atmospheric pressure, to enter the chamber **50**, and thus decreases the vacuum in the chamber **50**. When all of the apertures **30** are

²²⁵ EX1006, Col. 5:61-6:37 (Waffner).

²²⁶ EX1006, Col. 5:10-17 (Waffner).

uncovered by the web loop **35**, the vacuum in the chamber **50** will be relatively low because there is the maximum leakage of atmospheric air into the chamber **50**.²²⁷

189. In particular, “[w]hile the outfeed and infeed speeds of the web **10** are relatively constant and remain in a selected, desired relationship, the vacuum, in the chamber **50** will remain generally unchanged because the length of the portion **33** of the loop **35** will remain the same.”²²⁸

25. Influence of the Material Loop

190. Waffner teaches an influence of the material loop, as claimed in the ’013 patent.

191. Waffner’s influence of the material loop is the pressure drop, change in a pressure differential, and change in a flow condition “[w]hen all of the apertures **30** are covered by the portion **33** of the loop **35** of the web **10**.” Waffner explains that “because the belt **28** passes over the opening **49** in the vacuum chamber **50** and is maintained in a tight, sealing relationship with the edges **48** of the vacuum chamber **50**, the degree of vacuum in the chamber **50** will depend upon the number of apertures **30** in the belt **28** which are covered by the downwardly descending portion **33** of the loop **35** of the web **10**.”²²⁹ Waffner describes how the pressure drops (or rises) in relation to the length of the material loop in the loop store:

²²⁷ EX1006, Col. 5:20-35 (Waffner).

²²⁸ EX1006, Col. 5:36-43 (Waffner).

²²⁹ EX1006, Col. 5:10-17 (Waffner).

When all of the apertures **30** are covered by the portion **33** of the loop **35** of the web **10**, such as, for example, shown in FIG. 3, the vacuum in the chamber **50** will be relatively high because there is very little leakage of atmospheric air into the chamber **50**. However, if the outspeed of the outgoing portion **40** of the web **10** becomes greater than the inspeed of the portions **12** of the web, the loop **35** will shorten. Consequently and as shown in FIG. 4, some of the apertures **30** in the belt **28** will become uncovered to the atmosphere. This permits more air, at atmospheric pressure, to enter the chamber **50**, and thus decreases the vacuum in the chamber **50**. When all of the apertures **30** are uncovered by the web loop **35**, the vacuum in the chamber **50** will be relatively low because there is the maximum leakage of atmospheric air into the chamber **50**.²³⁰

192. In particular, “[w]hile the outfeed and infeed speeds of the web **10** are relatively constant and remain in a selected, desired relationship, the vacuum, in the chamber **50** will remain generally unchanged because the length of the portion **33** of the loop **35** will remain the same.”²³¹

26. Position Determination

193. Waffner teaches a position determination, as claimed in the '013 patent.

194. Waffner’s position determination is the “vacuum signal” when all of the apertures **30** are covered by the portion **33** of the loop **35** of the web **10**.” Waffner describes how the pressure drops (or rises) in relation to the length of the material loop in the loop store:

When all of the apertures **30** are covered by the portion **33** of the loop **35** of the web **10**, such as, for example, shown in FIG. 3, the vacuum in the chamber **50** will be relatively high because there is very little

²³⁰ EX1006, Col. 5:20-35 (Waffner).

²³¹ EX1006, Col. 5:36-43 (Waffner).

leakage of atmospheric air into the chamber **50**. However, if the outspeed of the outgoing portion **40** of the web **10** becomes greater than the inspeed of the portions **12** of the web, the loop **35** will shorten. Consequently and as shown in FIG. 4, some of the apertures **30** in the belt **28** will become uncovered to the atmosphere. This permits more air, at atmospheric pressure, to enter the chamber **50**, and thus decreases the vacuum in the chamber **50**. When all of the apertures **30** are uncovered by the web loop **35**, the vacuum in the chamber **50** will be relatively low because there is the maximum leakage of atmospheric air into the chamber **50**.²³²

In Waffner, “[s]uch a change in the vacuum is transmitted as a vacuum signal, through the vacuum line **52** to the transducer-amplifier **54**.”²³³

27. Control Device

195. Müller teaches a control device, as claimed by the ’013 patent.

196. Müller’s control device is a “control system.” “Preferably, the unreeling device has a sensor which monitors the progress of the consumption of the individual interleaver reel and in particular is connected to the open-loop/closed-loop control system of the system according to the invention, which outputs an appropriate signal as necessary when one or more cartridges have to be replaced or refilled.”²³⁴

197. Müller teaches using its control device for many purposes:

- “Preferably, the system according to the invention, in particular the cutting device, has a sensor which respectively determines the

²³² EX1006, Col. 5:20-35 (Waffner).

²³³ EX1006, Col. 5:43-46 (Waffner).

²³⁴ EX1004, [0050] (Müller).

interleaver reel circumference. By using the signal from this sensor, for example, the drive of the braking means and/or the drive means for the respective interleaver reel can be controlled;”²³⁵

- “Preferably, the unreeling device has a sensor which monitors the progress of the consumption of the individual interleaver reel and in particular is connected to the open-loop/closed-loop control system of the system according to the invention, which outputs an appropriate signal as necessary when one or more cartridges have to be replaced or refilled;”²³⁶
- “Preferably, the cutting device has a sensor which establishes that the unreeling device is decked correctly on the cutting device;”²³⁷
- “Preferably, each buffer having the higher storage capacity has a dancer, which is preferably provided with position sensing, the signal from which is used to control the unreeling of the interleaver reel of the respective track.”²³⁸

And a POSA reading Müller at the time of the patent and in view of the state of the art would understand Müller teaches a machine control for other functions.

198. In Müller, features of the web handling device are driven by drives

“provided on the cutting device:”

The drive **6, 7** of the interleaver reels and/or the drive **5** of the brakes is preferably provided on the cutting device. The fact that the unreeling device according to the invention preferably has no dedicated drive means that said device can be implemented very simply and has a low weight, which is advantageous for the onward movement of the unreeling device by a worker.²³⁹

Those drives are independently controlled:

²³⁵ EX1004, [0024] (Müller).

²³⁶ EX1004, [0050], (Müller).

²³⁷ EX1004, [0050], (Müller).

²³⁸ EX1004, [0027] (Müller).

²³⁹ EX1004, [0048] (Müller).

Thus, each reel can be driven individually, in order, for example, to control the buffered interleaver strip length per track individually and/or to be suitable for the different cutting speed per track.²⁴⁰

B. The combination of Müller and Waffner would have been obvious.

199. Müller discloses an apparatus for providing interleaver material to the cutting region of food product slicing machine. Like many interleaver devices known in the art, Müller discloses creating a buffer loop of web material upstream of the rollers that insert the web material into the cutting area. A POSA would have recognized the advantages of including a “vacuum chamber” such as disclosed in Waffner, and using a “vacuum signal” to detect, determine, and control loop length. A POSA would have found it obvious to incorporate the teachings of Waffner into the interleaver taught by Müller.

200. Further, a POSA would have expected success in combining the teachings of Müller and Waffner.

1. Motivation to Combine

- a) A POSA would be motivated to combine Waffner’s techniques with Müller’s apparatus for provision of interleaver to ensure that an appropriate length of loop is stored in Müller’s buffer.**

201. A POSA would recognize the importance of controlling the “buffer” loop in Müller. For example, Müller explains that “[b]y means of the buffers,

²⁴⁰ EX1004, [0048] (Müller).

damage, in particular tearing of the interleaver strip, is prevented and/or the unreeling of the interleaver reels can be evened out, at least somewhat.”²⁴¹ Waffner likewise teaches the importance of a loop of material acting as a buffer:

It has long been known that the feeding of web material, such as paper or other fragile sheeting, from an input to an output is best accomplished by permitting a loose loop to form in the web between the inlet and the outlet. With such a loop, the web will not be damaged if there are changes in the relative infeed and outfeed speeds of the web.²⁴²

202. Without the ability to determine the length of loop in the buffer, the buffer might run out, inadvertently creating a high-tension zone before the interleaver ejector roller **14**. This too high tension could lead to slippage (and a too-short or non-existence sheet of interleaver) if the tension difference overcomes the traction of roller **14**, or “web breaks” or other damage to the web.²⁴³

203. Determining the length of the loop buffer is particularly important in the interleaving operation described by Müller. To feed paper into the cutting region of a food slicer at industrial speeds, the paper must be intermittently fed at high acceleration. Müller specifically refers to the need to “insert the interleaver strip into the cutting plane with a very high acceleration.”²⁴⁴ Other patents likewise

²⁴¹ EX1004, [0026] (Müller).

²⁴² EX1006, Col. 1:6-17 (Waffner).

²⁴³ EX1011, p. 14 (Excerpts from *The Mechanics of Web Handling*).

²⁴⁴ EX1004, [0048] (Müller).

inform a POSA that in the “high speed operation” of food slicing-and-interleaving machines, insufficient slackness in the loop is a problem.²⁴⁵ And the videos available to a POSA showing these slicing-and-interleaving machines in operation show the high speeds, and high accelerations, needed to insert paper into the cutting region and stop it so it can be sliced in between and slice of food product.²⁴⁶ Indeed, these videos include slow-motion sequences to allow a viewer to see this high-speed, dynamic acceleration of the paper.²⁴⁷ Because of this high acceleration (and sudden braking) of paper exiting the buffer, the amount of buffered material in the loop would be subject to rapid changes, and would need means for reliable determination.

204. Notably, Müller explains that the buffer it teaches is not perfect. For example, Müller teaches “[b]y means of the buffers, damage, in particular tearing of the interleaver strip, is prevented and/or the unreeling of the interleaver reels can be evened out, at least somewhat.”²⁴⁸ A POSA would be motivated to search for and incorporate techniques that would improve Müller’s buffer.

205. Waffner directly explains that its techniques can be used to improve the control over a loose loop of web material:

²⁴⁵ EX1023, Col. 8:46-56 (Pryor 531).

²⁴⁶ EX1022 (GEA “DualSlicer” Video); EX1024 (Weber “Slicer 604” Video).

²⁴⁷ EX1022 (GEA “DualSlicer” Video).

²⁴⁸ EX1004, [0026] (Müller).

It is an object of the present invention to provide an improved apparatus which is utilized to control the infeed speed of a continuous web so that a loose loop is formed and maintained in the web so as to substantially eliminate damage to the web.²⁴⁹

206. The benefits of these techniques—“substantially eliminating damage to the web”—would be important to a POSA. For example, damage to the web that caused the web material to break or jam in the web material feeding apparatus would result in processing delays, which would decrease the profitability of a food processor. Even if the web material did not break or jam, damage to the interleaver sheets, such as wrinkling, tearing, or incorrect lengths, could be noticed by the end customer of the food product and decrease the desirability of the product.

207. A POSA would be motivated to combine Waffner’s techniques with Müller’s apparatus for provision of interleaver to ensure that an appropriate length of loop is stored in Müller’s buffer. Müller teaches that buffer **12** “preferably buffers only as much interleaver material as is needed for the ejection of an interleaver” sheet.²⁵⁰ And while Müller teaches that a contacting sensor can be used, Müller does not specify a particular form of sensor.

208. Waffner is explicit that it teaches a device that allows “a loop [] of a predetermined length” to be maintained in a loose loop.²⁵¹ A POSA would

²⁴⁹ EX1006, Col. 2:57-62 (Waffner).

²⁵⁰ EX1004, [0048] (Müller).

²⁵¹ EX1006, Col. 5:55-60 (Waffner).

understand that Waffner allows this by using a contacting sensor—the apertures in its contact surface which connect to a transducer-amplifier—to monitor the length of the loop and send control signals to determine that length. Other references available to a POSA would further encourage the POSA to make this combination. For example, as discussed more below in section XII.B, Fukuchi expressly identifies the “high speed” starts and “instantaneous[.]” stops when “paper [is] cut to a predetermined size,” and teaches a POSA that using a vacuum sensor to determine loop length is an effective solution for that scenario.²⁵² A POSA would be motivated to use the specific contacting sensor taught by Waffner in Müller’s interleaver.

209. Waffner teaches that these benefits can be achieved with simple construction using inexpensive parts:

From the foregoing, it is apparent that I have provided an improved apparatus for controlling the infeed speed of a loose loop of a web to match its outfeed speed so that damage to the web is minimized. Furthermore, the components used to control the web feed speed are relatively simple in construction and inexpensive to manufacture.²⁵³

A POSA would recognize that Waffner’s technique could be implemented with simple construction and inexpensive manufacturing using electronic sensors and machine controls.²⁵⁴

²⁵² EX1007, Col. 2:9-20 (Fukuchi).

²⁵³ EX1006, Col. 6:50-56 (Waffner).

²⁵⁴ *See, supra*, section VI.F.

210. A POSA would be motivated by these advantages, for example because they would allow the POSA to reduce the cost of building a food slicer with an interleaver. This would allow the POSA to charge lower prices for the device (and attract more customers) or realize a greater margin on each sale.

211. As a further motivation to use Waffner's technique, I note that at the time of the '013 patent, there were existing patents that claimed other forms of sensors to determine loop length in a slicing-and-interleaving machine. For example, Pryor 531 had issued in Jul. 26, 2016.²⁵⁵ Pryor 531 claimed:

1. A sheet interleaver for a slicing machine that provides a slicing plane for slicing an elongated food product and a sheet from web material beneath said elongated product, comprising:

- a supply of web material;
- a drawing station having a first driver for drawing web material from said supply;
- a feed station having a second driver for receiving web material from said drawing station and driving said web material through a cutting nip into said slicing plane;
- a controller in signal-communication with said first and second drivers to drive web material at select differential speeds by said first and second drivers such that tension of the web material between said drawing station and said feed station is controlled; and
- a non-contact sensor that senses tension of web material between said drawing station and said feed station and is in signal-communication with said controller to adjust the differential speed of said first and second drivers to maintain said tension within a pre-selected range.

EX1023, "Pryor 531" at Claim 1

212. At a high level, it is my opinion that a POSA designing a slicing-and-interleaving machine that used a web material buffer loop could conclude that if they

²⁵⁵ EX1023 (Pryor 531).

used a “non-contact sensor” in such a machine, they would risk infringing the Pryor 531 claim. Consequently, a POSA would be motivated to use *contacting* sensors—such as the pressure sensor taught by Waffner—in their design, as the inventors of the ‘013 patent and Weber were apparently motivated to do so in this situation.

b) A POSA would be motivated to combine Waffner’s techniques with Müller’s apparatus to realize additional advantages of a vacuum chamber.

213. A POSA would recognize that adding a vacuum chamber and contact surface to Müller’s strip guide would allow the system to use those same components for other benefits beyond sensing the loop. For example, and as I explain in more detail below, a POSA would understand that the vacuum chamber could be used during “threading” of a new reel of interleaver material. And for further example, a POSA would understand that the vacuum chamber could be used as a tension control element for web material leaving the loop.

214. A POSA would view the multiple possible benefits of a vacuum chamber as a further reason to combine Waffner’s teachings with Müller’s system. A POSA would expect to reduce complexity, decrease costs, and simplify maintenance by using one component (a vacuum chamber, air-permeable contact surface, and sensor) for several functions.

(1) Simplification of Loading New Material

215. A POSA would be motivated to combine Waffner's techniques with Müller's apparatus for provision of interleaver to simplify loading new interleaver material.

216. Müller teaches that is a benefit to "reduce the outlay when changing the interleaver reels."²⁵⁶ In particular, Müller teaches a number of improvements to "threading" the new interleaver strip into the apparatus.²⁵⁷ A POSA would understand that decreasing the time needed to thread the interleaver material into the apparatus would increase productivity.

217. A POSA would recognize that Waffner's techniques could be incorporated in Müller's apparatus to decrease threading time. Müller already teaches its contact surface, the "strip guide," has a role during threading: it can be "shortened, i[n] particular when threading the interleaver strip."²⁵⁸ Converting Müller's strip guide to the vacuum chamber and contacting belt used in Waffner would simplify threading. Because the vacuum chamber would hold interleaver material against the belt without the need for a corresponding clamp or roller, strip material would not need to be "threaded" through this portion of the apparatus. And

²⁵⁶ EX1004, [0004] (Müller).

²⁵⁷ E.g. EX1004, [0048] (Müller).

²⁵⁸ EX1004, [0031] (Müller).

the belt could then be used to drive the interleaver material further along the apparatus, such as into the interleaver ejector roller. This would eliminate the need for hand-threading, and speed up the threading process.

(2) Tension Control of Web Material Exiting the Loop

218. A POSA would be motivated to combine Waffner's techniques with Müller's apparatus to control tension on the web material leaving the loop.

219. Speaking generally as to web-handling systems: "[t]ension is a very important web manufacturing process setting."²⁵⁹ A POSA would know that "[i]f the tension is **too low**, the web will tend to flop and **flutter** and will tend to shift and the **path** will wander sideways going through the machine and may lose **traction** on rollers."²⁶⁰ Too-low tension may also lead to "wrinkling from roller misalignment."²⁶¹ If web is "running too loose," a POSA would expect "attendant difficulties of keeping the web flat and stable."²⁶² If tension were "to fall below zero even momentarily," a POSA would understand that the web might entangle itself on

²⁵⁹ EX1011, p. 14 (Excerpts from *The Mechanics of Web Handling*).

²⁶⁰ EX1011, p. 14 (Excerpts from *The Mechanics of Web Handling*) (emphasis added).

²⁶¹ EX1011, p. 14 (Excerpts from *The Mechanics of Web Handling*).

²⁶² EX1011, p. 15 (Excerpts from *The Mechanics of Web Handling*).

part of the machine.²⁶³ It would be obvious to a POSA that there would be a benefit to preventing too-low tensions in a web handling process.

220. It was known in the food slicing and interleaving industry that the tension of interleaver material fed to the cutting region from a loose loop must be controlled. For example, in Pryor 531, the inventors noted:

Without a sufficient slackness in the web material **312** upstream of the roller **342**, the delivery of the extended end portion **312a** can be hampered during high speed operation. Additionally, too much slackness can hamper the delivery of the extended end portion **312a**.²⁶⁴

A POSA would understand that in the Pryor 531 system, “slackness” was an indication of a need for tension control. In other words, by the October 2008 publication date of Pryor 531, POSAs in the food slicing and interleaving industry knew that tension control was advantageous in loose-loop web handling systems.

221. This technique was known in other web-handling processes for web-cutting applications before the time of the '013 patent. For example, in DePoi, the inventors describe the “rapid deceleration” that is “of particular interest in a high speed apparatus having a sheet material cutter that requires the sheet material web to be stopped for cutting.”²⁶⁵ When this “rapid deceleration” stops the web at the cutting region, “inertia loading on the web is significantly larger than the tension

²⁶³ EX1011, p. 17 (Excerpts from *The Mechanics of Web Handling*).

²⁶⁴ EX1023, Col 8:46-56 (Pryor 531).

²⁶⁵ EX1014, ¶[0002]-[0003] (DePoi).

force provided by devices commonly used as a tensioning device in a high speed [] cutter, such as a vacuum box.”²⁶⁶ In other words, uncontrolled web may continue to travel under “inertia” out of a traditional loop store, which a POSA would understand could lead to web damage or tangling. A POSA would understand that incorporating a vacuum brake into the contact surface of the loop store—as suggested in Waffner and DePoi, for example—would be beneficial in a “cutter” system.

222. Müller’s web handling apparatus was such a system. And Waffner specifically teaches that:

Control over the infeed and outfeed speeds of the web in order to maintain a loose loop becomes *particularly critical* when the web is utilized in a system wherein *the tension of the web must be kept uniform*.²⁶⁷

From this, a POSA would understand that Waffner’s teachings were particularly applicable to the web handling apparatus disclosed in Müller.

223. A POSA would be motivated to combine Waffner’s technique with Müller’s apparatus to control tension of the interleaver material exiting the loop. A POSA regarding Müller would see that Müller does not teach any means for controlling tension of the interleaver material exiting the loop. Rather, a POSA would understand that an apparatus constructed exactly as disclosed in Müller would

²⁶⁶ EX1014, ¶[0002]-[0003] (DePoi).

²⁶⁷ EX1006, Col 1:18-22 (Waffner).

have interleaver material leaving the loop at essentially zero tension—the tension would be determined only by any friction between the material and the strip guide as well as a small inertial and gravitational resistance from the material itself. Yet a POSA would understand that rollers, such as the interleaver ejector rollers, would perform more reliably if the material leaving the loop was held under some tension.

224. In order to control that tension, a POSA would be motivated to use a vacuum chamber to brake the material exiting the loop. It was already known in the art that “[v]acuum rollers ... a highly effective web control device that can handle a wide variety of web tensions.”²⁶⁸ The web handling art teaches a number of reasons why using a vacuum brake could be a “great advantage” over other forms of tension control, such as nip rollers²⁶⁹ For example, a vacuum brake does not bulge the paper, does not contact the paper with additional braking elements such as brushes, rollers, and the like, and allows for quick adjustments of braking strength.²⁷⁰ A vacuum brake (or vacuum roller) is also safer, saves time, eliminates adjustments, and will not “produce scratches, imprints, and wrinkles in the web.”²⁷¹

²⁶⁸ EX1015 (Eggen, T., “Get a Grip on Your Web”).

²⁶⁹ EX1017, [0044] (Kröhnert).

²⁷⁰ EX1017, [0044] (Kröhnert).

²⁷¹ EX1015 (Eggen, T., “Get a Grip on Your Web”).

225. Waffner teaches use of a vacuum chamber that a POSA would recognize could be used as a tension-control brake.

226. A POSA would recognize that the function of the vacuum brake could be enhanced by having the brake extend over a curved portion of the strip guide. It was known in the art to have the “vacuum zone” (i.e. air-permeable contact surface) “approximate[] the area of web wrap” (i.e. be curved where the web wraps around the vacuum).²⁷² And Müller’s strip guide already has a curved portion.²⁷³ In other words, a POSA would understand that increasing the “wrap angle” (i.e. curvature) around the contact surface would increase the friction. This is supported by other references available to a POSA, which teach: “the force generated by the brake may be amplified by the geometry of [a] curved deck [i.e. a convexly-curved contact surface] by an amount [$e^{f \cdot \alpha}$], where f is the coefficient of friction between the web[] and the [surface], and α is the angle the web wraps around the guide (expressed in radians).”²⁷⁴ In other words, the braking force increases exponentially as the angle of curvature increases. A POSA would understand that by adding a curve to the contact surface, additional braking force could be realized without increasing the vacuum strength. It would have been obvious to a POSA to have that

²⁷² EX1015 (Eggen, T., “Get a Grip on Your Web”).

²⁷³ See, *supra* section XI.A.16.

²⁷⁴ EX1014, ¶[0033] (DePoi).

curved portion be air permeable so as to communicate with the vacuum chamber and act as an enhanced paper brake.

(3) Stability of Web Material Leaving the Loop

227. As Müller's web material is withdrawn from the loop store at high acceleration, a POSA would expect that the material might be vibrated, twisted, or otherwise perturbed by that acceleration. A POSA would understand that this might cause issues in delivery of the web material to the cutting region. However, a POSA would expect to be able to improve the stability of web material leaving the loop by having the web contact a surface exposed to vacuum through air-permeable openings. I note that other teachings available to a POSA teach the applicability and benefit of using air pressure to "enhance the controllability" of web in a loop.²⁷⁵ And it was known to use vacuum as a "web guide[]." ²⁷⁶

228. The loop size determination device of Waffner includes a vacuum chamber against which the web material contacts. A POSA would recognize that, in addition to being used to detect and determine loop length, this vacuum chamber could be used to increase stability on the web material. Being able to use these same components for multiple beneficial functions would be further motivation to use Waffner's teachings in Müller.

²⁷⁵ EX1023, Col. 11:2-4 (Pryor 531).

²⁷⁶ EX1015 (Eggen, T., "Get a Grip on Your Web).

c) A POSA would be motivated to control the various functions of the device through a central control.

229. At the time of the patent, a POSA would have understood that using a central machine control would be an efficient way of controlling a slicer and interleaver. This would allow the POSA to build a machine where different processes were tightly coordinated. Using a common machine control would also allow the system to be efficiently updated with new software to add features or address problems. And using a common machine control would allow a user to efficiently program different routines for different products.²⁷⁷ I understand that in the food slicing industry, product “changeover” (when a plant begins using an existing food slicing line to process a different type of food our output a different format of slicing) can occur frequently at some plants. And I understand that modern, high-speed slicers have a number of settings that need to be changed to accommodate a changeover. Using a common machine control would allow an operator to adjust and save those settings at a common location.

230. And generally speaking, at the time of the patent, it would have been obvious to a person of skill designing sophisticated mechatronic apparatuses to use

²⁷⁷ *E.g.*, EX1019, p. 21 (History of Control History of PLC and DCS) (“The fundamental advantages of these systems is the fact that they use programming rather than rewiring to configure for a new application or to try out a new control strategy.”).

a central control that sent and received electronic signals. By the time of the patent, central PLC control systems had “made a great impact on the manufacturing industry.”²⁷⁸ They offered “greater reliability” required “less maintenance” and had a “longer life” than mechanical relays or analog equipment.²⁷⁹ And a POSA would understand that it is desirable to use “associated control [that] allows a great flexibility on the pre-programmed selection of interleaving slices without manual intervention,” and that such a control would be efficiently realized using a central PLC control system to control at least the slicer and the paper feed.²⁸⁰

231. A POSA would be motivated to control all the motors – including at least the motors of the removal device and the suction device – through the common control. This would allow those motors to be tightly coordinated, and for different settings to be applied to them to allow for product changeovers. A POSA would be motivated to connect all the sensors – including the loop size sensor – to the common control. This would allow the system to control the motors based on input from those sensors.

²⁷⁸ EX1019, p. 21 (History of Control History of PLC and DCS).

²⁷⁹ EX1019, p. 21 (History of Control History of PLC and DCS).

²⁸⁰ EX1023, Col. 3:37-39 (Pryor 531).

d) Müller and Waffner are analogous art.

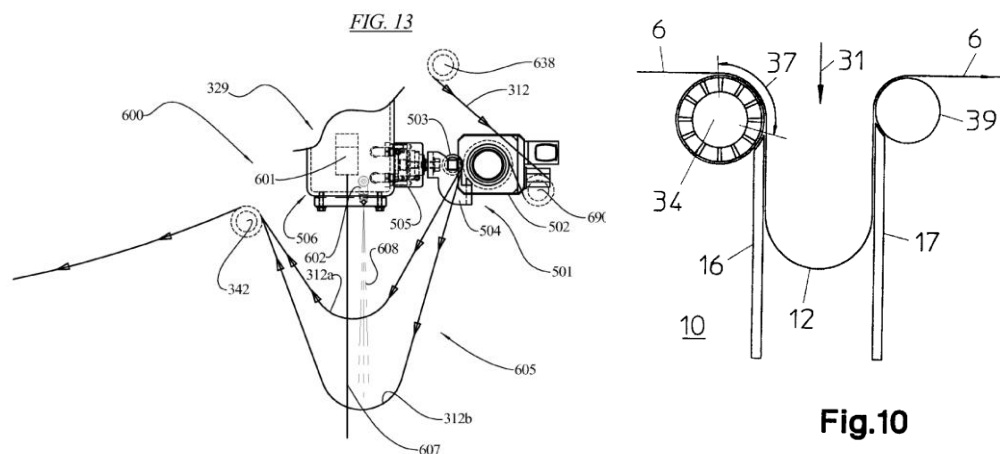
232. Müller and Waffner are analogous art. Both relate to the same field of endeavor, which is web handling. Müller’s claim 1 does not claim any specific structure of a food slicer, and is directed broadly at an “unreeling device.”²⁸¹ Further, Müller and Waffner are reasonably pertinent to the same problem, which is control of a buffer loop of web material. This is the same problem that faced the inventors of the ’013 patent. I note, also, that the Examiner understood that the analogous art included web handling applications, even if those applications did not relate to the food industry. The Examiner rejected claims of the ’612 application under 35 U.S.C. § 103 in view of U.S. Pub. No. 2012/0073249 to Pryor *et al.* (“Pryor 249”) and U.S. Patent No. 5,979,308 to Kägi *et al.* (“Kägi”).²⁸² Pryor 249 relates to a “sheet interleaver” for “a slicing machine.”²⁸³ Kägi relates to “a flat embossing machine for a ... foil web.”²⁸⁴ Despite involving different industries, both Pryor 249 and Kägi relate to the same web-handling field of endeavor. And both are pertinent to the problem of control of a buffer loop of web material:

²⁸¹ EX1004, claim 1 (Müller).

²⁸² EX1002, at 459 (’013 patent file history).

²⁸³ EX1016, Abstract (Pryor 249).

²⁸⁴ EX1012, Col. 1:5-10 (Kägi).



EX1016, “Pryor 249” at Fig. 13; EX1012, “Kägi” at Fig. 10

I agree with the Examiner’s determination that web-handling systems that teach control of buffer loops are analogous art to the ’013 patent. Müller and Waffner are such analogous art.

