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(54) Tape splicing method, and device for carrying out the method

(57) The automatic splicing device has a base plate (3) supporting a first reel (1) and a second reel (2) storing primary (1a) and secondary (2a) opaque pull-tab strips, and rollers for guiding a primary pull-tab strip from the first reel (1) to a packaging machine. An infeed device (9) is mounted on the plate (3) downstream of the second reel (2) for retaining an end portion of the secondary pull-tab strip (2a) at a first location, and a clamp retains a translucent heat sealable patch (101) in a second location at a sealing unit (104). A strip cutting unit (11) and a pressure and cutting unit (13) are movably mounted on the plate (3) downstream of the infeed device (9) for cutting the primary pull-tab strip (1a) at a third location, spaced from the first location. The pressure and cutting unit is activated for applying the translucent patch extending across the gap between the ends of the opaque pull-tab strips to form an optically detectable window indicative of the splice position.

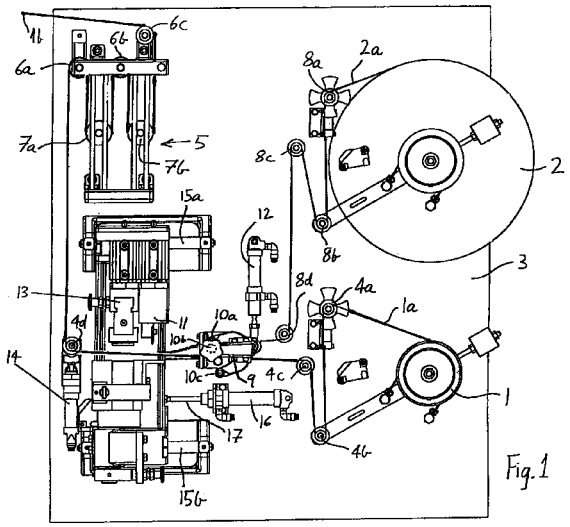

Fig. 1

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Description

TECHNICAL FIELD

[0001] The present invention relates to a method of splicing the tape used for manufacturing pull-tab type opening devices for packages containing pourable food products, and to an automatic device for carrying out the method in a machine for packaging liquid food or pourable food products.

BACKGROUND ART

[0002] One common type of packaging for pourable food products, such as wine, tea, milk, fruit juice, tomato puree, UHT milk (also known as long life milk) etc., is a container made from a continuous web of laminated packaging material. The packaging material is constituted by a layer of fibre-based material such as paper, which is covered on each side with a plastic material such as polyethylene. In order to manufacture aseptic packages, one face of the polyethylene-coated paper is coated with a barrier material such as aluminum or a synthetic barrier material, which in turn is coated with a plastic material such as polyethylene. For manufacturing aseptic packages, the packaging material web passes through an aseptic chamber and is sterilized, for example by means of the application of a sterilizing agent such as hydrogen peroxide which is successively evaporated by heating and/or by irradiating the packaging material with light of appropriate wavelength and intensity. The sterilized web of laminated packaging material is transversely bent and longitudinally sealed to form a longitudinally-sealed packaging material tube. The packaging material tube in practice forms an extension of the aseptic chamber and is continuously filled with sterile or sterile treated liquid food product.

[0003] The longitudinally sealed tube filled with liquid food product is then clamped between pairs of forming and sealing members which transversely seal and form the product filled tube to form pillow-shaped packages. The forming and sealing members may be mounted in mutually facing pairs, on respective pairs of reciprocating jaws. The filled and sealed pillow-shaped packages are then transported to a final folding station, wherein the pillow-shaped packages are mechanically folded into a final shape, such as a parallelepiped shape. Non-aseptic packages for pasteurized products are manufactured in the same way, but without sterilzation of the packaging material.

[0004] Examples of commercially available packages of this type are the parallelepiped packages commonly known by the registered trademarks Tetra Brik® and Tetra Brik Aseptic®, and the parellelepiped packages with bevelled corners, commonly known by the registered trade marks Tetra Prisma® and Tetra Prisma Aseptic®.

[0005] The known machines for manufacturing aseptic packages of the above-described type, include, e.g., the commercially available TBA/8™, TBA/19™ and TBA/21™ machines, manufactured by Tetra Brik Packaging Systems, of Via Delfini, Modena, Italy. The known machines for manufacturing non-aseptic packages of the above-described type, include, e.g., the commercially available TB/18™ and TB/19™ machines, manufactured by Tetra Brik Packaging Systems AB, of Ruben Rausings gata, Lund, Sweden.

[0006] In order to provide a convenient method of opening the packages manufactured in the manner set forth heretofore, the known packaging machines are sometimes provided with an apparatus known as a pull tab unit. The pull tab units are located upstream of the aseptic chamber and include a first punching station for forming apertures at regular intervals in the packaging material web, at portions thereof which, when folded, form the top or uppermost wall of the package. The apparatuses also have a second station including means for sealing a patch of polyethylene or other food-compatible material on the inside face of the packaging material such that it covers the hole formed at the punching station. Finally, the pull-tab unit has a third station, where an aluminium pull-tab is severed from a strip of polyethylene-covered aluminium, and applied over the hole punched in the packaging material and the patch. The pull-tab is sealed to the underlying patch, and may also be at least partially sealed to the outer surface of the packaging material surrounding the hole. In this way, the user of a finished package merely peels off the pull-tab opening device, thereby also severing the polyethylene patch at the edge of the hole in the packaging material, in order to access the aperture and pour the contents from the package. The known pull-tab units include, e.g., the PT8™, PT10™, PT19™ and PT21™ pull-tab units manufactured by Tetra Brik Packaging Systems, Via Delfini, Modena, Italy.

[0007] The pull-tab strip is generally supplied on reels which should last for a complete shift or production run, however, when the production run is longer than envisaged, the pull-tab tape has to be spliced. In order to splice the tape, the operator is compelled to stop the machine. He then cuts the old pull-tab strip, abuts the cut end against the end of a new reel of pull-tab strip, and connects them together with a piece of adhesive tape. When the machine is restarted, all of the packages made of packaging material which was located in the means for applying sterilizing agent (e.g., a hydrogen peroxide bath) are rejected. Furthermore, a photocell reads the position of the black tape used to splice the pull-tab strip, and the package provided with the pull-tab containing the spliced material, together with several packages before and after the splice (to allow a margin of safety), are also rejected.

[0008] Currently, no splicing devices are available for automatically splicing the pull-tab strip in a machine for packaging pourable food products, and all splices are made by hand, and consequently the packaging

machine has to be stopped in order to make the splice manually.

[0009] Splicing devices are known for joining the reels of material for manufacturing the polyethylene patch in a pull-tab unit. The automatic splicing devices of this type are mounted on the packaging machine upstream of a series of conventional dancing rollers forming a tape magazine. This allows a sufficient quantity of tape to be supplied for continuing normal operation of the machine, during the time required for the device to effect the splicing of a proximal end of a new or reserve tape to the distal end of a used tape exiting an emptied reel.

[0010] The splicing device includes an abutment block and a heated block. The abutment block has a pressure surface, and a plurality of small holes formed in the pressure surface which are connected to a vacuum source. A full reserve-reel of tape is rotatably mounted proximate to the abutment block, and the proximal end of the tape is drawn from the reel and drawn across the face of the abutment block in a tape advancement direction. The reserve tape is retained at the abutment surface by the vacuum at the plurality of small holes. Tape drawn from a primary reel, in the same advancement direction, passes in front of the abutment block. The primary tape in use is separated from the end of the reserve tape and the pressure surface by a pin, rigidly connected to the abutment block and located upstream of the pressure surface with respect to the advancement direction of the primary tape. The heated block is located in front of and is spaced-apart from the abutment block, and the abutment block is connected to a fluid-activated cylinder, such that it can be moved into abutment engagement with the heated block.

