



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11) **EP 0 844 179 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
27.05.1998 Bulletin 1998/22

(51) Int. Cl.⁶: **B65B 43/30**

(21) Application number: **96308531.1**

(22) Date of filing: **26.11.1996**

(84) Designated Contracting States:
**AT BE CH DE DK ES FI FR GB GR IE IT LI LU MC
NL PT SE**
Designated Extension States:
AL LT LV SI

(71) Applicants:
• **KRAFT FOODS, INC.**
Northfield, Illinois 60093 (US)
• **MOLINS PLC**
Blakelands, Milton Keynes MK14 5LU (GB)

(72) Inventors:
• **Seaward, David Robert**
Coventry, CV4 8HS (GB)
• **Whitlock, Peter**
Coventry, CV4 8HS (GB)

• **Martin, Simon**
Coventry, CV4 8HS (GB)
• **Bailey, Thomas William**
Coventry, CV4 8HS (GB)
• **Messing, Julian Gregory**
Coventry, CV4 8HS (GB)

(74) Representative:
Eyles, Christopher Thomas et al
W.P. THOMPSON & CO.
Celcon House
289-293 High Holborn
London WC1V 7HU (GB)

Remarks:

Claims 24-43 are deemed to be abandoned due to non-payment of the claims fee (Rule 31 (2) EPC).

(54) **Method of opening flattened bags**

(57) The invention provides a method of opening flattened bags (4'). An open topped container (3) is carried at the top of a flanged member (9) carried by a carriage (6) which moved by an endless chain (2) at a constant speed along a path in a conveying direction (A). The open topped container is in two halves (24,25) which are separated at a bag opening station to allow a flattened bag (4') moving faster than the endless chain (2) to enter the container (3) and then slow down to the same speed as the endless chain (2). The two halves (24,25) then close thereby trapping the bottom seal (63) of the bag between the bottom parts (24d,25d) of the two halves (24,25). Plenum chambers (47,48) in the base of the container (3) are connected via respective vacuum tubes (57,59) to bellows connectors (58,60) which, as the container (3) and bag (4') travel on, run adjacent a vacuum box to effect evacuation of the plenum chambers (47,48) and hence the chamber surrounding the bottom walls (24d,25d), the side walls (24a, to 24c, 24a to 25c), and two stationary members (61,62) under which the container (3) is caused to pass to cause the flattened bag (4') to open and conform closely to the interior of the container (3).

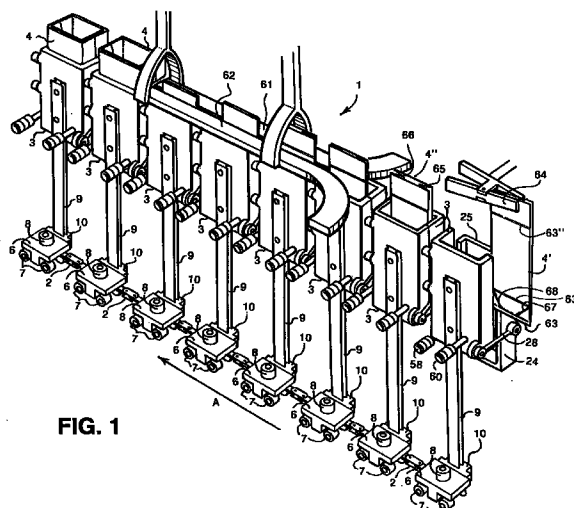


FIG. 1

EP 0 844 179 A1

Description

This invention relates to an apparatus and method for opening flattened bags.

Packaging machines often incorporate a bag making section in which a web of a sealable material, which is normally pre-printed with a repeating pattern giving the advertising copy and product information that is to appear on each bag, is formed into a tube by sealing together edge opposite portions of the web and then individual bag lengths with a transverse bottom fin seal are severed from the tube. It is then necessary to open out the flattened bag lengths so that a desired amount of the desired product, for example a comminuted product such as roasted and ground coffee, can be inserted into the bag prior to sealing to form the finished package.

In some cases it may be desirable for the package to be sold as an evacuated package whereas under other circumstances it may be desired to sell a gas flushed package. To enable these aims to be achieved the packaging machine may incorporate an evacuation section, with, optionally, a gas bleed-back arrangement.

It is important that the bag shall be opened reliably since otherwise valuable product may be spilled if the feed mechanism for filling of the bags attempts to fill a bag that has not been properly opened. It is also important that bag opening shall be effected quickly if the high operating speeds, typically 200 bags per minute or higher, that are now demanded in the art are to be achieved.

GB-A-1003768 describes an apparatus for the packing of solid or liquid materials in sealable bags or sachets. This is a hand operated machine with a carriage movable along a pathway and supporting a jig adapted to receive a bag. The jig has double walls, the inner one of which is permeable and the space between the double walls is connected to a vacuum for opening the bag under the influence of the vacuum. A suction cup attached to a tubular arm is used to transfer a bag from a magazine to the jig. After filling with biscuits or solid, granular or liquid material the operator operates a lever which folds over flaps at the upper end of the jig to fold over the top of the bag, whereupon the top of the bag is sealed. The sealed bag can then be removed from the jig, one way of achieving this being by providing a retractable bottom to the jig.