2. Expectation of Success

233. A POSA would have a reasonable expectation of success in making the combination discussed above.

234. At the time of the ’013 patent, food slicing interleavers were a proven technology with commercial applications.²⁸⁵ A POSA would understand that the modifications described above would represent localized changes to the loose loop control of such interleavers, and would expect that the general (and industry-proven) operation of the interleaver and slicer could otherwise remain unchanged.

²⁸⁵ EX1022 (GEA DualSlicer Video); EX1024 (Weber Slicer 604 Video)

Specifically, it was recognized in the food-slicing-and-interleaving industry that “[a]ny other method of sensing the slackness of the web accumulation loop can also be used” in an interleaver.²⁸⁶

235. The components needed to generate a vacuum, use a vacuum to increase friction along a braking surface, and detect the strength of that vacuum were well-known mechanical and electronic components and would be within a POSA’s skill level to use. For example, vacuum rollers were a known component in web handling.²⁸⁷ And incorporating a stationary vacuum chamber with a permeable contact surface would have been an even easier application of vacuum to web handling. As discussed above in section VI.E, a number of food product slicers with interleavers incorporated compressed or evacuated air into their web handling apparatuses.²⁸⁸ A POSA would have reasonably expected to succeed in incorporating them into an interleaver like Müller’s.

236. A POSA would further expect success because using a pressure sensor to determine loop length had been repeatedly demonstrated in web-handling applications. As I discuss above in section VI.B, Lahti, Bryer, Waffner, and Fukuchi

²⁸⁶ EX1021, Col. 9:48-49 (Pryor 872).

²⁸⁷ EX1015 (Eggen, T., “Get a Grip on Your Web).

²⁸⁸ EX1005, 3:35-39, Fig. 1 (Jordan); EX1023, Fig. 16 (Pryor 531); EX1021, Fig. 13 (Pryor 872); EX1025, Fig. 1 (GEA 258).

all taught this technique.²⁸⁹ Bryer went as far as explaining that this was how loop length was “usually” determined in certain web systems.²⁹⁰ Given a five-decade history of this technique, a POSA would have expected success in using it in the context of Müller.

237. It would have been within a POSA’s skill to determine parameters, such as the size and shape of the suction element and the strength of the suction. A POSA would expect to be able to pick suitable parameters without undue experimentation. For example, a POSA would expect success in looking to the size of the strip guide in Müller, and using that as a starting point for designing the size and shape of the contact surface of the vacuum chamber. For further example, a POSA would expect success in looking at the vacuum strength of known vacuum-assisted rollers, and using that as a starting point for setting the vacuum strength in the vacuum chamber. Indeed, relatively straight forward equations relating the size (e.g. “total area”) of the contact surface, shape (e.g. “the angle the web wraps around guide”), and vacuum strength (e.g. “pressure generated by the vacuum”) existed which could guide the POSA in this process.²⁹¹

²⁸⁹ EX1008 (Lahti); EX1009 (Bryer); EX1006 (Waffner); EX1007 (Fukuchi).

²⁹⁰ EX1009, Col. 1:63-65 (Bryer).

²⁹¹ EX1014, ¶[0034] (DePoi).

238. When combining Waffner’s vacuum-sensing and vacuum-braking techniques with Müller’s interleaver, a POSA would take into account the current state of the art. For example, a POSA would understand that when Waffner filed his application in 1979, electronic machine control technology was in its infancy.²⁹² Yet by 2017, the time of the ’013 patent, sophisticated, programmable machine controllers were standard, as evident from the record in this case as well as my own experience in engineering.²⁹³ Electronic pressure sensors were readily available from vendors as well by the time of the ’013 patent.²⁹⁴ And Müller specifically teaches using a machine control to receive, process, and send numerous signals in order to control the slicing, interleaving, and web handling functions.²⁹⁵ A POSA would expect success using Müller’s control to process the vacuum signal and determine the length of the loose loop of web. A POSA would find it obvious to use an analog or digital sensor to detect pressure changes and electronically communicate that information to a machine control.

²⁹² EX1019, pp. 13-14 (History of Control History of PLC and DCS)

²⁹³ EX1019, p. 2 (History of Control History of PLC and DCS) (2013) (“PLCs are produced and sold worldwide”)

²⁹⁴ See, e.g. EX1018 (Omega High (0.08%) Accuracy Metric Pressure Transducers) (2015).

²⁹⁵ See *supra* at section XI.A.27.

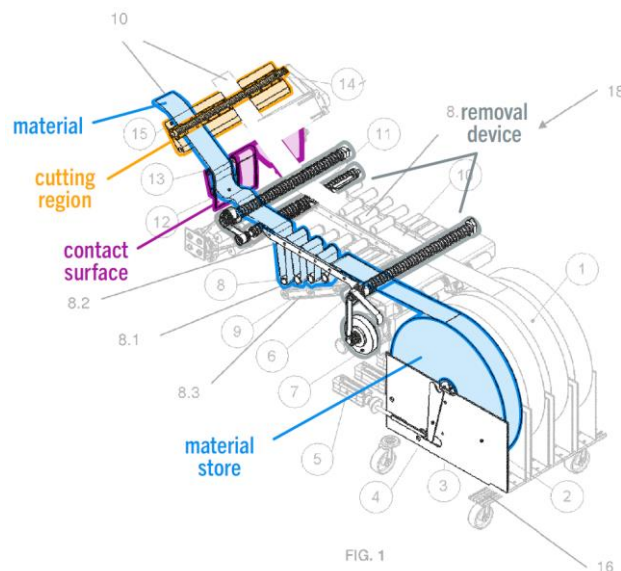
C. The combination of Müller and Waffner meets each element of the challenged claims.

1. Independent Claim 2

- a) Preamble: An apparatus for a single-track or multitrack provision of web-like interleaved sheet material at a cutting region in which products supplied on one track or on multiple tracks are cut into slices and interleaved sheets are introduced which are cut off from the provided interleaved sheet material in the cutting region, the apparatus comprising:**

239. To the extent the preamble is limiting, Müller discloses the preamble.

Müller, as combined with Waffner, would meet the preamble.



EX1004, “Müller” at Fig. 1 (annotated)

240. A POSA would understand that Müller’s system is an apparatus for single-track or multitrack provision of web-like interleaved sheet material. A POSA would understand that the system was an “apparatus,” because Müller teaches the

mechanical equipment and components necessary to realize its system. A POSA would understand that the system was for single-track or multitrack provision of material, because Müller teaches a “plurality of interleaver reels” and that an “interleaver strip is provided for each track.”²⁹⁶ A POSA would understand that Müller’s material is web like sheet material, because it forms a “strip” and because paper is a well-recognized example of web material.²⁹⁷ A POSA would understand that Müller’s material is interleaved, because Müller refers to it as “interleaver strip” material and explains in detail how it is “placed between” (i.e. interleaved with) “two slices.”²⁹⁸

241. A POSA would understand that Müller’s system provides the material at a cutting region in which products supplied on one track or on multiple tracks are cut into slices and interleaved sheets are introduced which are cut off from the provided interleaved sheet material in the cutting region. A POSA would understand that Müller’s “cutting plane” is a cutting region, because it is the region at which a blade cuts both food and paper.²⁹⁹ A POSA would understand that Müller’s “product,” such as “food” are products, because Müller refers to them explicitly as

²⁹⁶ See *supra* at section XI.A.1.

²⁹⁷ See *supra* at section XI.A.2.

²⁹⁸ See *supra* at section XI.A.3.

²⁹⁹ See *supra* at section XI.A.4.

product, and because in the food slicing industry, food is commonly referred to as “products.”³⁰⁰ A POSA would understand that Müller’s “tracks” are tracks, because Müller refers to the path taken by the food as “tracks,” and explains that its “cutting device in the present case has four tracks.”³⁰¹ A POSA would understand that Müller’s food is cut into slices, because Müller describes that food being “severe[d]” by a knife to form “a plurality of slices of food.”³⁰² A POSA would understand that Müller’s “interleavers” are sheets, because Müller describes the interleavers as the sheets of “paper, in particular coated paper or a film, which reduced the adhesive forces between two slices of food”—individual pieces of paper are frequently referred to as sheets.³⁰³ A POSA would understand that these sheets are cut off from the provided interleaved sheet material in the cutting region, because Müller explains that the “interleaver is preferably cut off, by the same knife which exits off the slices of food, from an interleaver strip.”³⁰⁴ A POSA would understand that Müller’s system introduces these sheets, because the material “is preferably inserted intermittently into the cutting place” and is “placed between two slices.”³⁰⁵

³⁰⁰ See *supra* at section XI.A.7.

³⁰¹ See *supra* at section XI.A.9.

³⁰² See *supra* at section XI.A.10.

³⁰³ See *supra* at section XI.A.3.

³⁰⁴ See *supra* at section XI.A.4.

³⁰⁵ See *supra* at section XI.A.1.

242. Consequently, an apparatus resulting from the obvious combination of Müller with Waffner would meet each element of the preamble to claim 2.

b) Element 2.1: a material store

243. Müller discloses this element. Müller, as combined with Waffner, would meet this element.

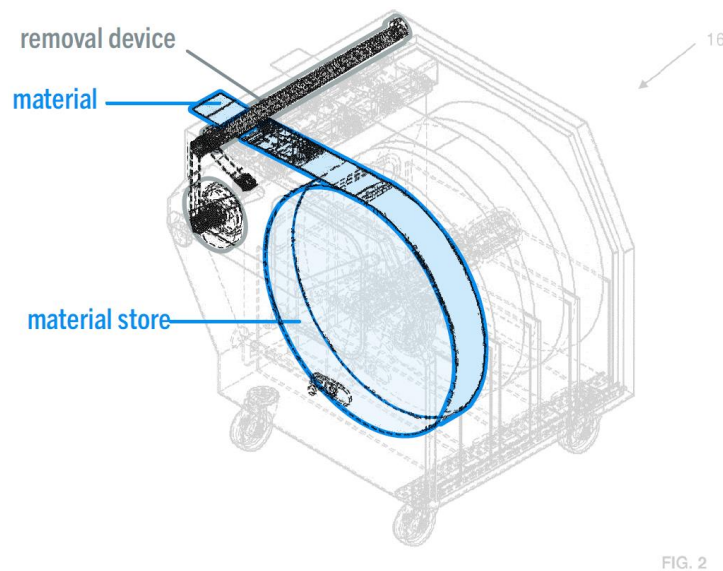


FIG. 2

EX1004, “Müller” at Fig. 2 (annotated)

244. A POSA would understand that Müller’s “interleaver reel” **1** is a material store. In order to be “unreeled” from the interleaver reel, Müller’s material strip must first be stored on the interleaver reel.³⁰⁶

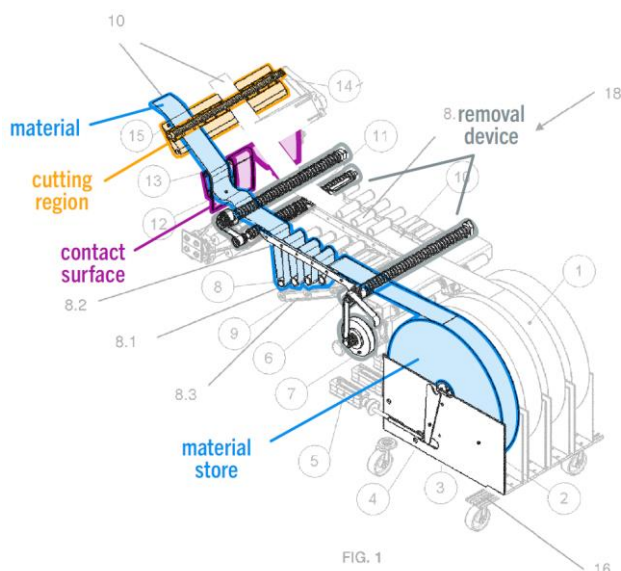
³⁰⁶ See *supra* Section XI.A.11.

245. Waffner likewise discloses a material store, as claimed.³⁰⁷

Consequently, an apparatus resulting from the obvious combination of Müller with Waffner would meet each element of [2.1].

c) Element 2.2: a removal device for a removal of a material web from the material store

246. Müller discloses this element. Müller, as combined with Waffner, would meet this element.



EX1004, “Müller” at Fig. 1 (annotated)

247. A POSA would understand that Müller’s “unreeling device” 18 including “drives 6, 7” and drive 11” is a removal device for a removal of a material web from a material store. As discussed above, Müller initially has a material web stored on a material store. And Müller’s unreeling device has structures to drive the

³⁰⁷ See *supra* at section XI.A.11.

interleaver reels (pulling material web from those reels) and a further drive to advance material web into the buffer **12**.³⁰⁸

248. For example, a POSA would understand that “drives **6, 7**” of the interleaver reels are roll-off drives driving material off the material roll. A POSA analyzing the path taken by Müller’s material would understand that as roller **6**, powered by drive **7** operate, they would pull material from the reel, causing the material to be driven off the material roll.³⁰⁹ And a POSA would understand that “drive **11**” was a conveying roller providing the material to the loop store. A POSA analyzing the path taken by Müller’s material would understand that buffer **12** could only be maintained if an additional driven nip roller separated buffer **12** from the upstream dancer rollers—a POSA would understand that drive **11** (or a substantially similar drive) drove the material into the loop store at buffer **12**. Without a second drive, the upstream dancer roller assembly “buffer” **8** would pull web material backward out of the loop.³¹⁰ Thus, the removal device has two parts: (1) a roll-off drive driving material off the material roll, and (2) a conveying roller providing the material to the loop store.

³⁰⁸ See *supra* at section XI.A.12.

³⁰⁹ See *supra* at section XI.A.12.

³¹⁰ See EX1004, [0027] (Müller).

249. I understand that in co-pending proceedings in the U.S. District Court for the Western District of Missouri, Petitioner has advanced a claim construction for this term of: “The removal device has two parts: (1) a roll-off drive driving material off the material roll, and (2) a conveying roller providing the material to the loop store.” Because Müller’s unreeling device satisfies these limitations under Petitioner’s proposed construction, whether or not that construction is adopted is not material to my analysis.

250. I note that a two-part removal device has advantages that a POSA would recognize. For example, such a device allows tension on the material leaving the material store to be controlled to a different value than tension on the material entering the loop store. Because different web processes, such as unreeling and buffering, may be best-performed at different tension values, a POSA would view this as an advantage.³¹¹

251. Waffner likewise discloses a removal device, as claimed.³¹² Consequently, an apparatus resulting from the obvious combination of Müller with Waffner would meet each element of [2.2].

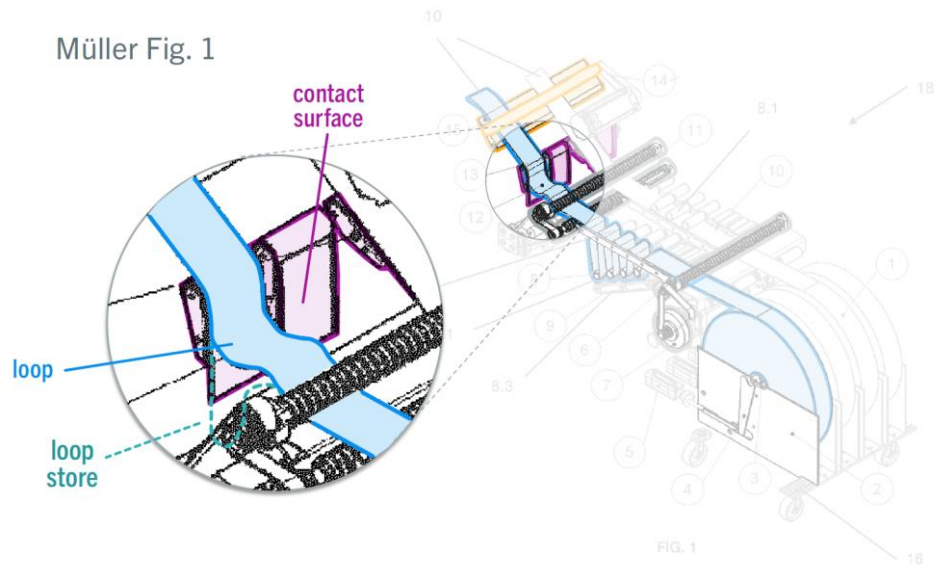
d) Element 2.3: a loop store defining a space for the removed material web to form a loop, the loop store

³¹¹ See *supra* at section XI.B.1.b.2.

³¹² See *supra* at section XI.A.12.

located between the material store and the cutting region

252. Müller discloses this element. Müller, as combined with Waffner, would meet this element.



EX1004, “Müller” at Fig. 1 (annotated)

253. A POSA would understand that Müller’s “buffer” **12** is a loop store defining a space for the removed material web to form a loop, the loop store located between the material store and the cutting region. A POSA would understand that Müller’s loop is a loop formed from removed material web. As explained above, material web is removed from a material store. And Müller describes this removed material as forming a “a loop” in buffer **12**.³¹³ A POSA would understand that buffer 12 was a loop store defining a space for this loop to form. The space is defined on

³¹³ See *supra* at section XI.A.13.

one side by a “strip guide” **13**.³¹⁴ The space is defined on the other side by drive **11**.³¹⁵ Within that region, the paper forms a loop. A POSA would understand that the loop store is located between the material store and the cutting region. Buffer **12** is located downstream from the material store (interleaver reel) and upstream from the cutting region (cutting plane).³¹⁶

254. Waffner likewise discloses a loop store, as claimed.³¹⁷ Consequently, an apparatus resulting from the obvious combination of Müller with Waffner would meet each element of [2.3].

- e) **Element 2.4: a contact surface having at least a portion thereof that is air permeable, the contact surface at least partially bounding the loop store and at least partially covered by the loop that contacts the contact surface**

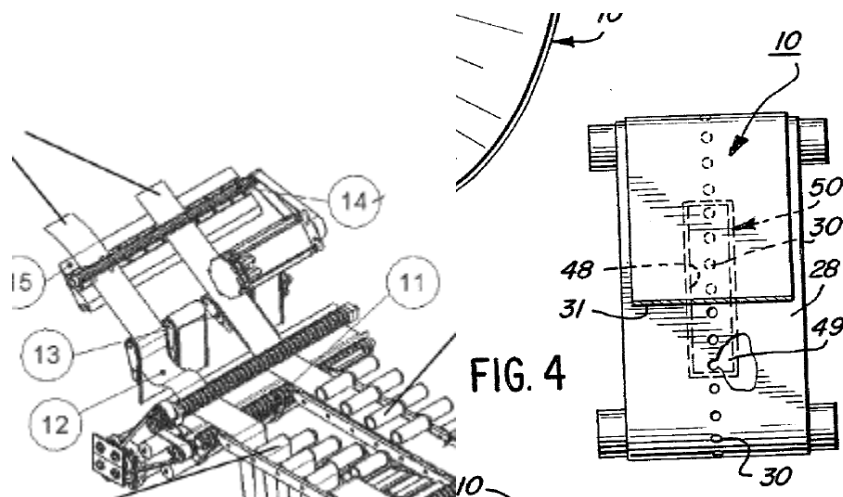
255. Müller, as combined with Waffner, would meet this element.

³¹⁴ See *supra* at section XI.A.13.

³¹⁵ See *supra* at section XI.A.13.

³¹⁶ See *supra* at section XI.A.13.

³¹⁷ See *supra* at section XI.A.13.



EX1004, “Müller” at Fig. 1 (excerpt); EX1006, “Waffner” at Fig. 4

256. A POSA would understand that Müller’s “strip guide” is a contact surface ... at least partially bounding the loop store and at least partially covered by the loop that contacts the contact surface. A POSA would understand that Müller’s “strip guide” is a contact surface, because “said strip is guided on its path” along the strip guide, and contacts the “plane” (i.e. surface) of the guide in the process. Figure 1 of Müller also shows the interleaver strip material contacting a surface of the strip guide. A POSA would understand that Müller’s strip guide partially bounds the loop store, because Figure 1 of Müller shows the strip guide as the left-most boundary of the loop store. As the strip exits contact with the strip guide, the strip exits the loop store and is shown proceeding in a straight (not looped) path. A POSA would understand that Müller’s “strip guide” is at least partially covered by the loop that

contacts the contact surface, because Figure 1 of Müller shows the interleaver strip material covering the upper portion of the strip guide.

257. A POSA would understand that Waffner's "belt **28**" is a contact surface having at least a portion thereof that is air permeable, the contact surface at least partially bounding the loop store and at least partially covered by the loop that contacts the contact surface. A POSA would understand that the "apertures **30**" in "belt **28**" were an air permeable portion, because the apertures allowed "leakage of atmospheric air" into the chamber. A POSA would understand that "belt **28**" was a contact surface, because the "apertures **30** in the belt **28**" are "covered by the downwardly descending portion **33** of the loop **35** of the web **10**." In order for the apertures to be covered by the loop, the loop must contact the belt **28**. Waffner's web "passes ... over [the] endless belt **28**." A POSA would understand that "belt **28**" was at least partially covered by the loop that contacts the contact surface, for the same reason. And a POSA would understand that "belt **28**" at least partially bounded the loop store at least because Figure 1 of Waffner shows belt **28** defining the left-most boundary of the loop store—prior to contacting belt **28**, the web material is shown travelling in a straight (not a looped) path.

258. When combining the teachings of Müller with Waffner, the resulting contact surface would have one or more apertures (as in Waffner's technique) and

would, as a consequence, have an air-permeable region. Consequently, an apparatus resulting from the obvious combination of Müller with Waffner would meet each element of [2.4].

- f) **Element 2.5: a device for determining a size of the loop formed in the loop store, the device detecting changes in at least one of a pressure differential and a flow condition, the pressure differential being a difference in pressure between a first side of the contact surface and a second side of the contact surface, the flow condition being a change of the flow of air through the air permeable portion of the contact surface, wherein the changes in the pressure differential and/or the flow condition represent a varying influence of the material loop on the air permeable portion of the contact surface that is provided as a measure for the loop size.**

259. Müller, as combined with Waffner, would meet this element.

260. As discussed below in section XI.C.8.f, a POSA would understand that Müller had a device for determining a size of the loop formed in the loop store, the device detecting a property that varied in dependence on the loop size.

261. A POSA would understand that Waffner's device that uses a "vacuum signal" to "change... the speed of rotation of... roll **14**" is a device for determining a size of the loop formed in the loop store the device detecting changes in at least one of a pressure differential and a flow condition, the pressure differential being a difference in pressure between a first side of the contact surface and a second side

of the contact surface, the flow condition being a change of the flow of air through the air permeable portion of the contact surface, wherein the changes in the pressure differential and/or the flow condition represent a varying influence of the material loop on the air permeable portion of the contact surface that is provided as a measure for the loop size. As discussed below in section XI.C.8.f, a POSA would understand that Waffner's device is for determining a size of the loop formed in the loop store. A POSA would understand that Waffner's "change[s] in the vacuum chamber" are changes in a pressure differential because those changes are to the "degree of vacuum in the chamber 50," which is a pressure differential as compared to "the atmosphere." A POSA would understand the pressure differential is a difference in pressure between a first side of the contact surface and a second side of the contact surface, because the side of the contact surface with the vacuum chamber has a low pressure and the side of the contact surface that contacts the web loop is at atmospheric pressure. And the differential between the vacuum pressure and the atmospheric pressure is detected and amplified at Waffner's bellows. A POSA would understand that Waffner's changes in "leakage of atmospheric air into the chamber 50" are changes in a flow condition, because the leakage of air into the chamber is a flow of air through the apertures 30. A POSA would understand that this flow condition is a change of the flow of air through the air permeable portion

of the contact surface, because the flow of atmospheric air is through apertures **30**.”

A POSA would understand that Waffner’s pressure drop, change in pressure differential, and change in flow condition “[w]hen all of the apertures **30** are covered by the portion **33** of the loop **35** of the web **10**” is an influence of the material loop on the air permeable portion of the contact surface because these changes are all caused (i.e. influenced) by Waffner’s web covering more or fewer apertures. A POSA would further understand that the varying influence of the web when “all [or fewer] of the apertures **30** are covered” is provided as a measure for the loop size, because the number of apertures covered by the loop depends on the loop size. Waffner teaches a pressure sensor, called a manometer, connected to a control device. Waffner teaches actually determining and detecting, rather than merely being capable of determining or detecting.

262. As explained below, in section XI.C.8.f, a POSA would read Waffner in view of the current state of the art, and would understand that electronic (as opposed to mechanical/pneumatic) controls would be used in Waffner’s device. However, whether the vacuum signal was transmitted electronically to a machine control and resulting control signals were sent to a motor—or whether the vacuum signal was transmitted pneumatically to a piston in order to mechanically change the infeed speed via a sheave—Waffner discloses the elements of [2.5].

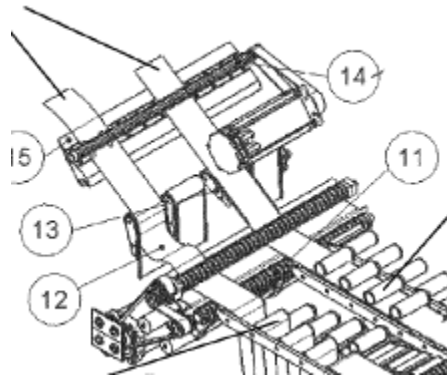
263. Waffner's device includes a "contacting sensor," for example, because the device requires the paper loop to contact (and cover) the apertures in order to cause the pressure drop which is detected.

264. Waffner's technique—using a vacuum signal to determine loop length—requires detecting the loop via changes in pressure differential and flow conditions and correspondingly determining loop length. Furthermore, Müller discloses a device to monitor the loop and determine a size of the loop. However, Müller does not specify a particular form of sensor to use for this purpose. A POSA would understand that the pressure/flow detector taught by Waffner could be used as Müller's sensor as a part of Müller's device for determining a size of the loop. Consequently, an apparatus resulting from the obvious combination of Müller with Waffner would meet each element of [2.5].

2. Dependent Claim 3

265. Claim 3 depends from claim 2 and further requires "wherein the loop store comprises a suction device for the material loop which acts on the material loop at least in a region at the outgoing side." As discussed above, claim 2 would have been obvious. And Müller, as combined with Waffner, would meet claim 3's additional limitation.

266. A POSA would understand that Müller's strip guide contacts the material loop at least in a region at the outgoing side. Müller's strip is guided along the strip guide "on its path from the interleaver reel as far as the insertion area." And Müller's Figure 1 shows the strip guide on the outgoing side of the loop store, where the interleaver strip exits the loop and goes out to the insertion area and cutting plane:



EX1004, "Müller" at Fig. 1 (excerpt)

267. A POSA would understand that Waffner's "source of vacuum" **48** is a suction device, as it is a "blower type" device capable of generating suction and creating a pressure drop in a vacuum chamber.

268. A source of vacuum would connect to a vacuum chamber at the strip guide, and a POSA would understand that the source of vacuum would act on the loop in that region, such as by increasing the friction of the loop against the strip guide. Consequently, an apparatus resulting from the obvious combination of Müller with Waffner would meet each element of [3].

3. Dependent Claim 9

269. Claim 9 depends from claim 2 and further requires “wherein the air permeable portion of the contact surface bounds at least one vacuum chamber to which a suction device is connected or which belongs to a suction device.” As discussed above, claim 2 would have been obvious. And Waffner discloses claim 9’s additional limitation. Müller, as combined with Waffner, would meet claim 9’s additional limitation.

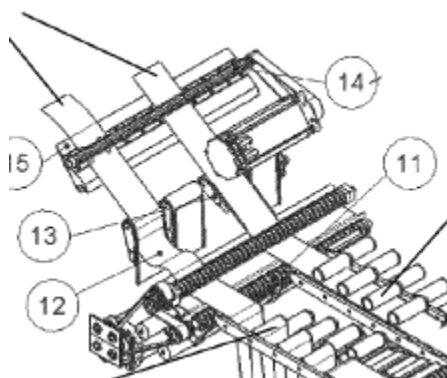
270. A POSA would understand that Waffner’s “apertures **30**” in “belt **28**” bound the vacuum chamber. As discussed above in section XI.C.1.e, these apertures form an air permeable portion of the contact surface. And belt **28**, with its apertures, “is maintained in tight contact with the edges **48** by the vacuum in chamber **50**,” forming a bound of the vacuum chamber. And as discussed above in section XI.C.2, a POSA would understand that there was a suction device connected to or belonging to the vacuum chamber.

271. A source of vacuum would connect to a vacuum chamber at the strip guide, forming a vacuum chamber bounded by an air-permeable portion. Consequently, an apparatus resulting from the obvious combination of Müller with Waffner would meet each element of [9].

4. Dependent Claim 10

272. Claim 10 depends from claim 2 and further requires “wherein the air permeable portion of the contact surface is convexly curved or has an arcuate contour.” As discussed above, claim 2 would have been obvious. And Müller, as combined with Waffner, would meet claim 10’s additional limitation.