[0011] Conventional sensor devices are used to detect when the tape on the primary reel in use is exhausted, and the distal end of the tape exits the empty reel. In this condition, the sensors provide an enabling signal for activating the fluid actuated cylinder and the abutment block is moved into abutment engagement with the heated block. The heated block includes a spring-loaded tape-locking unit, which engages the fixed pin of the abutment block upon actuating of the fluid-activated cylinder, thereby trapping the distal end portion of the primary tape therebetween. At the same time, a spring-loaded portion of the heated block engages the pressure surface of the abutment block, thereby welding the distal end portion of the primary tape to the proximal end portion of the reserve tape. A knife located beneath the tape-locking unit, i.e., upstream of the pressure surface with respect to the tape advancement direction, cuts the unwanted remaining end portion of the primary tape, upstream of the weld.

[0012] Throughout the time required to effect the splicing operation, tape is drawn from the above-mentioned series of dancing rollers located downstream of the splicing device, i.e., interposed between the splicing unit and the packaging machine. When the splicing operation is completed, the fluid activated cylinder is retracted and the abutment block is moved away from the heated block. The unwanted cut-off end portion of primary tape is released from its locked position between the pin and the tape locking unit, and the spliced portion of tape is released from its locked position between the spring-loaded displaceable heated block and the pressure surface. The pulling action exerted on the tape by the packaging machine overcomes the retaining force of the vacuum applied at the plurality of holes formed in the pressure surface, and the tape is thus drawn from the new reel. Since the new reel may last, in practice, for approximately one hour or more, depending obviously on the size of the reel, the machine operator can mount a new reel of tape thereon at the most suitable time according to his work schedule.

[0013] The splice thus obtained provides a joint wherein the spliced tapes overlap each other and define an angle of 180 degrees relative to each other. This means that when a force is exerted on the tape in a direction parallel to the longitudinal extension of the tape, only linear forces act on the spliced joint, and no lateral forces are exerted which would tend to pull the joint apart.

[0014] However, the device is structurally complicated, and compulsorily requires the presence of relatively expensive vacuum means and related control mechanisms. Moreover, the plurality of small holes provided in the pressure surface are susceptible to becoming clogged with foreign matter, thereby prejudicing correct retention of the proximal end of the reserve tape, and increasing maintenance requirements.

[0015] Moreover, the fact that the tapes are overlapped when spliced, makes this arrangement unsuitable for splicing the thicker polyethylene coated aluminium pull-tab material. In fact, such a splice could not be detected by the photocells, in order to enable the package containing the spliced material to be rejected. This feature is essential to ensure perfect sterile quality of every package produced.

[0016] Another known type of tape splicing unit has been devised for joining together the sealing tape used for sealing together the longitudinal edges of the packaging material web, whereby to produce a longitudinally sealed tube which is continuously formed, filled and sealed to produce packages. In this type of device, a heated block and an abutment block are normally spaced apart. A tape in use is drawn from a primary reel and passes between the abutment block and the heated block in a tape advancement direction. A reel of reserve tape is fed through a series of dancing rollers and is passed over the abutment block in a direction opposite to the advancement direction. The proximal end of the tape is clamped on a face of the abutment block located remote from the heated block. The heated block has a

heated pressure surface, a knife located upstream of the heated pressure surface, with respect to the taper advancement direction, and two spring-loaded pins protruding from the surface of the heated block, and retractable into seats formed therein. The heated block is mounted on a fluid-activated cylinder. Conventional sensor devices are used to detect when the tape on the primary reel in use is exhausted, and the distal end of the tape exits the empty reel. In this condition, the sensors provide an enabling signal for activating the fluid actuated cylinder and the heated block is moved into abutment engagement with the abutment block. The pins retract into their seats formed in the heated block, and the heated pressure surface engages the abutment block, trapping overlapping portions of the primary tape and reserve tape therebetween. At the same time, the knife connected to the heating block enters a seat formed in the abutment block, cutting through both of the unwanted end portions of the reserve tape and the primary tape. Upon retracting the fluid activated cylinder, the heated block moves away from the abutment block, and the mutually-spliced proximal end of the reserve tape and the distal end of the primary tape are released.

[0017] Although this latter type of splicing device is very advantageous in that it eliminates the need for vacuum means, it is not devoid of drawbacks. Specifically, the splice thus obtained provides a spliced joint wherein the spliced tapes define an angle of 0 (zero) degrees relative to each other. This means that when a force is exerted on the tape in a direction parallel to the longitudinal extension of the tape, lateral forces are exerted on the spliced joint which tend to pull the joint apart. When failure of the tape splice occurs, the packaging machine has to be stopped and production is lost while a new splice is made. Furthermore, the fact that the tapes are overlapped when spliced, makes this arrangement unsuitable for splicing the thicker polyethylene coated aluminium pull-tab material. In fact, such a splice could not be detected by the photocells, in order to enable the package containing the spliced material to be rejected.

OBJECTS OF THE INVENTION.

[0018] There is thus a general need in the art to provide an improved method for splicing pull-tab tape of the kind used for providing opening devices on packages manufactured in machines for packaging liquid food products, which overcomes the drawbacks encountered in the use of the prior art splicing devices. There is also the need to provide a pull-tab splicing unit for carrying out such a method.

[0019] An object of the invention is to provide a method and splicing device capable of making a spliced joint wherein the spliced tapes define an angle of 180 degrees relative to each other. This means that when a force is exerted on the tape in a direction parallel to the longitudinal extension of the tape, only linear forces act on the spliced joint, and no lateral forces are exerted on the spliced joint which would tend to pull the joint apart.

[0020] A further object of the invention is to provide a method which allows a splice to be detected in a very reliable manner, and which can be carried out automatically by means of a splicing device which is structurally simple, reliable in operation, and has very low maintenance requirements.

[0021] Yet a further object of the invention is to provide a splicing device which is economically advantageous and simple to manufacture.

[0022] With the above objects in view, as well as other objects of the invention which will become apparent hereinafter, there is provided a method of splicing an opaque pull-tab strip material as defined in claim 1.

[0023] According to further aspects of the invention, there are provided an automatic splicing unit for carrying out the method of claims 1-5, as defined in claim 6, and a spliced pull-tab strip as defined in claim 11.

[0024] Further features of the invention are defined in the sub claims.

BRIEF DESCRIPTION OF THE ACCOMPANYING DRAWINGS.

[0025]

Figure 1 is a front elevation view of the splicing device according to the invention, showing a primary pull-tab strip used by a packaging machine, and a secondary pull-tab strip ready for splicing thereto;

Figure 2 is a front elevation view, similar to figure 1, showing a brake unit in an activated condition for blocking the position of the primary pull-tab strip with respect to the cutting and sealing units;

Figures 3 and 4 are schematic elevation views similar to those of the preceding figures showing a cutting unit in activated and deactivated conditions, respectively;

Figure 5 is a schematic elevation view illustrating a lateral displacement of a sealing unit occurring upon completion of operation of the cutting unit;

Figures 6 and 7 are schematic elevation views showing the activation and deactivation of a sealing unit for welding a thermo-sealable patch over the spaced apart ends of two pull-tab strips to be spliced together;

Figure 7a is a schematic view, to an enlarged scale, showing the splice obtained with the device and method according to the invention;

Figure 7b, is a schematic view similar to the drawing figure 7a, showing the arrangement of a pressure and cutting unit for trimming the longitudinal extension of a heat sealable patch to the width of overlying pull-tab strips to be spliced together and;

Figure 8 illustrates the activation of an infeed unit for retaining a cut end of a primary pull-tab strip,

and repositioning of the cutting and sealing units, which are returned to an initial position, in preparation for a new splicing operation.