In WO-A-88/03892 there is disclosed a device for compressing a compressible material packaged in an air-impermeable casing such as a plastics sack. This has an outer container in which an intermediate bag of air-impermeable material is placed, the bottom of this intermediate bag being anchored to the bottom of the outer container. The sack with the material to be compressed is placed in the intermediate bag and then air is supplied to the space between the intermediate bag and the outer container in order to compress the sack and its contents.

An apparatus for spreading open flattened bags is taught in US-A-5279095. This has a pair of air pervious endless belts each with a working face and an opposite, reverse face, with the working faces of the two belts diverging from one another at an acute angle in a bag conveying direction. The working faces run over respective vacuum boxes so that a flattened bag introduced into the nip between the belts with its top to one side of the belts and with its bottom seal to the other side of the belts is opened out as the bag moves along between the diverging working faces of the belts. Such an arrangement results, however, in quite high energy consumption because of the use of vacuum boxes.

It is accordingly an object of the invention to provide an apparatus for opening bags reliably and speedily and with low energy consumption. It is a further object of the invention to provide a method of opening flattened bags at high speed, typically at speeds in excess of 200 bags per minute, with great reliability, and with a minimal energy consumption. An additional object of the invention is to provide an apparatus for opening flattened bags at high speed which obviates the risk of damage to the bags during the bag opening step and which enables packages of well defined shape to be produced upon filling, sealing and evacuating the opened bags.

According to the invention there is provided a method of opening a flattened bag comprising the steps of:

- (a) providing a support container for a bag to be opened, said container defining a partially enclosed chamber with an open end;
- (b) introducing a flattened bag into the container, said bag having an openable end and a closed end and being positioned in the container with its closed end in said chamber and its openable end extending towards or through the open end of the chamber; and
- (c) applying suction to evacuate the chamber at spaced regions in said chamber corresponding to peripheral regions of the closed end of said bag, thereby to cause the bag to open and to conform to the internal shape of the chamber.

The invention further provides an apparatus for opening a flattened bag comprising:

a support container for a bag to be opened, said container defining a partially enclosed chamber with an open end;
 means for introducing a flattened bag into the container, the bag having an openable end and a closed end, so as to position the flattened bag in the container with its closed end in the chamber and with its openable end extending towards or through the open end of the chamber; and
 means for applying suction to the chamber so as to evacuate the chamber at spaced regions in said

chamber corresponding to peripheral regions of the closed end of the bag, thereby to cause the bag to open and conform to the internal shape of the chamber.

Preferably the chamber is constructed so as to have a base substantially opposite said open end and at least two side walls extending from the base towards said open end, and is arranged so that suction can be applied from narrow regions adjacent the transitions between said base and said side walls. It is also preferred that the container shall comprise first and second separable parts laterally separable one from another, said first and second separable parts including bottom wall means and side wall means, the bottom wall means cooperating in the closed condition of the open topped support container to form a bottom wall for the support container and the side wall means of the first and second separable parts cooperating in the closed condition of the support container to form side walls for the support container; in this case the flattened bag can be introduced into the container by steps comprising:

opening the support container to admit a flattened bag by separating the separable parts laterally; introducing the flattened bag between the first and second separable parts; and closing the support container by bringing the first and second separable parts together.

In a preferred method of the invention flattened bag has a front, a back, and a transverse bottom seal and a portion of the flattened bag is trapped between bottom portions of the first and second separable parts of the container as the separable parts close. In one arrangement the container includes opposed portions which are capable of gripping a portion of the flattened bag to locate the flattened bag in the container in its closed condition.

Said opposed portions may comprise a fixed portion on one of the separable parts and a pivotable portion pivotally mounted on said one of the separable parts so as to be pivotable between a closed condition in which said fixed and pivotable portions cooperate to grip said portion of said flattened bag and an open position in which said fixed portion and said pivotable portion are spaced one from another to allow the flattened bag to enter the container. Preferably the pivotable portion is biased towards its open position. It can also be arranged that the pivotable portion engages a bottom wall portion of the other separable part which moves it towards its closed position as the two separable parts close to support said flattened bag.

In one arrangement the second separable part of the container is pivotally linked to the first separable part thereof by means of a parallelogram linkage and lateral separation of the separable parts occurs by virtue of the second separable part swinging laterally outwardly and

downwardly away from the first separable part.

In the container the bottom wall means are each associated with a plenum chamber connected to respective vacuum connection means and communicating with the chamber around the flattened bag by means of passageways adjacent the side wall means of the separable parts and evacuation of the plenum chambers is effected through the vacuum connection means thereby to evacuate the chamber around the flattened bag and to open the flattened bag. The bottom wall means can be arranged so as to separate along a first substantially vertical longitudinal plane while the side wall means of the second separable part is arranged to separate from the side wall means of the first separable part at at least one longitudinal end of the support container along a vertical longitudinal plane that is laterally offset from the first substantially vertical longitudinal plane. Furthermore the bottom wall means can be arranged to separate along a first substantially vertical longitudinal plane while the side wall means of the second separable part can be arranged to separate from the side wall means of the first separable part at one longitudinal end of the support container along a second vertical longitudinal plane that is laterally offset from the first substantially vertical longitudinal plane and at the other longitudinal end of the support container along a third longitudinal plane that is laterally offset to the other side of the first substantially vertical plane from the second substantially vertical plane.