273. A POSA would understand that Müller’s strip guide has part of the contact surface convexly curved or having an arcuate contour. This curve is shown, for example in Figure 1 of Müller:



EX1004, “Müller” at Fig. 1 (excerpt)

274. When combining the teachings of Müller with Waffner, a POSA would have the air-permeable portion of the strip guide extend to the curved portion of the strip guide. For example, this would make the strip guide more effective at

controlling tension.³¹⁸ Consequently, an apparatus resulting from the obvious combination of Müller with Waffner would meet each element of [10].

5. **Dependent Claim 12**

275. Claim 12 depends from claim 2 and further requires “wherein the web length entering the loop store per time unit is controllable by an internal or external control device in dependence on the loop size.” As discussed above, claim 2 would have been obvious. And Müller discloses claim 12’s additional limitation. Müller, as combined with Waffner, would meet claim 12’s additional limitation.

276. A POSA would understand that Müller disclosed a control device. Müller’s control device is its “control system.” The control system “is used to control the unreeling of the interleaver reel.”³¹⁹ Müller also discloses that “[t]he length of the loop is preferably monitored, in particular by a contact sensor.”³²⁰ And Müller’s control system can be used to control functions in response to sensors, for example “position sensing, the signal from which is used to control the unreeling of the interleaver reel.”³²¹ Müller’s buffer 12 “preferably buffers only as much interleaver as is needed for the ejection of an interleaver.”³²² A POSA would

³¹⁸ See *supra* at section XI.B.1.b.2.

³¹⁹ See *supra* at section XI.A.27.

³²⁰ See *supra* at section XI.A.21.

³²¹ See *supra* at section XI.A.27.

³²² See *supra* at section XI.A.21.

understand that Müller maintains this buffer by having the web length entering the loop store per time unit be controllable by an internal or external control device in dependence on the loop size.

277. Consequently, an apparatus resulting from the obvious combination of Müller with Waffner would meet each element of [12].

6. Dependent Claim 13

278. Claim 13 depends from claim 12 and further requires “wherein the removal device is controllable by the control device in dependence on the loop size.” As discussed above, claim 12 would have been obvious. And Müller discloses claim 13’s additional limitation. Müller, as combined with Waffner, would meet claim 13’s additional limitation.

279. As discussed above in section XI.C.1.c a POSA would understand that Müller had a removal device. That removal device includes “drive **11**” which drives interleaver material into buffer **12**.³²³ Further, Müller’s buffer **12** “preferably buffers only as much interleaver as is needed for the ejection of an interleaver.”³²⁴ And as discussed above in section XI.C.5, Müller has a control device. A POSA would understand that drive **11** is controllable by the control device in dependence on the loop size.

³²³ See *supra* at section XI.A.12.

³²⁴ See *supra* at section XI.A.21.

280. Consequently, an apparatus resulting from the obvious combination of Müller with Waffner would meet each element of [13].

7. Dependent Claim 16

281. Claim 16 depends from claim 2 and further requires “wherein the result of a position determination of the material loop is provided as a measure for the loop size.” As discussed above, claim 2 would have been obvious. And Müller discloses claim 16’s additional limitation. Müller, as combined with Waffner, would meet claim 16’s additional limitation.

282. A POSA would understand that the vacuum signal of Waffner was a result of a position determination of the material loop that is provided as a measure for the loop size. The level of the vacuum signal depends on the position of the loop against the contact surface. And this position determination is provided as a measure of the loop size in order to change the rate of material entering the loop.

283. Consequently, an apparatus resulting from the obvious combination of Müller with Waffner would meet each element of [16].

8. Independent Claim 17

- a) **Preamble: An apparatus for a single-track or multitrack slicing of food products having a product feed which supplies products to be sliced on one track or on multiple tracks to a cutting region in which a cutting blade moves in a rotating and/or revolving manner to cut the supplied products into slices, and having an apparatus for the provision of web-like**

interleaved sheet material at the cutting region in which the products supplied are cut into said slices and interleaved sheets are introduced which are cut off from the provided interleaved sheet material in the cutting region, said apparatus comprising:

284. To the extent the preamble is limiting, Müller discloses the preamble.

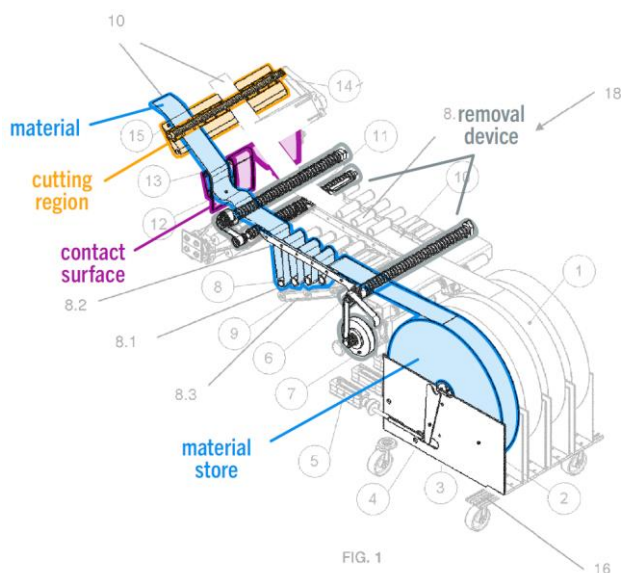
Müller, as combined with Waffner, would meet the preamble.

285. A POSA would understand that Müller's "cutting device" is an apparatus for single-track or multitrack slicing of food products having a product feed which supplies products to be sliced on one track or on multiple tracks to a cutting region in which a cutting blade moves in a rotating and/or revolving manner to cut the supplied products into slices. As described in section XI.C.1.a, Müller teaches tracks, a cutting region, slicing, food products, and slices. A POSA would understand that Müller's "drive that transports the product" is a product feed, because the drive feeds the food product along the tracks. A POSA would understand that Müller's "cutting knife" is a cutting blade, because the knife "severs slices of food" and likewise "severs the respective interleaver." A POSA would understand that Müller's "cutting knife" moves in a rotating and/or revolving manner because Müller teaches "a rotating cutting knife."

286. A POSA would understand that Müller's "system" **18** is an apparatus for the provision of web-like interleaved sheet material at the cutting region in which

the products supplied are cut into said slices and interleaved sheets are introduced which are cut off from the provided interleaved sheet material in the cutting region. As I discuss in section XI.C.1.a, Muller teaches web-like interleaved sheet material, a cutting region, and interleaved sheets. A POSA would understand that Müller's "cutting plane" is a cutting region in which the products supplied are cut into said sliced and interleaved sheets are introduced which are cut off from the provided interleaved sheet material in the cutting region, because Müller teaches that Müller's "cutting knife" is a cutting blade, because the knife "severs slices of food" and likewise "severs the respective interleaver."

287. Consequently, an apparatus resulting from the obvious combination of Müller with Waffner would meet each element of the Preamble to claim 17.



EX1004, "Müller" at Fig. 1 (annotated)

b) Element 17.1: a material store

288. Müller and Waffner each disclose this element, for the same reasons as discussed in section XI.C.1.b. Müller, as combined with Waffner, would meet this element.

c) Element 17.2: a removal device for a removal of a material web from the material store

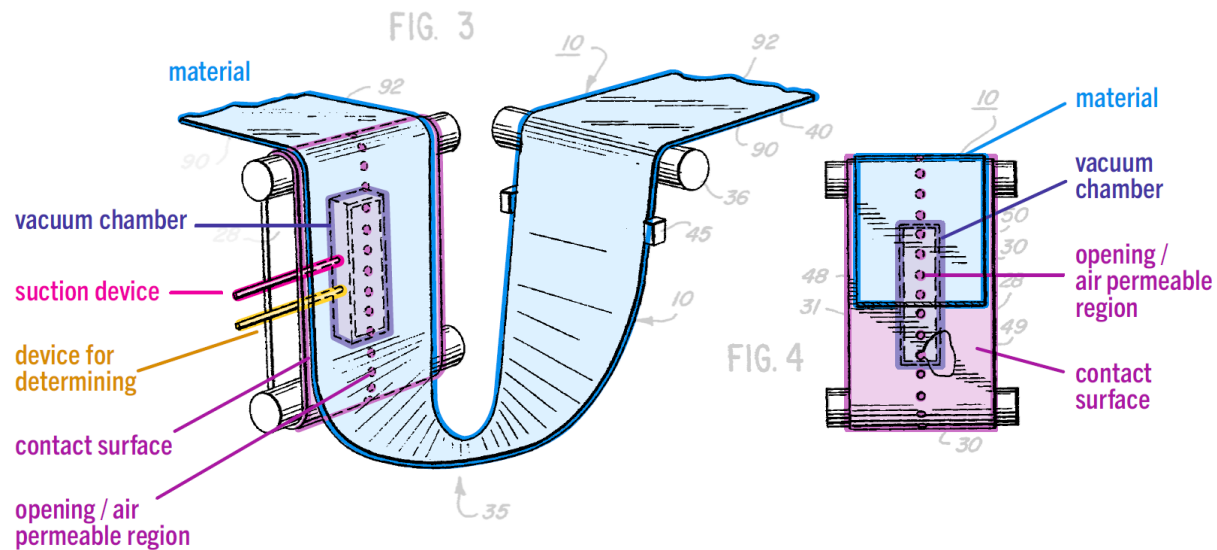
289. Müller and Waffner disclose this element, for the same reasons as discussed in section XI.C.1.c. Müller, as combined with Waffner, would meet this element.

d) Element 17.3: a loop store defining a space for the removed material web to form a loop, the loop store located between the material store and the cutting region

290. Müller discloses this element, for the same reasons as discussed in section XI.C.1.d. Müller, as combined with Waffner, would meet this element.

e) Element 17.4: at least one vacuum chamber, the at least one vacuum chamber having at least one opening located adjacent a path of the loop

291. Waffner discloses this element. Müller, as combined with Waffner, would meet this element.



EX1006, “Waffner” at Figs. 3-4 (annotated)

292. A POSA would understand Waffner’s “vacuum chamber 50” to be an at least one vacuum chamber having at least one opening located adjacent a path of the loop.” A POSA would understand Waffner’s “vacuum chamber 50” to be at least one vacuum chamber, at least because Waffner uses those words to describe this feature.³²⁵ Further, Waffner explains that “vacuum chamber 50” is connected to a source of vacuum.³²⁶ A POSA would understand that Waffner’s “apertures 30” were at least one opening, because an aperture is a commonly used term that means opening.³²⁷ Further, the apertures must be openings, because when those openings are covered by the material loop, the flow of atmospheric air into the vacuum

³²⁵ See *supra* at section XI.A.14.

³²⁶ See *supra* at section XI.A.14.

³²⁷ See *supra* at section XI.A.17.

chamber decreases.³²⁸ A POSA would understand that the “apertures **30**” are part of the vacuum chamber, because the degree of vacuum in the chamber depends on the number of apertures covered, and because the apertures are “disposed along [a] longitudinal center line” of belt **28**, which forms the outer wall of the vacuum chamber.³²⁹ A POSA would understand that the path taken by interleaver material as it enters and exits the loop formed in buffer **12** is a path of the loop, because this is an ordinary usage of these words.³³⁰ And a POSA would understand that the apertures are located adjacent to a path of the loop, because as the loop increases in length, it covers a number of those apertures.³³¹

293. Waffner’s technique—using a vacuum signal to determine loop length—teaches the existence of a vacuum chamber with openings adjacent to the path of the loop. Consequently, an apparatus resulting from the obvious combination of Müller with Waffner would meet each element of [6.4].

- f) Element 17.5: a device for determining a size of the loop formed in the loop store based on the detection of a pressure drop within the at least one vacuum**

³²⁸ See *supra* at section XI.A.17.

³²⁹ See *supra* at section XI.A.17.

³³⁰ See *supra* at section XI.A.20.

³³¹ See *supra* at section XI.A.17.

chamber when the opening is at least partially covered by the loop

294. Waffner discloses this element. Müller, as combined with Waffner, would meet this element.

295. A POSA would understand that Müller’s “contacting sensor” and “control system” are a device for determining a size of the loop formed in the loop store. A POSA would understand that Müller’s “contacting sensor” detects some property that varies in dependence on the size of the loop. And a POSA would understand that based on this detection, Müller’s control system sends control signals to drive motors to determine the size of the loop formed.³³²

296. However, Müller does not explain the specific form of its “contacting sensor,” and does not explain what specific property the sensor detects.³³³

297. A POSA would understand that Waffner’s device that uses a “vacuum signal” to “change... the speed of rotation of... roll **14**” is a device for determining a size of the loop formed in the loop store based on the detection of a pressure drop within the at least one vacuum chamber when the opening is at least partially covered by the loop.³³⁴ A POSA would understand that Waffner’s “degree of vacuum” is a pressure drop, as a vacuum is by definition at a lower (i.e. dropped) pressure from

³³² See *supra* at section XI.A.21.

³³³ See *supra* at section XI.A.21.

³³⁴ See *supra* at section XI.A.21-22.

atmosphere. A POSA would understand that this pressure drop occurs within the at least one vacuum chamber, as Waffner teaches that “the degree of vacuum [is] in the chamber **50**.” A POSA would understand that this pressure drop occurs when the opening is at least partially covered, because Waffner teaches that “the degree of vacuum in the chamber **50** will depend upon the number of apertures **30** in the belt **28** which are covered by the downwardly descending portion **33** of the loop **35** of the web **10**.” It would be apparent that as the openings become covered, there would be reduced flow of (relatively high-pressure) atmospheric air into the chamber, and as a result a lower pressure would result. A POSA would understand that Waffner’s device detects this pressure drop, because the pressure drop results in a “vacuum signal,” and a POSA would understand that a signal would be used to detect the change. And a POSA would understand that the device determines the size of the loop, because the level of the vacuum signal would correspond to the number of apertures covered (and hence the size of the loop), and because Waffner then uses that vacuum signal to change the “infeed speed of the web **10**” to maintain a near-constant size of the loop. This allows for a “loop **35** of a predetermined [i.e. determining a size] length.”³³⁵ Waffner teaches a pressure sensor, called a

³³⁵ EX1006, Col. 5:55-60 (Waffner).

manometer, connected to a control device. Waffner teaches actually determining and detecting, rather than merely being capable of determining or detecting.

298. As explained above, in section VI.F, a POSA would read Waffner in view of the current state of the art, and would understand that electronic (as opposed to mechanical/pneumatic) controls would be used in Waffner's device. However, whether the vacuum signal was transmitted electronically to a machine control and resulting control signals were sent to a motor—or whether the vacuum signal was transmitted pneumatically to a piston in order to mechanically change the infeed speed via a sheave—Waffner discloses the elements of [1.5].

299. Waffner's device includes a “contacting sensor,” because the device requires the paper loop to contact (and cover) the apertures in order to cause the pressure drop which is detected.³³⁶

300. Waffner's technique—using a vacuum signal to determine loop length—teaches detecting the loop via pressure changes and correspondingly determining loop length. Furthermore, Müller discloses a device to monitor the loop and determine a size of the loop. However, Müller does not specify a particular form of sensor to use for this purpose. A POSA would understand that the pressure detector taught by Waffner could be used as Müller's sensor as a part of Müller's

³³⁶ See *supra* at section XI.A.21.

device for determining a size of the loop.³³⁷ Consequently, an apparatus resulting from the obvious combination of Müller with Waffner would meet each element of [6.5].

9. Dependent Claim 18

301. Claim 18 depends from claim 17 and further requires “wherein a common control device is provided which is configured to coordinate the slicing of the products and the provision of the interleaved sheet material.” As discussed above, claim 17 would have been obvious. And Müller discloses claim 18’s additional limitation. Müller, as combined with Waffner, would meet claim 18’s additional limitation.

302. A POSA would understand that Müller’s “control system” is a common control device configured to coordinate the slicing of the products and the provision of the interleaved sheet material. Müller’s control system can be used for many purposes. And a POSA would understand that in order to advance interleaver material into the cutting plane at the same time as food product, control of the slicing of the products and the provision of the interleaved sheet material would have to be coordinated. For example, Müller teaches that “each reel can be driven individually” to coordinate with and “be suitable for the different cutting speed per track.” And

³³⁷ See also section XI.B.1.a.

because drives **6, 7** of the interleaver reels and/or the drive **5** of the brakes is preferably provided on the cutting device,” the control device on the cutting device is necessarily a “common” control device with the interleaver.

303. Further, as I discuss in section XI.B.1.d, a POSA would see obvious advantages to using a single common machine controller to control all functions of the slicer and interleaver. Consequently, an apparatus resulting from the obvious combination of Müller with Waffner would meet each element of the Preamble to claim 17.

10. Independent Claim 19

304. Claim 19 is identical to claim 2, other than its preamble. As discussed above, claim 2 would have been obvious. The preamble of claim 19 is identical to the preamble of claim 17. As discussed above, claim 17 would have been obvious. Müller, as combined with Waffner, would meet claim 19.

11. Dependent Claim 20

305. Claim 20 depends from claim 19 and further requires “wherein a common control device is provided which is configured to coordinate the slicing of the products and the provision of the interleaved sheet material.” As discussed above, claim 19 would have been obvious. And as discussed with respect to claim 18, above, the additional elements of claim 20 would have been obvious as well. Müller, as combined with Waffner, would meet claim 20’s limitations.

XII. GROUND 2: CLAIMS 2, 3, 9, 12, 13, AND 16-20 WOULD HAVE BEEN OBVIOUS OVER JORDAN IN VIEW OF FUKUCHI.

306. It is my opinion that claims 2, 3, 9, 12, 13, and 16–20 would have been obvious to a POSA over Jordan in view of Fukuchi. Below, I explain how Jordan and Fukuchi disclose and make obvious each and every limitation of these claims.

A. Overview of the References

307. It is my opinion that together, Jordan and Fukuchi teach every element of the challenged claims of the '013 patent.

308. I have prepared a chart to summarize this:

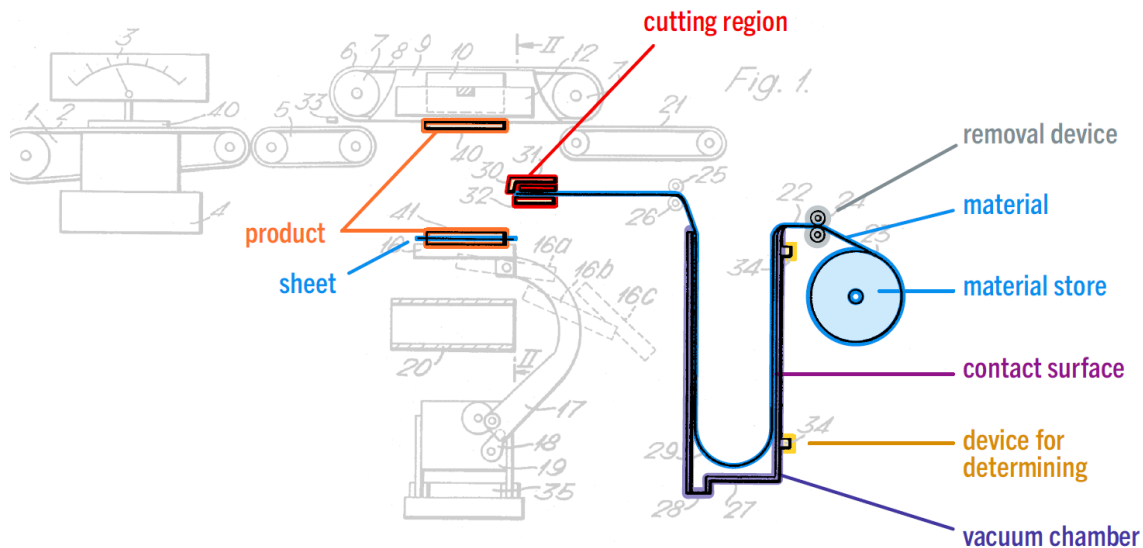
'013 Patent Claim Element	Exemplary Disclosure in Jordan and Fukuchi
Apparatus for ... provision	“paper feed arrangement” (Jordan)
Material	“web 22 of paper” (Jordan) “chip paper 1” (Fukuchi)
Sheets	“sheets” (Jordan)
Cutting region	“cutter 30” (Jordan)
Cutting blade	blade at “cutter 30” (Jordan)
Apparatus for... slicing	“cutting machine” (Jordan)
Products	“foods,” such as “cheese, sausage, ham, rock salmon” (Jordan)
Product feed	feed drives in a “cutting machine” (Jordan)
Tracks	tracks in a “cutting machine” (Jordan)
Slices	“slices 40” (Jordan)
Material store	“magazine roll 23” (Jordan) “delivery bobbin” (Fukuchi)
Removal device	“take-up rollers 24” (Jordan) “delivery roller 11” and “feed roller 31” (Fukuchi)
Loop store	“shaft 27” (Jordan) “reserving chamber 40a” (Fukuchi)

'013 Patent Claim Element	Exemplary Disclosure in Jordan and Fukuchi
Vacuum chamber	“shaft 27” “provided with a vacuum connection 28” (Jordan) “pressure detecting chamber 40b” (Fukuchi)
Suction device	device connected to a “vacuum connection 28” (Jordan) “blower 36” (Fukuchi)
Contact surface	back wall of “shaft 27” (Jordan) back wall of “reserving chamber 40a” (Fukuchi)
Opening	“slit 40c” (Fukuchi)
Air permeable portion	portion of “reserving chamber 40a” which can be ventilated” (Fukuchi)
Loop	“loop 29” (Jordan) “amount of absorbing and feeding the chip paper” (Fukuchi)
Path	path taken by interleaver material as it enters and exits the loop formed in “shaft 27” (Jordan) “U shape” (Fukuchi)
Device for determining a size of the loop	“two photocells” used to adjust the speed of “take-up rollers 24” (Jordan) “pressure detector 60” and “control system” (Fukuchi)
Pressure drop	“change of pressure” (Fukuchi)
Changes in ... a pressure differential	changing “difference between” the “internal pressure of the pressure detecting chamber” and “atmospheric pressure” (Fukuchi)
Influence of the material loop	“pressure ... changed in accordance with the amount of absorbing and feeding the belt-like material.” (Fukuchi)
Position determination	signal from the “two photocells” when “the loop becomes too large” or “to[o] small” (Jordan) “slit position” (Fukuchi)
Control device	“electronic computer” (Jordan) “control system” (Fukuchi)

In the section below, I provide an overview of additional detail on where a POSA would locate the elements of the '013 patent in the references. In Section XII.C below, I address the challenged claims element by element.

1. Apparatus for ... Provision

309. Jordan teaches an apparatus for provision, as claimed in the '013 patent.



EX1005, "Jordan" at Fig. 1 (annotated)

310. Jordan's apparatus for provision is a "paper feed arrangement." In

Jordan:

The device according to the invention can be provided with a paper feed arrangement. The web 22 of paper is drawn by the take-up rollers 24 from a magazine roll 23 and conveyed to a paper cutter 30 which cuts off the individual sheets. The paper is fed in by feed rollers 25 and 26 at about the time the air permeable conveying device 6 grips a slice of the right weight. The sheet of paper fed in under the cutter 30 is cut off when the falling slice 40 comes into contact with the paper. In order to ensure that the paper projects roughly horizontally the feed rollers are provided with devices which produce corrugations in the paper. For

instance, the feed roller **25** has circular projections and the feed roller **26** has a recess corresponding to the feed roller **25** as a rotating section. Satisfactory cutting of the fed-in sheet of paper is achieved by pressing the front end of the web before the cutting movement of the cutter through a clamp **31** against a counter surface **32**. The different speeds of the web **22** of paper in the take-up rollers **24** and the feed rollers **25** and **26** is evened out by a loop **29** in the web **22** of paper. This loop is drawn by vacuum into a shaft **27**. The vacuum holds the loop taut without impeding the movement of the web of paper. The shaft **27** is provided with a vacuum connection **28**. The size of the loop **29** is controlled by, for instance, two photocells **34**. If the loop becomes too large the take-up rollers **24** are stopped. If the loop becomes too small to take-up rollers **24** are speeded up until the loop is sufficiently big again.³³⁸

Jordan describes this “paper feed arrangement” elsewhere in the patent, as well.³³⁹

2. Material

311. Jordan teaches material, as claimed in the '013 patent.

312. Jordan’s material is “web **22** of paper.” “The web **22** of paper is drawn by the take-up rollers **24** from a magazine roll **23** and conveyed to a paper cutter **30** which cuts off the individual sheets.”³⁴⁰ Jordan teaches that the “sheets of paper” are “to be placed between the slices” of food product.³⁴¹ “The web **22** of paper is drawn by the take-up rollers **24** from a magazine roll **23** and conveyed to a paper cutter **30** which cuts off the individual sheets.”³⁴² In Jordan, “[t]he sheet of paper

³³⁸ EX1005, Col. 5:29-6:9 (Jordan).

³³⁹ EX1005, Col. 3:31-58 (Jordan).

³⁴⁰ EX1005, Col. 5:30-33 (Jordan).

³⁴¹ EX1005, Col. 3:31-33 (Jordan).

³⁴² EX1005, Col. 5:30-33 (Jordan).

fed in under the cutter **30** is cut off when the falling slice **40** comes into contact with the paper.”³⁴³

313. Fukuchi likewise teaches material, as claimed in the '013 patent.

314. Fukuchi's material is “chip paper **1**.” Fukuchi's “present invention relates to an apparatus for stably transferring belt-like material.”³⁴⁴ As a particular, but non-limiting example, Fukuchi describes its material as the “chip paper of cigarette.”³⁴⁵ In Fukuchi, “[t]he feed roller **31** draws chip paper **1** from the supplying apparatus **10** to be transferred to the winding apparatus **30** through the hole forming device **20**.”³⁴⁶

315. Fukuchi is explicit that its techniques can be applied to other types of web-handling apparatuses:

The use of the apparatus for stably transferring belt-like material of the present invention is not limited to the punching apparatus for forming fine holes in rolled chip paper. The present invention can be applied to the supplying apparatus or the winding apparatus, independently. Moreover, the present invention can be applied to the apparatus for printing or processing the other belt-like material, e.g., wrapping paper.³⁴⁷

3. Sheets

316. Jordan teaches sheets, as claimed in the '013 patent.

³⁴³ EX1005, Col. 5:35-38 (Jordan).

³⁴⁴ EX1007, Col. 1:7-8 (Fukuchi).

³⁴⁵ EX1007, Col. 1:11 (Fukuchi).

³⁴⁶ EX1007, Col. 5:36-38 (Fukuchi).

³⁴⁷ EX1007, Col. 13:60-67 (Fukuchi).

317. Jordan's sheets are "sheets." Jordan teaches that the "sheets of paper" are "to be placed between the slices" of food product.³⁴⁸ "The web 22 of paper is drawn by the take-up rollers 24 from a magazine roll 23 and conveyed to a paper cutter 30 which cuts off the individual sheets."³⁴⁹ In Jordan, "[t]he sheet of paper fed in under the cutter 30 is cut off when the falling slice 40 comes into contact with the paper."³⁵⁰ As Jordan describes an embodiment of his invention:

In a further embodiment of the process according to the invention sheets of paper can be placed between the individual slices. In order to do this a sheet of paper is pushed forward horizontally into the path of the slices being released downwards from the air-permeable conveying device and cut off from its delivery web when the falling slice touches the paper. The sheet of paper is pushed forward a little above the maximum height of the stack on the stacking surface. Owing to the fact that the slice is already in contact with the sheet of paper when it is being cut off, the sheet of paper does not slip to the side as it drops down.³⁵¹

4. Cutting Region

318. Jordan teaches a cutting region, as claimed in the '013 patent.

319. Jordan's cutting region is a "cutter 30." In Jordan, "[t]he sheet of paper fed in under the cutter 30 is cut off when the falling slice 40 comes into contact with the paper."³⁵² "Satisfactory cutting of the fed-in sheet of paper is achieved by

³⁴⁸ EX1005, Col. 3:31-33 (Jordan).

³⁴⁹ EX1005, Col. 5:30-33 (Jordan).

³⁵⁰ EX1005, Col. 5:35-38 (Jordan).

³⁵¹ EX1005, Col. 2:43-55 (Jordan).

³⁵² EX1005, Col. 5:36-38 (Jordan).

pressing the front end of the web before the cutting movement of the cutter through a clamp **31** against a counter surface **32**.”³⁵³

320. A POSA reading Jordan at the time of the '013 would do so in the context of the state-of-the-art at the time of the '013 patent. Jordan details an embodiment where food slices are pre-cut by “known high speed slicing machines” and delivered via conveyor belts, and the sheets are cut in a different cutting region.³⁵⁴ However, a POSA would understand that by the time of the '013 patent, the conventional, state-of-the-art way to interleave sheets with food slices cut from “high speed” machines would be to sever the slices and the sheets at the same cutting region using a single revolving blade. For example, the success of this technique had been demonstrated in videos published before (and near) the time of the '013 patent.³⁵⁵ This technique was also consistently taught in patent publications post-dating Jordan (including publications near in time to the '013 patent).³⁵⁶ In such a state-of-the-art slicing-and-interleaving machine, a POSA would understand that Jordan’s “cutter” would be a cutting blade that moves in a rotating manner to cut the

³⁵³ EX1005, Col. 5:43-47 (Jordan).