DESCRIPTION OF THE PREFERRED EMBODIMENT.

[0026] With reference to the drawing figures, the device according to the invention has a first reel 1 of primary pull-tab strip 1a, and a second reel 2 of secondary pull tab strip 2a rotatably mounted on a plate-like support member or frame 3. The support member 3 is adapted to be mounted on a form, fill and seal type machine for packaging pourable food products and is advantageously movably mounted thereon, e.g., slideably, mounted, in order to facilitate replacement of the reels 1, 2 by an operator.

[0027] Figure 1 shows the normal working of the device, with primary pull-tab strip being drawn from the reel 1, and entrained around a series of rollers 4a-4d, before passing through a magazine 5, including a series of fixed rollers 6a-6c and a series of movable dancing rollers 7a, 7b. Any suitable conventional means can be provided for monitoring the quantity of primary pull-tab strip on the reel 1. The distal end 1b of the primary pull-tab strip 1a is fed to a form, fill and seal type filling machine for manufacturing packages of pourable food products. A brake 50a,50b including a brake arm 51a,51b is also provided for tensioning each pull-tab strip 1a,2a.

[0028] Figure 1 also shows the secondary pull-tab strip 2a prepared ready for splicing. The secondary pull-tab strip 2a is drawn from the reel 2 and passed around a series of secondary rollers 8a-8d, before being passed into an infeed unit 9.

[0029] The infeed unit 9 is provided with an upper infeed guide roller 10a, which is pressed against a central infeed guide roller 10b, to retain the secondary pull-tab strip in the desired position, with the end 2b of the secondary strip 2a located proximate to strip cutting unit 11. The infeed unit 9 also has a lower infeed guide roller 10c which, in the drawing figure 1 is shown in a lowered position whereby to avoid interference with the primary pull-tab strip 1a which is being used by a packaging machine. A pneumatic cylinder 12 is provided for switching the infeed unit between the position shown in figure 1, with the secondary pull-tab strip blocked between the infeed rollers 10a and 10b, and the position shown in figure 7, whereat the primary pull tab strip is blocked between the rollers 10b and 10c As will be explained hereinafter, the infeed device is moved to this latter position when a splice has been made.

[0030] The device according to the invention also has a pressure and cutting unit 13 located adjacent to the strip cutting unit 11. The strip cutting unit 11, and the pressure and cutting unit 13 are both movable along upper and lower horizontal guide rails 15a, 15b upon activating a pneumatic piston 16, having a stem 17, connected to the units 11,13. A brake unit 14 is also provided which is activated for blocking the primary pull-tab strip in position during splicing.

[0031] With reference to figure 2, the pressure and cutting unit 13 is located above means such as a spring-loaded clamp 100, for retaining a patch 101 of material to be sealed to the ends of the primary and secondary pull-tab strips 1a,2a during splicing. The pull-tab strips are usually made of an opaque material such as aluminium and advantageously, the patch 101 is made of a transparent as heat-sealable material such polyethylene. As shown in figure 7b, the pressure and cutting unit 13 has a pressure surface 13a and knives 102,103 for trimming the longitudinal extension of the patch 101 to substantially match the width of the pull-tab strips 1a,2a, and is located adjacent to an apropriatey eated ealing unit 104.

[0032] When the conventional detection means (not illustrated) detect that the reel 1 of primary pull-tab strip 1a is exhausted, a signal is sent to the central control unit of the packaging machine and the brake unit 14 is activated. More precisely, compressed air is fed to a hydraulic brake cylinder 16, having a stem 17, connected to a brake shoe 18, which blocks the primary pull-tab strip 1a against the roller 4a. During the time that the brake shoe 18 blocks the strip 1a against the roller 4a, continuity of operation is guaranteed by the pull-tab strip magazine 5, where the portion of the primary strip 1a entrained around the dancing rollers 7a,7b is used by the packaging machine in production.

[0033] Referring now to figures 3 and 4, when the primary pull-tab strip 1a is blocked between the brake shoe 18 and the roller 4a, and the strip 1a contained in the magazine 5 starts to be used by the packaging machine in production, the strip cutting unit 11 is activated. Compressed air is fed to a pneumatic cutting unit cylinder 19, and the cuter 20 connected to the stem 21 of the cylinder 19 is lowered and cuts the primary pull-tab strip 1a. The brake arm 51a drops downwardly by gravity and automatically withdraws the end of the remainder of the primary pul-tab strip from the area of operation of the pull-tab strip from the area of operation of the pressure and cutting unit 13 and the sealing unit 104.

[0034] When cutting is completed, as shown in figure 4, the pneumatic cutting unit cylinder 19 is deactivated and the cutter 20 is retracted upwardly to its initial position. It will be noted that throughout these operations, the strip cutting unit and pressure and sealing unit units are located at the left hand side of the horizontal guide rails 15a,15b.

[0035] As can be seen in figures 5, 6 and 7, when the cutter 20 has been retracted, the pneumatic cylinder 16 is activated such that the strip cutting unit 11 and the pressure and cutting unit 13 are moved towards the infeed unit 9 along the horizontal guide rails 15a, 15b. The end 22 of the secondary pull-tab strip 2a is held at a first location by the infeed unit 9. The patch 101 is held below the end of the secondary pull-tab strip 2a and

also below the cut end 23 of the primary pull-tab strip 1a at a second location. The cut end 23 of the primary pull-tab strip 1a is blocked (by virtue of the fact that the primary pull-tab strip is trapped between the brake shoe 18 and the roller 4a) in a third location which is spaced from the end 22 of the secondary pull-tab strip 2a. This causes a gap 24 to be created between the ends 22, 23 of the first and second pull-tab strips.

[0036] Compressed air is then fed to a pneumatic pressure unit cylinder 25 and the stem 26 of the cylinder 25 pushes the pressure and cutting unit 13, such that the patch 101 of heat sealable material is pressed into engagement with the ends 22,23 of the pull-tab strips. Sufficient pressure is applied and the sealing unit 104 is heated to a sufficient temperature to ensure sealing of the patch 101 to the ends 22,23 of the pull-tab strips 1a,2a. At the same time, the knives 102,103 cut the ends of the patch 101 such that its longitudinal extension substantialy corresponds to the width of the pull-tab strips 1a,2a. When the sealing cycle is complete the sealing unit cylinder 25 is activated to raise the pressure and cutting unit 13 and the patch 101 is released from the unit 13 and remains affixed to the pull-tab strips. The splice thus formed is schematically illustrated in figure 7a, wherein the transparent patch 13a covers the gap 24 between the ends 22, 23 of the opaque pull-tab strips 1a, 2a, thereby forming an optically detectable window, whereby the spliced material can be detected by a photocell of the packaging machine, and the package containing the spliced material can be discarded. In this way, splicing is effected in a fully automatic manner, without prejudicing the integrity of any produced package that is destined to reach the consumer.

[0037] Finally, as shown in figures 7 and 8, the infeed device 9 is activated by the pneumatic means 12. The upper infeed roller 10a is raised, thereby releasing the secondary pull-tab strip 2a which has been spliced to the primary pull-tab strip 1a, from between the upper infeed roller 10a and the roller 10b. As shown in figure 8, the brake shoe 18 is moved away from the roller 4a by activating the pneumatic piston 16. Also, as shown in figure 8, the cylinder 16 is activated to return the cutting and sealing units 11,13 to an initial position (i.e., to the left hand side of the guide rails 15a, 15b in the drawing figure 8). An operator can then prepare the device ready to make a new splice, which is done by placing a new patch 101 on the sealing unit, and replacing the reel 1 with a new reel of pull tab strip. Thereafter, by threading the end of the new pull-tab strip around the rollers 4a-4c and between the rollers 10b, 10c of the infeed device 9, to block the end of the new strip in the correct position ready to make the next splice.