A preferred method further includes the step of locking the support container closed after entry of a flattened bag therein and before evacuation of the chamber surrounding the flattened bag.

The method may further include:

moving the open topped support container in open condition at a first predetermined substantially constant speed along a path in a conveying direction through a bag loading station; moving the flattened bag along a path in the same direction through the bag loading station at a second predetermined speed which is greater than the first predetermined speed and between the two separable parts of the support container; slowing the flattened bag as it enters the open support container to the first predetermined speed; closing the support container by bringing the separable parts together; and evacuating the chamber surrounding the flattened bag.

If the flattened bag has a transverse bottom seal and then the separable parts of the container are arranged so that on closure with a flattened bag between them the transverse bottom seal is trapped between bottom portions of the separable parts.

In a particularly preferred arrangement the bottom wall means of one of the separable parts includes a ple-

num chamber communicating with the chamber around the flattened bag and connected to a vacuum connection pipe carrying a bellows connector, the bottom wall means of the other separable part includes a plenum chamber connected to a vacuum connection pipe carrying a bellows connector, a vacuum box is mounted adjacent the path of travel of the container, the vacuum box having an operating face with one or more orifices which is disposed substantially parallel to the path of travel of the container, and a flexible belt having apertures spaced along its length passes across the operating face of the vacuum box, the spacing of the apertures and the timing of the belt being arranged so that, as the container with a bag therein passes the vacuum box, the bellows connectors can communicate with the vacuum box thereby to evacuate the plenum chambers and the chamber around the flattened bag so as to open the flattened bag.

It is particularly preferred for the support container to have a substantially parallelepipedal interior shape in its closed condition.

The flattened bag will typically have a longitudinal seal formed by sealing together opposite side edges of a web of a sealable material and will also have a gusseted bottom. Such gussets in the flattened bag may be defined in part by diagonal seals. Preferably the flattened bag is pre-creased along lines substantially parallel to the closed end of the bag corresponding to the top and bottom edges of the package, particularly when the package is a substantially parallelepipedal package.

It will normally be preferred for the container to be arranged to be moved along a predetermined path with the flattened bag disposed edgewise to the direction of movement of the container; in this case first and second top closure members can be disposed above the predetermined path so as to lie adjacent to the open end of the container and form a top cover for the chamber. These first and second juxtaposed members can be laterally spaced one from another by a distance of from about 2 mm to about 7 mm, e.g. from about 4 mm to about 6 mm.

In one form of apparatus there is further provided:

means for moving the container in open condition at a first predetermined substantially constant speed along a path in a conveying direction through a bag loading station;

means for moving the flattened bag along a path in the same direction through the bag loading station at a second predetermined speed which is greater than the first predetermined speed and between the two separable parts of the support container;

means for slowing the flattened bag as it enters the open support container to the first predetermined speed; and

means for closing the support container by bringing the separable parts together.

In order that the invention may be clearly understood and readily carried into effect two preferred forms of bag opening and support apparatus constructed in accordance with the present invention will now be described, by way of example only, with reference to the accompanying drawings, wherein:-

Figure 1 is a perspective view of part of a packaging machine for making evacuated packages each comprising a sealed, evacuated bag containing a charge of a comminuted material, such as roasted and ground coffee;

Figure 2 is a perspective view on an enlarged scale of one of the bag containers of the machine of Figure 1, with the container in its open condition;

Figure 3 is a similar view to that of Figure 2 showing the bag container in its closed condition;

Figure 4 is a front view of one of the bag containers removed from the machine of Figure 1;

Figure 5 is a left side view, partly in section, of the bag container of Figure 4;

Figure 6 is a top plan view, partly in section, of the bag container of Figures 4 and 5;

Figure 7 is a detail view of part of one of the carriages of the machine of Figures 1 to 6;

Figure 8 is a perspective view of a device for delivering flattened bags to the machine of Figures 1 to 6;

Figures 9 and 10 are front views of the device of Figure 8 illustrating its mode of operation;

Figure 11 is a further front view of the device of Figures 8 to 10 showing the cam surfaces for controlling the attitude of the bag-holding clips;

Figure 12 is a vertical section of a modified form of bag container in closed condition; and

Figure 13 is a similar vertical section through the bag container of Figure 12 in open condition.