³⁵⁴ EX1005, Col. 6:14-16 (Jordan) (“The apparatus according to the invention can be combined with known high-speed slicing machines”).

³⁵⁵ EX1022 (GEA DualSlicer Video); EX1024 (Weber Slicer 604 Video).

³⁵⁶ EX1010 (Fessler); EX1013 (Weber); EX1020 (Dreier); EX1023 (Pryor 531); EX1021 (Pryor 872); EX1004 (Müller); EX1025 (GEA 258).

supplied products into slices, as well as cutting of sheets of paper from the web material. In such a state-of-the art slicing-and-interleaving machine, a POSA would understand that food product is driven to the cutting region along tracks by a product feed.

321. Furthermore, a POSA would recognize that the specific reasons given in Jordan for slicing food product in one region and forming interleaved stacks of slices in a different region no longer applied. Jordan, writing in 1973, explained that

Hitherto stacks of food slices have been formed at a cutting machine. The individual slices fell one after the other on a stacking surface in a random fashion. The stacks formed in this way were of irregular form. ***To overcome this***, the invention provides a method of forming stacks of flexible food slices comprising feeding a series of flexible food slices in turn to the underside of a moving air permeable conveyor, attaching each slice in turn to the underside of the conveyor by vacuum, conveying each attached slice to a position over a stacking support, stopping said conveyor with said slice at said position, releasing the vacuum and forcibly releasing said slice to allow it to fall from the conveyor and form a stack on said stacking support. This method ***allows accurately defined stacks*** to be produced.

A further problem was that the stacks were ***not uniform in weight***. Resetting the cutting machine to correct the thickness of the slices or the number of the slices could not be done without a considerable loss of time. With foods such as cheese, sausage, ham, rock salmon etc. deviations occur fairly suddenly, however, in the dimensions of the pieces to be cut and in the consistency of the product. Portions from the ends of the pieces therefore frequently had to be repacked by hand. Sorting out the end pieces or pieces which broke off during cutting could not be done either without some work by hand. According to a further feature of the invention each slice is weighed before being

attached to the conveyor and only slices of correct weight are released over said stacking support.³⁵⁷

A POSA would understand that by the time of the '013 patent, advances in machine control technology had solved these issues. For example, in videos published before the time of the '013 patent, food product is shown being sliced at a single cutting region along with interleaved paper sheets, and falling into “accurately defined stacks.”³⁵⁸ In that same video, an “OptiScan” machine scans the incoming food product, which a POSA would understand is one way to provide for “slices of the correct weight” forming the stack.³⁵⁹ And the video shows that the resulting stacks, measured in grams, are the correct weight with no human intervention.³⁶⁰

³⁵⁷ EX1005, Col. 1:9-42 (Jordan).

³⁵⁸ EX1022, 0:42-1:06 (GEA DualSlicer Video).

³⁵⁹ EX1022, 1:06-1:18 (GEA DualSlicer Video).

³⁶⁰ EX1022, 1:34-1:44 (GEA DualSlicer Video).



Further, patent publications from the time of the '013 patent detail specific improvements to food slicers that allow for this provision. For example, Provisur had disclosed:

high speed food loaf slicing machines that slice one, two, or more food loaves simultaneously using one cyclically driven slicing blade. ***Independent loaf feed drives*** are provided so that slices cut from one loaf may ***vary in thickness*** from slices cut from the other loaf ...

In the food loaves slices are received in ***groups of predetermined weight*** on a receiving conveyor that is disposed adjacent to the slicing blade...

The receiving conveyor receives the slices as they are cut by the slicing machine. In many instances, ***neatly aligned stacked groups are preferred*** and, as such, the sliced product is stacked on the receiving conveyor before being transferred from the machine. In other instances, the groups are shingled so that a purchaser can see a part of every slice through a transparent package. In these other instances, conveyor belts of the receiving conveyor are gradually moved during the slicing process to separate slices.

Paper interleaving mechanisms used in conjunction with cutting machines are disclosed in U.S. Pat. Nos. 6,752,056 and 4,583,435. According to these patents, slabs of product such as cheese are oriented angularly with respect to a horizontal conveyor and are fed downwardly into a slicing plane defined by a moving slicing blade. A roll of web material such as paper is arranged beneath the slab and has a length of

web continuously fed toward and beneath a cut face of the slab such that when ***the cutting blade slices a slice from the slab the cutting blade simultaneously slices off a leading end portion of the web,*** forming a sheet.³⁶¹

These disclosures are representative of the state-of-the-art at the time of the '013 patent. A POSA would know that accurate, on-weight stacks of sliced food product could be formed at the blade, while also cutting interleaver material into interleaver sheets at the same blade.

322. A POSA would recognize that the multi-step technique used in the described Jordan embodiment would be unnecessary to recognize the aims of Jordan. Jordan's technique involves multiple steps, and only operates on a single slice at a time. The technique comprising:

- feeding a series of flexible food slices in turn to the underside of a moving air permeable conveyor,
- attaching each slice in turn to the underside of the conveyor by vacuum, conveying each attached slice to a position over a stacking support,
- stopping said conveyor with said slice at said position,
- releasing the vacuum and forcibly releasing said slice to allow it to fall from the conveyor and form a stack on said stacking support.³⁶²

A POSA would understand that this would be slower than using the state-of-the-art food slicing technologies available at the time of the '013 patent, and would not be

³⁶¹ EX1021, Col. 1:21-63 (Pryor 872).

³⁶² EX1005, Col. 1:9-42 (Jordan).

necessary to achieve Jordan’s goals of “accurately defined stacks” that were “uniform in weight.”

323. A POSA reading Jordan *at the time of the ’013 patent* would understand that Jordan taught using a state-of-the-art apparatus for slicing food product, which would include using a cutting region where both interleaver material and food product was sliced by the same, rotating, cutting blade.

5. Cutting Blade

324. Jordan teaches a cutting blade, as claimed in the ’013 patent.

325. Jordan’s cutting blade is a blade at “cutter **30**.” In Jordan, “[t]he sheet of paper fed in under the cutter **30** is cut off when the falling slice **40** comes into contact with the paper.”³⁶³

326. As I discuss above in section XII.A.4, a POSA reading Jordan *at the time of the ’013 patent* would understand that Jordan taught using a state-of-the-art apparatus for slicing food product, which would include using a cutting region where both interleaver material and food product was sliced by the same, rotating, cutting blade. In such a slicer, the cutting region would have a cutting blade that moves in a rotating manner to cut the supplied products into slices.³⁶⁴

³⁶³ EX1005, Col. 5:36-38 (Jordan).

³⁶⁴ See, e.g., EX1022 (GEA “DualSlicer” Video); EX1024 (Weber “Slicer 604” Video).

6. Apparatus for ... Slicing

327. Jordan teaches an apparatus for slicing, as claimed in the '013 patent.

328. Jordan's apparatus for slicing is a "cutting machine." Jordan teaches "[H]itherto stacks of food slices have been formed at a cutting machine."³⁶⁵

329. As I discuss above in section XII.A.4, a POSA reading Jordan *at the time of the '013 patent* would understand that Jordan taught using a state-of-the-art apparatus for slicing food product, which would include using a cutting region where both interleaver material and food product was sliced by the same, rotating, cutting blade. Such a slicing machine would have product feeds driving food product along tracks toward the slicing station.

7. Products

330. Jordan teaches products, as claimed in the '013 patent.

331. Jordan's products are "foods," such as "cheese, sausage, ham, rock salmon."³⁶⁶

8. Product Feed

332. Jordan teaches a product feed, as claimed in the '013 patent.

333. Jordan's product feed is feed drives in a "cutting machine."

³⁶⁵ EX1005, Col. 1:9-10 (Jordan).

³⁶⁶ EX1005, 1:27-48 (Jordan).

334. As I discuss above in section XII.A.4, a POSA reading Jordan *at the time of the '013 patent* would understand that Jordan taught using a state-of-the-art apparatus for slicing food product, which would include using a cutting region where products would be fed to the cutting region using feed drives.

9. Tracks

335. Jordan teaches tracks, as claimed in the '013 patent.

336. Jordan's tracks are tracks in a "cutting machine."

337. As I discuss above in section XII.A.4, a POSA reading Jordan *at the time of the '013 patent* would understand that Jordan taught using a state-of-the-art apparatus for slicing food product, which would include using a cutting region where products would be fed to the cutting region along one or more tracks. For example, food being fed along tracks is shown in videos of state-of-the-art cutting machines at the time of the '013 patent.³⁶⁷

10. Slices

338. Jordan teaches slices, as claimed in the '013 patent.

339. Jordan's slices are "slices **40**." In Jordan, "[t]he slices **40** fall from a cutting apparatus."³⁶⁸ Jordan's invention "enables sheets of paper to be interleaved

³⁶⁷ EX1022 (GEA "DualSlicer" Video); EX1024 (Weber "Slicer 604) Video).

³⁶⁸ EX1005, Col. 3:64-65 (Jordan).

between the individual slices.”³⁶⁹ Jordan explains “[h]itherto stacks of food slices have been formed at a cutting machine. The individual slices fell one after the other on to a stacking surface in a random fashion.”³⁷⁰ In Jordan, “a slicing machine is used.”³⁷¹

11. Material Store

340. Jordan teaches a material store, as claimed in the ’013 patent.

341. Jordan’s material store is “magazine roll **23**.” “The web **22** of paper is drawn by the take-up rollers **24** from a magazine roll **23** and conveyed to a paper cutter **30** which cuts off the individual sheets.”³⁷² “The sheets of paper to be placed between the slices are fed in by take-up rollers which are continuously operated and remove the paper from a magazine roll.”³⁷³

342. Likewise, Fukuchi teaches a material store as claimed in the ’013 patent.

343. Fukuchi’s material store is a “delivery bobbin.” In Fukuchi:

The delivery roller **11** provided in the supplying apparatus **10** has a bobbin holder, and a rotational shaft on which the bobbin holder is fixed. In the bobbin holder, a delivery bobbin having chip paper **1** as belt-like material wound in the roll form is detachably provided. The delivery bobbin is mounted on the rotational shaft of the delivery roller

³⁶⁹ EX1005, Col. 1:52-54 (Jordan).

³⁷⁰ EX1005, Col. 1:9-11 (Jordan).

³⁷¹ EX1005, Col. 1:67 (Jordan).

³⁷² EX1005, Col. 5:30-33 (Jordan).

³⁷³ EX1005, Col. 3:31-33 (Jordan).

11, and the shaft is rotated. so that chip paper **1** is delivered to the transferring passage **15**.³⁷⁴

12. Removal Device

344. Jordan teaches aspects of a removal device.

345. In Jordan, “[t]he web **22** of paper is drawn by the take-up rollers **24** from a magazine roll **23** and conveyed to a paper cutter **30** which cuts off the individual sheets.”³⁷⁵ “The sheets of paper to be placed between the slices are fed in by take-up rollers which are continuously operated and remove the paper from a magazine roll.”³⁷⁶ In Jordan, “[t]he different speeds of the web **22** of paper in the take-up rollers **24** and the feed rollers **25** and **26** is evened out by a loop **29** in the web **22** of paper. This loop is drawn by vacuum into a shaft **27**.”³⁷⁷

346. In particular, Jordan’s removal device is two-part. First, take-up rollers **24** draw material from the material store. Second, vacuum inserts drawn material into a loop.

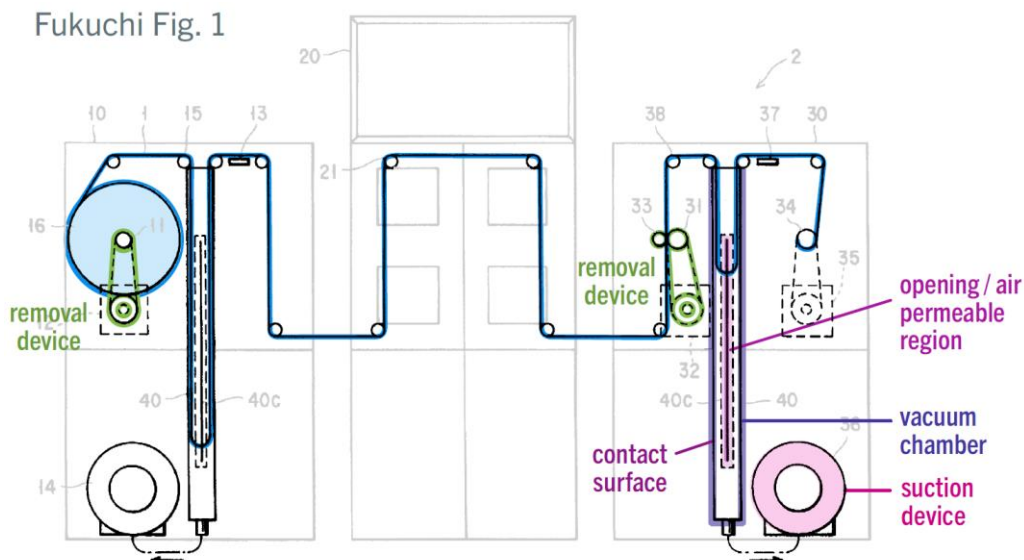
347. Likewise, Fukuchi teaches a removal device, as claimed in the ’013 patent.

³⁷⁴ EX1007, Col. 5:66-6:6 (Fukuchi).

³⁷⁵ EX1005, Col. 5:30-33 (Jordan).

³⁷⁶ EX1005, Col. 3:31-33 (Jordan).

³⁷⁷ EX1005, Col. 5:47-6:9 (Jordan).



EX1007, “Fukuchi” at Fig. 1 (annotated)

Fukuchi’s removal device is “delivery roller 11” and “feed roller 31.” In Fukuchi:

FIG. 1 is a front view schematically showing a hole forming apparatus having an apparatus for stably transferring belt-like material. As shown in FIG. 1, a punching apparatus 2 comprises a supplying apparatus 10 for delivering belt-like material, e.g., chip paper 16 wound in a roll form, a hole forming apparatus 20 for forming fine holes in chip paper delivered from the supplying apparatus; and a winding apparatus 30 for winding chip paper 1 in which holes are formed by the hole forming device 20. Moreover, the winding apparatus 30 comprises a feed roller 31 to be described later. The feed roller 31 draws chip paper 1 from the supplying apparatus 10 to be transferred to the winding apparatus 30 through the hole forming device 20. Furthermore, between the supplying apparatus 10 and the winding apparatus 30, there is provided a transferring passage, which is formed of a plurality of rollers, to transfer chip paper.

The supplying apparatus 10 comprises a delivery roller 11 to which the rolled chip paper 16 is attached, a servo motor 12 for driving the delivery roller at a predetermined rotating speed, a brake device 13 for adjusting tension of chip paper 1 delivered from the rolled chip paper 16 attached on the delivery roller 11, a blower 14 for absorbing the

delivered chip paper **1**, an absorbing and feeding apparatus **40** for continuously absorbing and feeding chip paper **1** when the blower **14** absorbs chip paper **1**, and a transferring passage **15** formed of a plurality of rollers.

Chip paper **1** is mainly pulled out from the rolled chip paper **16** by a feed roller **31** provided in the winding apparatus **30**. The servo motor **12** for driving the delivery roller **11** is controlled in accordance with an amount of reserved chip paper **1** of the absorbing and feeding apparatus **40** on the supplying apparatus **10**. In other words, the apparatus for stably transferring belt-like material on the supplying apparatus **10** comprises the feed roller **31** functioning as a main roller, the delivery roller **11** functioning as a follow roller, the transferring passage **15** where chip paper is transferred. and the absorbing and feeding apparatus **40** for continuously absorbing and feeding chip paper.³⁷⁸

Fukuchi teaches “the delivery roller **11** and the feed roller **31** are driven, so that chip paper **1** is continuously absorbed and fed, and pulled outside from the reserving chamber.”³⁷⁹ In Fukuchi:

The winding apparatus **30** comprises a feed roller **31** for transferring chip paper **1**, a servo motor **32** for driving the feed roller **31** at a predetermined rotating speed, a winding roller **34** for winding chip paper **1** transferred by the feed roller **31** in a roll form, a servo motor **35** for driving the winding roller **34** at a predetermined rotating speed, a blower **36** for absorbing chip paper **1** transferred by the feed roller **31**, the absorbing and feeding apparatus **40** for continuously absorbing and feeding chip paper **1** when the blower **36** absorbs chip paper **1**, a brake apparatus **37** for adjusting tension of chip paper wound by the winding roller **34**, and a transferring passage **38** formed of a plurality of rollers.³⁸⁰

³⁷⁸ EX1007, Col. 5:26-65 (Fukuchi).

³⁷⁹ EX1007, Col. 6:63-65 (Fukuchi).

³⁸⁰ EX1007, Col. 7:55-67 (Fukuchi).

Fukuchi teaches “The chip paper **1** transferred by the feed roller **31** is continuously absorbed and fed to the reserving chamber from the opening of the reserving chamber **40a** of the absorbing and feeding apparatus **40** on the side of the winding apparatus **30**.”³⁸¹ In other words, the path taken by Fukuchi’s paper includes:

By the rotation of the delivery roller **11**, chip paper **1** is continuously delivered from the rolled chip paper **16**...

By the rotation of the feed roller **31**, and that of the rubber roller **33**, which comes in contact with the feed roller **31**, the chip paper **1** is continuously delivered on the transferring passage **38**. Then, the chip paper **1** to be passed through the place close to the upper portion of the absorbing and feeding apparatus **40** is continuously absorbed and fed to the reserving chamber **40a** of the absorbing and feeding apparatus **40** by absorbing force of the blower **36** connected to the bottom of the absorbing and feeding apparatus **40**.³⁸²

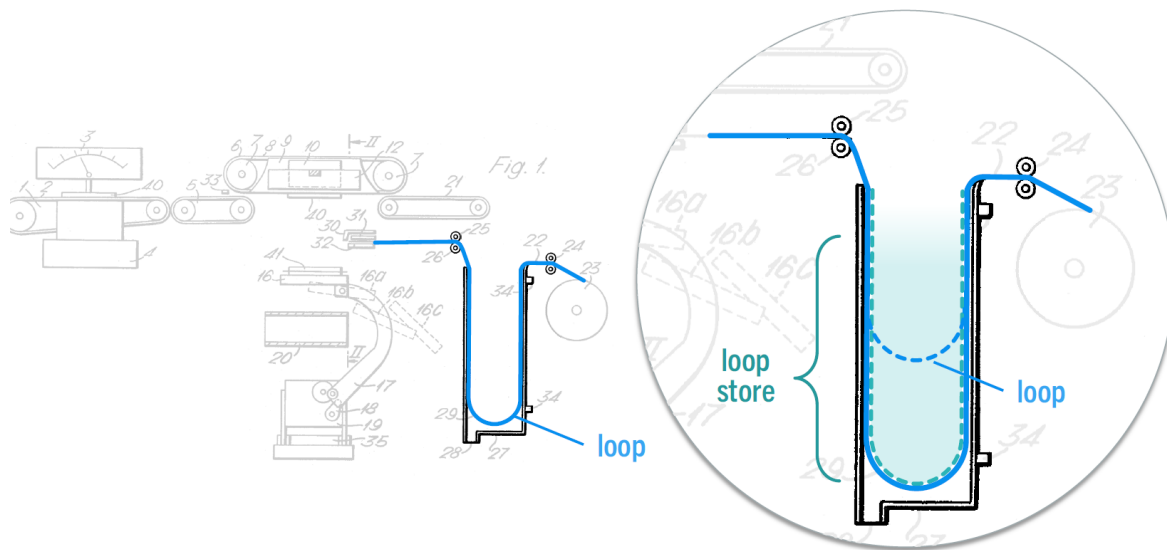
Thus, the removal device has two parts: (1) a roll-off drive driving material off the material roll, and (2) a conveying roller providing the material to the loop store.

13. Loop Store

348. Jordan teaches a loop store as claimed by the ’013 patent.

³⁸¹ EX1007, Col. 8:59-63 (Fukuchi).

³⁸² EX1007, Col. 10:5-40 (Fukuchi).



EX1005, “Jordan” at Fig. 1 (annotated)

349. Jordan’s loop store is a “shaft 27.” In Jordan:

The different speeds of the web 22 of paper in the take-up rollers 24 and the feed rollers 25 and 26 is evened out by a loop 29 in the web 22 of paper. This loop is drawn by vacuum into a shaft 27. The vacuum holds the loop taut without impeding the movement of the web of paper. The shaft 27 is provided with a vacuum connection 28. The size of the loop 29 is controlled by, for instance, two photocells 34. If the loop becomes too large the take-up rollers 24 are stopped. If the loop becomes too small to take-up rollers 24 are speeded up until the loop is sufficiently big again.³⁸³

Jordan explains that the loop store is “[b]etween the feed rollers and the take-up rollers.”³⁸⁴

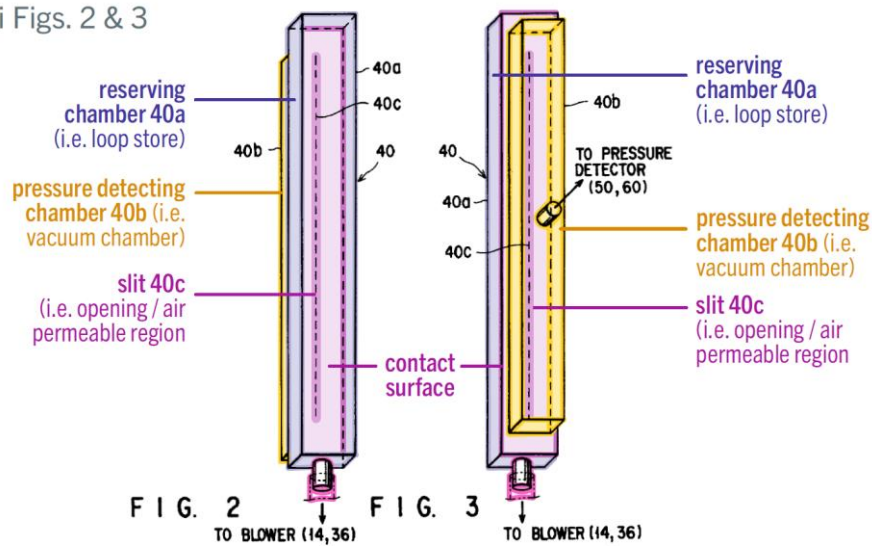
350. Likewise, Fukuchi teaches a loop store as claimed by the ’013 patent.

³⁸³ EX1005, Col. 5:47-6:9 (Jordan).

³⁸⁴ EX1005, Col. 3:35-37 (Jordan).

Fukuchi's loop store is a "reserving chamber 40a."

Fukuchi Figs. 2 & 3



EX1007, "Fukuchi" at Figs. 2-3 (annotated)

In Fukuchi, the web-handling apparatus comprises "absorbing and feeding means, having a reserving chamber for reserving the transferred belt-like material, for applying a pressure difference to first and second spaces of the reserving chamber divided by the transferred belt-like material to the reserving chamber."³⁸⁵ In Fukuchi:

The winding apparatus **30** comprises a feed roller **31** for transferring chip paper **1**, a servo motor **32** for driving the feed roller **31** at a predetermined rotating speed, a winding roller **34** for winding chip paper **1** transferred by the feed roller **31** in a roll form, a servo motor **35** for driving the winding roller **34** at a predetermined rotating speed, a blower **36** for absorbing chip paper **1** transferred by the feed roller **31**, the absorbing and feeding apparatus **40** for continuously absorbing and feeding chip paper **1** when the blower **36** absorbs chip paper **1**, a brake

³⁸⁵ EX1007, Col. 2:28-41 (Fukuchi).

apparatus **37** for adjusting tension of chip paper wound by the winding roller **34**, and a transferring passage **38** formed of a plurality of rollers.³⁸⁶

Fukuchi further describes the absorbing and feeding apparatus:

The absorbing and feeding apparatus **40**, which is provided between the delivery roller **11** and the brake apparatus **13**, comprises a box-type reserving chamber **40a** and a pressure detecting chamber **40b** as shown in FIGS. 2 and 3. In the pressure detecting chamber **40b**, which is provided at the back of the absorbing and feeding apparatus **40**, pressure of the interior is detected by a detector to be described later. An upper portion of the reserving chamber **40a** is opened such that delivered chip paper **1** can be absorbed. The bottom of the reserving chamber **40a** is connected to the blower **14** for absorbing air of the reserving chamber **40a** by predetermined absorbing force. In the other words, the reserving chamber **40a** and the pressure detecting chamber **40b** are formed as one unit through a slit **40c**. The pressure detecting chamber **40b** is connected to a pressure detector **50** for detecting internal pressure of the pressure detecting chamber **40b**. Also, surfaces other than the surface having the slit **40c** are closed.

Particularly, by absorbing air in the reserving chamber **40a** of the absorbing and feeding apparatus **40**, chip paper **1**, which is inserted in the reserving chamber **40a** from the opening of the upper portion of the reserving chamber **40a** in advance, is absorbed and fed to the bottom portion to which the blower **14** is connected. In other words, air of the space, which is from the inserted chip paper **1** to a place close to the lower portion of the reserving chamber to which the blower **14** is connected, is positively absorbed by the blower **14**, and results in obtaining pressure close to vacuum. On the other hand, air, which is from the inserted chip paper to a place close to the opening of the reserving chamber, is maintained to be pressure close to atmospheric pressure. Therefore, by pressure difference acting on chip paper **1** inserted in the reserving chamber, chip paper **1** is absorbed and fed to

³⁸⁶ EX1007, Col. 7:55-67 (Fukuchi).

the lower portion of the reserving chamber **40a** to which the blower **14** is connected.³⁸⁷

Fukuchi teaches that the second absorbing and feeding chamber, located between the feed roller and the winding apparatus, operates in substantially the same way:

As already explained with reference to FIGS. **2** and **3**, the absorbing and feeding apparatus **40** has the box-typed reserving chamber **40a** and the pressure detecting chamber **40b**. The upper portion of the reserving chamber **40a** is opened. The blower **36** is connected to the bottom portion of the reserving chamber **40a**. A pressure detector **60** is connected to the pressure detecting chamber **40b**. The internal pressure of the pressure detecting chamber **40b** is detected by the pressure detector **60**. The internal pressure of the pressure detecting chamber **40b** is changed in accordance with the amount of absorbing and feeding the chip paper **1**. The rotating speed of the servo motor **35** for driving the winding roller **34** is controlled in accordance with the amount of absorbing and feeding the chip paper **1** as described later.³⁸⁸

14. Vacuum Chamber

351. Jordan discloses a vacuum chamber, as claimed by the '013 patent.

352. Jordan's vacuum chamber is a "shaft **27**" "provided with a vacuum connection **28**." In Jordan:

This loop is drawn by vacuum into a shaft **27**. The vacuum holds the loop taut without impeding the movement of the web of paper. The shaft **27** is provided with a vacuum connection **28**.³⁸⁹

³⁸⁷ EX1007, Col. 6:18-52 (Fukuchi).

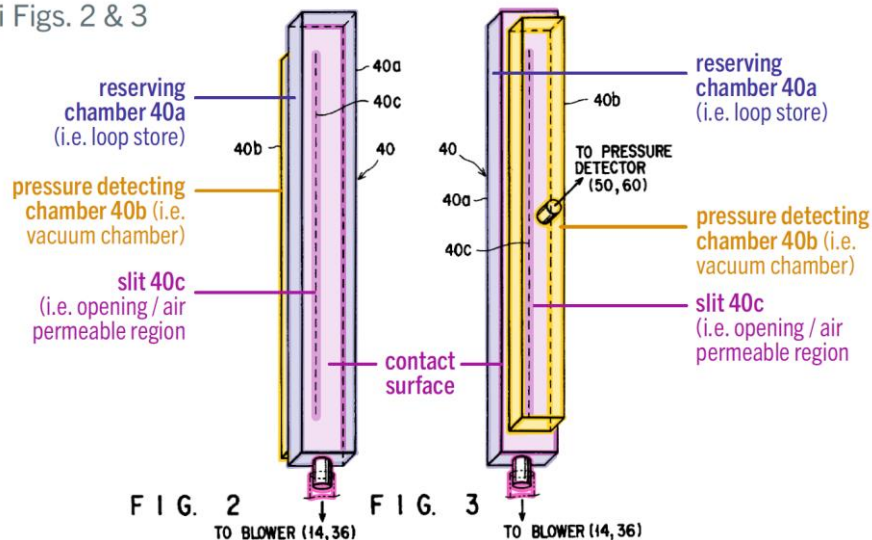
³⁸⁸ EX1007, Col. 8:31-45 (Fukuchi).