[0038] The working of the device is the following:

[0039] In order to splice a pull-tab strip material in a machine for packaging pourable food products with the above-described device, an operator must ensure normal running of the packaging machine, i.e., check that a primary pull-tab strip is being fed from a first reel 1 to the packaging machine. The quantity of primary pull-tab strip 1a on the first reel is monitored with conventional means.

[0040] In order to prepare the device for splicing, an operator unwinds a secondary pull-tab strip 2a from a second reel 2 and retains an end portion of the secondary pull-tab strip 2a, to be spliced to the primary pull-tab strip 1a, at a first location. A patch 101 is also retained adjacent to the sealing unit 13, using conventional means such a spring clamp. The patch 101 is used for interconnecting a cut end of the primary strip to an end portion of said secondary strip at a second location. When the reel of primary pull-tab strip 1a is exhausted, the cutting unit cuts the primary pull-tab strip to form a cut end, which is retained at a third location, by activating the brake 18 to act on the roller 4a. Thereafter by activating the pressure and cutting unit 13, the pressure pad 13a is moved from the second location, into contact with the end portion of the secondary pull-tab strip and the cut end of the primary pull-tab strip. The sealing unit is activated to apply heat and pressure for sealing the patch to the end portion of the secondary pull-tab strip and the cut end of said primary pull-tab strip. When sealing is completed, pressure is released from the patch, the end portion of the secondary pull-tab strip and the cut end of the primary pull-tab strip. Thereafter, the secondary pull-tab strip is fed to the packaging machine. It should be noted that in accordance with the device and method of the present invention, an optically detectable window indicative of a splice position is formed in the opaque pull-tab strip. This is achieved by material by spacing the cut end of the primary pull-tab strip at the third location, at a distance from the end portion of the secondary pull-tab strip at the first location, to define a gap therebetween. The patch is made of substantially transparent or translucent material extending across the gap. The invention as described herein may be modified without thereby departing from the scope of the appended claims.

Claims

1. A method of splicing an opaque pull-tab strip material in a machine for packaging pourable food products, comprising the steps of;

   - feeding a primary pull-tab strip to a packaging machine,
   - retaining an end portion of a secondary pull-tab at a first location,
   - retaining a heat-sealable patch at a second location,
   - cutting said primary pull-tab strip upon exhaustion of said first reel to form a cut end retaining said cut end at a third location,
   - sealing said patch to said end portion of said secondary pull-tab strip at said first location and to said cut end of said primary pull-tab strip

at said third location to provide a spliced opaque pull-tab strip material,

- feeding said sliced opaque pull-tab strip material to said packaging machine,

characterized in that it comprises the step of forming an optically detectable window indicative of a splice position in said spliced opaque pull-tab strip material by carrying out the intermediate step of;

- spacing said end portion of said secondary primary pull-tab strip at said first location, at a distance from said cut end of said primary pull-tab strip at said third location, to define a gap therebetween, and providing said patch in a substantially transparent material extending across said gap.

2. Method according to claim 1, characterized in that it comprises cutting said primary pull-tab strip at a location which is laterally displaced with respect to said first location.

3. Method according to claims 1-2, characterized in that it comprises;

- cutting said primary pull-tab strip with a cutting unit,
- sealing said patch with a pressure and cutting unit, and
- the intermediate step of laterally displacing said strip cutting unit and said pressure and cutting unit after said step of cutting said primary pull-tab strip and said before said step of sealing said patch.

4. Method according to claim 3, characterized in that it comprises the step of cutting said patch simultaneously when applying heat and pressure for sealing said patch to said end portion of said secondary pull-tab strip and to said cut end of said primary pull-tab strip with said pressure and cutting unit.

5. Method according to claim 1, 2, 3 or 4, characterized in that it comprises the step of blocking said secondary pull-tab strip in a fixed position in an infeed unit when using said primary pull-tab strip, and blocking said primary pull-tab strip in a fixed position with a brake during said step of sealing said patch.

6. Method according to claim 5, characterized in that it comprises the step of releasing said secondary pull-tab strip from said infeed unit and releasing said primary pull-tab strip from said brake upon completing said step of forming an optically detectable window indicative of a splice position in said opaque pull-tab strip material

7. Automatic splicing device for carrying out the method defined in claims 1-6, characterized in that it comprises;

- a base having means for rotatably supporting a first reel and a second reel storing primary and secondary pull-tab strips,
- rollers connected to said base plate for guiding a primary pull-tab strip from a first reel to a packaging machine,
- an infeed device mounted on said plate downstream of said second reel for retaining an end portion of a secondary pull-tab strip at a first location,
- a device for retaining a heat sealable patch in a second location,
- a strip cutting unit mounted on said plate downstream of said infeed device for cutting a primary pull-tab strip at a third location,
- means for sealing a heat-sealable patch to a cut end of a primary pull-tab strip and to an end portion of a secondary pull-tab strip,

characterized in that it comprises a pressure and cutting unit movable simultaneously with said strip cutting unit between said first location and said third location.

8. Automatic splicing device according to claim 1, **characterized in that** it comprises a fluid activated cylinder, for moving said strip cutting unit and said pressure and cutting unit, after activation of said strip cutting unit and prior to actuation of said pressure and cutting unit.

9. Automatic splicing device according to claim 7, **characterized in that** it further comprises an infeed unit having movable rollers, said movable rollers being movable from a first position, whereat said infeed unit blocks a secondary tape in a fixed position during feeding of a primary pull-tab strip to a packaging machine, and a second position, whereat said infeed unit releases said primary pull-tab strip upon splicing thereto a secondary pull-tab strip.

10. Automatic splicing device according to claim 7, 8 or 9**, characterized in that** it comprises at least one brake including a fluid activated brake shoe acting on at least one of said rollers for guiding a primary pull-tab strip from a first reel to a packaging machine, for blocking a primary pull-tab strip during activation of said cutting unit and said sealing unit.

