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(54) Tape applicator and method for applying closures to uneven surfaces

(57) An apparatus and a method for attaching a tape to a surface of a flexible or rigid package member is described comprising:

a tape applicator (10) for applying discrete strips (4) of the tape (14) to the surface of the package member (1), said tape applicator (10) including a flexible membrane (20) which can be moved from a first tape receiving position to a second position in pressure contact with the surface of said package member (1). A tape supplier is provided for selectively supplying the discrete strips (4) of tape (14) from a tape dispenser, each discrete strip (4) of tape (14) being positioned with a major surface of said strip (4) of tape (14) facing towards said flexible membrane when in the first position.

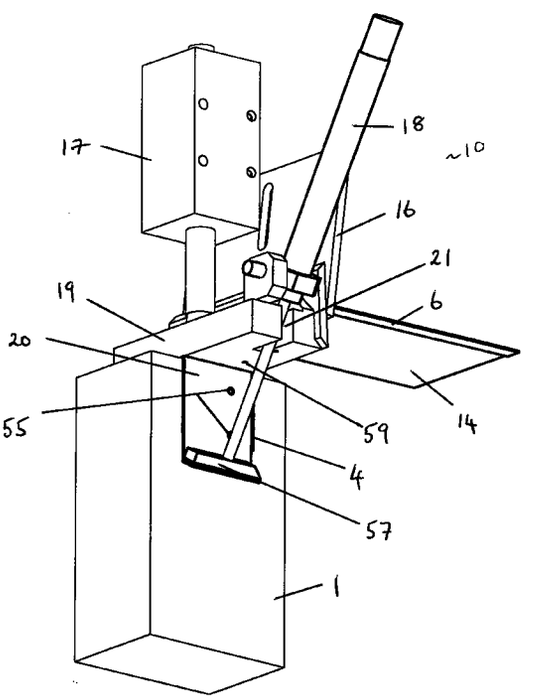

Fig. 7

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Description

The present invention relates to an apparatus and method for attaching a piece of tape to an uneven surface of a flexible or rigid package member such as a carton or a filled bag. The tape may be used to close or seal a package and may be adapted to facilitate later re-opening of the package.

An automatic corner tape sticking device for a carton sealing machine is known from EP- 0 274 175 in which a conveyor conveys boxes along a path, two pairs of cutters are disposed symmetrically on the respective upper and lower frames to cut tape extending along the upper and lower edges of a box moving along the path. Two pairs of short brushes are disposed symmetrically on the frames at a suitable distance behind the cutter heads for pressing down the ends of the tapes cut by the cutter heads as well as two pairs of long brushes disposed symmetrically on the frames at a suitable distance behind the short brushes for pressing down the tapes along their major extent between the ends. Such known devices which include brushes for brushing down overhanging pieces of adhesive tape may have the disadvantage that with time the brushes wear and the application of the tape is no longer perfect. Further, with packages whose dimension vary by a certain tolerance, it is difficult to design brushes which provide a constant pressure independent of the size of the package.

WO 88/03897 shows a machine for closing packages by means of adhesive tape sections which are cut from a tape roll. In order to facilitate later tearing of the tape section from the package when the package is to be re-opened, the layer of adhesive tape on the tape section is inactivated at the ends of the tape section so as to form gripping flaps at these ends. Overhanging pieces of adhesive tape are pressed down using a roller. Such known devices using rollers may have the disadvantage that they only work satisfactorily with relatively rigid, rectangular packages. Further, a change of package often requires a change in the size, position or design of the roller.

US-A-4 769 972 shows the machine for sealing the corner of a flexible bag member by applying a segment of adhesive tape from a roll of a tape to a corner of the flexible bag.

The tape is mechanically applied to the top, end and bottom surface of the corner of a bag member and a mechanical wiper applies an overhanging portion of the tape to a side surface in a neatly folded condition. Mechanisms are provided for supplying a cut segment of tape respectively to bag members transported along a conveyor. The overhanging portions of adhesive tape are smoothed down using rigid paddles. One disadvantage of the known machine can be that the rigid paddles must be located accurately in order to smooth down the adhesive tape correctly. Changes in bag design may require changes in the size, position or design of the paddles.

DE-3 915 192 describes a method and a process for manufacturing packages typically used for folded paper handkerchiefs. Such packages normally have a re-openable seal which consists of a finger lift and a piece of adhesive tape. The method includes covering two of adjacent packages with an appropriate piece of tape and then cutting the tape in the middle between the two packages and folding over the remaining protruding pieces of tape. Folding over is carried out by a series of rollers. One disadvantage of the known machine is that it must be set-up for a specific size of product and changing the size requires modifications to the machine, including different rollers.

The object of the present invention is to avoid the disadvantages of the prior art. In particular, one object of the present invention is to provide an apparatus and a method for reliably attaching a tape to an irregular surface such as an edge of either flexible or rigid packaging.

Summary of the invention

The present invention provides an apparatus for attaching a tape to a surface of a flexible or rigid package member, comprising a tape applicator for applying discrete strips of the tape to the surface of the package member, said tape applicator including a flexible membrane which can be moved from a first tape receiving position to a second position in pressure contact with the surface of said package member; and a tape supplier for selectively supplying the discrete strips of tape from a tape dispenser, each discrete strip of tape being positioned with a major surface of said strip of tape facing towards said flexible membrane when in the first position.

The present invention also includes a method for attaching a tape to a surface of a flexible or rigid package member, comprising: supplying discrete strips of tape from a tape dispenser and selectively locating each said discrete strip of tape with a major surface of said strip of tape facing towards a flexible membrane when in a first position; locating a package member with reference to said flexible membrane; and attaching said strip of tape to said package member by moving said flexible membrane from said first position to a second position in pressure contact with at least one surface of said package member.

It is preferred if the flexible mebrane is pliable, e.g. made from leather, rubberised cloth, or similar. It is also preferred if the mebrane is tensioned in the second position. The tape may be plain, adhesive, or double-sided adhesive tape, or may be part of a mechanical fixing system.

The dependent claims define further embodiments of the present invention.

The present invention may provide the advantage of applying discrete pieces of tape at high speeds to

irregular surfaces of a package in a reliable manner.

The present invention may provide the advantage that the application of the discrete pieces of tape may be made to packages of variable form without major changes in the equipment.

The present invention may provide the advantage that there are few wearing surfaces and the performance of the equipment is independent of any such wear.

The present invention may provide the advantage that the discrete pieces of tape may be applied reliably even when the packages arrive at the tape applicator in different orientations or relative positions to the applicator.

Further embodiments of the present invention with their advantages will be described with reference to the following drawings.

Brief description of the drawings

Fig. 1 shows a schematic representation of a package member.

Fig. 2 shows a schematic representation of a tape applicator in accordance with a first embodiment of the present invention.

Fig. 3 shows a schematic representation of a second embodiment of the present invention.

Fig. 4 shows a schematic general aspect of the tape applicator in accordance with the first embodiment of the present invention.

Figs. 5 to 8 show schematic detail representations of the tape applicator in accordance with the first embodiment of the present invention.

Figs. 9 and 10 show schematic representations of a third embodiment of the present invention.

Description of the illustrative embodiments

The present invention will be described with reference to certain specific embodiments and to the drawings but the invention is not limited thereto but merely by the claims. The drawings are schematic only, some dimensions having been exaggerated for clarity purposes and the drawings are not limiting to the invention.