³⁸⁹ EX1005, Col. 6:1-4 (Jordan).

Jordan teaches that “it has been found that the paper can be fed in at high speed in this way.”³⁹⁰

353. Likewise, Fukuchi discloses a vacuum chamber as claimed by the '013 patent.

Fukuchi Figs. 2 & 3



EX1007, “Fukuchi” at Figs. 2-3 (annotated)

354. Fukuchi’s vacuum chamber is “pressure detecting chamber **40b**.” “In Fukuchi:

The absorbing and feeding apparatus **40**, which is provided between the delivery roller **11** and the brake apparatus **13**, comprises a box-type reserving chamber **40a** and a pressure detecting chamber **40b** as shown in FIGS. 2 and 3. ... The bottom of the reserving chamber **40a** is connected to the blower **14** for absorbing air of the reserving chamber **40a** by predetermined absorbing force. ... Also, surfaces other than the surface having the slit **40c** are closed.

³⁹⁰ EX1005, Col. 3:38-40 (Jordan).

Particularly, by absorbing air in the reserving chamber **40a** of the absorbing and feeding apparatus **40**, chip paper **1**, which is inserted in the reserving chamber **40a** from the opening of the upper portion of the reserving chamber **40a** in advance, is absorbed and fed to the bottom portion to which the blower **14** is connected. In other words, air of the space, which is from the inserted chip paper **1** to a place close to the lower portion of the reserving chamber to which the blower **14** is connected, is positively absorbed by the blower **14**, and results in obtaining pressure close to vacuum.³⁹¹

355. Fukuchi has a second vacuum chamber in “pressure detecting chamber

40b.” In Fukuchi:

In the other words, the reserving chamber **40a** and the pressure detecting chamber **40b** are formed as one unit through a slit **40c**. The pressure detecting chamber **40b** is connected to a pressure detector **50** for detecting internal pressure of the pressure detecting chamber **40b**. Also, surfaces other than the surface having the slit **40c** are closed.³⁹²

And:

The slit **40c** is formed such that air of the []reserving chamber **40a** and that of the pressure detecting chamber **40b** can be ventilated. If the slit can achieve the above function, the slit may be linearly arranged.³⁹³

In operation:

The blower **36** is connected to the bottom portion of the reserving chamber **40a**. A pressure detector **60** is connected to the pressure detecting chamber **40b**. The internal pressure of the pressure detecting chamber **40b** is detected by the pressure detector **60**. The internal pressure of the pressure detecting chamber **40b** is changed in accordance with the amount of absorbing and feeding the chip paper **1**.

³⁹¹ EX1007, Col. 6:18-52, Col. 8:31-45 (Fukuchi).

³⁹² EX1007, Col. 6:29-35 (Fukuchi).

³⁹³ EX1007, Col. 7:12-16 (Fukuchi).

In Fukuchi:

By applying negative pressure to the second space, a pressure difference between the first and second spaces of the reserving chamber is generated. Then, the internal pressure of the pressure detecting chamber, which communicates with the reserving chamber through the fine communicating hole, is changed in accordance with the amount of absorbing and feeding the belt-like material.³⁹⁴

15. Suction Device

356. Jordan discloses a suction device, as claimed by the '013 patent.

357. Jordan's suction device is a device connected to a "vacuum connection 28." In Jordan, "[t]he shaft 27 is provided with a vacuum connection 28."³⁹⁵ In Jordan, "loop is drawn by vacuum into a shaft 27" and "vacuum holds the loop taut without impeding the movement of the web of paper."³⁹⁶

358. Although Jordan does not explicitly describe the source of vacuum, it would be obvious to a POSA that Jordan teaches a conventional source of vacuum, such as a blower.

359. Likewise, Fukuchi teaches a suction device as claimed in the '013 patent. Fukuchi's suction device is "blower 36." In Fukuchi:

Air of the space, which is from the inserted chip paper 1 to a place close to the lower portion of the reserving chamber to which the blower [36]

³⁹⁴ EX1007, Col. 4:12-19 (Fukuchi).

³⁹⁵ EX1005, Col. 6:1-4 (Jordan).

³⁹⁶ EX1005, Col. 6:1-3 (Jordan).

is connected, is positively absorbed by the blower [36], and results in obtaining pressure close to vacuum.³⁹⁷

In other words:

As already explained with reference to FIGS. 2 and 3, the absorbing and feeding apparatus 40 has the box-typed reserving chamber 40a and the pressure detecting chamber 40b. The upper portion of the reserving chamber 40a is opened. The blower 36 is connected to the bottom portion of the reserving chamber 40a. A pressure detector 60 is connected to the pressure detecting chamber 40b. The internal pressure of the pressure detecting chamber 40b is detected by the pressure detector 60. The internal pressure of the pressure detecting chamber 40b is changed in accordance with the amount of absorbing and feeding the chip paper 1. The rotating speed of the servo motor 35 for driving the winding roller 34 is controlled in accordance with the amount of absorbing and feeding the chip paper 1 as described later.³⁹⁸

The resulting vacuum acts on the paper:

Therefore, by pressure difference acting on chip paper 1 inserted in the reserving chamber, chip paper 1 is absorbed and fed to the lower portion of the reserving chamber 40a to which the blower [36] is connected.³⁹⁹

In other words, “blower 36 absorbs chip paper 1.”⁴⁰⁰ In Fukuchi, “chip paper 1 supplied from the feed roller 31 is continuously absorbed and fed to the reserving chamber by absorbing force of the blower 36.”⁴⁰¹

³⁹⁷ EX1007, Col. 6:42-45 (Fukuchi) (describing blower 14, which a POSA would understand is analogous to blower 36).

³⁹⁸ EX1007, Col. 8:31-45, 6:18-52 (Fukuchi).

³⁹⁹ EX1007, Col. 6:49-52 (Fukuchi) (describing blower 14, which a POSA would understand is analogous to blower 36).

⁴⁰⁰ EX1007, Col. 7:62-63 (Fukuchi).

⁴⁰¹ EX1007, Col. 9:5-8 (Fukuchi).

And:

As explained above, the apparatus for stably transferring belt-like material of the present invention comprises the absorbing and feeding apparatus for continuously absorbing and feeding the belt-like material in the transferring passage where the belt-like material is transferred. The absorbing and feeding apparatus comprises the reserving chamber for absorbing and feeding the belt-like material to be reserved therein, and the pressure detecting chamber connected to the reserving chamber through the slit or the through hole. The reserving chamber has the opening portion for absorbing and feeding the belt-like material, and the blower is connected to at the position, which is opposite to the opening portion. If the blower absorbs the internal air of the reserving chamber, negative pressure is applied to the belt-like material to be passed through the opening portion. so that the belt-like material is absorbed and fed to the reserving chamber. The pressure detecting chamber is closed such that pressure of the pressure detecting chamber is changed in accordance with the change of the pressure in the reserving chamber connected to the pressure detecting chamber through the through hole. The pressure of the pressure detecting chamber is detected by the pressure detector. The pressure of the reserving chamber is changed in accordance with the amount of absorbing and feeding the belt-like material absorbed and fed in the reserving chamber. Due to this, the lowermost end position of the absorbed and fed belt-like material can be correctly detected by detecting the internal pressure of the pressure detecting chamber.⁴⁰²

16. Contact Surface

360. Jordan teaches a contact surface as claimed by the '013 patent.

361. Jordan's contact surface is a back wall of "shaft 27." In Jordan:

This loop is drawn by vacuum into a shaft 27. The vacuum holds the loop taut without impeding the movement of the web of paper. The shaft 27 is provided with a vacuum connection 28.⁴⁰³

⁴⁰² EX1007, Col. 14:1-27 (Fukuchi).

⁴⁰³ EX1005, Col. 6:1-4 (Jordan).

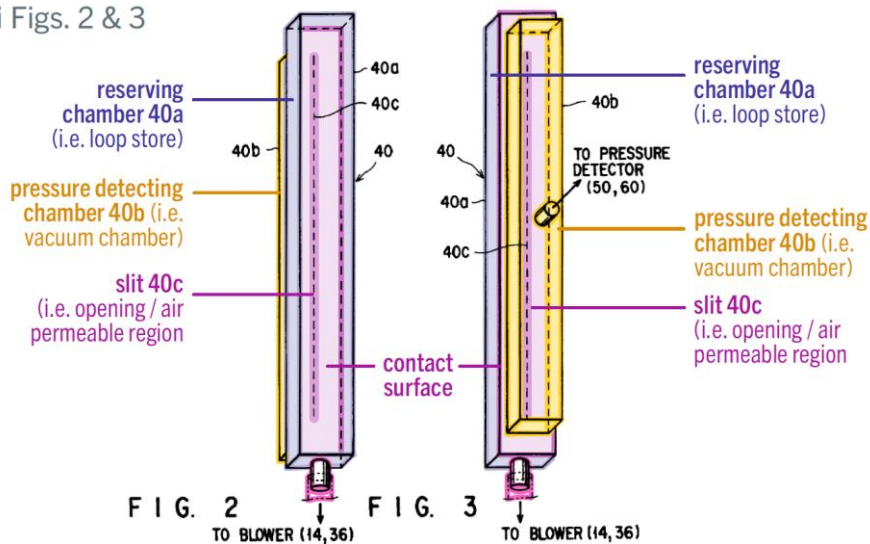
Jordan teaches that “it has been found that the paper can be fed in at high speed in this way.”⁴⁰⁴

362. Although Jordan does not explicitly describe the contact between the interleaver material and the back wall of the shaft, a POSA would understand that Jordan teaches such contact. In order for a “vacuum” to exist in the shaft capable of “draw[ing]” in the paper, a POSA would recognize that the paper loop would need to substantially separate the vacuum connection at the bottom of the shaft from atmospheric air at the top. A POSA would expect the shaft to be of approximately equal depth to the width of the paper, and understand that the edge of the paper would contact the front and back walls of the shaft as it formed a loop.

363. Likewise, Fukuchi teaches a contact surface as claimed by the ’013 patent.

⁴⁰⁴ EX1005, Col. 3:38-40 (Jordan).

Fukuchi Figs. 2 & 3

*EX1007, “Fukuchi” at Figs. 2, 3 (annotated)*

364. Fukuchi’s contact surface is a back wall of the “reserving chamber.” Fukuchi explains that, “according to the present invention, the belt-like material is transferred to the reserving chamber through the opening portion of the reserving chamber so as to divide the reserving chamber to first and second spaces.”⁴⁰⁵

365. Although Fukuchi does not explicitly disclose contact between the material loop and the back wall of the reserving chamber, a POSA would understand that Fukuchi teaches such contact. In order for the material to “divide” the reserving chamber into “first and second spaces,” a POSA would recognize that the material loop would need to substantially separate the bottom of the reserving chamber from the top. A POSA would expect the reserving chamber to be of approximately equal

⁴⁰⁵ EX1007, Col. 4:9-12 (Fukuchi).

depth to the width of the paper, and understand that the edge of the paper would contact the front and back walls of the reserving chamber as it formed a loop.

17. Opening

366. Fukuchi discloses an opening, as claimed in the '013 patent.

EX1007, "Fukuchi" at Fig. 2 (annotated)

367. Fukuchi's opening is "slit 40c." In Fukuchi, "the reserving chamber **40a** and the pressure detecting chamber **40b** are formed as one unit through slit **40c**."⁴⁰⁶ In Fukuchi:

The slit **40c** is formed such that air of the [rese]reserving chamber **40a** and that of the pressure detecting chamber **40b** can be ventilated. If the slit can achieve the above function, the slit may be linearly arranged.⁴⁰⁷

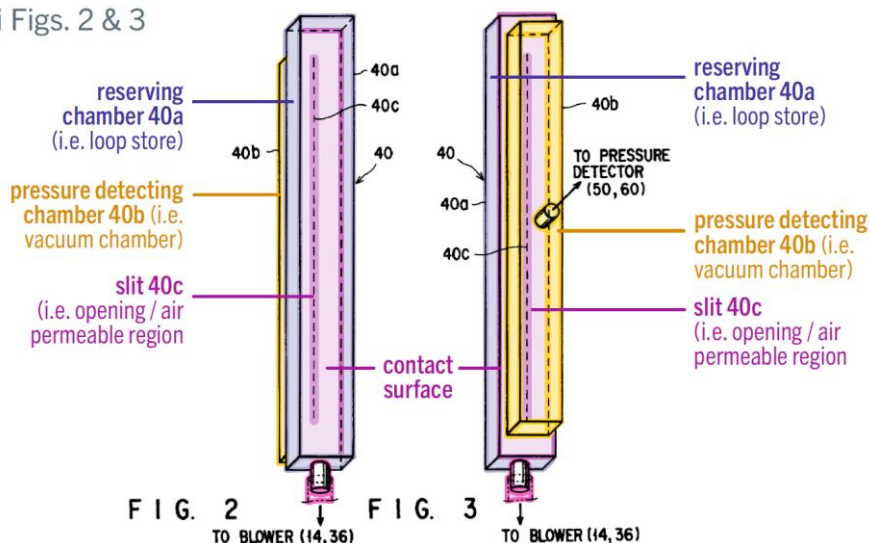
18. Air Permeable Portion

368. Fukuchi discloses an air permeable portion, as claimed by the '013 patent.

⁴⁰⁶ EX1007, Col. 6:29-31 (Fukuchi).

⁴⁰⁷ EX1007, Col. 7:12-16 (Fukuchi).

Fukuchi Figs. 2 & 3

*EX1007, “Fukuchi” at Figs. 2,3 (annotated)*

369. Fukuchi’s air permeable portion is the portion of reserving chamber **40a** which “can be ventilated.” In Fukuchi:

The slit **40c** is formed such that air of the [rese]reserving chamber **40a** and that of the pressure detecting chamber **40b** can be ventilated. If the slit can achieve the above function, the slit may be linearly arranged.⁴⁰⁸

19. Loop

370. Jordan teaches a loop, as claimed by the ’013 patent.

371. Jordan’s loop is a “loop **29**.” In Jordan:

The different speeds of the web **22** of paper in the take-up rollers **24** and the feed rollers **25** and **26** is evened out by a loop **29** in the web **22** of paper. This loop is drawn by vacuum into a shaft **27**. The vacuum holds the loop taut without impeding the movement of the web of paper. The shaft **27** is provided with a vacuum connection **28**. The size of the loop **29** is controlled by, for instance, two photocells **34**. If the loop becomes too large the take-up rollers **24** are stopped. If the loop

⁴⁰⁸ EX1007, Col. 7:12-16 (Fukuchi).

becomes to[o] small to take-up rollers **24** are speeded up until the loop is sufficiently big again.⁴⁰⁹

372. Likewise, Fukuchi teaches a loop as claimed by the '013 patent.

373. Fukuchi's loop is the "amount of absorbing and feeding the chip paper."

Fukuchi teaches that "a length of chip paper **1**, which is from an uppermost end portion of the reserving chamber to a lowermost end portion, is hereinafter called amount of absorbing and feeding the chip paper."⁴¹⁰ Fukuchi recognizes the paper in the reserving chamber forms a "U shape":

In such a preparation process, in consideration of the point that the chip paper **1** is absorbed and fed to the reserving chamber **40a** in a U shape later, the chip paper **1** is pulled out extra in advance. Then, the chip paper **1** is inserted in each reserving chamber **40a** by a predetermined length.⁴¹¹

Similarly, Fukuchi teaches:

By the above absorption, a predetermined amount of chip paper **1** is absorbed and fed to the reserving chamber **40a** of each of the supplying apparatus **10** and the winding apparatus **30** in a U shape to be reserved therein.⁴¹²

20. Path

374. Jordan teaches a path, as claimed by the '013 patent.

375. Jordan's path is the path taken by interleaver material as it enters and exits the loop formed in "shaft **27**." In Jordan:

⁴⁰⁹ EX1005, Col. 5:47-6:9 (Jordan).

⁴¹⁰ EX1007, Col. 6:66-7:2 (Fukuchi).

⁴¹¹ EX1007, Col. 9:4045 (Fukuchi).

⁴¹² EX1007, Col. 9:53-56 (Fukuchi).

The different speeds of the web **22** of paper in the take-up rollers **24** and the feed rollers **25** and **26** is evened out by a loop **29** in the web **22** of paper. This loop is drawn by vacuum into a shaft **27**.⁴¹³

376. Likewise, Fukuchi teaches a path, as claimed by the '013 patent.

Fukuchi's path is the path is a "U shape." Fukuchi teaches:

By the above absorption, a predetermined amount of chip paper **1** is absorbed and fed to the reserving chamber **40a** of each of the supplying apparatus **10** and the winding apparatus **30** in a U shape to be reserved therein.⁴¹⁴

21. Device for Determining a Size of the Loop

377. Jordan teaches a device for determining a size of the loop.

378. Jordan's device for determining a size of the loop includes "two photocells" used to adjust the speed of "take-up rollers **24**." In Jordan:

The size of the loop **29** is controlled by, for instance, two photocells **34**. If the loop becomes too large the take-up rollers **24** are stopped. If the loop becomes too small to take-up rollers **24** are speeded up until the loop is sufficiently big again.⁴¹⁵

379. Fukuchi teaches a device for determining a size of the loop, as claimed in the '013 patent. Fukuchi teaches a pressure sensor, called a manometer, connected to a control device. Fukuchi teaches actually determining and detecting, rather than merely being capable of determining or detecting.

⁴¹³ EX1005, Col. 5:46-6:1 (Jordan).

⁴¹⁴ EX1007, Col. 9:53-56 (Fukuchi).

⁴¹⁵ EX1005, Col. 5:47-6:9 (Jordan).

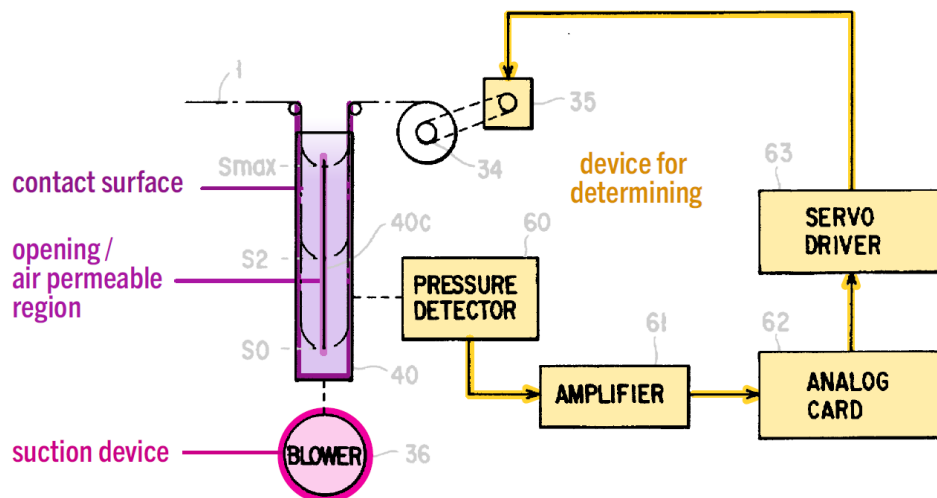


FIG. 8

EX1007, “Fukuchi” at Fig. 8 (annotated)

380. Fukuchi’s device is “pressure detector 60” and “control system.” It was an “object” of Fukuchi’s invention to “provide a detector for ensuring a stable transfer of belt-like material.”⁴¹⁶ The device includes “detecting means for detecting an extending position of the belt-like material moving up or down in the reserving chamber; and controlling means for controlling the transferring means in accordance with an output detected by the detecting means so as to adjust a transferring speed of the belt-like material.”⁴¹⁷ In particular:

According to a second aspect of the present invention, there is provided to an apparatus for stably transferring belt-like material comprising supplying means for supplying belt-like material; absorbing and feeding means having a reserving chamber for continuously absorbing and feeding the belt-like material supplied from the supplying means,

⁴¹⁶ EX1007, Col. 2:23-27 (Fukuchi).

⁴¹⁷ EX1007, Col. 2:27-41 (Fukuchi).

and a pressure detecting chamber, provided at the back of the reserving chamber through a through hole, and closed to detect its internal pressure; transferring means for pulling out the belt-like material absorbed and fed to the reserving chamber of the absorbing and feeding means so as to be transferred; pressure converting means, connected to the pressure detecting chamber of the absorbing and feeding means, for detecting the internal pressure of the pressure detecting chamber changing in accordance with the amount of absorbing and feeding the belt-like material absorbed and fed to the reserving chamber so as to convert the detected internal pressure to an electrical signal; and controlling means for decreasing the amount of supply of the belt-like material supplied by the supplying means when the amount of absorbing and feeding the belt-like material is large, and for increasing the amount of supply of the belt-like material supplied by the supplying means when the amount of absorbing and feeding the belt-like material is small based on the electrical signal converted by the pressure converting means.⁴¹⁸

Fukuchi teaches that its control over loop size “is performed based on the internal pressure of the pressure detecting chamber changing in accordance with the amount of absorbing and feeding the belt-like material to the reserving chamber of the absorbing and feeding means, that is, the length, which is from the upper end portion of the reserving chamber to the lowermost end position the absorbed and fed belt-like material.”⁴¹⁹ In other words:

Then, the internal pressure of the pressure detecting chamber, which communicates with the reserving chamber through the fine communicating hole, is changed in accordance with the amount of absorbing and feeding the belt-like material. Therefore, the pressure change of the pressure detecting chamber is detected, thereby the

⁴¹⁸ EX1007, Col. 2:42-67 (Fukuchi).

⁴¹⁹ EX1007, Col. 3:62-4:1 (Fukuchi).

amount of absorbing and feeding the belt-like material can be correctly detected.⁴²⁰

Fukuchi describes this relationship between pressure and loop length in the described embodiment:

As already explained with reference to FIGS. 2 and 3, the absorbing and feeding apparatus **40** has the box-typed reserving chamber **40a** and the pressure detecting chamber **40b**. The upper portion of the reserving chamber **40a** is opened. The blower **36** is connected to the bottom portion of the reserving chamber **40a**. A pressure detector **60** is connected to the pressure detecting chamber **40b**. The internal pressure of the pressure detecting chamber **40b** is detected by the pressure detector **60**. The internal pressure of the pressure detecting chamber **40b** is changed in accordance with the amount of absorbing and feeding the chip paper **1**. The rotating speed of the servo motor **35** for driving the winding roller **34** is controlled in accordance with the amount of absorbing and feeding the chip paper **1** as described later.⁴²¹

In Fukuchi:

The change of pressure is detected by the pressure detector **60** connected to the pressure detecting chamber **40b**. and a difference between the above pressure and atmospheric pressure is converted to a voltage.⁴²²

Fukuchi provides Fig. 9 to illustrate this influence, as “FIG. 9 is experimental data showing the relationship between the slit position of the belt-like material and an

⁴²⁰ EX1007, Col. 4:15-22 (Fukuchi).

⁴²¹ EX1007, Col. 8:31-45 (Fukuchi).

⁴²² EX1007, Col. 12:31-38 (Fukuchi).

analog card input voltage in the belt-like material absorbing and feeding apparatus on the side of the winding apparatus of FIG. 8.”⁴²³

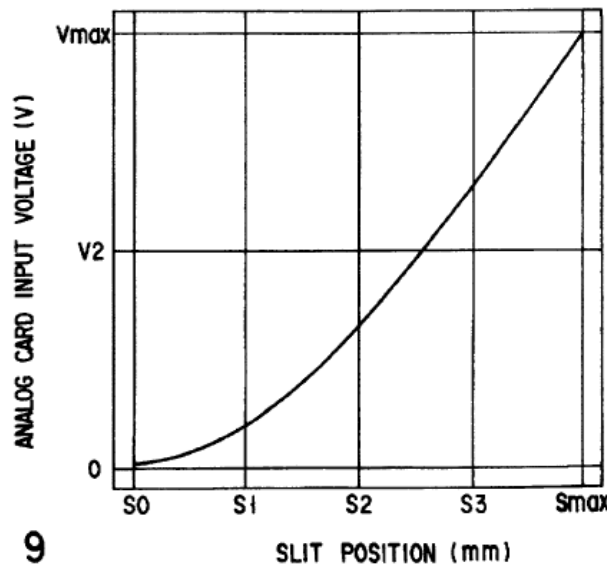


FIG. 9

EX1007, “Fukuchi” at FIG. 9

Fukuchi discloses that the loops in its reserving chambers can be set to different predetermined sizes:

Normally, when power of the blower **14** and **36** are turned on, the amount of absorbing and feeding the chip paper is set to be large in the reserving chamber on the side of the delivery apparatus **10**, so that chip paper is absorbed and fed to the place relatively close to the bottom portion. At this time, the amount of absorbing and feeding the chip paper is set to be small in the reserving chamber on the side of the winding apparatus **30**, so that the chip paper is absorbed and fed to the place relatively close to the upper portion.⁴²⁴

The size of the loop is controlled by the control system:

⁴²³ EX1007, Col. 4:66-5:3 (Fukuchi).

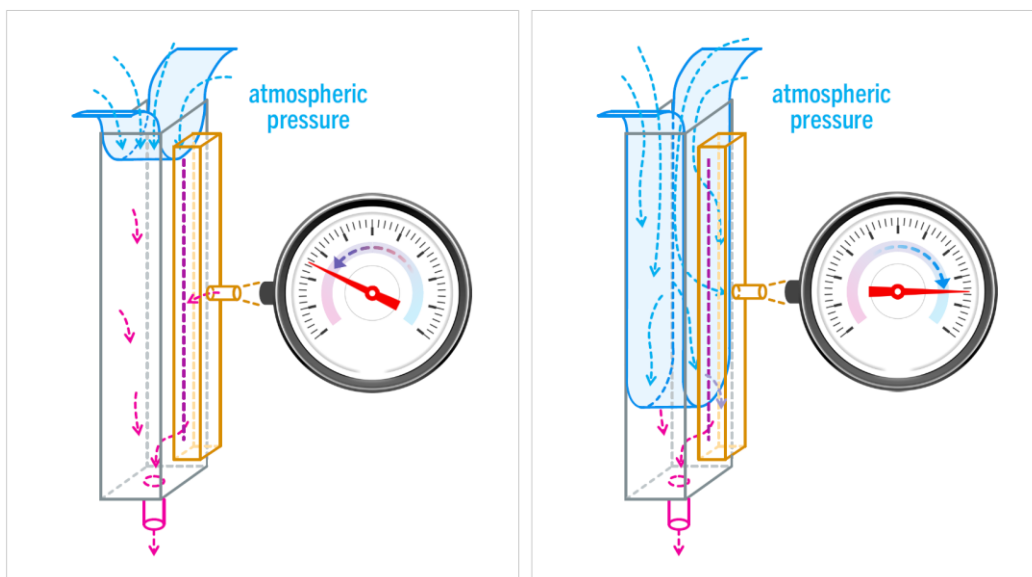
⁴²⁴ EX1007, Col. 9:56-65 (Fukuchi).

Next, the following will explain a method for controlling the rotating speed of the winding roller **34** with reference to FIGS. **8** to **13**.⁴²⁵

In the above-mentioned control system, the rotating speed of the winding roller **34** can be controlled in accordance with the amount of absorbing and feeding chip paper **1** in the reserving chamber regardless of the diameter of the roll of the winding roller **34** by which chip paper is wound. Moreover, the apparatus can be instantaneously started and stopped without applying high load to chip paper **1**, and the feed roller **31**.⁴²⁶

22. Pressure Drop

381. Fukuchi teaches a pressure drop, as claimed by the '013 patent.



Schematic Diagram for Illustrative Purposes

382. Fukuchi's pressure drop is a "change of pressure." In Fukuchi "[t]he slit **40c** is formed such that air of the [rese]serving chamber **40a** and that of the pressure detecting chamber **40b** can be ventilated." consequently:

⁴²⁵ EX1007, Col. 12:15-25 (Fukuchi).

⁴²⁶ EX1007, Col. 13:52-59 (Fukuchi).