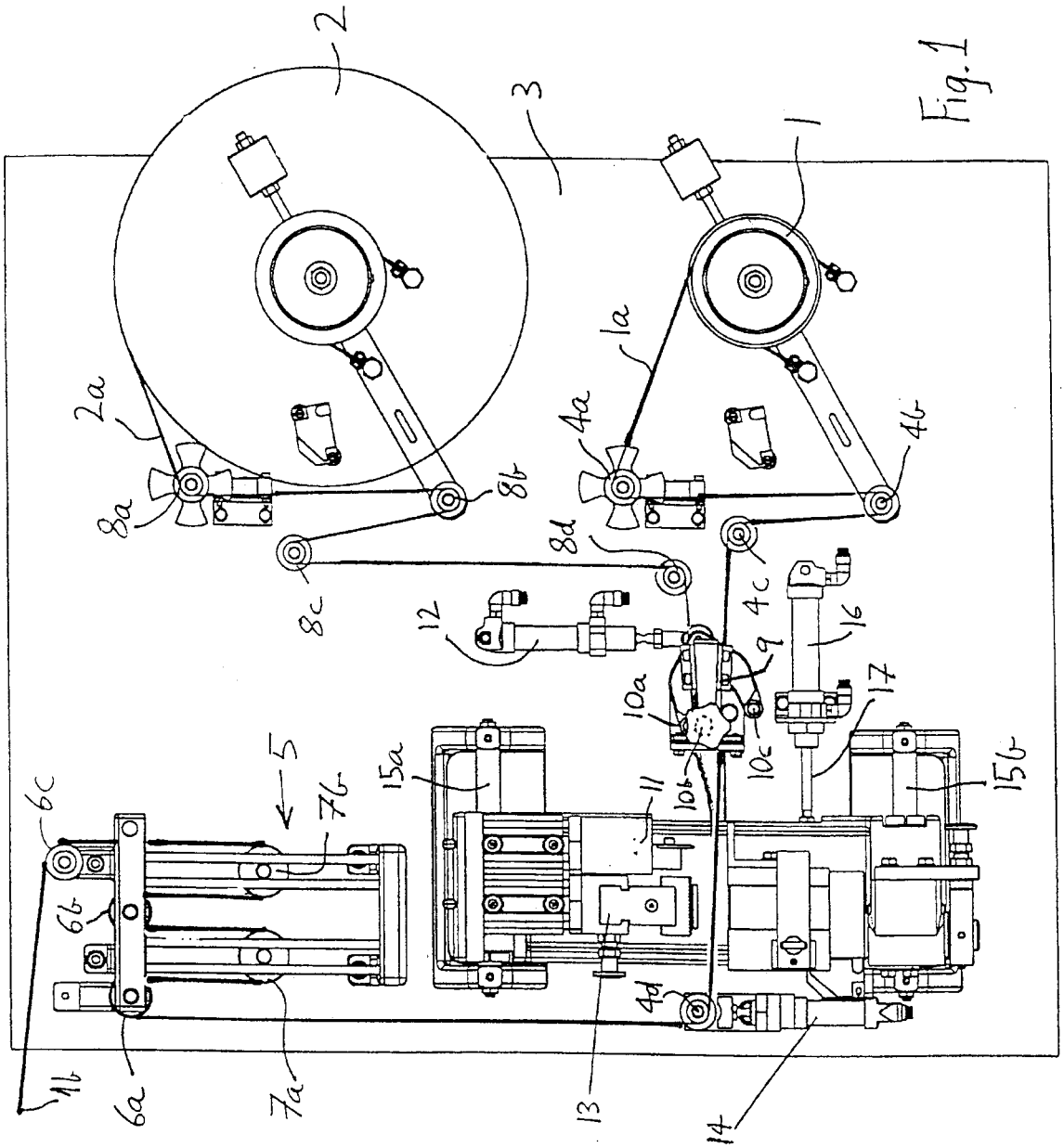
11. Automatic splicing device according to claim 7 or 8, characterized in that said pressure and cutting unit comprises a pressure surface interposed between at least two knives and engageable with a sealing

unit.

12. Spliced pull-tab strip for packages of pourable food products obtained with the method according to claims 1-2 and the apparatus according to claims 3-9, comprising a primary opaque pull-tab strip having a cut end, a secondary opaque pull tab strip having an end spaced from said cut end, **characterized in that** it comprises a gap defined between said cut end of said primary pull-tab strip and said end of said secondary pull-tab strip, and a translucent patch sealed to the upper surfaces of said primary pull-tab strip and said secondary pull-tab strip and extending across said gap.

13. Spliced pull-tab strip according to claim 12, **characterized in that said** primary and secondary pull-tab strips are made of a material comprising aluminium, and in that said patch is made of a heat-sealable material comprising polyethylene.

14. Spliced pull-tab strip according to claims 12 or 13, **characterized in that** said patch is substantially transparent.


2
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2a
1a
4a
4b
8a
8b
8c
8d
4c
12
9
16
10a
10c
17
15b
15a
11
10b
5
7b
6c
6b
7a
6a
11b
13
14
4d

Fig. 1

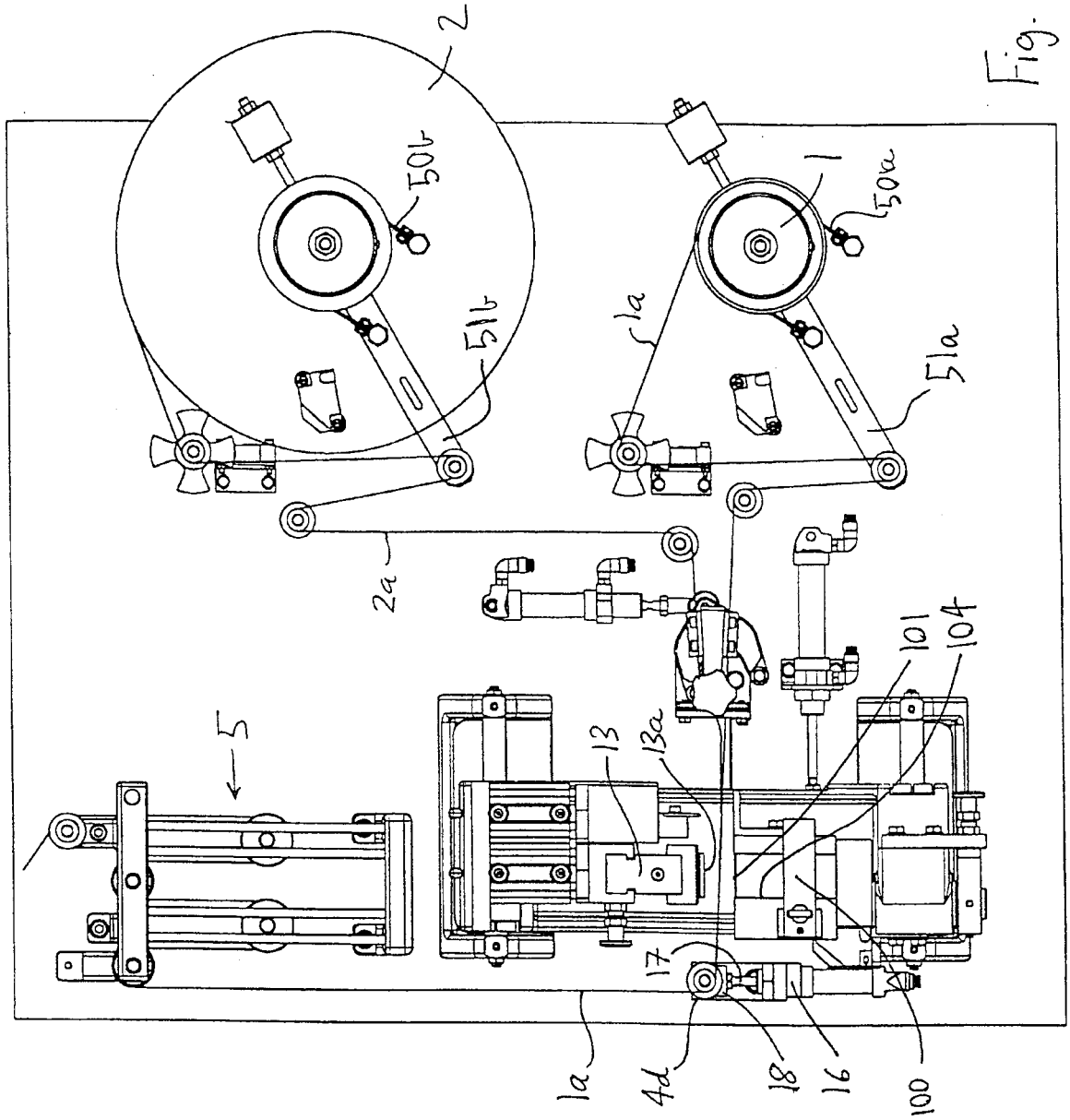


Fig. 2.