Referring to Figure 1, part of a packaging machine 1 for making evacuated packages, for example evacuated sealed bags containing roasted and ground coffee is depicted. This has an endless chain 2 (only part of which is shown) which passes between and around two carousels (not shown) arranged one at each end of the machine 1. The direction of travel of endless chain 2 is shown in each of Figures 1 to 3 by arrows A. Endless chain 2 is used to convey containers 3 for bags 4 around the machine 1 to and from the portion of the machine 1 which is shown in Figure 1 and which is the portion of machine 1 in which flat preformed bags 4' are inserted into the containers 3 and opened out. Thus Figure 1 shows at its right hand side a flat bag 4' about to be inserted into a container 3 and at its left hand side a fully opened bag 4.

From the portion of the machine 1 illustrated in Figure 1 the opened bags 4 are conveyed in the direction of the arrow A to a first carousel at the left hand end of the machine (as illustrated) where the containers 3 and

bags 4 are individually tared, then part filled with a first dose of roasted and ground coffee, re-weighed, and topped up to a desired weight with a second dose of the roasted and ground coffee. The containers 3 with their filled bags 4 then travel back to the right hand end of the machine 1 along a reverse path behind the illustrated part of the machine 1 in the opposite direction to arrow A and pass around the second carousel which is at the right hand end of the machine 1, that is to say the right hand end as illustrated. On this second carousel the filled bags 4 are evacuated and sealed or are evacuated, gas flushed (with, for example, carbon dioxide or nitrogen) and sealed. A small amount of a desirable coffee aroma fraction may be bled into the evacuated filled bags 4 before the sealing step in order to enhance the aroma when the sealed package is first opened. In passage along the reverse path from the first carousel to the second carousel the bags 4 and their contents may be tamped by, for example, a brief period of vertical vibration, in order to settle the contents of the bags 4 and facilitate formation of a neat parallelepipedal package.

As can better be seen from Figure 2, endless chain 2 consists of links 5 joined one to another with carriages 6 attached to appropriate links 5 at regular intervals. Carriages 6 are arranged to run on a pair of substantially parallel level tracks (not shown in Figures 1 to 3) on rollers 7. A guide roller 8 arranged to rotate about a vertical axis is mounted on each carriage 6 and runs in a guide track (also not shown in Figures 1 to 3) mounted where necessary along the runs of the endless chain 2 and on each carousel above the carriages 6 so as to assist in preventing carriages 6 from tipping. A pair of similar guide rollers (which again are not shown in Figures 1 to 3) which are also arranged to rotate about a vertical axis are provided on the underside of each carriage 6. These further rollers run in a corresponding guide track under the endless chain 2 located between the level tracks for rollers 7; this further guide track is not shown in Figures 1 to 3.

Each carriage 6 also carries a vertical flanged member 9 which is slidably received in a bracket 10 mounted on the rear of carriage 6. Member 9 can be raised and lowered at appropriate moments in the operating cycle relative to its corresponding carriage 6 by means of a roller 11 which, at the appropriate moment or moments in the operating cycle of the machine 1, runs up a stationary ramp surface (not shown) as it is carried around the machine 1 by the endless chain 2 in order to raise member 9 and the container 3 that it carries and then runs down a corresponding ramp surface (also not shown) to lower it again.

As can be seen from Figure 2, member 9 carries at its upper end a mounting plate 12 for its associated container 3. Mounting plate 12 is provided on its rear face with three studs 13 with enlarged heads (see Figure 5, which shows only one of the studs 13). Studs 13 engage in keyways 14 (see Figure 4) in a backing plate

15 on the front of container 3. This arrangement allows for container 3 to be released temporarily from its associated member 9 at the appropriate moment in the operating cycle, specifically for taring and weighing purposes. A crank arm 16 pivotally mounted on a pivot pin 17 carries an operating roller 18 and a locking roller 19 which engages in slots 20, 21 formed in mounting plate 12 and backing plate 15 respectively to lock container 3 in place on member 9. A spring 22 is attached at one end to crank arm 16 and at its other end to a bolt 23 on mounting plate 12 and biases crank arm 16 towards its locked position, as shown in Figure 3. Operating roller 18 is arranged to bear against a stationary cam track (not shown) which is shaped so as to move roller 18 to its unlocked position, shown in Figure 2, at the appropriate point in the operating cycle of machine 1, as the container 3 is carried along by chain 2, and then to move it back to its locked position again.

Each container 3 has interior surfaces which define a substantially parallelepipedal shape. It is split vertically into two halves 24, 25. The rear half 24 of container 3 is connected to the front half 25 thereof by a parallelogram linkage formed by pivoted arms 26, 27 (see Figure 5) at its left side and by a single pivoted arm 28 at its right side. In moving from its closed position, shown in Figure 3, to its open position, shown in Figure 2, rear half 24 swings downward and rearward away from front half 25. Container 3 is held locked in its closed position by means of locking levers 29, 30 mounted one at each end of container 3 which engage respectively with pins 31, 32 on front half 25. Levers 29, 30 are biased towards their locking positions by means of respective springs 33, 34. Locking lever 29 pivots about pin 35 and carries a roller 36 which engages with a stationary cam track (not shown) when it is desired for container 3 to open. Locking lever 30 pivots about pin 37 and carries a roller 38 which engages with a corresponding stationary cam track (not shown), which runs parallel to the corresponding cam track for roller 35, to open container 3 at the appropriate point along its path. Roller 38' (see Figure 5) which is carried by rear half 24 is arranged to cooperate with a corresponding cam track (not shown) to urge rear half 24 back to its closed condition at a point further along the path of container 3 from that at which container 3 is caused to open.