At this time, the internal pressure of the pressure detecting chamber **40b** provided at the back of the reserving chamber **40a** is changed in accordance with the slit position S_0 to S_{max} of chip paper **1** absorbed and fed in the reserving chamber **40a**. The change of pressure is detected by the pressure detector **60** connected to the pressure detecting chamber **40b**. and a difference between the above pressure and atmospheric pressure is converted to a voltage.⁴²⁷

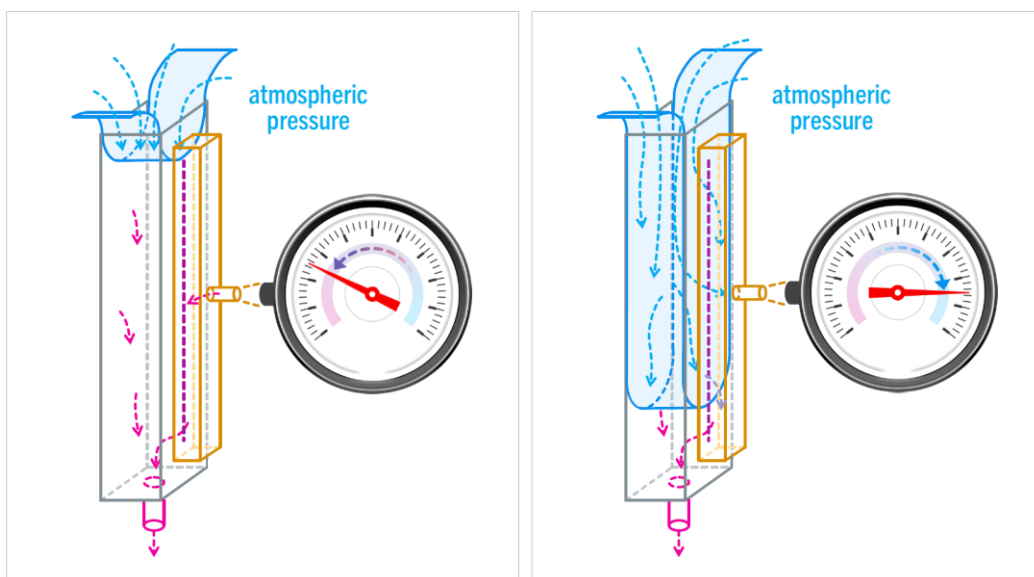
In operation:

The blower **36** is connected to the bottom portion of the reserving chamber **40a**. A pressure detector **60** is connected to the pressure detecting chamber **40b**. The internal pressure of the pressure detecting chamber **40b** is detected by the pressure detector **60**. The internal pressure of the pressure detecting chamber **40b** is changed in accordance with the amount of absorbing and feeding the chip paper **1**.

23. Changes in ... a Pressure Differential

383. Fukuchi teaches changes in a pressure differential, as claimed by the '013 patent.

⁴²⁷ EX1007, Col. 12:31-38 (Fukuchi).



Schematic Diagram for Illustrative Purposes

384. Fukuchi's changes is the changing "difference between" the "internal pressure of the pressure detecting chamber" and "atmospheric pressure." Fukuchi explains that, "according to the present invention, the belt-like material is transferred to the reserving chamber through the opening portion of the reserving chamber so as to divide the reserving chamber to first and second spaces."⁴²⁸ In Fukuchi:

By applying negative pressure to the second space, a pressure difference between the first and second spaces of the reserving chamber is generated. Then, the internal pressure of the pressure detecting chamber, which communicates with the reserving chamber through the fine communicating hole, is changed in accordance with the amount of absorbing and feeding the belt-like material.⁴²⁹

In Fukuchi:

⁴²⁸ EX1007, Col. 4:913 (Fukuchi).

⁴²⁹ EX1007, Col. 4:12-19 (Fukuchi).

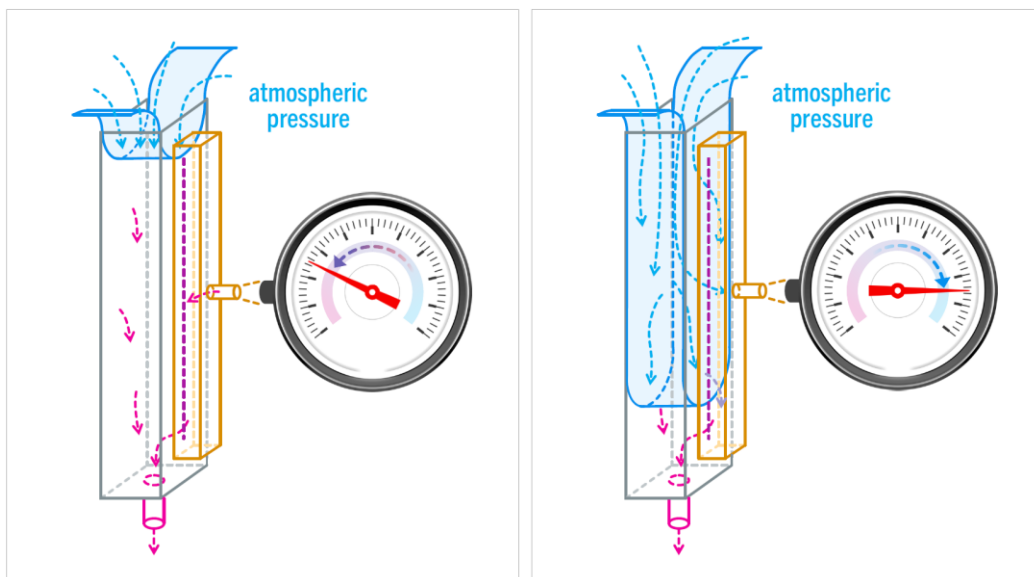
At this time, the internal pressure of the pressure detecting chamber **40b** provided at the back of the reserving chamber **40a** is changed in accordance with the slit position S_0 to S_{max} of chip paper **1** absorbed and fed in the reserving chamber **40a**. The change of pressure is detected by the pressure detector **60** connected to the pressure detecting chamber **40b**. and a difference between the above pressure and atmospheric pressure is converted to a voltage.⁴³⁰

Meanwhile, in the first space of Fukuchi's reserving chamber:

On the other hand, air, which is from the inserted chip paper to a place close to the opening of the reserving chamber, is maintained to be pressure close to atmospheric pressure.⁴³¹

24. Influence of the Material Loop

385. Fukuchi teaches an influence of the material loop, as claimed by the '013 patent.



Schematic Diagram for Illustrative Purposes

⁴³⁰ EX1007, Col. 12:31-38 (Fukuchi).

⁴³¹ EX1007, Col. 6:46-49 (Fukuchi).

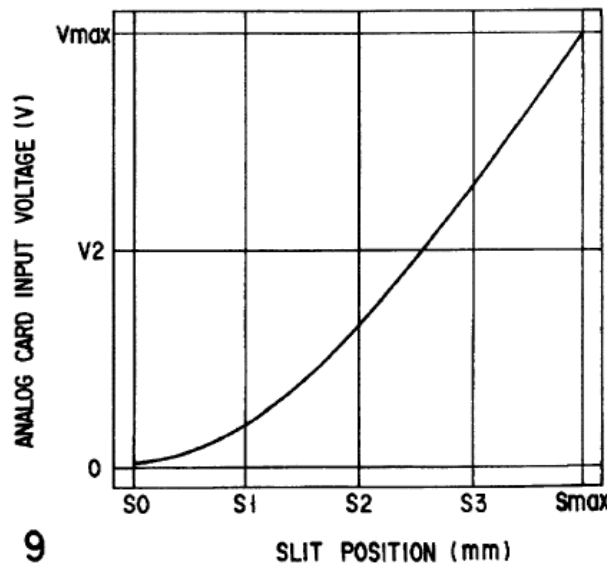
386. Fukuchi's influence of the material loop is the "pressure ... changed in accordance with the amount of absorbing and feeding the belt-like material." In Fukuchi:

By applying negative pressure to the second space, a pressure difference between the first and second spaces of the reserving chamber is generated. Then, the internal pressure of the pressure detecting chamber, which communicates with the reserving chamber through the fine communicating hole, is changed in accordance with the amount of absorbing and feeding the belt-like material.⁴³²

Fukuchi provides Fig. 9 to illustrate this influence, as "FIG. 9 is experimental data showing the relationship between the slit position of the belt-like material and an analog card input voltage in the belt-like material absorbing and feeding apparatus on the side of the winding apparatus of FIG. 8."⁴³³

⁴³² EX1007, Col. 4:12-19 (Fukuchi).

⁴³³ EX1007, Col. 4:66-5:3 (Fukuchi).



EX1007, "Fukuchi" at FIG. 9

25. Position Determination

387. Jordan teaches a position determination as claimed in the '013 patent.

388. Jordan's position determination is the signal from the "two photocells"

when "the loop becomes too large" or "too small." In Jordan:

The size of the loop **29** is controlled by, for instance, two photocells **34**. If the loop becomes too large the take-up rollers **24** are stopped. If the loop becomes too small to take-up rollers **24** are speeded up until the loop is sufficiently big again.⁴³⁴

389. Likewise, Fukuchi teaches a position determination as claimed in the '013 patent.

390. Fukuchi's position determination is the "slit position." Fukuchi describes its slit position as:

⁴³⁴ EX1005, Col. 5:47-6:9 (Jordan).

At this time, a length, which is from the position of the slit **40c** closest to the blower, that is, the deepest position of the slit **40c** to the lowermost end portion of chip paper 1 absorbed and fed to the reserving chamber **40a** corresponds to the position of the slit **40c** where the lowermost end portion of chip paper **1** is placed. Then, the length is hereinafter called as a slit position S. The position where the lowermost end portion of the chip paper **1** is placed at the deepest position of the slit **40c** is S₀, and the position where the lowermost end portion of chip paper 1 is placed at the uppermost position of the slit **40c** is S_{max}.⁴³⁵

Fukuchi discloses, in substantial detail, control methodology for detecting and determining the slit position: “the following will explain a method for controlling the rotating speed of the winding roller **34** with reference to FIGS. **8** to **13**.”⁴³⁶

Fukuchi summarizes this control methodology as:

In other words, if the amount of absorbing and feeding the chip paper **1** in the reserving chamber is large, that is, the slit position of chip paper **1** is low, the analog card output voltage is increased, and the rotating speed of the servomotor **35** is increased. Therefore, the amount of winding chip paper **1**, which is wound by the winding roller **34**, is increased. As a result, the slit position rises. On the other hand, if the amount of absorbing and feeding chip paper **1** is small, that is, the slit position of chip paper **1** is high, the analog card output voltage is decreased, and the rotating speed of the servo motor **35** is reduced. Therefore, the amount of winding of chip paper **1**, which is wound by the winding roller **34**, is decreased. As a result, the slit position is lowered.⁴³⁷

And:

The analog card **52** is a control circuit for approximately converting a non-linear function to a linear function. The conversion to the linear

⁴³⁵ EX1007, Col. 10:57-67 (Fukuchi).

⁴³⁶ EX1007, Col. 12:22-13:59 (Fukuchi).

⁴³⁷ EX1007, Col. 13:37-51 (Fukuchi).

function is performed by the following step based on the graph of FIG. 5.⁴³⁸

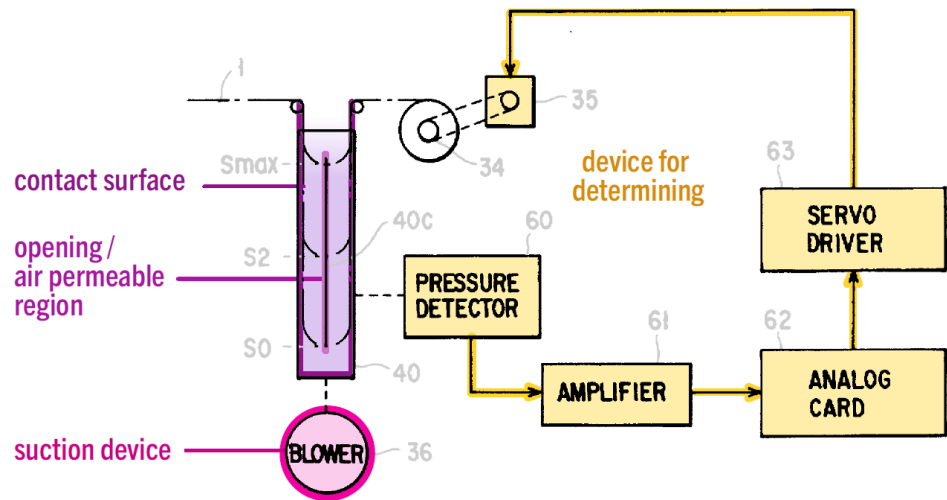
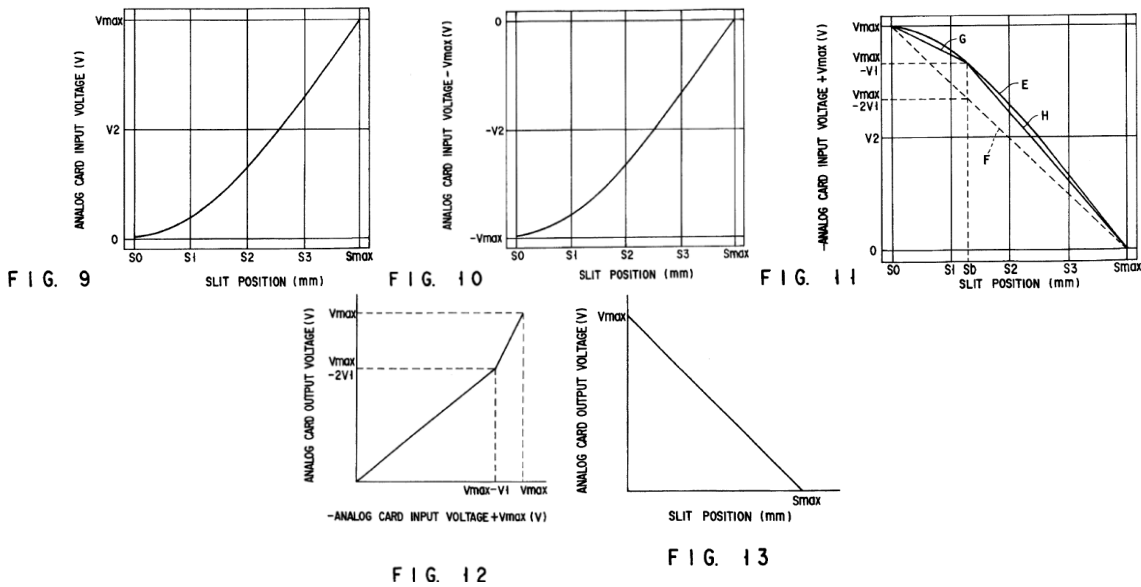


FIG. 8

EX1007, “Fukuchi” at FIG. 8



EX1007, “Fukuchi” at FIGs. 9–13

⁴³⁸ EX1007, Col. 11:20-24 (Fukuchi).

26. Control Device

391. Jordan teaches a control device as claimed by the '013 patent.

392. Jordan's control device is an "electronic computer." In Jordan:

The separate movements of the air-permeable conveying device, the paper infeed and the stacking surface are controlled by the conveyor scales and a scanning device arranged in the conveying direction before the air-permeable conveying device, in conjunction with an electronic computer.⁴³⁹

Jordan describes several components connected to its electronic computer, such as the "cutting apparatus:"

The slices **40** fall from a cutting apparatus (not illustrated) preferably first on to a weighing conveyor comprising a conveyor belt 2, an indicating instrument 3 and a weighing device **4** and coupled with an electronic computer. A scanning device **33**, preferably a photocell, detects the approach of the slice **40** and in conjunction with the electronic computer sets the air-permeable conveying device **6** in motion.⁴⁴⁰

393. Further, as I discuss above in section VI.F, a POSA reading Jordan at the time of the '013 patent would understand that Jordan teaches the use of state-of-the-art machine control. At the time of the '013 patent, the state-of-the-art would be to use a central electronic machine control that receives input signals from the sensors and sends control signals to the motors. A POSA would understand that

⁴³⁹ EX1005, Col. 2:65-3:2 (Jordan).

⁴⁴⁰ EX1005, Col. 3:65-4:1 (Jordan).

Jordan's computer was likely a PLC. A POSA would understand that Jordan teaches the use of such a control device.

394. Likewise, Fukuchi teaches a control device.

395. Fukuchi's control device is a "control system."

396. Fukuchi discloses its control system controlling multiple machine functions:

- The servo motor 12 drives the delivery roller 11 which is controlled at a predetermined rotating speed based on a control signal output from a control system to be described later;⁴⁴¹
- At this time, the servo motor 35 for driving the winding roller 34 is controlled based on a control signal sent from a control system to be described later, so that the winding roller 34 is driven at a predetermined rotating speed.⁴⁴²

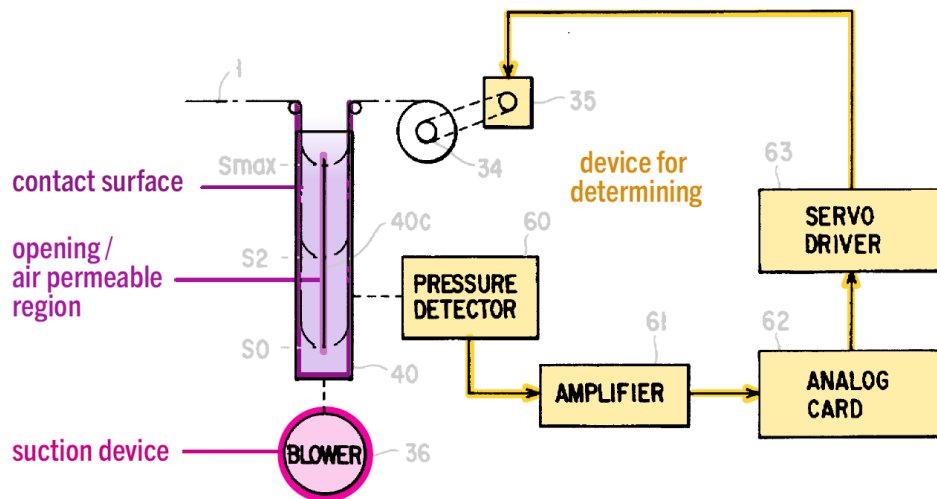


FIG. 8

EX1007, "Fukuchi" at FIG. 8

⁴⁴¹ EX1007, Col. 6:6-9 (Fukuchi).

⁴⁴² EX1007, Col. 9:15 (Fukuchi).

397. Further, as I discuss above in section VI.F, a POSA reading Fukuchi at the time of the '013 patent would understand that Fukuchi teaches the use of state-of-the-art machine control. At the time of the '013 patent, the state-of-the-art would be to use a central electronic machine control that receives input signals from the sensors and sends control signals to the motors. A POSA would understand that Fukuchi teaches the use of such a control device. Specifically, a POSA would understand that in implementing Fukuchi's teachings at the time of the '013 patent, the "pressure detector" and "servo driver" would be connected to a common machine controller.

B. The combination of Jordan and Fukuchi would have been obvious.

398. Jordan discloses an apparatus for providing interleaver material to the cutting region of food product slicing machine. Like many interleaver devices known in the art, Jordan discloses creating a buffer loop of web material upstream of the rollers that insert the web material into the cutting area. A POSA would have recognized the advantages of using a pressure sensor to detect, determine, and control loop length. A POSA would have found it obvious to incorporate the teachings of Fukuchi into the interleaver taught by Jordan.

399. Further, a POSA would have expected success in combining the teachings of Jordan and Fukuchi.

1. Motivation to Combine

- a) **A POSA would be motivated to combine Fukuchi's techniques with Jordan's apparatus for provision of interleaver to ensure that an appropriate length of loop is stored in Jordan's buffer.**

400. A POSA would recognize the importance of controlling the buffer “loop” in Jordan. For example, Jordan teaches that the loop is necessary for “[t]he different speeds of the web 22 of paper in the take-up rollers 24 and the feed rollers 25 and 26 [to be] evened out.”⁴⁴³ Other references available to a POSA teach the importance of a buffer loop in an interleaver operation as well. Müller explains that “[b]y means of the buffers, damage, in particular tearing of the interleaver strip, is prevented and/or the unreeling of the interleaver reels can be evened out, at least somewhat.”⁴⁴⁴ Waffner likewise teaches the importance of a loop of material acting as a buffer:

It has long been known that the feeding of web material, such as paper or other fragile sheeting, from an input to an output is best accomplished by permitting a loose loop to form in the web between the inlet and the outlet. With such a loop, the web will not be damaged if there are changes in the relative infeed and outfeed speeds of the web.⁴⁴⁵

401. Without the ability to determine the length of loop in the buffer, the buffer might run out, inadvertently creating a high-tension zone before the

⁴⁴³ EX1005, Col. 5:47-49 (Jordan).

⁴⁴⁴ EX1004, [0026] (Müller).

⁴⁴⁵ EX1006, Col. 1:6-17 (Waffner).

interleaver ejector roller **14**. This too high tension could lead to slippage (and a too-short or non-existence sheet of interleaver) if the tension difference overcomes the traction of roller **14**, or “web breaks” or other damage to the web.⁴⁴⁶

402. Determining the length of the loop buffer is particularly important in the interleaving operation described by Jordan. To feed paper into the cutting region of a food slicer at industrial speeds, the paper must be intermittently fed at high acceleration. References available to a POSA would inform a POSA that in the “high speed operation” of food slicing-and-interleaving machines, insufficient slackness in the loop is a problem.⁴⁴⁷ This is because of the need to “insert the interleaver strip into the cutting plane with a very high acceleration.”⁴⁴⁸ And the videos available to a POSA showing these slicing-and-interleaving machines in operation show the high speeds, and high accelerations, needed to insert paper into the cutting region and stop it so it can be cut in between each slice of food product.⁴⁴⁹ Indeed, these videos include slow-motion sequences to allow a viewer to see this high-speed, dynamic acceleration of the paper.⁴⁵⁰ Because of this high acceleration (and sudden braking) of paper exiting the buffer, the amount of buffered material in

⁴⁴⁶ EX1011, pp. 14 (Excerpts from *The Mechanics of Web Handling*).

⁴⁴⁷ EX1023, Col. 8:46-56 (Pryor 531).

⁴⁴⁸ EX1004, [0048] (Müller).

⁴⁴⁹ EX1022 (GEA “DualSlicer” Video); EX1024 (Weber “Slicer 604” Video).

⁴⁵⁰ EX1022 (GEA “DualSlicer” Video).

the loop would be subject to rapid changes, and would need means for reliable determination.

403. Notably, Jordan teaches obvious defects in the buffer it teaches. Jordan is unable to determine the precise size of the loop, because the loop is “controlled by... two photocells.”⁴⁵¹ This allows Jordan to detect if the loop is “too large” or “to[o] small,” but does not allow Jordan to determine the size of the loop between those extremes.⁴⁵² Rather than continuously detect and determine loop length, Jordan can only “stop” the rollers entirely once the loop has become too large.⁴⁵³ This is not an efficient control system, as the system waits until the loop is already at (or near) a fault condition to make a correction. A POSA would be motivated to search for and incorporate techniques that would improve Jordan’s buffer.

404. Fukuchi directly explains that its techniques can be used to improve the control over a loose loop of web material:

An object of the present invention is to provide an apparatus for stably transferring belt-like material, which can be instantaneously started at high speed and stopped. Also, an object of the present invention is to provide a detector for ensuring a stable transfer of belt-like material.⁴⁵⁴

⁴⁵¹ EX1005, Col. 6:5 (Jordan).

⁴⁵² EX1005, Col. 6:6-10 (Jordan).

⁴⁵³ EX1005, Col. 6:6-10 (Jordan).

⁴⁵⁴ EX1007, Col. 2:23-27 (Fukuchi).

405. The benefits of these techniques—“stable transfer,” even at “high speed” starts and stops—would be important to a POSA. High speed slicing-and-interleaving machines, such as disclosed in Jordan, require stable transfer of the interleaver material. And Fukuchi teaches that the object of the invention is an improved “detector,” which a POSA would have recognized is an aspect of Jordan’s system that could be improved.

406. A POSA would be motivated to combine Fukuchi’s techniques with Jordan’s apparatus for provision of interleaver to ensure that an appropriate length of loop is stored in Fukuchi’s buffer. Jordan teaches that sensors prevent its loop from remaining too short or too long.⁴⁵⁵ But Jordan teaches a sensor system that could not be used for precise control. Conversely, Fukuchi teaches that its technique for using a pressure detection to determine loop length provides a linear voltage output across the entire range of loop length:

⁴⁵⁵ EX1005, Col. 6:5-9 (Jordan).

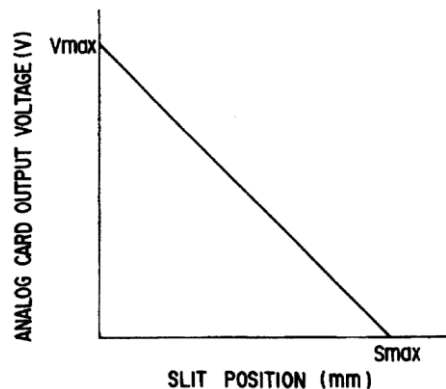


FIG. 13

EX1007, “Fukuchi” at Fig. 13

A POSA would understand that having position determinations across the entire range of loop size would allow precise, continuous control methodology to be used. For example, the signals generated by Fukuchi’s technique would allow proportional-integral-derivative (“PID”) control to be used to enhance the operation of the loop buffer and allow “stable” transfer.

407. Fukuchi teaches that with its technique, “the apparatus can be instantaneously started or stopped without applying high load to chip paper itself. Also, chip paper **1** can be prevented from being broken when the apparatus is instantaneously started or stopped.”⁴⁵⁶ Through blower **36** acting in reserving chamber **40a** “the load which is applied to the feed roller **31** and the chip paper **1** when the apparatus is instantaneously started or stopped, is relaxed. Due to this, the

⁴⁵⁶ EX1007, Col. 7:29-32, 9:6-17 (Fukuchi).

apparatus can be instantaneously started or stopped without applying a high load to the chip paper itself. Also the chip paper 1 can be prevented from being broken when the apparatus is started or stopped.”⁴⁵⁷ A POSA would recognize that applying a “high load” to the paper might result in slippage and short sheets, causing product to be improperly interleaved and lower-value (or unusable). A POSA would recognize that the paper being broken would delay production, and make the benefits of owning a slicing-and-interleaving machine lower. Fukuchi’s teachings that its sensor system (which uses a pressure sensor to determine loop length) could solve these problems would be motivation for a POSA to combine Fukuchi’s techniques with Jordan.

408. As further motivation to use Fukuchi’s technique, a POSA would understand that Jordan already included the suction device necessary to generate the vacuum needed in Fukuchi’s techniques. Using the suction device for a second purpose—determining loop length—would be an efficient use of parts, and would be a desirable combination.

409. As a further motivation to use Fukuchi’s technique, I note that at the time of the ’013 patent, there were existing patents that claimed other forms of

⁴⁵⁷ EX1007, Col. 9:6-17 (Fukuchi).

sensors to determine loop length in a slicing-and-interleaving machine. For example, Pryor 531 had issued in Jul. 26, 2016.⁴⁵⁸ Pryor 531 claimed:

1. A sheet interleaver for a slicing machine that provides a slicing plane for slicing an elongated food product and a sheet from web material beneath said elongated product, comprising:
 a supply of web material;
 a drawing station having a first driver for drawing web material from said supply;
 a feed station having a second driver for receiving web material from said drawing station and driving said web material through a cutting nip into said slicing plane;
 a controller in signal-communication with said first and second drivers to drive web material at select differential speeds by said first and second drivers such that tension of the web material between said drawing station and said feed station is controlled; and
 a non-contact sensor that senses tension of web material between said drawing station and said feed station and is in signal-communication with said controller to adjust the differential speed of said first and second drivers to maintain said tension within a pre-selected range.

EX1023, “Pryor 531” at Claim 1

410. At a high level, it is my opinion that a POSA designing a slicing-and-interleaving machine that used a web material buffer loop could conclude that if they used a “non-contact sensor” in such a machine, they would risk infringing the Pryor 531 claim. Consequently, a POSA would be motivated to use *contacting* sensors—such as the pressure sensor taught by Fukuchi—in their design.

b) A POSA would be motivated to use a two-part removal device.

411. Fukuchi teaches a two part removal device, as discussed in sections [XII.A.12] and [XII.C.1.c]. This allows tension to be controlled in an extra region—

⁴⁵⁸ EX1023 (Pryor 531).

the paper can have one tension leaving the material store, and can have a different tension as it is fed into the buffer loop. Speaking generally as to web-handling systems: “[t]ension is a very important web manufacturing process setting.”⁴⁵⁹ A POSA would know that “[i]f the tension is **too low**, the web will tend to flop and **flutter** and will tend to shift and the **path** will wander sideways going through the machine and may lose **traction** on rollers.”⁴⁶⁰ Too-low tension may also lead to “wrinkling from roller misalignment.”⁴⁶¹ If web is “running too loose,” a POSA would expect “attendant difficulties of keeping the web flat and stable.”⁴⁶² If tension were “to fall below zero even momentarily,” a POSA would understand that the web might entangle itself on part of the machine.⁴⁶³ Consequently, a POSA would expect benefits from, and be motivated to add, an additional tension control zone.

c) A POSA would be motivated to control the various functions of the device through a central control.

412. At the time of the patent, a POSA would have understood that using a central machine control would be an efficient way of controlling a slicer and interleaver, as I discuss in more detail in section XI.B.1.d.

⁴⁵⁹ EX1011, p. 14 (Excerpts from *The Mechanics of Web Handling*).

⁴⁶⁰ EX1011, p. 14 (Excerpts from *The Mechanics of Web Handling*) (emphasis added).

⁴⁶¹ EX1011, p. 14 (Excerpts from *The Mechanics of Web Handling*).

⁴⁶² EX1011, p. 15 (Excerpts from *The Mechanics of Web Handling*).