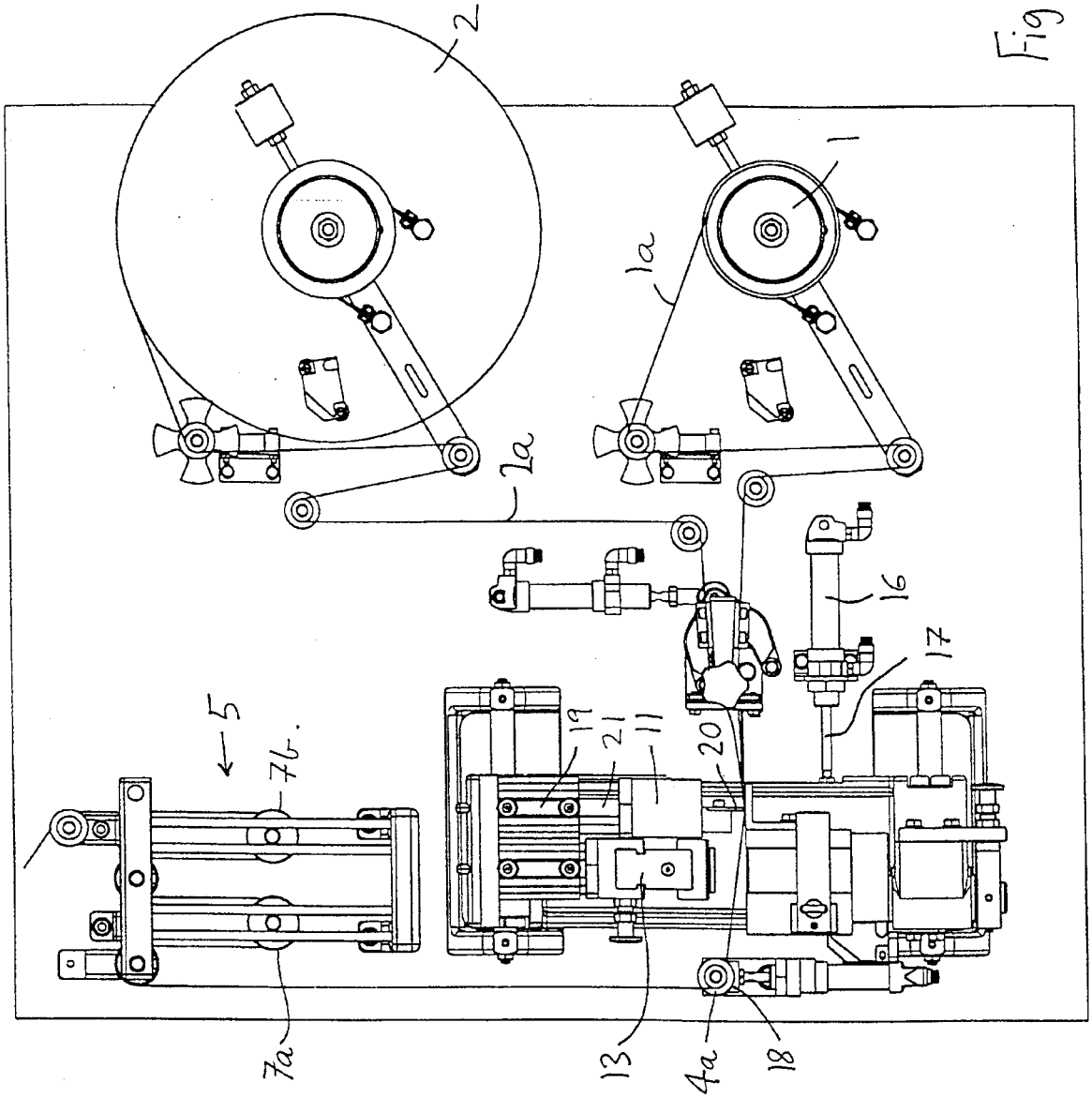


Fig. 3.

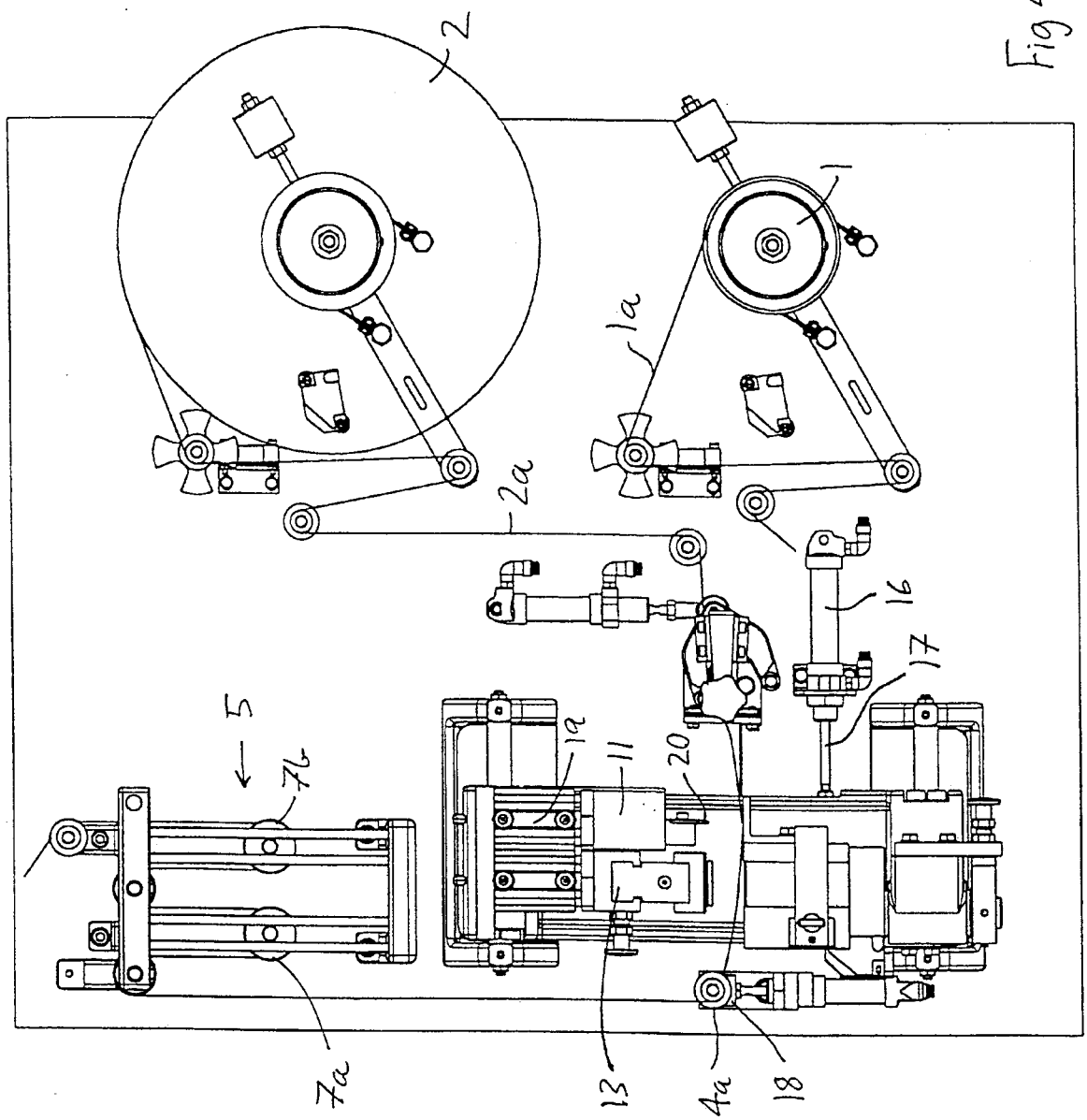


Fig 4.