Fig. 1 shows a schematic representation of a package member 1 including a main body 2, a flap 3 and one or more sealing tapes 4 which may optionally have finger lift tabs 5 at one end. Sealing tapes 4 are generally applied across an edge of package member 1. This edge may be relatively well pronounced and substantially 90° in the case of a rigid carton but in the case of a loosely filled bag, such as washing powder in a flexible package, the edge may be ill-defined and may be irregular in shape. The tape or tapes 4 may be coated with an adhesive which allows re-opening and re-closing of the bag or tapes 4 may include an aggressive, pressure sensitive adhesive which only allows one opening and cannot be re-used but the invention is not limited thereto. Tape 4 may also be part of a mechanical fastening such as a hook-and-loop fastener. Tape 4 may be provided with an array of plastic hooks which engage with the surface of flap 3 which may be provided with a suitable receiving surface such as an array of loops or vice versa. When a hook and loop attachment system is used, suitable loop fabrics include looped stitched materials generally, brushed nylon, materials under the trade name "Kanebo" or under the trade name "Velcro" from Selectus Limited of Stoke-on-Trent, UK. Suitable hook materials are also available under the trade name "Kanebo" or the trade name "Velcro", the latter again supplied by Selectus Ltd. Suitable mechanical closure systems may also include mating tape materials with structured surfaces such as described in EP-A-263 587 or EP-A-389 130 or EP-A-263 587 which are incorporated herein by reference. Tape 4 may also be a double-sided adhesive tape.

Fig. 2 shows a schematic representation of a tape applicator system 10 for the application of adhesive tapes in accordance with the present invention. Package members 1 may be transferred via a conveyor 11 to a station for application of a discrete piece of tape 4 on an uneven surface on the package members 1 such as an edge. Any conventional conveyor may be used and, depending on the type of conveyor used, the position of the package members 1 on the conveyor surface 12, may not be exactly uniform so that the package members 1 arrive at the tape application station at slightly different positions and orientations on the conveyor 12. The tape applicator system 10 in accordance with the present invention may absorb such variations in orientation and apply tape 4 reliably. An adhesive tape dispenser is schematically represented by 13 for dispensing an adhesive tape 14 to a cutting mechanism 16 at which discrete pieces 4 of adhesive tape 14 are cut and delivered to a tape applicator 17 to 19. If a finger lift 5 is to be provided on each discrete piece of tape 4, a roller mechanism 15 may be provided for folding over one longitudinal edge of tape 14 so that an edge strip of double thickness of tape is produced with no exposed adhesive surface. After cutting off a suitable length of tape 14 at the cutting mechanism 16, the discrete piece of tape 4 is held to the lower surface of a shoe 19 by means of a vacuum clamp or similar holding means. Between the shoe 19 and tape piece 4 is placed a flexible membrane 20 which may be fixed at one point to shoe 19, normally at the peripheral edge of shoe 19 which is remote from the finger lift portion 5 of tape piece 4. Flexible mebrane 20 may be hingedly fixed to shoe 19. the hinge may be provided by the flexibility of the membrane 20 iyself or a separate rigid element may be fixed to the end of the membrane 20 and a hinge be provided between the element and the shoe 19. At the diametrically opposite position from the securing position of flexible membrane 20, a device 18 is provided for lowering and rotating membrane 20. Actuator 18 may be a pivoted pneumatic cylinder. The arrival of a package member 1 at the tape applicator may be sensed by

an optical sensor, a proximity sensor, or similar. When one of the packaging members 1 is located beneath the tape applicator, the piece of tape 4 is moved down by shoe 19 towards package member 1 by means of extension of actuator 17 which may be a pneumatic cylinder or similar and thus adhesive tape 4 is brought into contact with the upper surface of package member 1. At the same time, actuator 18 extends and rotates so as to apply pressure and tension to membrane 20 to force tape piece 4 against the edge of package member 1. By tensioning the membrane 20, pressure may be applied along the complete length of tape piece 4. During the tape application process conveyor 11 is preferably halted.

Fig. 3 shows a further, schematic representation of a tape applicator system 30 in accordance with a second embodiment of the present invention. Package member 1 is carried by conveyor 12 to a station for application of a piece of tape 4. A robot 22 or similar includes a first actuator 17 attached to a shoe 19 with a membrane 20 being secured to shoe 19 at one end as described for the previous embodiment, and a second actuator 18 which may be a pivotable pneumatic cylinder, for tensioning and pushing down the end of flexible membrane 20 to conform to the edge of package 1. Precut pieces of adhesive tape 4 may be stacked in a stack 35 on an adjustable support 37. The upper non-adhesive surface of tape piece 4 may be a low energy tape surface, for instance covered with a silicone release agent as described in Satas, Ed., Handbook of Pressure sensitive adhesives, 2nd edition (Nostrand Reinhold, 1989) the disclosure of which is incorporated herein by reference. Actuator 17 is extended to bring shoe 19 and flexible membrane 20 into contact with the upper piece 4 of adhesive tape. Vacuum is then applied to hold the piece of tape 4 against the membrane 20 as actuator 17 is retracted thus picking up a single piece 4 of adhesive tape. The whole structure 17-19 is then transferred to the tape application station above a packaging member 1. Extension of actuator 17 and actuator 18 then presses tape piece 4 against the upper and side surfaces of package member 1 thus installing the tape piece 4 across the edge of package member 1.

In accordance with any of the embodiments of the present invention, the tape 14 may be reclosable adhesive tape type Scotchpro™ #8485 available from Minnesota Mining and Manufacturing Co., Minnesota, USA. The present invention is not limited thereto. In accordance with the second embodiment, stack 35 of tape pieces 4 may include tape pieces 4 which are not coated with adhesive. Instead, the relevant surfaces of package member 1 may be coated with a hot-melt adhesive layer and membrane 20 and/or shoe 19 may be provided with a heating device. A piece of tape 4 may be transferred to the tape application station as described for the second embodiment, actuator 17 applies tape 4 to the top surface of package member 1 and actuator 18 applies tension to membrane 20 to apply tape 4 about the edge of package member 1 as described previously. Heater elements in shoe 19 and/or membrane 20 are then heated to a sufficient temperature to melt the hot-melt adhesive on the relevant surfaces of package member 1 so that tape piece 4 is adhesively connected to package member 1.

Further, tape piece 4 may comprise part of a mechanical closure system such as hook-and-loop or structured mating surfaces as described above. Tape pieces 4 may also be double-sided adhesive tapes. In this case the surface of membrane 20 in contact with tape 4 is preferably coated with an adhesion reducing coating such as a silicone release agent.

Fig. 4 shows a general aspect of the tape applicator in accordance with the first embodiment of the present invention. Adhesive tape 14 is located on a suitable dispensing device 40 and the adhesive tape 14 is fed through a series of rollers 41-43 to an optional finger lift tab producing mechanism 15 which folds-over one of the edges of the tape on the adhesive side thereof so as to produce an edge section of the tape 14 which is double in thickness and has no exposed adhesive surface. The folded-over tape 14 is then transferred by further rollers 44-46 to a cutting knife 16 which, in co-operation with the pressing shoe 19 cuts-off discrete portions of the adhesive tape 14. To prevent the adhesive tape 14 sticking to the cutting knife 16, the knife 16 may be supplied with a small quantity of lubricating oil from oil supply 27. Alternatively or additionally, the knife 16 may be cooled by known refrigerating methods. In order to give the adhesive tape 14 some longitudinal stability, the adhesive tape 14 may be given a slightly curved cross-section in a roller mechanism 23 so that it may extend through an opening in the cutting mechanism 16 to lie underneath shoe 19. Shoe 19 may be driven downwards by means of an actuator 17 which is preferably a pneumatic cylinder or other similar actuator device. As shoe 19 progresses downwards, it slides against the spring-loaded cutting knife 16 to cut-off a portion 4 of tape 14. At the same time a vacuum is applied to shoe 19 and in particular to small holes on the underside of shoe 19. Vacuum may be fed to shoe 19 via conventional valves and pipes from a vacuum pump. Alternatively, vacuum be provided by a venturi suction device driven by compressed air which may be attached directly to shoe 19. Beneath and across the width of shoe 19 and attached to at least one part thereof is a flexible membrane 20. The attachment should allow membrane 20 to swing downwards as a flap of material. The membrane 20 may be hingedly attached to shoe 19. The hinge may be provided by the flexibility of the membrane 20 or a separate rigid element may be attached to the end of membrane 20 and this element is then hinged to shoe 19. To one free end of the flexible membrane 20 is attached an actuator 18 which is preferably a pneumatic cylinder. Compressed air may be supplied to the cylinders 17 or 18 by means of a air supply controlled by valve 26. The attachment point of flex-

ible membrane 20 to shoe 19 is preferably on the edge of shoe 19 which is diametrically opposite from the actuator 18. Holes in the flexible membrane 20 are aligned with the holes 59 in shoe 19 and the upper surface of membrane 20 is preferably flat and forms a gas seal with the underside of shoe 19. The applied vacuum holds the cut-off portion 4 of tape 14 against the underside of flexible membrane 20.