⁴⁶³ EX1011, p. 17 (Excerpts from *The Mechanics of Web Handling*).

d) Jordan and Fukuchi are analogous art

413. Jordan and Fukuchi are analogous art. Both relate to the same field of endeavor, which is web handling. Further, Jordan and Fukuchi are reasonably pertinent to the same problem, which is control of a buffer loop of web material. This is the same problem that faced the inventors of the '013 patent. I note, also, that the Examiner understood that the analogous art included web handling applications, even if those applications did not relate to the food industry, as I describe in more detail in section XI.B.1.e. I note further that the Board has applied Jordan as a reference to determine that claims of a patent on slicing-and-interleaving systems were not patentable.⁴⁶⁴ Jordan and Fukuchi are such analogous art.

2. Expectation of Success

414. A POSA would have a reasonable expectation of success in making the combination discussed above.

415. At the time of the '013 patent, food slicing interleavers were a proven technology with commercial applications.⁴⁶⁵ A POSA would understand that the modifications described above would represent localized changes to the loose loop control of such interleavers, and would expect that the general (and industry-proven) operation of the interleaver and slicer could otherwise remain unchanged.

⁴⁶⁴ EX1029 (IPR2019-01464 Final Written Decision).

⁴⁶⁵ EX1022 (GEA DualSlicer Video); EX1024 (Weber Slicer 604 Video)

Specifically, it was recognized in the food-slicing-and-interleaving industry that “[a]ny other method of sensing the slackness of the web accumulation loop can also be used” in an interleaver.⁴⁶⁶

416. The components needed to detect the strength of that vacuum were well-known mechanical and electronic components and would be within a POSA’s skill level to use. For example, I have located an electronic pressure sensor that would have been available to a POSA at the time of the ’013 patent.⁴⁶⁷ And Fukuchi provides pages of explanation for how signals from an electronic pressure sensor could be processed by the machine control.⁴⁶⁸ A POSA would have reasonably expected to succeed in incorporating a pressure sensor into an interleaver like Jordan’s.

417. A POSA would further expect success because using a pressure sensor to determine loop length had been repeatedly demonstrated in web-handling applications. As I discuss above in section VI.B, Lahti, Bryer, Waffner, and Fukuchi all taught this technique.⁴⁶⁹ Bryer went as far as explaining that this was how loop

⁴⁶⁶ EX1021, Col. 9:48-49 (Pryor 872).

⁴⁶⁷ *See, e.g.* EX1018 (Omega High (0.08%) Accuracy Metric Pressure Transducers) (2015).

⁴⁶⁸ EX1007, Col. 11:1-13:51, Figs. 4–13 (Fukuchi)

⁴⁶⁹ EX1008 (Lahti); EX1009 (Bryer); EX1006 (Waffner); EX1007 (Fukuchi).

length was “usually” determined in certain web systems.⁴⁷⁰ Given a five-decade history of this technique, a POSA would have expected success in using it in the context of Müller.

418. Designing and constructing a pressure sensing chamber would come with an expectation of success as well. A POSA would be able to machine walls, including a wall with a slit or other opening, easily using commonly available materials (such as metal) and machining tools (such as die presses, lathes, etc.).

419. A POSA would not be limited to bodily incorporation of Fukuchi’s components into Jordan’s interleaver. Rather, it would be within a POSA’s skill to determine parameters, such as the size of the pressure sensing chamber. For example, a POSA would understand that the size of the pressure sensing chamber should be large enough to include a slit that spans the length of anticipated “slit positions,” otherwise the sensor could not determine loop length continuously. And the POSA would understand that the pressure sensing chamber should not be too large, as that would make the changes in pressure smaller (because less air, as a proportion of air in the chamber) would flow through the slit. Within these limits, a POSA would be able to test different configurations of pressure sensing chambers,

⁴⁷⁰ EX1009, Col. 1:63-65 (Bryer).

which would be easy and inexpensive to machine and swap in and out. It would not require undue experimentation to settle on a workable configuration.

420. In any event, Jordan and Fukuchi teach highly similar web-handling systems. Both hold a loose loop of paper in a buffer under tension in a chamber under vacuum. The modifications to Jordan to incorporate Fukuchi's technique would be small, giving a POSA an additional reason to expect success.

421. When combining Fukuchi's vacuum-sensing techniques with Jordan's interleaver, a POSA would take into account the current state of the art. For example, a POSA would understand that when Jordan filed his application in 1973, electronic machine control technology was in its infancy.⁴⁷¹ Yet by 2017, the time of the '013 patent, sophisticated, programmable machine controllers were standard.⁴⁷² Electronic pressure sensors were readily available from vendors as well by the time of the '013 patent.⁴⁷³ And Jordan and Fukuchi both specifically teach using a computer or other machine control to receive, process, and send numerous signals in order to control the slicing, interleaving, and web handling functions.⁴⁷⁴

⁴⁷¹ EX1019, pp. 13-14 (History of Control History of PLC and DCS)

⁴⁷² EX1019, p. 2 (History of Control History of PLC and DCS) (2013) ("PLCs are produced and sold worldwide")

⁴⁷³ See, e.g. EX1018 (Omega High (0.08%) Accuracy Metric Pressure Transducers) (2015).

⁴⁷⁴ See *supra* at section XII.A.26.

A POSA would expect success using Müller's control to process the vacuum signal and determine the length of the loose loop of web. A POSA would find it obvious to use an analog or digital sensor to detect pressure changes and electronically communicate that information to a machine control.

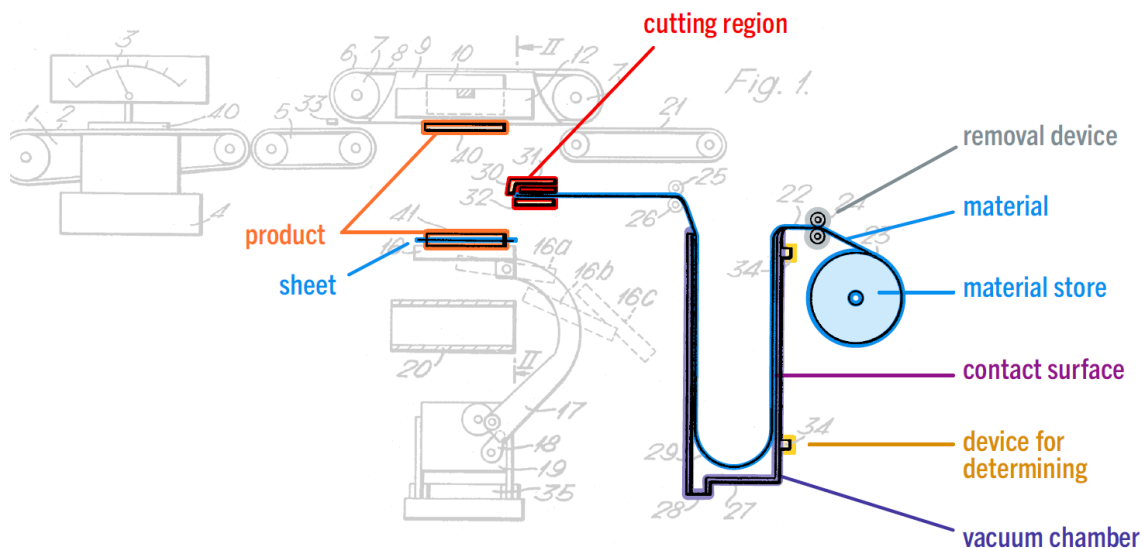
C. The combination of Jordan and Fukuchi meets each element of the challenged claims.

1. Independent Claim 2

- a) Preamble: An apparatus for a single-track or multitrack provision of web-like interleaved sheet material at a cutting region in which products supplied on one track or on multiple tracks are cut into slices and interleaved sheets are introduced which are cut off from the provided interleaved sheet material in the cutting region, the apparatus comprising:**

422. To the extent the preamble is limiting, Jordan discloses the preamble.

Jordan, as combined with Fukuchi, would meet the preamble.



EX1005, “Jordan” at Fig. 1 (annotated)

423. A POSA would understand that Jordan’s “paper feed arrangement” is an apparatus for single-track or multitrack provision of web-like interleaved sheet material. A POSA would understand that the arrangement was an “apparatus,” because Jordan teaches the mechanical equipment and components necessary to realize its arrangement. A POSA would understand that the system was for single-track or multitrack provision of material, because Jordan teaches that its paper “is fed in” (i.e. provided) to a cutter.⁴⁷⁵ A POSA would understand that Jordan’s “web 22 of paper” is web like sheet material, because it is described as a “web” and because paper is a well-recognized example of web material.⁴⁷⁶ A POSA would

⁴⁷⁵ See *supra* at section XII.A.1.

⁴⁷⁶ See *supra* at section XII.A.2.

understand that Jordan's paper is interleaved, because Jordan refers to "sheets of paper" "to be placed between [i.e. interleaved with] slices."⁴⁷⁷ A POSA would understand that Jordan's "foods," such as "cheese, sausage, ham, rock salmon" are products, because in the food slicing industry, food is commonly referred to as "products."⁴⁷⁸ A POSA would understand that Jordan's "slices **40**" are slices, because Jordan describes that "a slicing machine is used" and "slices **40** fall from a cutting apparatus."⁴⁷⁹ A POSA would understand that Jordan's "sheets" are sheets, because Jordan teaches that the "sheets of paper" are "to be placed between the slices" of food product.⁴⁸⁰

424. A POSA would read Jordan in light of the state of the art at the time of the '013 patent (in 2017). For example, Jordan specifically describes "known high-speed slicing machines."⁴⁸¹ At the time of the '013 patent, the known high-speed slicing machines cut paper and product at the same cutting surface.⁴⁸² Consequently, although Jordan literally discloses a "cutter **30**" that only cuts paper (because product is sliced at a separate "cutting machine"), a POSA reading Jordan at the time of the

⁴⁷⁷ See *supra* at section XII.A.3.

⁴⁷⁸ See *supra* at section XII.A.7.

⁴⁷⁹ See *supra* at section XII.A.10.

⁴⁸⁰ See *supra* at section XII.A.3.

⁴⁸¹ EX1005, Co. 6:15-16 (Jordan).

⁴⁸² E.g. EX1022 (GEA "DualSlicer" Video); EX1024 (Weber "Slicer 604" Video).

patent would understand Jordan to disclose a known high-speed slicing machine where the paper cutter and food slicer were a common blade at a common cutting region.

425. A POSA would understand that Jordan's arrangement provides the material at a cutting region in which products supplied on one track or on multiple tracks are cut into slices and interleaved sheets are introduced which are cut off from the provided interleaved sheet material in the cutting region. A POSA would understand that Jordan's "cutter **30**" is a cutting region, because it is where the "paper fed in ... is cut off."⁴⁸³ A POSA would understand that Jordan's "cutting machine" has tracks, because food cutting machines at the time of the '013 patent had tracks.⁴⁸⁴ A POSA would understand that these sheets are cut off from the provided interleaved sheet material in the cutting region, because Jordan explains that "[t]he sheet of paper fed in under the cutter **30** is cut off when the falling slice **40** comes into contact with the paper."⁴⁸⁵ A POSA would understand that Jordan's system introduces these sheets, because the material "is conveyed [i.e. introduced] to a paper cutter **30**."⁴⁸⁶ A POSA would understand that Jordan's products are cut

⁴⁸³ See *supra* at section XII.A.4.

⁴⁸⁴ See *supra* at section XII.A.9.

⁴⁸⁵ See *supra* at section XII.A.4.

⁴⁸⁶ See *supra* at section XII.A.1.

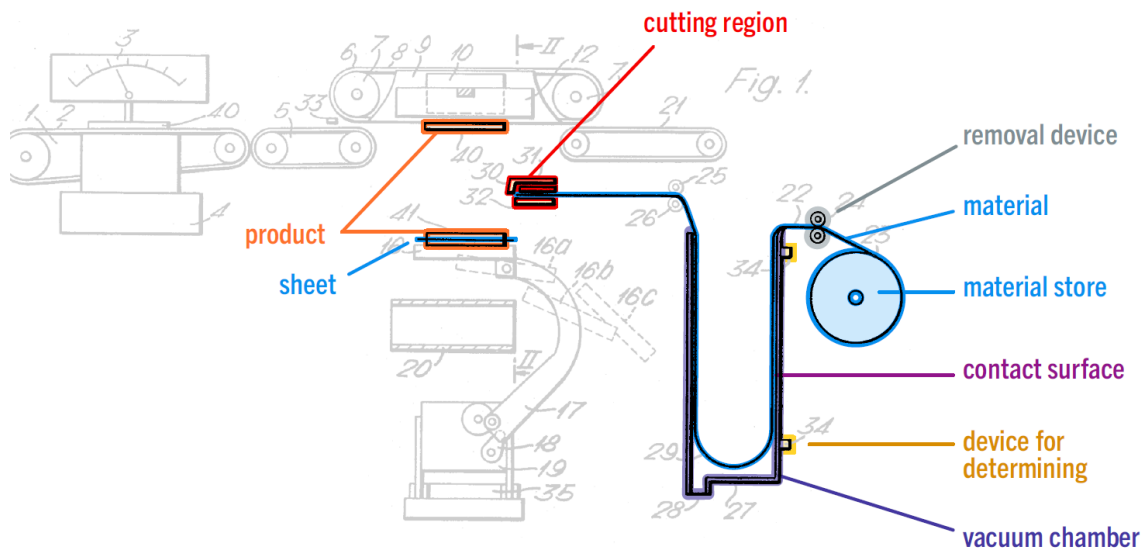
into slices in the cutting region, because—as I explain in the next paragraph—the POSA would read Jordan in light of the current state-of-the-art.

426. Consequently, an apparatus resulting from the obvious combination of Jordan with Fukuchi would meet each element of the Preamble to claim 2.

b) Element 2.1: a material store

427. Jordan discloses this element. Jordan, as combined with Fukuchi, would meet this element.

428. A POSA would understand that Jordan’s “magazine roll 23” is a material store. In order to be “drawn... from” from the magazine roll, Jordan’s paper must first be stored on the roll.⁴⁸⁷



EX1005, “Jordan” at FIG. 1 (annotated)

⁴⁸⁷ See *supra* Section XII.A.11.

429. Fukuchi likewise discloses a material store, as claimed.⁴⁸⁸

Consequently, an apparatus resulting from the obvious combination of Jordan with Fukuchi would meet each element of [2.1].

c) Element 2.2: a removal device for a removal of a material web from the material store

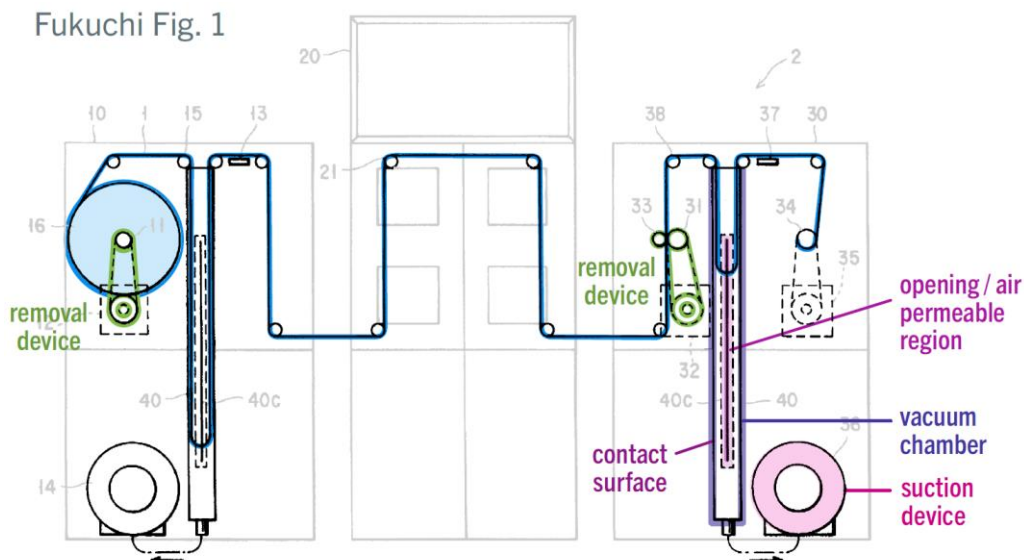
430. Jordan and Fukuchi disclose this element. Jordan, as combined with Fukuchi, would meet this element.

431. A POSA would understand that Jordan's "take-up rollers **24**" include aspects of a removal device for a removal of a material web from a material store. As discussed above, Jordan initially has a material web stored on a material store. And Jordan's "take-up rollers **24**" are used to "draw[]" (i.e. remove) the web of paper "from a magazine roll."⁴⁸⁹ Jordan's take-up rollers are "continuously operated" [i.e. have a drive] to roll off material from the material store. And Jordan uses vacuum to "draw[]" loop "into a shaft **27**," (i.e. convey and provide the material to the loop store). Thus, the removal device has two parts.

432. A POSA would further understand that Fukuchi's "delivery roller 11" and "feed roller 31" are a removal device for a removal of a material web from a material store.

⁴⁸⁸ See *supra* at section XII.A.11.

⁴⁸⁹ See *supra* at section XII.A.12.



EX1007, “Fukuchi” at Fig. 1 (annotated)

A POSA would understand Fukuchi’s “delivery bobbin” is a material store, because the bobbin is “having [i.e. storing] chip paper **1** as belt-like material wound in the roll.”⁴⁹⁰ In Fukuchi, “[b]y the rotation of the delivery roller **11**, the chip paper **1** is continuously delivered from [i.e. removed from] the rolled chip paper **16** on the bobbin. Roller **11** is “driven” (i.e. a roll-off drive) to drive material of the rolled chip paper. Meanwhile, “[b]y the rotation of the feed roller **31** ... chip paper **1** is continuously delivered [i.e. conveyed] ... close to the upper portion of the absorbing and feeding apparatus **40** [i.e. provided to the loop store].” Thus, the removal device has two parts: (1) a roll-off drive driving material off the material roll, and (2) a conveying roller providing the material to the loop store.

⁴⁹⁰ See *supra* at section XII.A.11.

433. I understand that in co-pending proceedings in the U.S. District Court for the Western District of Missouri, Petitioner has advanced a claim construction for this term of: “The removal device has two parts: (1) a roll-off drive driving material off the material roll, and (2) a conveying roller providing the material to the loop store.” Because Fukuchi’s “delivery roller 11” and “feed roller 31” satisfies these limitations under Petitioner’s proposed construction, whether or not that construction is adopted is not material to my analysis.

434. I note that a two-part removal device has advantages that a POSA would recognize. For example, such a device allows tension on the material leaving the material store to be controlled to a different value than tension on the material entering the loop store. Because different web processes, such as unreeling and buffering, may be best-performed at different tension values, a POSA would view this as an advantage.⁴⁹¹

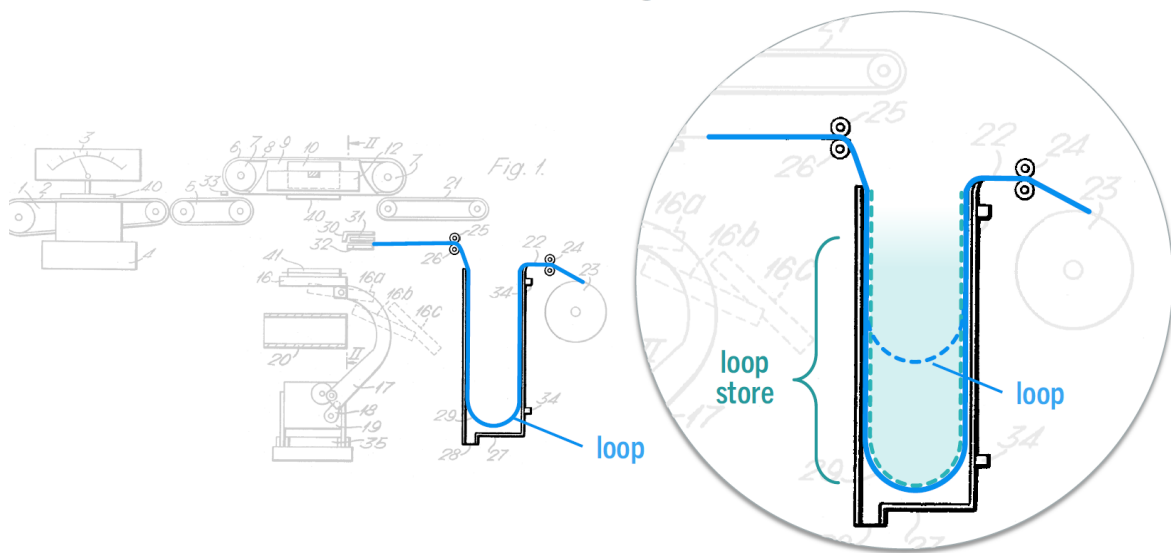
435. Consequently, an apparatus resulting from the obvious combination of Jordan with Fukuchi would meet each element of [2.2].

d) Element 2.3: a loop store defining a space for the removed material web to form a loop, the loop store

⁴⁹¹ See *supra* at sections XI.B.1.b.2, XII.B.1.b.

located between the material store and the cutting region

436. Jordan discloses this element. Jordan, as combined with Fukuchi, would meet this element.



EX1005, “Jordan” at Fig. 1 (annotated)

437. A POSA would understand that Jordan’s “shaft 27” is a loop store defining a space for the removed material web to form a loop, the loop store located between the material store and the cutting region. A POSA would understand that Jordan’s “loop 29” is a loop formed from removed material web. As explained above, material web is removed from a material store. And Jordan describes this removed material as forming a “a loop 29” that is “drawn by vacuum into a shaft 27.”⁴⁹² A POSA would understand that “shaft 27” was a loop store defining a space

⁴⁹² See *supra* at section XII.A.13.

for this loop to form. The loop is “drawn” (i.e. stored) in the shaft, where the “size of the loop **29** is controlled” (i.e. the loop is formed).⁴⁹³ And a “shaft” is a defined space. And a POSA would understand that Jordan’s shaft is located between the material store and the cutting region, because “[t]he different speeds of the ... take-up rollers **24** [i.e. rollers near the material store] and the feed rollers **25** and **26** [i.e. rollers near the cutting region] is evened out by a loop 29 ... drawn by vacuum into a shaft 27.”⁴⁹⁴ The shaft must, therefore, be between the material store and the cutting region.

438. Fukuchi likewise discloses aspects of a loop store, as claimed.⁴⁹⁵ Consequently, an apparatus resulting from the obvious combination of Jordan with Fukuchi would meet each element of [2.3].

- e) **Element 2.4: a contact surface having at least a portion thereof that is air permeable, the contact surface at least partially bounding the loop store and at least partially covered by the loop that contacts the contact surface**

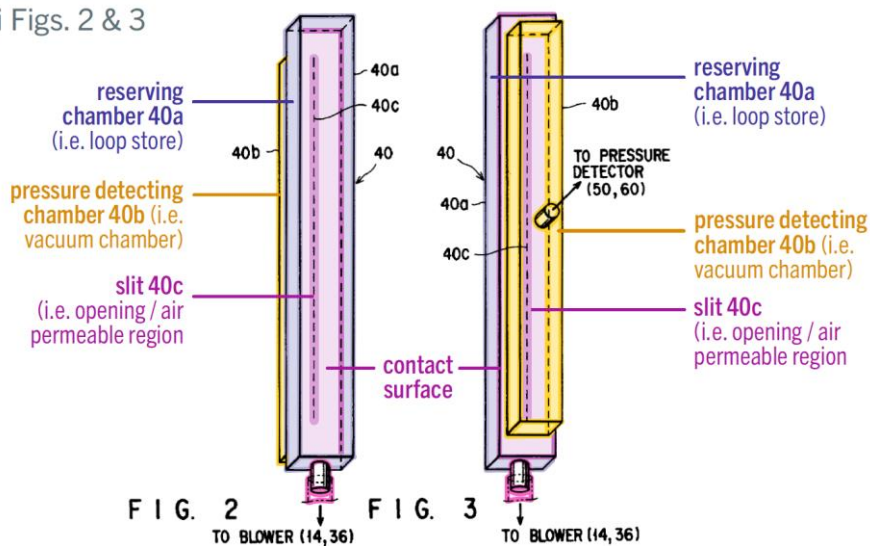
439. Müller, as combined with Waffner, would meet this element.

⁴⁹³ See *supra* at section XII.A.13.

⁴⁹⁴ See *supra* at section XII.A.13.

⁴⁹⁵ See *supra* at section XII.A.13.

Fukuchi Figs. 2 & 3



EX1007, “Fukuchi” at Figs. 2, 3 (annotated)

440. A POSA would understand that Jordan’s back wall of “shaft 27” is a contact surface ... at least partially bounding the loop store and at least partially covered by the loop that contacts the contact surface. A POSA would understand that wall is a contact surface, because a “vacuum” exists in the shaft, and that would not be possible if there was space between Jordan’s paper material and the front and back walls of the shaft (i.e. there must be contact).⁴⁹⁶ The back wall of the shaft bounds the loop store, because it forms a wall (i.e. a bound) of the shaft.⁴⁹⁷ The back wall of the shaft is at least partially covered by the loop, as the loop contacts the back wall and covers a part of it from atmospheric air above the shaft.

⁴⁹⁶ See *supra* at section XII.A.16.

⁴⁹⁷ See *supra* at section XII.A.16.

441. A POSA would understand that Fukuchi’s back wall of the “reserving chamber” is a contact surface having at least a portion thereof that is air permeable, the contact surface at least partially bounding the loop store and at least partially covered by the loop that contacts the contact surface. A POSA would understand that the portion of reserving chamber **40a** which “can be ventilated” is an air permeable portion, because the slit **40c** allows the reserving chamber and the pressure detecting chamber to “be ventilated” (i.e. for air to permeate).⁴⁹⁸ A POSA would understand that the back wall was a contact surface, because “belt-like material ... divide[s] the reserving chamber to first and second spaces”, and must contact the front and back walls of the chamber to do so.⁴⁹⁹ A POSA would understand that the back wall was at least partially covered by the loop that contacts the contact surface, for the same reason. And a POSA would understand that the wall at least partially bounded the loop store, because a wall is a boundary.

442. When combining the teachings of Jordan with Fukuchi, the resulting contact surface would have a slit (as in Fukuchi’s technique) and would, as a consequence, have an air-permeable region. Consequently, an apparatus resulting

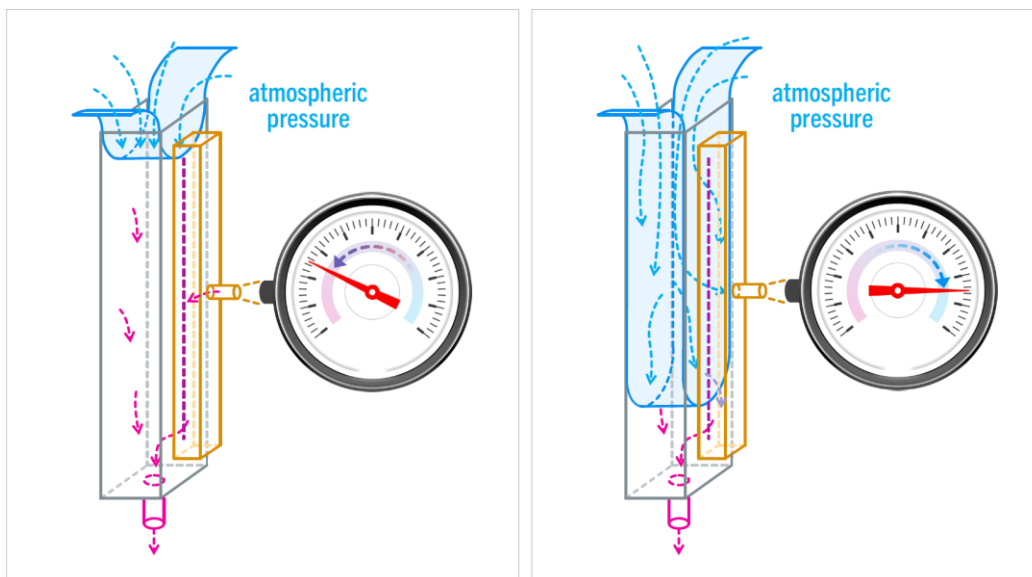
⁴⁹⁸ See *supra* at section XII.A.18.

⁴⁹⁹ See *supra* at section XII.A.16.

from the obvious combination of Jordan with Fukuchi would meet each element of [2.4].