Reference numerals 39, 40, 41, and 42 indicate pivot pins for arms 26, 27, while reference numerals 43 and 44 indicate pivot pins for arm 28.

As can be seen from Figure 6, the two halves 24, 25 of container 3 are somewhat asymmetrical so that the plane of separation 45 along which the two halves 24, 25 separate at the right hand end of container 3 is offset to one side of the centre line L-L while the plane 46 along which the two halves 24, 25 separate at the left hand end of the container 3 is offset to the other side of centre line L-L. However, the two halves 24, 25 separate at the base of the container 3 along the centre line L-L. The walls 24a, 24b, and 24c and base 24d together

define approximately half of a parallelepiped, the remaining portion of which is defined by the walls 25a, 25b and 25c and the base 25d of half 25.

The base of the container 3 is provided with plenum chambers 47, 48 arranged one in each half 24 or 25. These plenum chambers 47, 48 are covered, except along the edges adjacent the internal walls of the respective half 24 or 25, with respective cover plates 49, 50; in Figure 6 the halves of these cover plates 49 and 50 towards the top of the Figure have been cut away to show the plenum chambers 47 and 48. Thus there are narrow slit-shaped apertures 51, 52 between the edges of cover plates 49, 50 and the internal walls of container 3 and larger substantially triangular apertures 53, 54 in the corners of the bottom of container 3. As can be seen from Figure 6, the corner of cover plate 50 can be cut away at 55. The bottom of container 3 can be made of magnetic material so that it will sit firmly on a load cell (not shown) on the first carousel during taring and weighing, at which time container 3 will have been released from member 9 by moving crank arm 16 to its unlocked position and lowering member 9 to cause studs 13 to move into the larger area parts of keyways 14. Roller 56 (see Figures 2 and 3) is arranged to cooperate with an appropriately positioned ramp surface (not shown) to impart a vertical vibratory movement to container 3 to assist in tamping of the charge of coffee or other comminuted material after the necessary weighing action has taken place.

The half 24 is provided with a vacuum connection pipe 57 with a flexible bellows connector 58 at its end; this vacuum connection pipe 57 leads to plenum chamber 47. A further vacuum connection pipe 59 with a further flexible bellows connector 60 is provided on half 25. This further vacuum connection pipe 59 is connected to plenum chamber 48.

Above the path of travel of containers 3 there are mounted two guide members 61, 62 (see Figure 1); these are spaced very closely above the tops of containers 3 but are laterally spaced one from another by about 5 to 10 mm so that a near air tight enclosure is formed by each container 3 and the guide members 61, 62 as the container 3 passes under guide members 61, 62. In the region below guide members 61, 62 there is mounted a vacuum box (not shown) across whose rear perforated operating face passes an endless belt (also not shown) which moves in synchronism with chain 2 and is provided with apertures arranged so as to marry up with bellows connectors 58, 60 as each container 3 comes past the vacuum box. The rear operating face of this vacuum box is perforated so that a vacuum can be drawn through bellows connectors 58, 60 as each container 3 passes behind and in close proximity to the vacuum box in synchronism with the apertured endless belt.

As can be seen from Figure 1, a flattened bag 4', which has a bottom fin seal 63, is suspended vertically from a spring loaded clip 64 of clothes peg construction

for movement in the direction of arrow A. Each bag (see flattened bag 4" in Figure 1) is formed with side gussets 65, 66. Also the bottom end of each bag (see flattened bag 4') has diagonal seals 67, 68. In addition the bag 4' has been horizontally pre-creased, as indicated at 63' and 63", at positions corresponding to where the top and bottom edges will be in the evacuated filled package. These side gussets, horizontal pre-creases and diagonal seals assist in eventual formation of a neat parallelepipedal package.

Figure 7 shows a detail of a carriage 6 and the track 69 on which this runs. Also visible is the roller 70 (to which reference has been made above) mounted underneath carriage 6. This runs in a groove 71 in track 69. Roller 8 runs in a corresponding groove 72 above the carriage 6; here it is illustrated as being in the underside of one of the carousels 73.

Figures 8 to 11 illustrate a device 74 for feeding the flattened bag 4' to the container 3, which is in open condition, at the right hand end of the part of the machine 1 shown in Figure 1 so as to feed the flattened bag 4' along a path which converges with that of the container 3. Device 74 is also designed so as to impart the desired variation in speed of movement of the clip 64. Device 74 comprises an endless belt 75 which is driven in a clockwise direction around four rollers 76, 77, 78, and 79 which are located at the corners of a frame in the shape of a floppy parallelogram formed by members 80, 81, 82, and 83. These are pivoted one to another by means of fixed pivots 84, 85 and by swinging pivots 86, 87. A cross member 88 is pivoted to the mid points of members 81, 83 on pivots 89, 90 and carries a pair of cam follower rollers 91, 92 which engage with the rim 93 of an elliptical cam wheel 94 which is mounted on axle 95. (For the sake of clarity cam wheel 94 is omitted from Figures 9 and 10). As cam wheel 94 is rotated so cam follower rollers 91, 92 follow its rim 93 and move cross member 88 from side to side which in turn causes the parallelogram linkage 80, 81, 82, 83 to swing from side to side. The extremes of this swinging movement are represented by Figures 9 and 10 respectively.