To apply the tape piece 4 to a package 1, actuator 17 is extended pushing tape piece 4 against the top of package 1. Simultaneously, or slightly later, actuator 18 is extended pushing membrane 20 against the side of package 1. Actuator 18 is preferably pivotably mounted so that as the actuator 18 extends it also rotates and a component of force is applied to the membrane 20 in the horizontal direction towards the package 1. Pivotable actuator 18 may be sprung biased so that membrane 20 is also tensioned thus exerting a distributed pressure to the top and side of package 1. Tape piece 4 being trapped between the package 1 and membrane 20, is placed in pressure contact with the top and side surface of package 1. Shield 25 prevents premature contact between the top of package 1 and the adhesive tape 14.

Schematic figures 5 to 8 show details of the tape applicator 10 in accordance with the first embodiment of the present invention. Items with the same reference numbers refer to the same items shown in other drawings. Adhesive tape 14 with optional finger lift 6 is fed through a window knife 16 to be located with its non-adhesive major surface underneath and facing the bottom of shoe 19. The bottom edge 54 of window knife 16 may be slightly dished so as the give tape 14 a slight curvature and therefore better stability. Window knife 16 is elastically biased against shoe 19 by a spring (not shown) for example. On the underside edge 51 of shoe 19 which faces window knife 16, a hardened cutting edge 51 is provided. A flexible membrane 20 is located underneath shoe 19 and substantially covers the underneath surface of shoe 19. Membrane 20 may extend beyond shoe 19. One free end 56 of the flexible membrane 20 is attached to an end plate 57 of actuator 18. End plate 57 may be freely rotatable with respect to actuator 18. The other end 58 of flexible membrane 20 is firmly attached to the end of shoe 19 remote from actuator 18. The membrane 20 may be hingedly attached to shoe 19 as described previously. Flexible membrane 20 may be made of any flexible material such as thin metal, elastomeric or plastic sheet material. It is preferred if the membrane 20 in accordance with all the embodiments of the invention is pliable, e.g. is made from leather, textile, rubber or rubberised cloth, any of which may include fibre-reinforcing materials. The flexible membrane 20 according to the present invention is, however, not limited thereto. The flexible membrane may also include an elastic member (not shown) between the membrane 20 and the shoe 19 or between the membrane 20 and the piece of tape 4. The elastic member may be a rubber foam pad or similar which allows some degree of adaption to the surface of the package 1. The elastic member may be covered and sealed into an outer jacket so that the foam is gas tight. The outer surfaces of the jacket may provide a gas seal between the jacket and the bottom surface of shoe 19 and to the upper surface of tape piece 4. The elastic member may also include the flexible mebrane 20 in the form a fluid filled body which acts like a cushion or water bed to provide some adaption to the surface of the package 1 and thus to distribute the pressure over each part of tape piece 4.

Particularly preferred is the membrane sheet type MT 489 supplied by the company Simmrit, Germany. The holes 55 may be optionally provided in membrane 20 which line up with corresponding holes 59 in shoe 19 for supply of vacuum to the interface between membrane 20 and tape 14. Other means of temporarily attaching tape 14 to the bottom of membrane 20 may be used. For instance, if tape 14 is magnetic a releasable magnet may be provided in shoe 19. Alternatively, the top surface of tape 14 may be corona treated so that it adheres to the underside of membrane 20 by static electrical forces.

Actuator 18 is advantageously pivotably mounted on a shaft or axle 53 in a support 52 which is attached to shoe 19. The pivot may be mounted on shoe 19 so the the pivoting direction is parallel to the longitudinal direction of membrane 20. Actuator 18 may be a pneumatic cylinder, a solenoid actuator, a motor driven actuator or similar. The extendable element of actuator 17 is attached to shoe 19. Actuator 17 may be a pneumatic cylinder, a solenoid actuator, a motor driven actuator or similar.

As best shown in Figure 6, lowering of actuator 17 slides the cutting edge 51 of shoe 19 against the window knife 16 and cuts off a portion 4 of tape 14 against edge 57 of window knife 16. Tape piece 4 is held against the underside of membrane 20 by vacuum or similar as described above. Actuator 17 forces the membrane 20 against the upper surface of package 1. Vacuum may now be released. As best shown in Figure 7, actuator 18 then lowers end plate 57 with membrane 20 attached. Due to the pivotable support of actuator 18, this rotates and applies a sideways force to the membrane 20 against the side of the package 1. Actuator 18 also applies a vertical force component to membrane 20, thus tensioning membrane 20 and applying a distributed pressure between tape piece 4 and the surface of package 1. To allow pivoting of actuator 18 it is preferable to provide a slit 21 in shoe 19 for freely sliding receipt of the extending element of angled actuator 18.

As shown in Figure 8, actuators 17 and 18 are retracted leaving tape piece 4 with finger lift 5 attached to package 1. The tape supplier then feeds a further piece of tape 14 through the window cutter 16 and the procedure starts again from the position shown in Figure 5. The conveyor of package 1 is preferably halted

during the tape application step.

The tape applicator 30 in accordance with the second embodiment includes the actuators 17, 18; the shoe 19 and membrane 20 as described with reference to Figures 5 to 8.

In the detailed description of the first embodiment above, the flexible membrane 20 is attached by one of its ends to the shoe 19. The invention is not limited thereto. The flexible membrane may be attached at its mid-point to the shoe 19 and the two free ends of the membrane 20 may be attached to two actuators 18 pivotably mounted at each end of the shoe 19 respectively. In this way the tape piece 4 may be applied across the top surface of package 1 and to both sides thereof.

Figures 9 and 10 show schematic representations of a tape applicator 60 in accordance with a third embodiment of the invention. The flexible membrane 20 of the first and second embodiments is provided by, and incorporated into a flexible bag 61. Bag 61 is attached to shoe 19 which has an air inlet port 62 and an air exhaust (vacuum) port 63. Inside bag 61 a flat spring 64 may optionally be provided. Spring 64 may be attached to the bottom of shoe 19. Spring 64 holds the bag 61 in a flat position when it is the collapsed state as best shown in Figure 9. Bag 61 may have a three-dimensional form in the expanded state which is particulrly adapted to apply a piece of tape 4 to a package 1.

A piece of tape 4 is located under shoe 19 by the tape supplier as described for the first and second embodiments when bag 61 is in the collapsed position. Small holes may be provided in the bottom of bag 61 so that the vacuum provided via outlet 63 holds tape piece 4 against the underside of bag 61. On inflation of bag 61 with air via inlet 62, tape piece 4 is forced to conform to the outer surface of package 1 as best shown in Figure 9. At the same time air escaping from the small holes in the bottom of bag 61 pushes down the tape piece 4 thus assisting the action of the bag 61. Spring 64 is compressed in this state. After application of tape piece 4, the air pressure is switched off and vacuum applied to collapse the bag 61. Spring 64 assists in returning bag 61 to a flat collapsed state as shown in Figure 9. To assist in rapid application of vacuum in any of the above embodiments, a large vacuum reservoir may be provided.