- f) **Element 2.5: a device for determining a size of the loop formed in the loop store, the device detecting changes in at least one of a pressure differential and a flow condition, the pressure differential being a difference in pressure between a first side of the contact surface and a second side of the contact surface, the flow condition being a change of the flow of air through the air permeable portion of the contact surface, wherein the changes in the pressure differential and/or the flow condition represent a varying influence of the material loop on the air permeable portion of the contact surface that is provided as a measure for the loop size.**

443. Jordan, as combined with Fukuchi, would meet this element.



Schematic Diagram for Illustrative Purposes

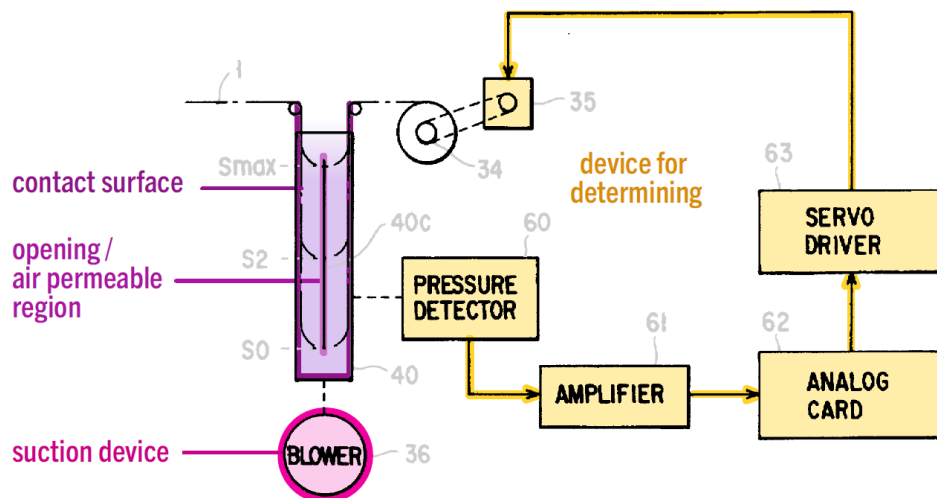


FIG. 8

EX1007, "Fukuchi" at Fig. 8 (annotated)

444. As discussed in section XII.C.7.f, a POSA would understand that Jordan had a device for determining a size of the loop formed in the loop store.

445. A POSA would understand that Fukuchi's "pressure sensor **60**" and "control system" is a device for determining a size of the loop formed in the loop store the device detecting changes in at least one of a pressure differential and a flow condition, the pressure differential being a difference in pressure between a first side of the contact surface and a second side of the contact surface, the flow condition being a change of the flow of air through the air permeable portion of the contact surface, wherein the changes in the pressure differential and/or the flow condition represent a varying influence of the material loop on the air permeable portion of the contact surface that is provided as a measure for the loop size. As discussed in

section XII.C.7.f, a POSA would understand that Fukuchi's sensor and control system is for determining a size of the loop formed in the loop store. A POSA would understand that Fukuchi's changing "difference between" the "internal pressure of the pressure detecting chamber" and "atmospheric pressure" are changes in a pressure differential because those changes are a "difference" (i.e. differential) in "pressure" between the detecting chamber and atmosphere.⁵⁰⁰ A POSA would understand the pressure differential is a difference in pressure between a first side of the contact surface and a second side of the contact surface: in the "first... space" of the reserving chamber, which is open to atmosphere at the top, the pressure would be atmospheric; the "first... space" of the reserving chamber is on one side of the contact surface (wall with the slit); the pressure of the pressure detecting chamber would be lower than atmospheric (because airflow occurs only through the slit, and the blower is removing air); and the detecting chamber is on the other side of the wall.⁵⁰¹ A POSA would understand that the changes in the pressure differential represent a varying influence of the material loop on the air permeable portion, because "the internal pressure of the pressure detecting chamber **40b** ... is changed in accordance with the slit position" (i.e. as the material loop changes "slit position")

⁵⁰⁰ See *supra* at section XII.A.23.

⁵⁰¹ See *supra* at section XII.A.23.

it has a varying influence on how much air is drawn out of the detecting chamber, through the air permeable portion (slit) by the blower, and how much air is drawn into the detecting chamber through the slit from atmosphere.⁵⁰² A POSA would understand that Fukuchi's "pressure detector **60**" and "control system" detect the changes in the pressure differential because "[t]he change of pressure is detected by the pressure detector **60** ... and a difference between the above pressure and atmospheric pressure is converted to a voltage."⁵⁰³ Fukuchi teaches a pressure sensor, called a manometer, connected to a control device. Fukuchi teaches actually determining and detecting, rather than merely being capable of determining or detecting.

446. Fukuchi's technique—using a pressure sensor to determine loop length—requires detecting the loop via changes in pressure differential and correspondingly determining loop length. Furthermore, Jordan discloses a device to monitor the loop and determine a size of the loop. However, Jordan's device can be improved with Fukuchi's technique. A POSA would understand that the pressure detector taught by Fukuchi could be used in place of Jordan's sensor as a part of Jordan's device for determining a size of the loop. Consequently, an apparatus

⁵⁰² See *supra* at section XII.A.23-24.

⁵⁰³ See *supra* at section XII.A.21.

resulting from the obvious combination of Jordan with Fukuchi would meet each element of [2.5].

2. Dependent Claim 3

447. Claim 3 depends from claim 2 and further requires “wherein the loop store comprises a suction device for the material loop which acts on the material loop at least in a region at the outgoing side.” As discussed above, claim 2 would have been obvious. Jordan and Fukuchi disclose the additional elements of claim 3. And Jordan, as combined with Fukuchi, would meet claim 3’s additional limitation.

448. A POSA would understand that Jordan’s suction device, connected to a “vacuum connection **28**” is a suction device for the material loop which acts on the material loop at least in a region at the outgoing side, because: some device must be responsible for the suction that creates a “vacuum” and a POSA would view Jordan as teaching a common device for creating a vacuum, such as a blower; the suction creates a vacuum that “draw[s]” (i.e. acts on) the loop “into a shaft,” and “holds the loop [i.e. acts on] taut;” and the suction acts on the entire loop, which includes its outgoing side.⁵⁰⁴

449. A POSA would understand that Fukuchi’s “blower **36**” is a suction device for the material loop which acts on the material loop at least in a region at the

⁵⁰⁴ See *supra* at section XII.A.15.

outgoing side, because: it is a “blower” which a POSA would recognize as a common type of device used to create suction; the blower “positively absorb[s] air (i.e. creates suction) and “results in obtaining pressure close to vacuum;” the resulting pressure difference is “acting on chip paper 1” (i.e. acts on the material loop) and causes the paper to be absorbed and fed to the lower portion of the reserving chamber;” and a POSA would understand that the vacuum acts on the entire loop, including the outgoing side.

450. Jordan likewise discloses a suction device, as claimed.⁵⁰⁵ Consequently, an apparatus resulting from the obvious combination of Jordan with Fukuchi would meet each element of [3].

3. Dependent Claim 9

451. Claim 9 depends from claim 2 and further requires “wherein the air permeable portion of the contact surface bounds at least one vacuum chamber to which a suction device is connected or which belongs to a suction device.” As discussed above, claim 2 would have been obvious. And Fukuchi discloses claim 9’s additional limitations. Jordan, as combined with Fukuchi, would meet claim 9’s additional limitations.

⁵⁰⁵ See *supra* at section XII.A.15.

452. A POSA would understand that the portion of Fukuchi's "reserving chamber **40a**" which "can be ventilated" is an air permeable portion of the contact surface that bounds at least one vacuum chamber to which a suction device is connected or which belongs to a suction device. As discussed in section XII.C.1.e, a POSA would understand that this portion of Fukuchi's reserving chamber was an air permeable portion of the contact surface. As discussed in section XII.C.7.e, Fukuchi's "pressure detecting chamber **40a**" is a vacuum chamber. A POSA would understand that Fukuchi's air permeable portion bounds the vacuum chamber, because "the reserving chamber **40a** and the pressure detecting chamber **40b** are formed as one unit through a slit **40c**," with the back wall (which has slit **40c** and is air permeable) of the reserving chamber (which is the front wall of the pressure detecting chamber) forming the boundary between the reserving chamber and the pressure detecting chamber. As discussed above in section XII.C.2, Fukuchi's "blower **36**" is a suction device. A POSA would understand the blower **36** is connected to and belongs to the pressure detecting chamber because "a place close to the lower portion of the reserving chamber" "obtain[s] pressure close to vacuum" through operation of the blower, and "the pressure detecting chamber [is] connected to the reserving chamber ... such that the pressure of the pressure detecting chamber

is changed” by the blower (i.e. the blower is connected to and belongs to the pressure detecting chamber).⁵⁰⁶

453. Jordan likewise discloses aspects of a suction device, as claimed.⁵⁰⁷ Consequently, an apparatus resulting from the obvious combination of Jordan with Fukuchi would meet each element of [9].

4. Dependent Claim 12

454. Claim 12 depends from claim 2 and further requires “wherein the web length entering the loop store per time unit is controllable by an internal or external control device in dependence on the loop size.” As discussed above, claim 2 would have been obvious. And Jordan discloses claim 12’s additional limitation. Jordan, as combined with Fukuchi, would meet claim 12’s additional limitation.

455. A POSA would understand that Jordan disclosed a control device. Jordan’s control device is its “electronic computer.” The control system coordinates the movements of “the paper infeed,” and a POSA would understand that Jordan uses the computer to control the take-up rollers **24** as well.⁵⁰⁸ Jordan also discloses that “If the loop becomes to[o] small [the] take-up rollers **24** are speeded up until the

⁵⁰⁶ See *supra* at section XII.A.15.

⁵⁰⁷ See *supra* at section XII.A.15.

⁵⁰⁸ See *supra* at section XII.A.26; EX1029, p. 25 (IPR2019-01464 Final Written Decision).

loop is sufficiently big again.”⁵⁰⁹ A POSA would understand that Jordan maintains this buffer loop by having the web length entering the loop store per time unit be controllable by an internal or external control device in dependence on the loop size.”

456. Consequently, an apparatus resulting from the obvious combination of Jordan with Fukuchi would meet each element of [12].

5. Dependent Claim 13

457. Claim 13 depends from claim 12 and further requires “wherein the removal device is controllable by the control device in dependence on the loop size.” As discussed above, claim 12 would have been obvious. And Jordan and Fukuchi disclose claim 13’s additional limitation. Jordan, as combined with Fukuchi, would meet claim 13’s additional limitation.

458. As discussed in section XII.C.1.c, a POSA would understand that Fukuchi had a removal device. That removal device includes “feed roller **31**” which delivers paper “to the reserving chamber” (i.e. loop store).⁵¹⁰ Further, Jordan’s buffer is kept from remaining “too large” or “to[] small.”⁵¹¹ And as discussed above

⁵⁰⁹ See *supra* at section XII.A.21.

⁵¹⁰ See *supra* at section XII.A.12.

⁵¹¹ See *supra* at section XII.A.21.

in section XII.C.4, Jordan has a control device. A POSA would understand that roller **31** is controllable by the control device in dependence on the loop size.

459. Consequently, an apparatus resulting from the obvious combination of Jordan with Fukuchi would meet each element of [13].

6. Dependent Claim 16

460. Claim 16 depends from claim 2 and further requires “wherein the result of a position determination of the material loop is provided as a measure for the loop size.” As discussed above, claim 2 would have been obvious. And Fukuchi discloses claim 16’s additional limitation. Jordan, as combined with Fukuchi, would meet claim 16’s additional limitation.

461. A POSA would understand that the “slit position” of Fukuchi was a result of a position determination of the material loop that is provided as a measure for the loop size. The slit position is a “length” (i.e. position) which is “convert[ed]” (i.e. it is a determination) using an “analog card” into a linear output (i.e. the determination is provided) voltage.⁵¹² Because the slit position changes in dependence on the size of the loop, the provided determination of slit position is provided as a measure of the loop size.⁵¹³

⁵¹² See *supra* at section XII.A.25.

⁵¹³ See *supra* at section XII.A.25.

462. Consequently, an apparatus resulting from the obvious combination of Müller with Waffner would meet each element of [16].

7. Independent Claim 17

- a) **Preamble: An apparatus for a single-track or multitrack slicing of food products having a product feed which supplies products to be sliced on one track or on multiple tracks to a cutting region in which a cutting blade moves in a rotating and/or revolving manner to cut the supplied products into slices, and having an apparatus for the provision of web-like interleaved sheet material at the cutting region in which the products supplied are cut into said slices and interleaved sheets are introduced which are cut off from the provided interleaved sheet material in the cutting region, said apparatus comprising:**

463. To the extent the preamble is limiting, Jordan discloses the preamble. Jordan, as combined with Fukuchi, would meet the preamble.

464. A POSA would understand that Jordan's "cutting machine" is an apparatus for single-track or multitrack slicing of food products having a product feed which supplies products to be sliced on one track or on multiple tracks to a cutting region in which a cutting blade moves in a rotating and/or revolving manner to cut the supplied products into slices. As described in section XII.C.1.a, Jordan teaches tracks, a cutting region, slicing, food products, and slices. A POSA would understand that Jordan's slicing machine had product feeds driving products along

tracks toward the slicing station.⁵¹⁴ And Jordan would disclose to a POSA a cutting blade moving in a rotating or revolving manner to cut the supplied product into slices.⁵¹⁵

465. A POSA would understand that Jordan's "paper feed arrangement" is an apparatus for the provision of web-like interleaved sheet material at the cutting region in which the products supplied are cut into said slices and interleaved sheets are introduced which are cut off from the provided interleaved sheet material in the cutting region. As I discuss in section XII.C.1.a, Jordan teaches web-like interleaved sheet material, a cutting region, and interleaved sheets. A POSA would understand that Jordan's "cutting plane" is a cutting region in which the products supplied are cut into said sliced and interleaved sheets are introduced which are cut off from the provided interleaved sheet material in the cutting region, because in state-of-the-art slicing-and-interleaving machines from the time of the '013 patent, the cutting plane was used to sever both slices and sheets.⁵¹⁶

466. Consequently, an apparatus resulting from the obvious combination of Jordan with Fukuchi would meet each element of the Preamble to claim 17.

⁵¹⁴ See *supra* at sections VI.D, XII.A.6.

⁵¹⁵ See *supra* at section XII.A.5.

⁵¹⁶ See *supra* at section XII.A.4.

b) Element 17.1: a material store

467. Jordan and Fukuchi each disclose this element, for the same reasons as discussed in section XII.C.1.2. Jordan, as combined with Fukuchi, would meet this element.

c) Element 17.2: a removal device for a removal of a material web from the material store

468. Fukuchi discloses this element (and Jordan discloses aspects of this element), for the same reasons as discussed in section XII.C.1.3. Jordan, as combined with Fukuchi, would meet this element.

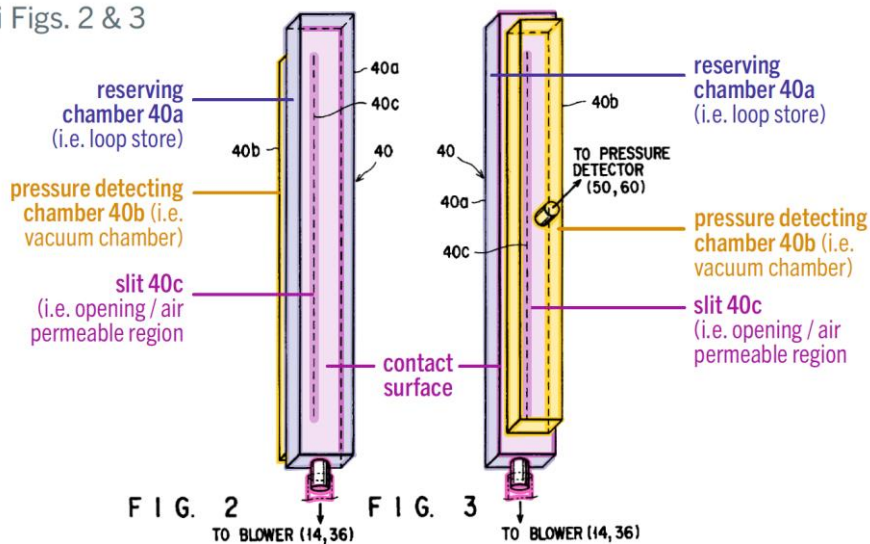
d) Element 17.3: a loop store defining a space for the removed material web to form a loop, the loop store located between the material store and the cutting region

469. Jordan discloses this element (and Fukuchi discloses aspects of this element), for the same reasons as discussed in section XII.C.1.4. Jordan, as combined with Fukuchi, would meet this element.

e) Element 17.4: at least one vacuum chamber, the at least one vacuum chamber having at least one opening located adjacent a path of the loop

470. Fukuchi discloses this element. Jordan, as combined with Fukuchi, would meet this element.

Fukuchi Figs. 2 & 3

*EX1007, "Fukuchi" at Figs. 2, 3 (annotated)*

471. A POSA would understand Jordan had "at least one vacuum chamber."

A POSA would understand Jordan's "shaft 27" is a vacuum chamber. The shaft "is provided with a vacuum connection 28" and draws paper in "by vacuum." The shaft has walls forming a chamber.

472. A POSA would understand Fukuchi's "pressure detecting chamber 40b" to be an at least one vacuum chamber having at least one opening located adjacent a path of the loop." A POSA would understand Fukuchi's "chamber 40b" to be at least one vacuum chamber, because it is "surfaces other than the surface having the slit 40c are closed" (i.e., it is a chamber), and a "blower" "appl[ies] negative pressure" (i.e. a vacuum) and "the internal pressure of the pressure

detecting chamber ... is changed.”⁵¹⁷ A POSA would understand that Fukuchi’s “slit **40c**” is at least one opening, because a slit is a type of opening, and the slit allows “the pressure detecting chamber **40b** [to] be ventilated.”⁵¹⁸ A POSA would understand that the “slit” is part of the vacuum chamber, because the slit occurs in a surface of the chamber (“the surface having the slit”).⁵¹⁹ A POSA would understand that the path taken by interleaver material as it enters and exits the loop formed in Jordan’s and Fukuchi’s loop stores are a path of the loop, because this is an ordinary usage of these words.⁵²⁰ And a POSA would understand that the pressure detecting chamber and slit is located adjacent to a path of the loop, because the reserving chamber (i.e. loop store) is “formed as one unit through [i.e. adjacent to] a slit **40c**” with the pressure detecting chamber.⁵²¹ In other words, the slit connects the pressure detecting chamber to the loop store, and so is adjacent to the loop.

473. Additionally, a POSA would understand that the “second space” in the “reserving chamber” of Fukuchi was a vacuum chamber.⁵²²

⁵¹⁷ See *supra* at section XII.A.14.

⁵¹⁸ See *supra* at section XII.A.17.

⁵¹⁹ See *supra* at section XII.A.17.

⁵²⁰ See *supra* at section XII.A.20.

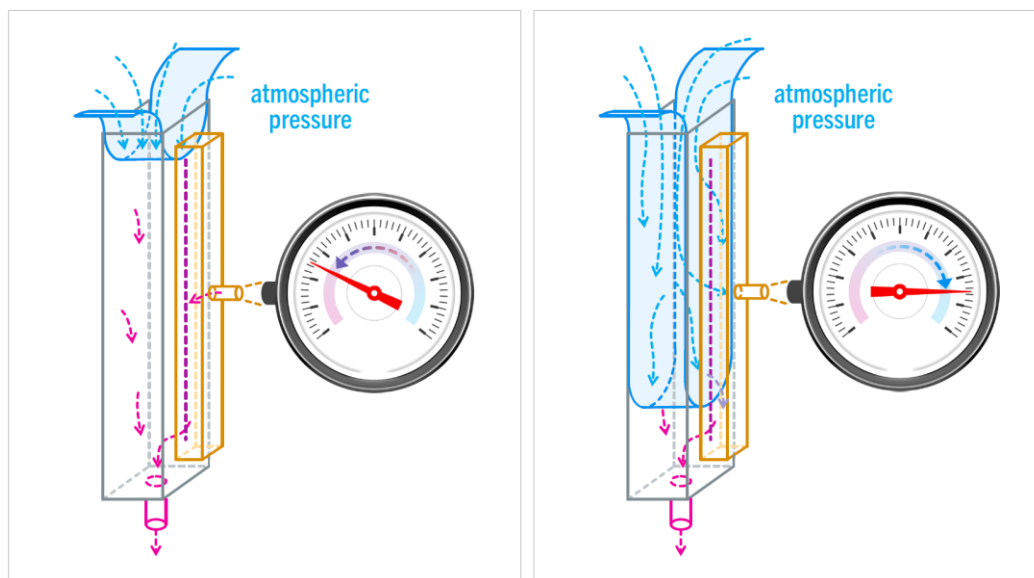
⁵²¹ See *supra* at section XII.A.17.

⁵²² See *supra* at section XII.A.14.

474. When combining the teachings of Jordan with Fukuchi, a POSA would not modify these relevant aspects of Fukuchi's technique. Fukuchi's technique—using a vacuum signal to determine loop length—teaches the existence of a vacuum chamber with openings adjacent to the path of the loop. Consequently, an apparatus resulting from the obvious combination of Jordan with Fukuchi would meet each element of [17.4].

- f) **Element 17.5: a device for determining a size of the loop formed in the loop store based on the detection of a pressure drop within the at least one vacuum chamber when the opening is at least partially covered by the loop**

475. Fukuchi discloses this element. Jordan, as combined with Fukuchi, would meet this element.



Schematic Diagram for Illustrative Purposes

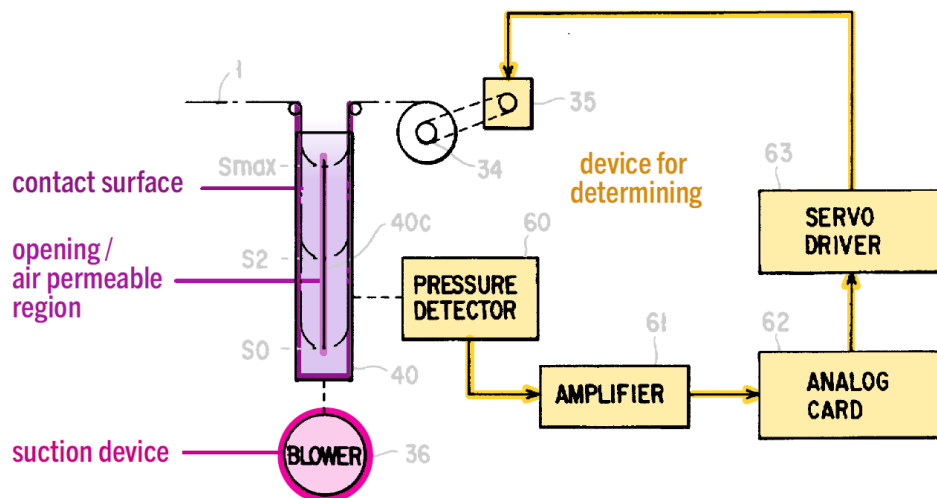


FIG. 8

EX1007, “Fukuchi” at Fig. 8 (annotated)

476. A POSA would understand that Jordan’s “two photocells” used to adjust the speed of “take-up rollers 24” are a device for determining a size of the loop formed in the loop store. In Jordan, the “size of the loop 29 is controlled [i.e. determined] by, for instance, two photocells 34.”⁵²³ The take-up rollers are speeded up or stopped to change the loop size.⁵²⁴

477. A POSA would understand that Fukuchi’s “pressure detector 60” and “control system” is a device for determining a size of the loop formed in the loop store based on the detection of a pressure drop within the at least one vacuum chamber when the opening is at least partially covered by the loop. A POSA would

⁵²³ See *supra* at section XII.A.21.

⁵²⁴ See *supra* at section XII.A.21.

understand that Fukuchi’s “change of pressure” is a pressure drop, when the “slit position” raises, less air “can be ventilated,” leading to a pressure drop.⁵²⁵ A POSA would understand that this pressure drop occurs within the at least one vacuum chamber, as the “internal pressure of the pressure detecting chamber **40b** is changed.”⁵²⁶ A POSA would understand that this pressure drop occurs when the opening is at least partially covered, because pressure is changed “in accordance with the amount of absorbing and feeding the chip paper **1**” as the “slit position” of the paper changes, covering more or less of the slit.⁵²⁷ If the slit were completely uncovered, e.g. because the paper had dropped entirely below the slit, the pressure would no longer change and there would be no pressure drop—consequently, the pressure only drops when the slit is partially covered. A POSA would understand that Fukuchi’s device detects this pressure drop, because “[t]he change of pressure is detected by the pressure detector **60**.”⁵²⁸ And a POSA would understand that the device determines the size of the loop, because “the amount of absorbing and feeding the chip paper is set [i.e. determined] to be small” and Fukuchi uses its “control system” to control the “rotating speed of the winding roller **34** in accordance with

⁵²⁵ See *supra* at section XII.A.22.

⁵²⁶ See *supra* at section XII.A.22.

⁵²⁷ See *supra* at section XII.A.22.

⁵²⁸ See *supra* at section XII.A.21.

the amount of absorbing and feeding chip paper **1** in the reserving chamber.”⁵²⁹

Fukuchi teaches a pressure sensor, called a manometer, connected to a control device. Fukuchi teaches actually determining and detecting, rather than merely being capable of determining or detecting.

478. Fukuchi’s technique—using a pressure sensor to determine loop length—requires detecting the loop via changes in pressure differential and correspondingly determining loop length. Furthermore, Jordan discloses a device to monitor the loop and determine a size of the loop. However, Jordan’s device can be improved with Fukuchi’s technique. A POSA would understand that the pressure detector taught by Fukuchi could be used in place of Jordan’s sensor as a part of Jordan’s device for determining a size of the loop. Consequently, an apparatus resulting from the obvious combination of Jordan with Fukuchi would meet each element of [17.5].

8. Dependent Claim 18

479. Claim 18 depends from claim 17 and further requires “wherein a common control device is provided which is configured to coordinate the slicing of the products and the provision of the interleaved sheet material.” As discussed above, claim 17 would have been obvious. And Jordan discloses claim 18’s

⁵²⁹ See *supra* at section XII.A.21.

additional limitation. Jordan, as combined with Fukuchi, would meet claim 18's additional limitation.

480. A POSA would understand that Jordan's "electronic computer" is a common control device configured to coordinate the slicing of the products and the provision of the interleaved sheet material. Jordan expressly discloses that its "conveying device, the paper infeed, and the stacking surface are controlled... in conjunction with an electronic computer."⁵³⁰ A POSA would understand that since the electronic computer is involved in the "control[]" of these components, it is a control device. Jordan also discloses that the "cutting apparatus ... [is] coupled with an electronic computer."⁵³¹ A POSA would understand, reading Jordan at the time of the '013 patent, that the electronic computer coupled to the cutting apparatus is the same computer—likely a PLC controller—as controls the "paper infeed."⁵³² Because the "cutting apparatus" is responsible for slicing of the products, and the "paper infeed" is responsible for the provision of the interleaved sheet material, a POSA would understand that Jordan discloses common control device configured to coordinate slicing and provision of sheet material.

⁵³⁰ See *supra* at section XII.A.26.

⁵³¹ See *supra* at section XII.A.26.

⁵³² See *supra* at section XII.A.26.

481. Further, as I discuss in section XII.B.1.c, a POSA would see obvious advantages to using a single common machine controller to control all functions of the slicer and interleaver. In any event, Fukuchi teaches aspects of the claimed common control as well. Consequently, an apparatus resulting from the obvious combination of Jordan with Fukuchi would meet each element of the Preamble to claim 17.

9. Independent Claim 19

482. Claim 19 is identical to claim 2, other than its preamble. As discussed above, claim 2 would have been obvious. The preamble of claim 19 is identical to the preamble of claim 17. As discussed above, claim 17 would have been obvious. Jordan, as combined with Fukuchi, would meet claim 19.

10. Dependent Claim 20

483. Claim 20 depends from claim 19 and further requires “wherein a common control device is provided which is configured to coordinate the slicing of the products and the provision of the interleaved sheet material.” As discussed above, claim 19 would have been obvious. And as discussed with respect to claim 18, above, the additional elements of claim 20 would have been obvious as well. Jordan, as combined with Fukuchi, would meet claim 20’s limitations.

XIII. THERE ARE NO OBJECTIVE INDICIA OF NONOBVIOUSNESS.

484. Considering the information I have reviewed, my general knowledge of the field of food processing equipment, general automation equipment, and publications within that and related fields, I am not aware of any objective evidence that would support the patentability of the '013 patent. Further, from my review of the prosecution history of the '013 patent, I did not see any objective indicia raised during the prosecution of the patent. I am also not otherwise aware of publicly available evidence of objective indicia of nonobviousness that would support the patentability of the '013 patent. Therefore, in my opinion, no objective indicia of nonobviousness support the patentability of the challenged claims of the '013 patent.

XIV. CONCLUSION

485. By signing this declaration, I recognize that my declaration will be filed as evidence in a contested case before the United States Patent and Trademark Office's Patent Trial and Appeal Board. I also recognize that I may be subject to cross-examination in the case. If cross-examination is required of me, I will appear for cross-examination within the United States during the allotted time.

486. 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 Section 1001 of Title 18 of the United States Code. I am over the age of eighteen years old, and I am competent to make this Declaration.

Date: December 6, 2023

DocuSigned by:

F00825E58253493...

Michael Jobin