Belt 75 carries a number of clips 64 which are similar in construction to spring loaded clothes pegs. Clips 64 are each pivotally mounted on a shaft that passes through a respective carrier 96. A spring loaded push rod (not shown) extends through carrier 96. One end of this push rod bears against one end of the rear movable arm of peg 64 and the other end projects from the rear of carrier 96. Pressure upon the rearward end of the push rod causes clip 64 to open. Carrier 96 is also provided with rollers 97 which bear on the edge of the parallelogram linkage 80, 81, 82, 83 as the belt 75 moves around it. The other end of the shaft on which clip 64 is mounted carries a crank arm 98 with a roller 99. This roller 99 engages with a cam track 100 as it passes around the bottom right hand corner of the parallelogram linkage. This causes the clip 64 to pivot through 90° until it extends horizontally. As it passes around the

bottom left hand corner of the parallelogram linkage so roller 99 engages with a further cam surface 101 (see Figure 11) which serves to rotate clip 64 through 90° again so that when it comes round the top left hand corner of the parallelogram linkage the clip 64 is again vertical.

In operation of the illustrated machine 1, the endless chain 2 is driven at a constant speed in the direction of arrow A. A flattened bag 4', which has a bottom fin seal 63, is suspended vertically from a clip 64 which is also moved in the direction of arrow A but somewhat faster than endless belt 2 so that it can overtake the containers 3. As can be seen from Figure 1 the container 3 at the right hand end of the illustrated part of the machine 1 is open, the rollers 36 and 38 having been forced downwards by engagement with their respective associated ramp surfaces (not shown). As the flattened bag 4' enters the open container 3 along its centre line L-L, the speed of clip 64 is reduced to match the speed of endless chain 2. Thus the flattened bag 4' and the open container 3 are now moving in synchronism. Next the open container 3 closes by allowing rollers 36, 38 to come off their ramp surface and roller 38' to engage with its corresponding ramp surface and by letting locking levers 29 and 30 return under the influence of springs 33 and 34 to their locked positions in which they engage pins 31 and 32 respectively. The bag 4' is positioned at such a height in relation to the half 25 of the open container 3 that, as the container 3 closes, the bottom fin seal 63 is trapped between the bottom edges of the two halves 24 and 25. Because the container 3 splits into two asymmetric halves 24 and 25 it is impossible for flattened bag 4' to overshoot the open container 3 since its leading vertical edge will hit first the inner face of the left hand wall of the open container 3. Immediately upon closure of container 3, clip 64 which is attached to an endless belt (not shown) opens so as to release flattened bag 4' and then travels on to pick up a new flattened bag 4'. Opening of clip 64 is effected by means of a fixed ramp surface (not shown) mounted behind the path of clip 64 against which the rear end of its spring loaded push rod bears so as to move the push rod forward against its spring to open clip 64. As can be seen best from the second flattened bag from the right hand end of Figure 1, i.e. the flattened bag 4'', is formed with side gussets 65, 66. Also the bottom end of each flattened bag 4' has diagonal seals 67, 68. These side gussets and diagonal seals assist in eventual formation of a neat parallelepipedal package.

The now closed container 3, with a flattened bag held firmly between the bottom edges of the two halves 24, 25 moves on under guide members 61, 62. Once the container 3 is fully under guide members 61, 62, flexible bellows connectors 58, 60 pass in front of a vacuum box (not shown) so as to draw a vacuum, via pipes 57 and 59, in the plenum chambers 47 and 48 respectively and hence via slits 51, 52 and triangular apertures 53, 54 in the main body of container 3. Because the top

of container 3 is at this point nearly closed by the guide members 61 and 62, except for a narrow gap between them, air cannot readily enter container 3 except by entering the flattened bag positioned therein. As a result, the bag opens very quickly and is drawn to conform snugly to the inside shape of container 3. As the container 3 emerges from under the left hand end of the guide members 61, 62 so the material of the bag tends to open it further as shown at the left hand end of Figure 1.

The gap between guide members 61 and 62 should not be so wide, on the one hand, that an effective vacuum cannot be drawn quickly and without use of excessive power within container 3 and not so narrow, on the other hand, that the top of the bag cannot slide down somewhat into container 3 to allow full opening of the bag to occur. A lateral gap of about 5 mm has been found suitable for bags made from a printed laminate 100 µm thick consisting of a layer of polyethylene terephthalate, a layer of low density polyethylene, and a layer of peelable polyethylene, with the peelable layer on the inside of the bag. Such a bag can be used for packaging, for example, 500 g of roasted and ground coffee.