It will be apparent to those skilled in the art that various changes may be made in the invention without departing from the spirit and scope thereof and therefore the invention is not limited by that which is enclosed in the drawings and specification but only as indicated in the claims

Claims

1. An apparatus for attaching a tape to a surface of a flexible or rigid package member, comprising

   a tape applicator for applying discrete strips of the tape to the surface of the package member, said tape applicator including a flexible membrane which can be moved from a first tape receiving position to a second position in pressure contact with the surface of said package member; and

   a tape supplier for selectively supplying the discrete strips of tape from a tape dispenser, each discrete strip of tape being positioned with a major surface of said strip of tape facing towards said flexible membrane when in the first position.

2. Apparatus according to claim 1, wherein said flexible membrane is substantially flat in said first position.

3. Apparatus according to any of claims 1 or 2, wherein said tape applicator includes a first actuator for moving at least a portion of said flexible membrane from said first position to pressure contact with one surface of said packaging member and at least a second actuator for moving another portion of said flexible membrane into pressure contact with another surface of said packaging member.

4. Apparatus according to claim 3, wherein said first actuator includes a pressing shoe, said flexible membrane is attached to said pressing shoe and one end of said flexible membrane is attached to said second actuator.

5. Apparatus according to claim 3 or 4, wherein said second actuator is pivotably attached to said pressing shoe.

6. Apparatus according to any of claims 1 to 5, wherein one surface of said flexible membrane is provided with a vacuum clamp for receiving and holding said strip of tape.

7. Apparatus according to claim 1 or 2, wherein said flexible membrane is included in a pressurizable bag.

8. Apparatus according to any of claims 1 to 7, wherein said tape supplier includes a cutter for selectively cutting off said discrete strips of tape from a continuos roll of tape.

9. Apparatus according to any of claims 1 to 8, further comprising a conveyor for conveying package members to said applicator.

10. A method of attaching a tape to a surface of a flexible or rigid package member, comprising:

supplying discrete strips of tape from a tape dispenser and selectively locating each said discrete strip of tape with a major surface of said strip of tape facing towards a flexible membrane when in a first position;

locating a package member with reference to said flexible membrane; and

attaching said strip of tape to said package member by moving said flexible membrane from said first position to a second position in pressure contact with at least one surface of said package member.