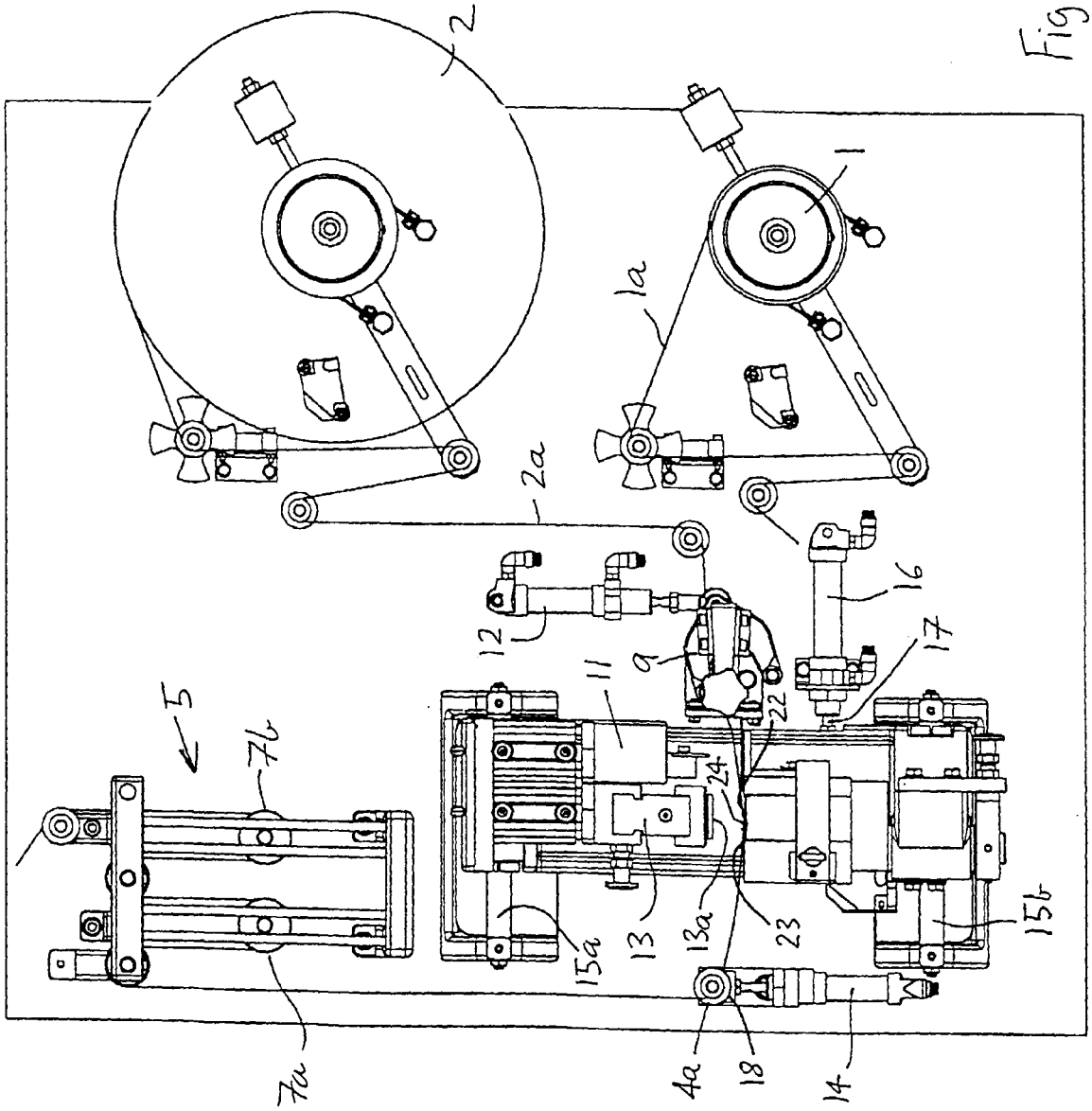


Fig. 5.

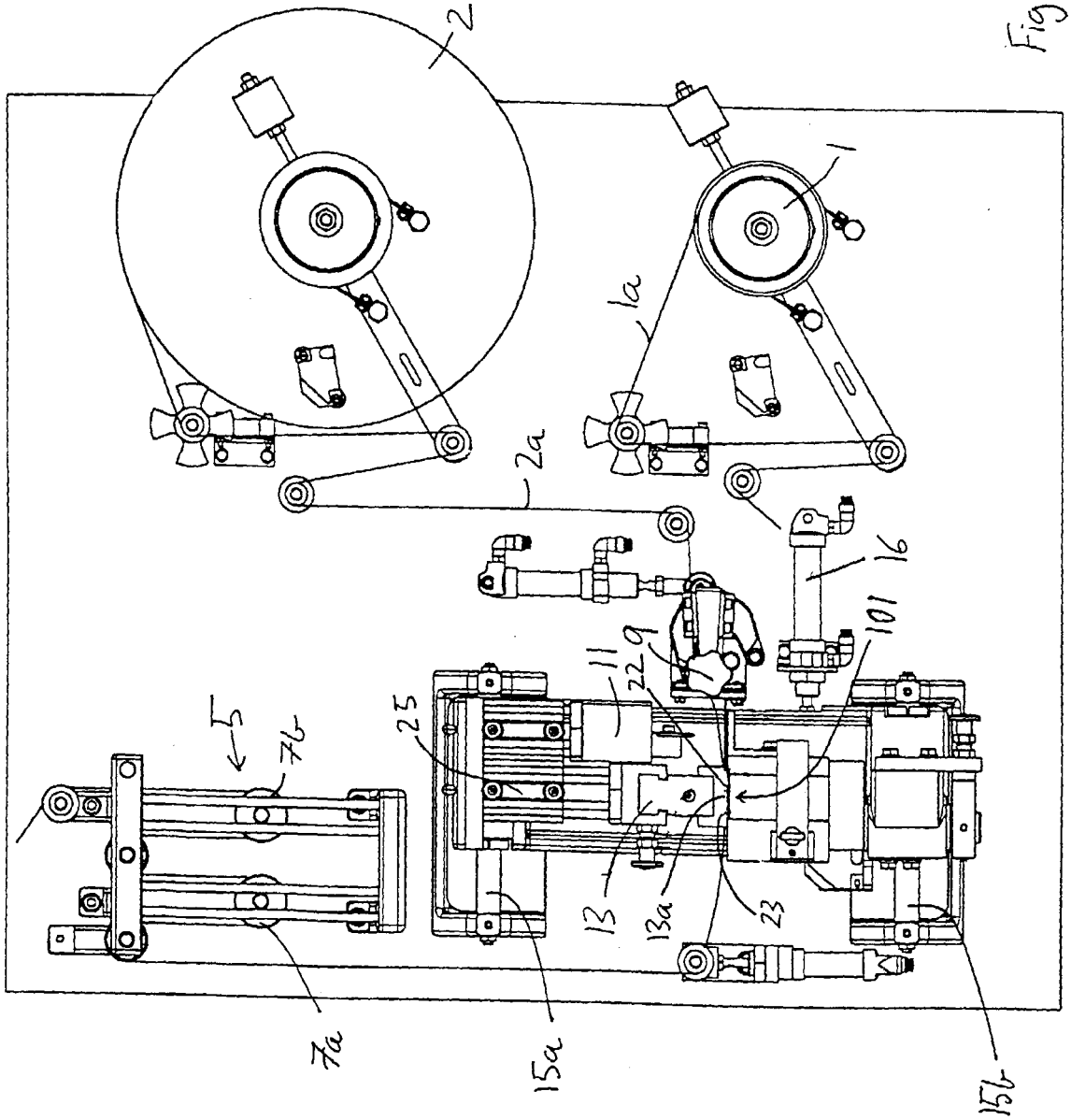
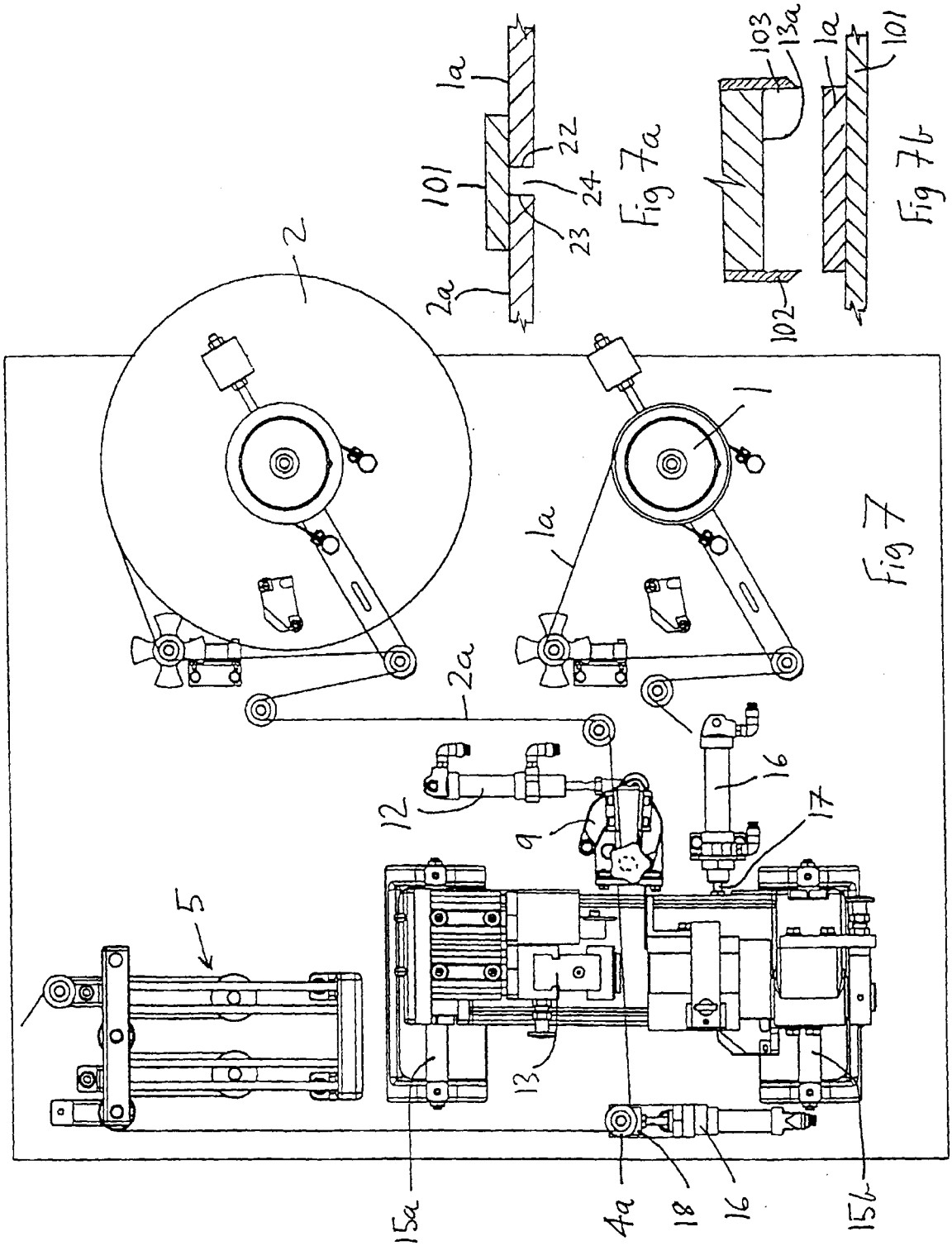