Turning now to Figures 8 to 11, device 74 is positioned below the path of movement of flattened bags 4' as they emerge from a bag forming machine bottom end first. The direction of movement of the bags 4' is indicated by arrow B in Figures 8 to 10; arrow A in Figures 8 to 10 corresponds to arrow A of Figures 1 to 3. As the clip comes around the top left hand corner of the parallelogram linkage, its push rod bears against a ramp surface (not shown) which forces it forward so that clip 64 is opened. The speed of travel of belt 75 is matched to that of the flattened bags 4' as they emerge from the bag forming machine pass in the direction of arrow B, each with its transverse fin seal at its leading end. The timing of the device 74 is so adjusted that, as each clip 64 attains a vertical attitude after passing around roller 76, it receives a flattened bag 4' (as shown in Figure 9). Clip 64 then closes as the rear end of its push rod comes off its cooperating ramp surface and carries flattened bag 4' along with it as it continues to move towards roller 77.

In order that the overall size of the packaging machine can be reduced the spacing between adjacent containers 3 along chain 2 is less than the height of a bag 4', for example approximately one half the height of a bag 4'. Since the speed of movement of the flattened bags 4' as they emerge lengthwise from the bag forming machine is greater than the speed of endless chain 2, it is necessary to slow the bag 4' as it is inserted into the appropriate container 3 to the speed of chain 2. In addition the design of machine 1 requires that a flattened bag 4' shall be inserted into the open container 3 in a vertical attitude, as shown in Figure 1, although it has been formed in a manner which results in it travelling bottom end first. The parallelogram linkage of device 64

allows the flattened bag 4' to be presented in the correct attitude and at the correct speed for insertion into open container 3.

The swinging movement of the parallelogram linkage is coordinated with the movement of the clip 64 from right to left along the lower run of belt 75 so that, as the flattened bag 4' approaches the open container 3, the linkage is swinging leftward so that clip 64 is moving faster than the speed of endless chain 2. However, as the flattened bag 4' enters the open container 3, the linkage reverses its direction of swing and commences to swing to the right, thus reducing the velocity of flattened bag 4' relative to that of the endless chain 2. As the linkage swings to the right, the right-to-left velocity of the flattened bag 4' equates to the corresponding velocity of the endless chain 2 so that the flattened bag 4' is moving at the same speed as the container 3 as this closes.

As can be seen from Figure 9, the flattened bag 4' is travelling endwise from left to right as it first captured by a clip 64. In passing over the roller 77 its attitude changes from horizontal to vertical. Then in passage around roller 78 roller 99 engages with the cam track 100 and rotates clip 64 through 90°. Thus as it commences to travel back in a leftward direction along the bottom run of belt 75 flattened bag 4' retains its vertical attitude in readiness for insertion into the open container 3. In passage around roller 79 roller 99 engages with cam track 101 which serves to rotate clip 64 through 90° again in readiness for capturing a further flattened bag 4'.

Figures 12 and 13 illustrate a modified form of container which, while generally similar to the container of Figures 2 to 6, has a trap door arrangement in its base instead of having a fixed base. In Figures 12 and 13 the same reference numerals have been used to identify those parts which are essentially the same as those present in the embodiment of Figures 2 to 6.

In the front half 25 of the modified container of Figures 12 and 13 plenum chamber 48 is closed on its upper side by a fixed part 201 which forms part of the floor to container 3. The bottom wall means 25d of front half 25 extends somewhat rearward (i.e. to the right as illustrated in Figures 12 and 13) past the plane of separation 45 and carries a pivotable member 202 mounted on pivots 203. Rubber pads 204 and 205 are provided on part 201 and member 202 respectively and grip the bottom end of bag 4' in the closed condition of the container. Member 202 is spring biased by means of a spring (not shown) in a clockwise direction as depicted in Figures 12 and 13. As the two halves separate, as shown in Figure 13, so member 202 swings down and away from front half 25 to the position of Figure 13. In this way a wide gap is formed between pads 204, 205 which minimises the risk of the bottom end of a bag 4' hitting part of container 3 and not entering it correctly. When the container 3 closes, the lip 206 extending across the bottom of the bottom wall means 24d of rear

half 24 catches under the free edge of flange 207 on member 202 and swings this anti-clockwise, as depicted in Figures 12 and 13, to move member 202 back to its closed position.

Claims

1. A method of opening a flattened bag comprising the steps of:

- (a) providing a support container (3) for a bag (4') to be opened, said container (3) defining a partially enclosed chamber with an open end;
- (b) introducing a flattened bag (4') into the container (3), said bag (4') having an openable end and a closed end (63) and being positioned in the container (3) with its closed end (63) in said chamber and its openable end extending towards or through the open end of the chamber; and
- (c) applying suction to evacuate the chamber at spaced regions in said chamber corresponding to peripheral regions of the closed end (63) of said bag (4'), thereby to cause the bag (4') to open and to conform to the internal shape of the chamber.