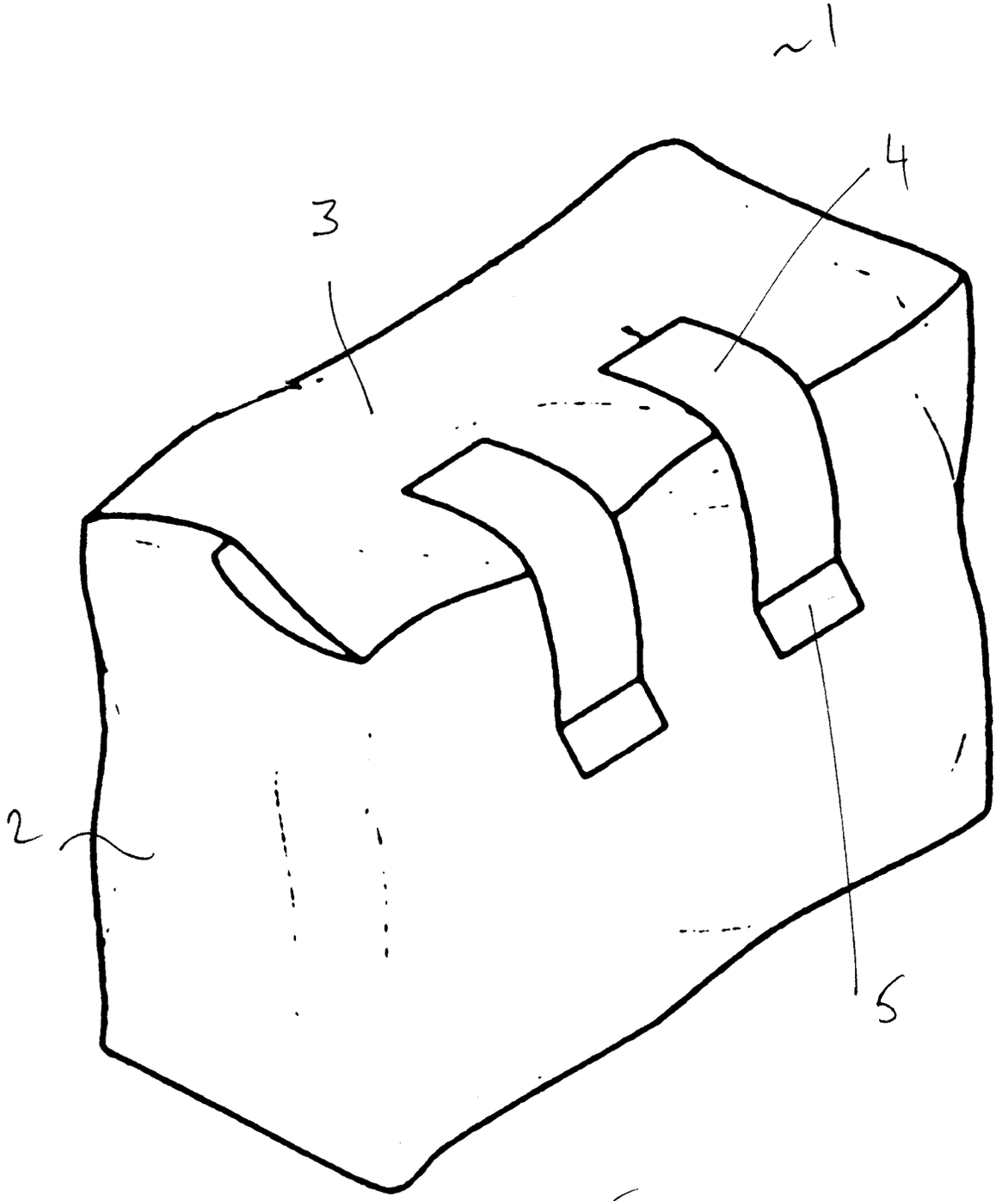

FIG. 1

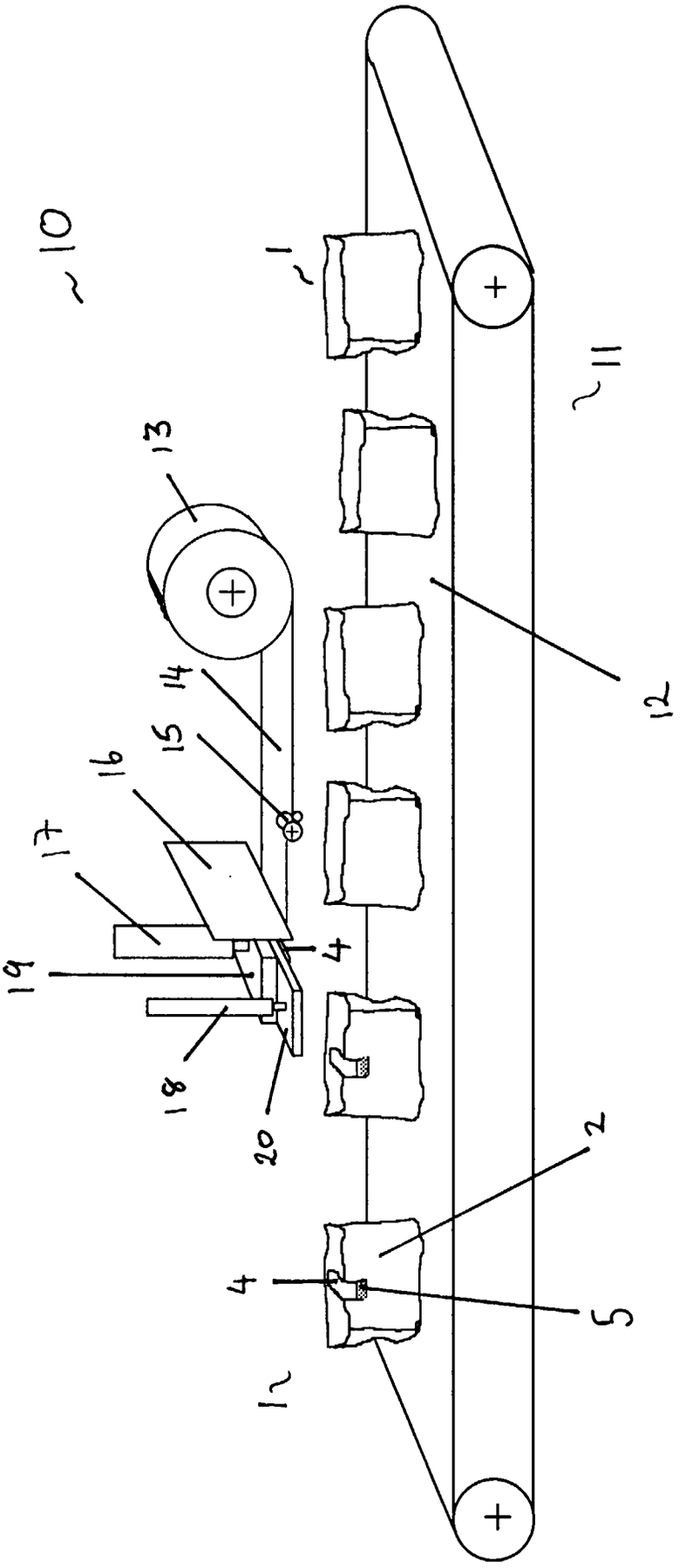

Fig. 2