Fig. 6.


1a
101
22
24
23
2a
Fig 7a
103
13a
1a
101
102
Fig 7b
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2a
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12
17
9
5
13
15a
4a
18
16
15b
Fig 7

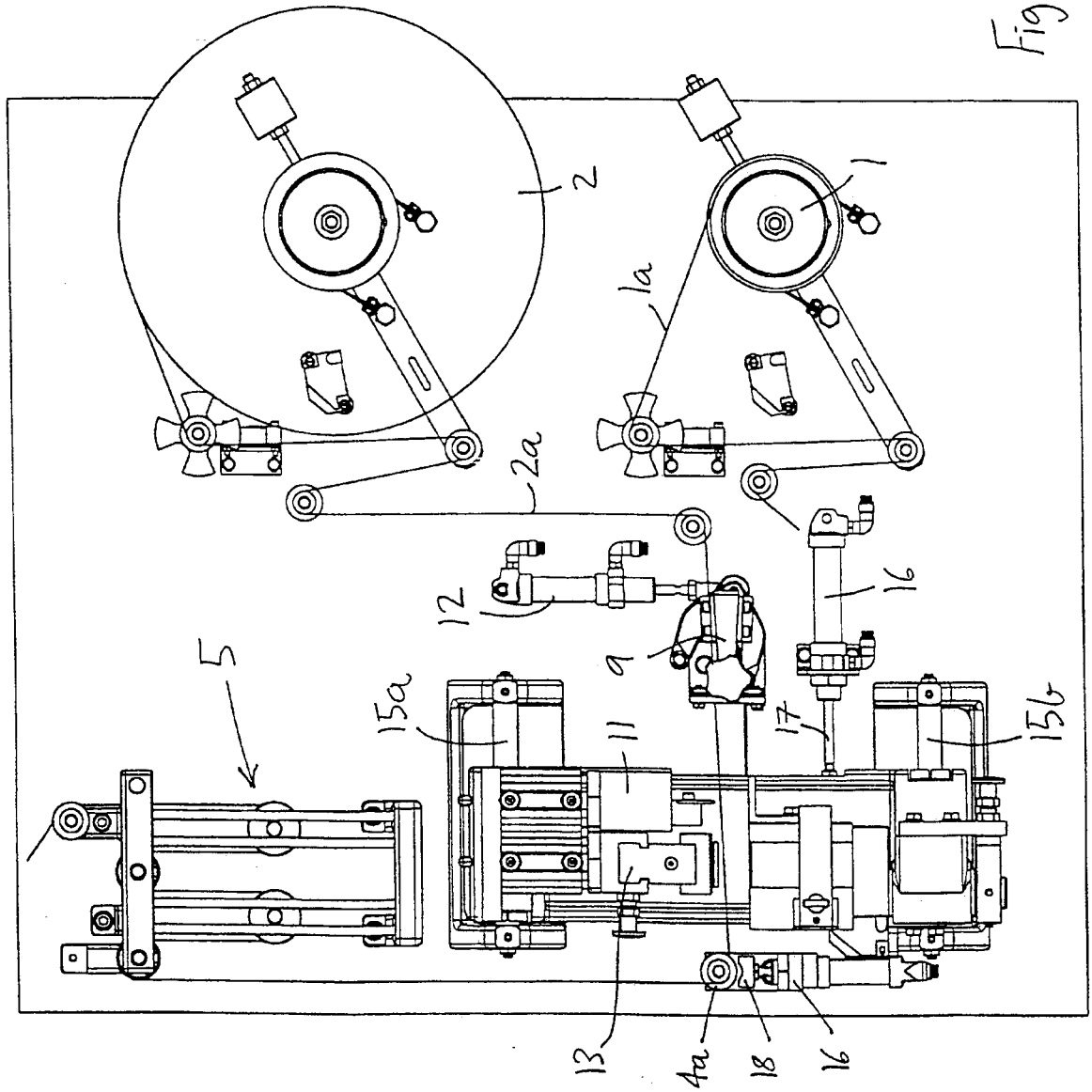

Fig. 8.

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EUROPEAN SEARCH REPORT

Application Number
EP 98 12 3910

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Y	* column 1, line 49 - column 4, line 3; figures *	2,5,6	
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B65H

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
BERLIN	25 May 1999	David, P

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