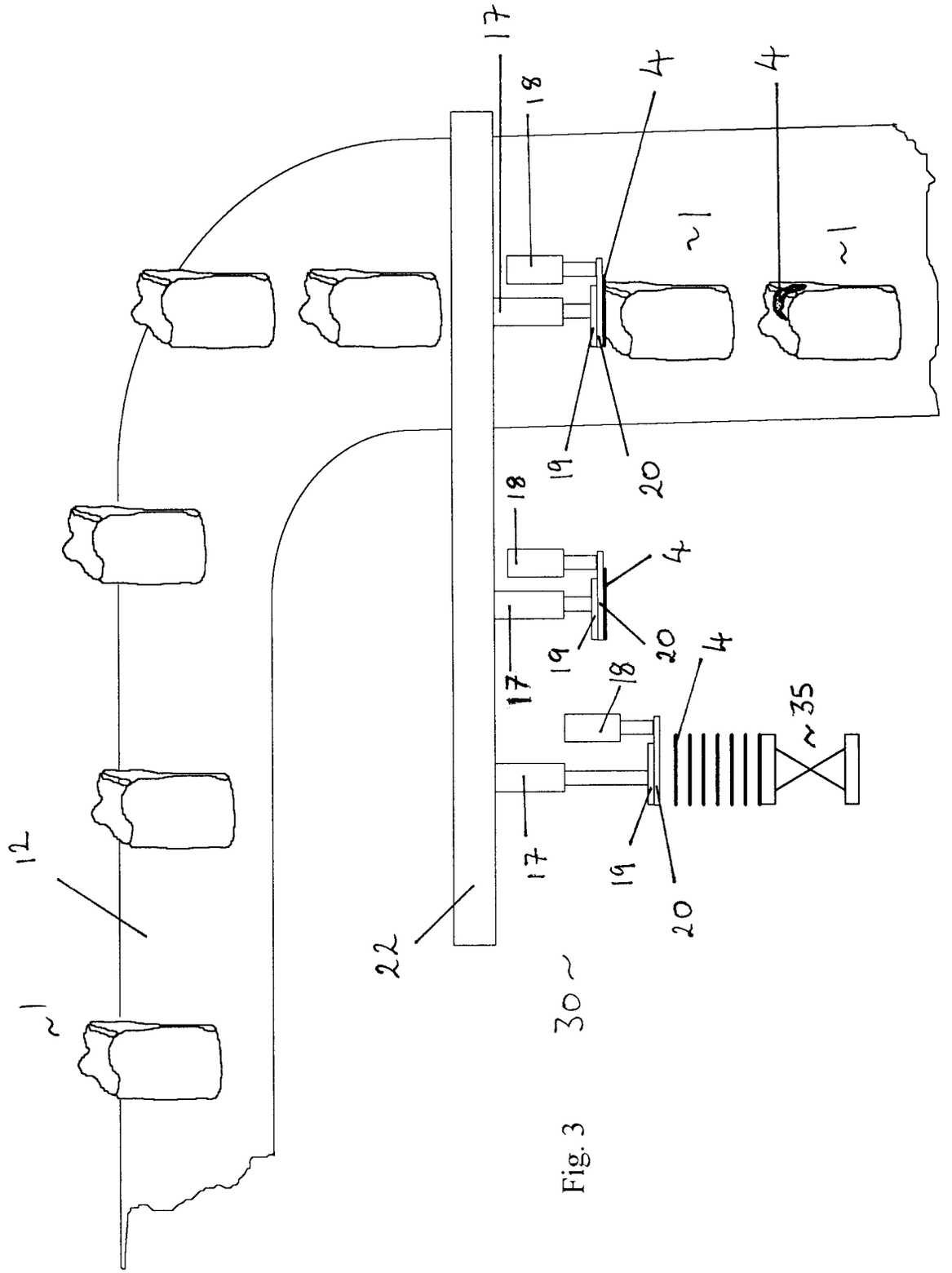

Fig. 3

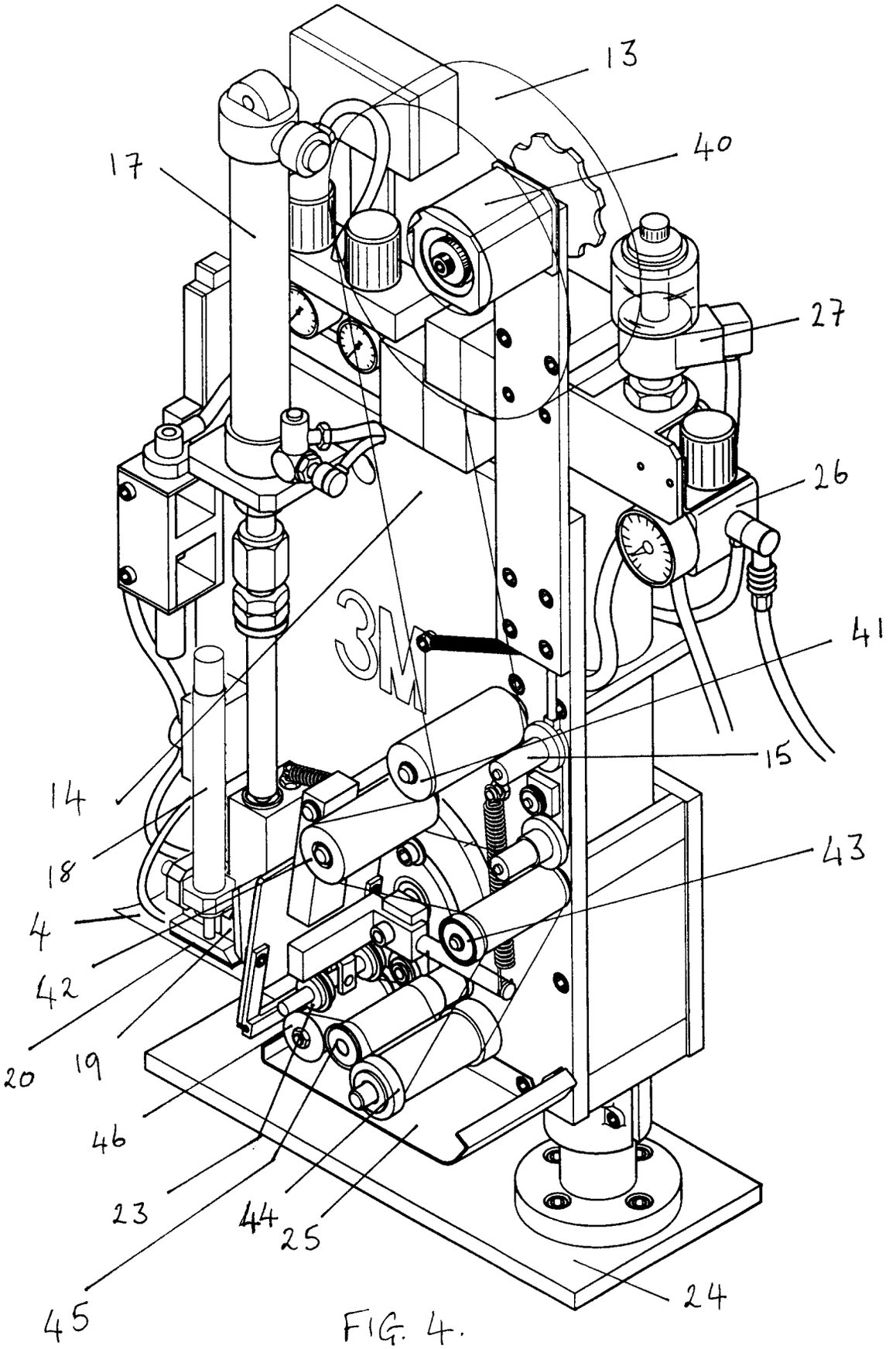

FIG. 4.

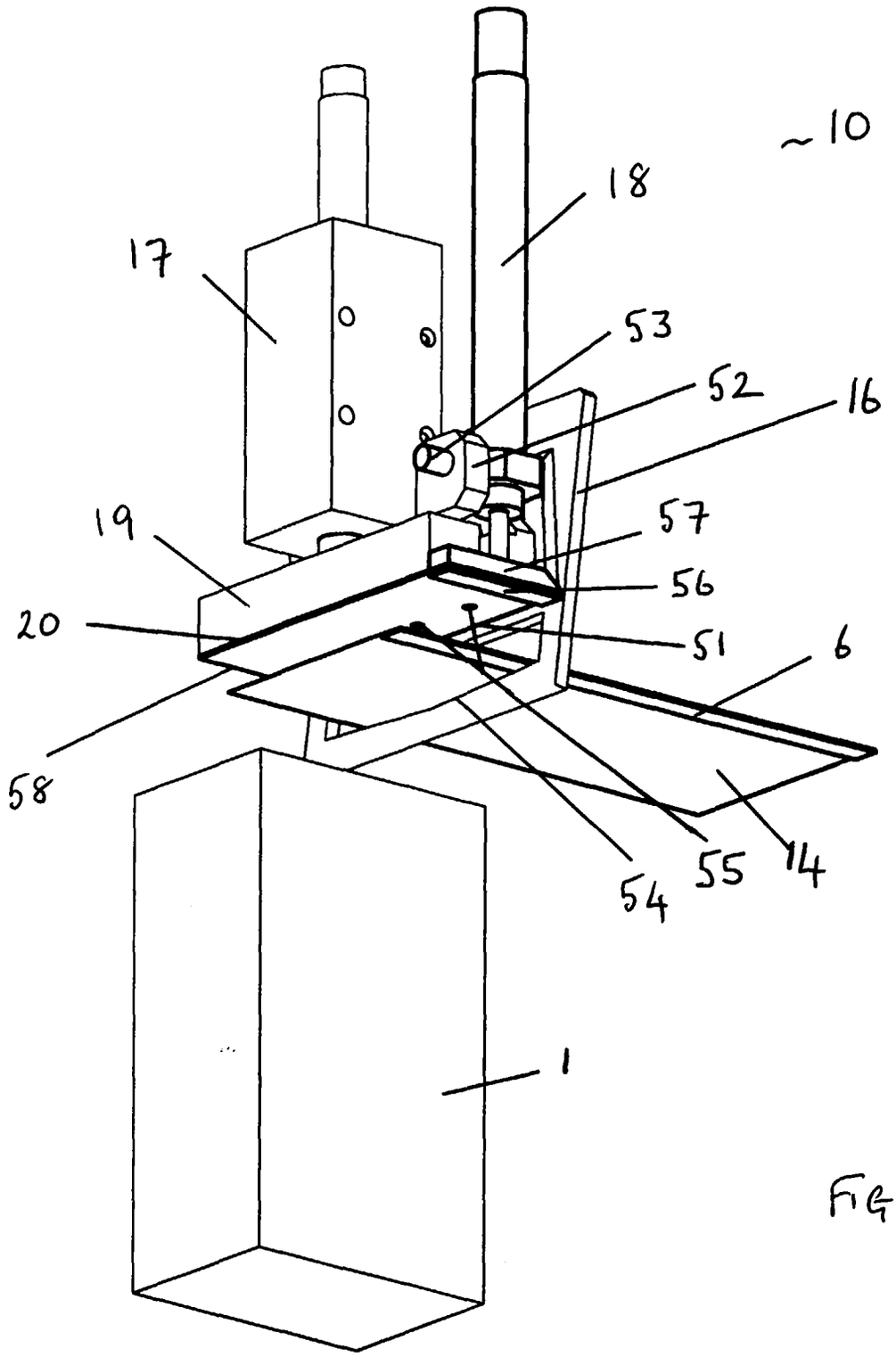

FIG 5

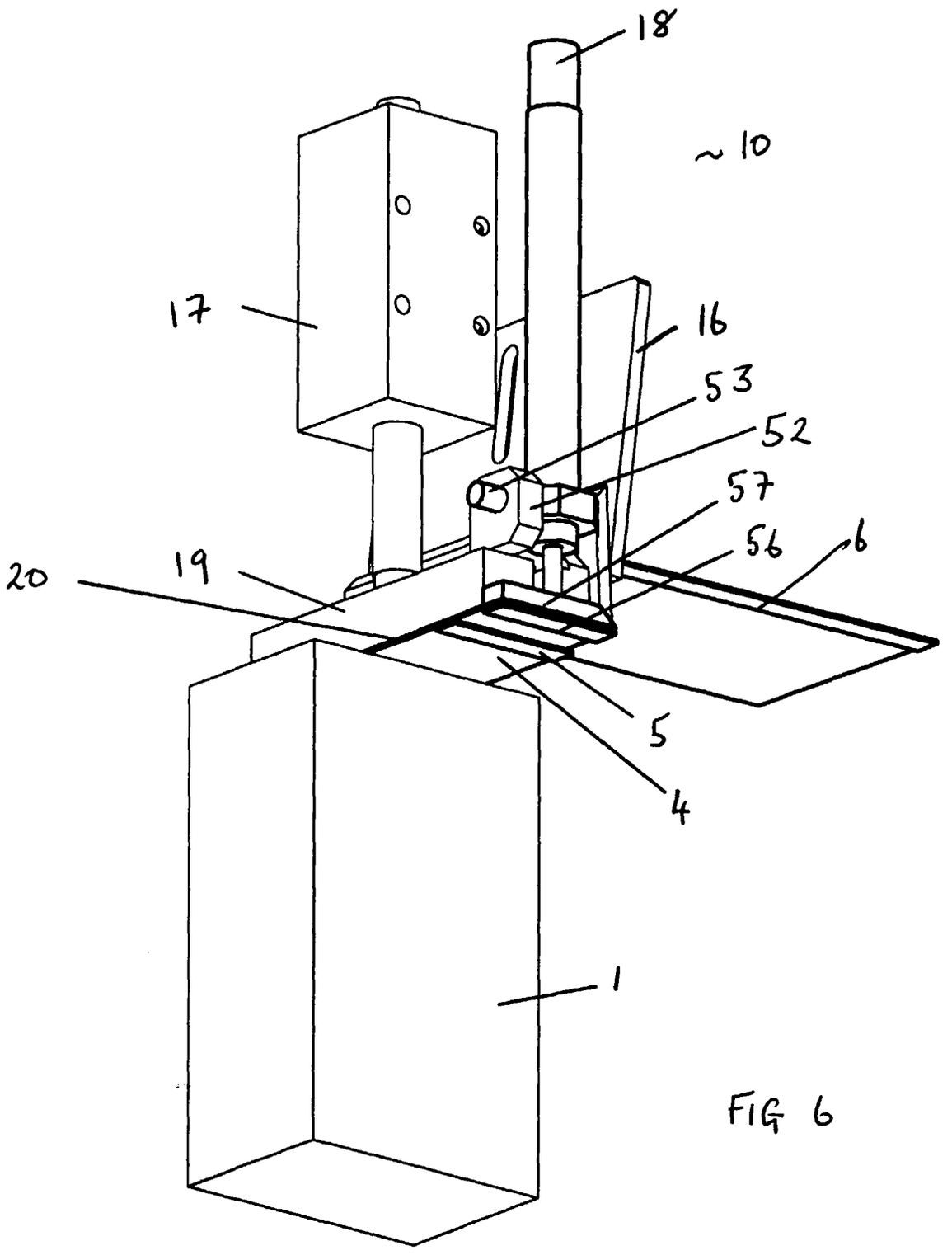

FIG 6

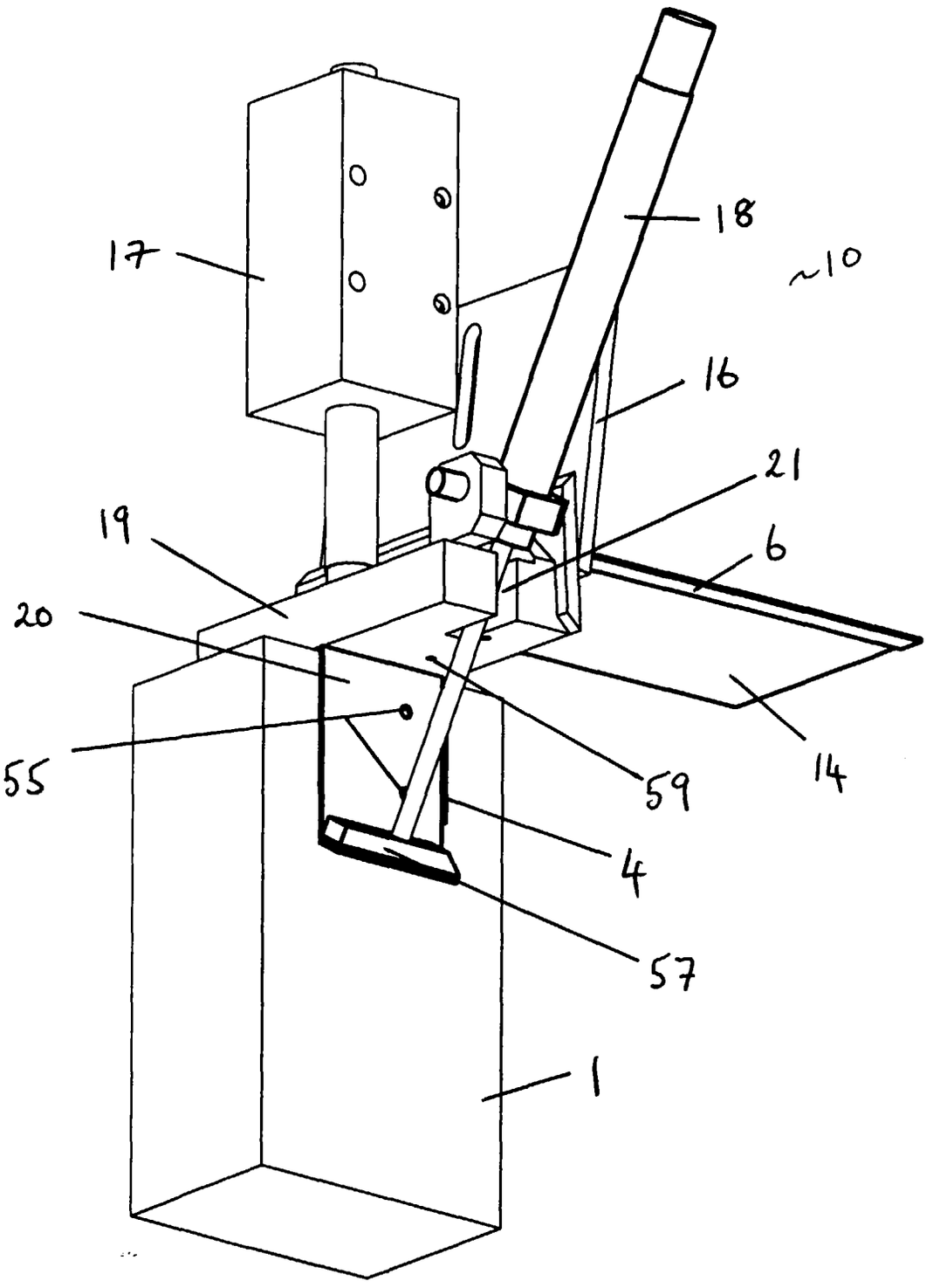

FIG. 7

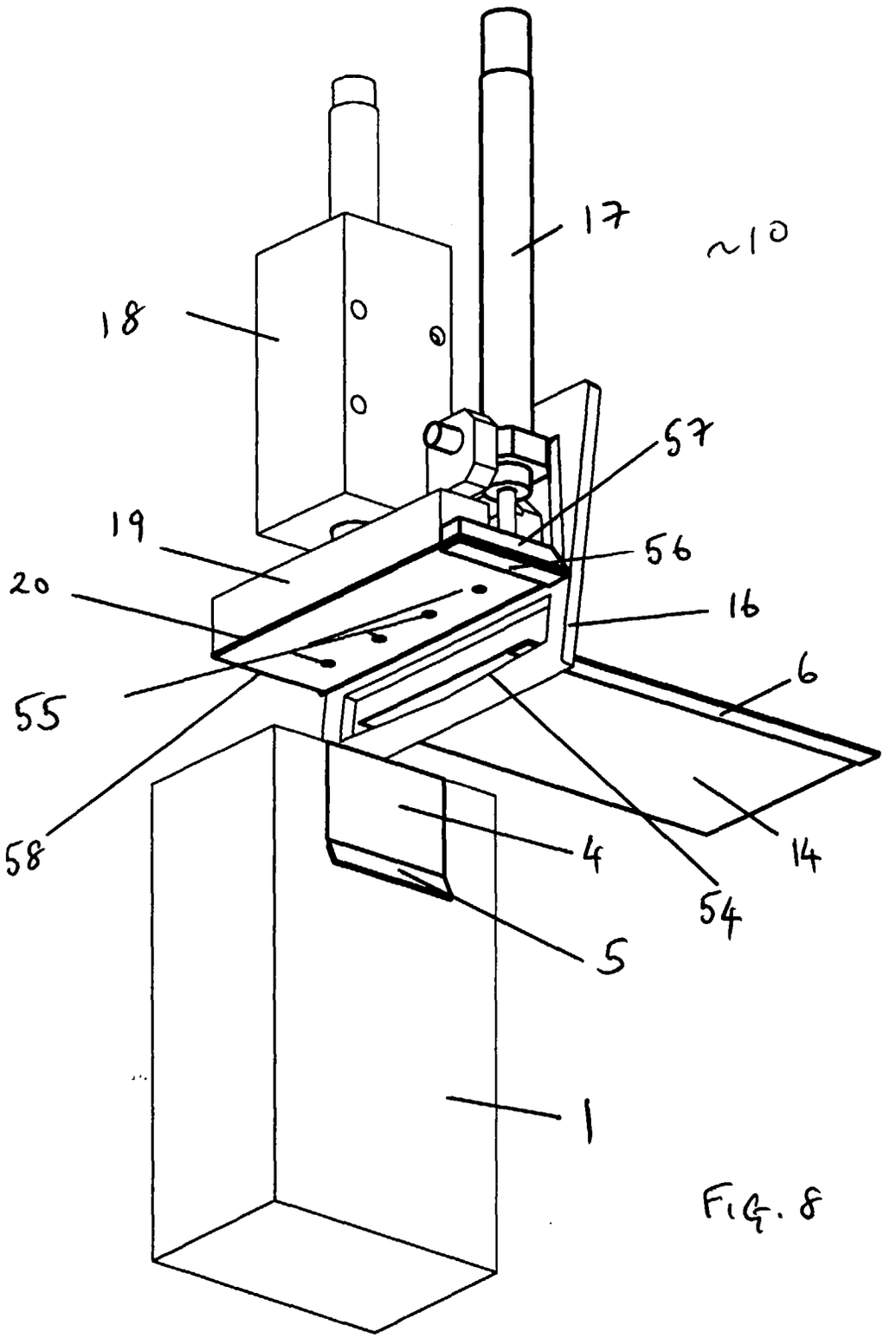

Fig. 8

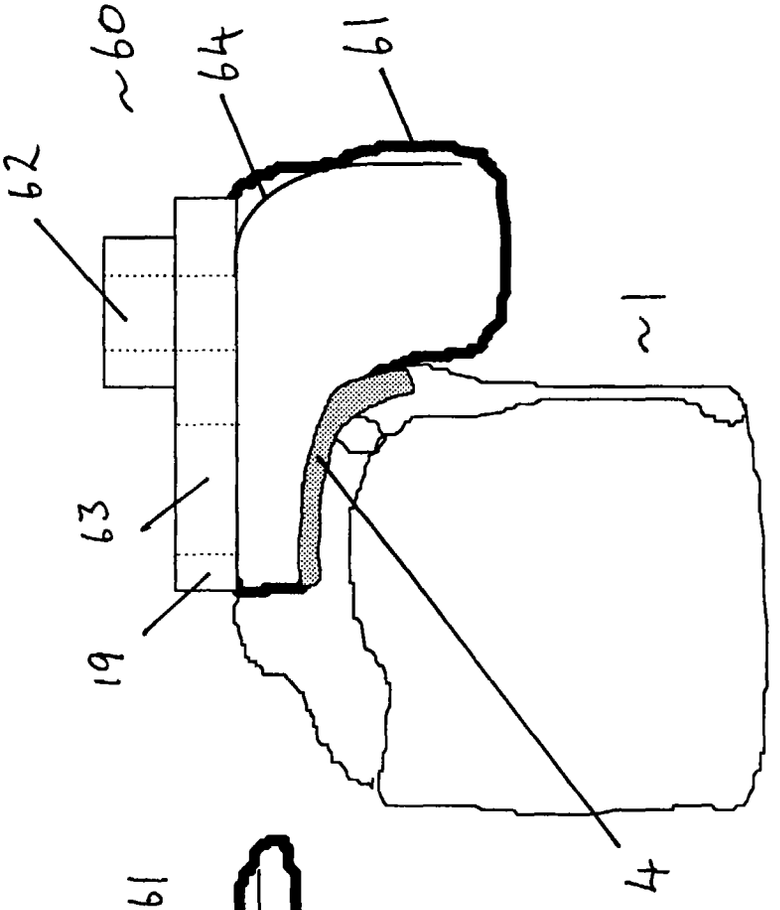

FIG. 10.

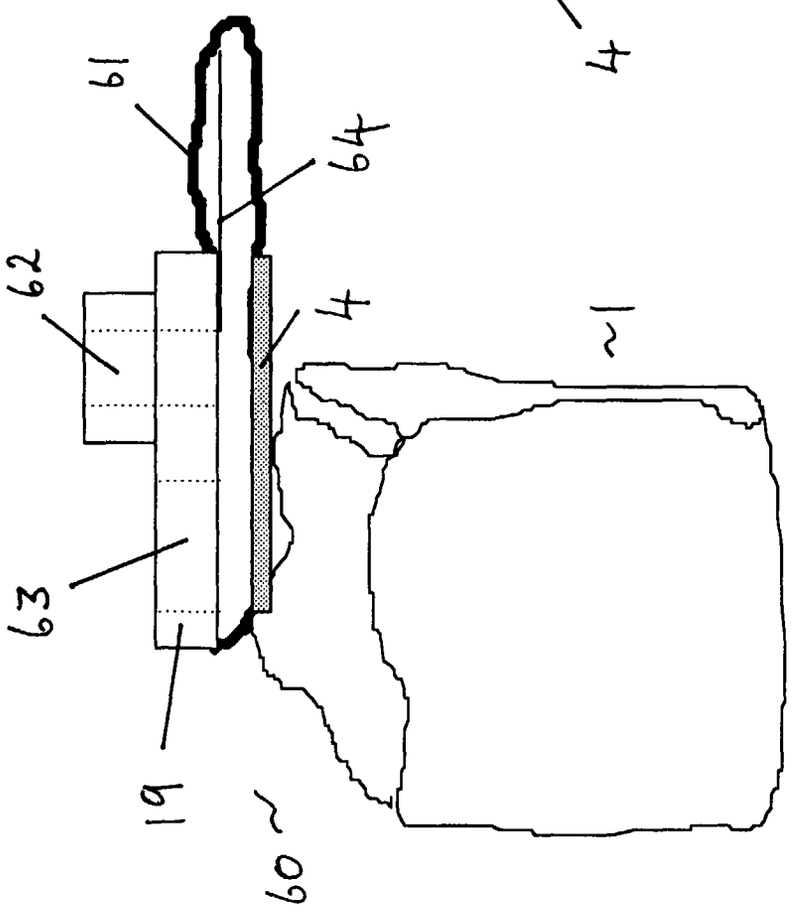

FIG. 9

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 96 20 2752

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	DE 11 01 265 B (BARRACLOUGH ET AL.) 2 March 1961 * column 4, line 49 - column 6, line 4; figures 1-3 *	1-5,8-10	B65B51/06 B65C1/04
X	US 3 159 325 A (J.W. TOENSING) 1 December 1964 * column 3, line 15-33; figures 1-4 *	1,2,6,8, 10	
X	WO 93 13986 A (SECURITY DOOR PA TJORN) 22 July 1993 * page 3, line 10 - page 4, line 11; figures 1-3 *	1,2,6,9, 10	
X	GB 2 238 034 A (TAKARA) 22 May 1991 * page 6, paragraph 2 - page 7, paragraph 1; figures 1,3 *	1,8	
A	DE 26 27 312 A (AGFA GEVAERT) 29 December 1977 * claim 1; figures 1-4 *	7	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

B65B
B65C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	26 February 1997	Grentzius, W

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