2. A method according to claim 1, in which the chamber has a base (24d, 25d; 201, 202) substantially opposite said open end and at least two side walls (24a to 24c, 25a to 25c) extending from the base (24d, 25d) towards said open end, said suction being applied from narrow regions (51, 52) adjacent the transitions between said base (24d, 25d; 201, 202) and said side walls (24a to 24c, 25a to 25c).

3. A method according to claim 1 or claim 2, in which the container (3) comprises first and second separable parts (24, 25) laterally separable one from another, said first and second separable parts (24, 25) including bottom wall means (24d, 25d; 201, 202) and side wall means (24a to 24c, 25a to 25c), the bottom wall means (24d, 25d; 201, 202) cooperating in the closed condition of the open topped support container (3) to form a bottom wall for the support container (3) and the side wall means (24a to 24c, 25a to 25c) of the first and second separable parts (24, 25) cooperating in the closed condition of the support container (3) to form side walls for the support container (3), and in which the step of introducing the flattened bag (4') into the container (3) comprises the steps of:

- opening the support container (3) to admit a flattened bag (4') by separating the separable parts (24, 25) laterally;
- introducing the flattened bag (4') between the first and second separable parts (24, 25); and

closing the support container (3) by bringing the first and second separable parts (24, 25) together.

4. A method according to claim 3, in which the flattened bag (4') has a front, a back, and a transverse bottom seal (63) and in which a portion (63) of the flattened bag (4') is trapped between bottom portions of the first and second separable parts (24, 25) as the separable parts (24, 25) close.
5. A method according to claim 3 or claim 4, in which said container (3) includes opposed portions (24d, 25d; 201, 202) which are capable of gripping a portion (63) of the flattened bag (4') to locate the flattened bag (4') in the container (3) in its closed condition.
6. A method according to claim 5, in which said opposed portions comprise a fixed portion (201) on one of the separable parts (25) and a pivotable portion (202) pivotally mounted on said one of the separable parts (25) so as to be pivotable between a closed condition in which said fixed and pivotable portions (201, 202) cooperate to grip said portion (63) of said flattened bag (4') and an open position in which said fixed portion (201) and said pivotable portion (202) are spaced one from another to allow the flattened bag (4') to enter the container (3).
7. A method according to claim 6, in which the pivotable portion (202) is biased towards its open position.
8. A method according to claim 6 or claim 7, in which said pivotable portion (202) engages a bottom wall portion (24d) of the other separable part (24) which moves it towards its closed position as the two separable parts (24, 25) close to support said flattened bag (4').
9. A method according to any one of claims 3 to 8, in which said second separable part (24) is pivotally linked to the first separable part (25) by means of a parallelogram linkage (26, 27, 28) and in which lateral separation of the separable parts (24, 25) occurs by virtue of the second separable part (24) swinging laterally outwardly and downwardly away from the first separable part (25).
10. A method according to any one of claims 3 to 9, in which the bottom wall means (24d, 25d; 201, 202) are each associated with a plenum chamber (47, 48) connected to respective vacuum connection means (57, 58, 59, 60) and communicating with the chamber around the flattened bag (4') by means of passageways (51, 52, 53, 54) adjacent the side wall means (24a to 24c, 25a to 25c) of the separable parts (24, 25) and which includes the step of evacuating the plenum chambers (47, 48) through the vacuum connection means (57, 58, 59, 60) thereby to evacuate the chamber around the flattened bag (4') and to open the flattened bag (4').
11. A method according to any one of claims 3 to 10, in which the bottom wall means (24d, 25d; 201, 202) are arranged to separate along a first substantially vertical longitudinal plane and in which the side wall means (24a, 24c) of the second separable part (24) is arranged to separate from the side wall means (25a, 25c) of the first separable part (25) at at least one longitudinal end of the support container (3) along a vertical longitudinal plane that is laterally offset from the first substantially vertical longitudinal plane.
12. A method according to claim 11, in which the bottom wall means (24d, 25d; 201, 202) are arranged to separate along a first substantially vertical longitudinal plane and in which the side wall means (24a, 24c) of the second separable part (24) is arranged to separate from the side wall means (25a, 25c) of the first separable part (25) at one longitudinal end of the support container (3) along a second vertical longitudinal plane that is laterally offset from the first substantially vertical longitudinal plane and at the other longitudinal end of the support container (3) along a third longitudinal plane that is laterally offset to the other side of the first substantially vertical plane from the second substantially vertical plane.
13. A method according to any one of claims 3 to 12, further including the step of locking the support container (3) closed after entry of a flattened bag (4') therein and before evacuation of the chamber surrounding the flattened bag (4').
14. A method according to any one of claims 3 to 13, further including:
 - moving the open topped support container (3) in open condition at a first predetermined substantially constant speed along a path in a conveying direction (A) through a bag loading station;
 - moving the flattened bag (4') along a path in the same direction (A) through the bag loading station at a second predetermined speed which is greater than the first predetermined speed and between the two separable parts (24, 25) of the support container (3);
 - slowing the flattened bag (4') as it enters the open support container (3) to the first predetermined speed;
 - closing the support container (3) by bringing

the separable parts (24, 25) together; and evacuating the chamber surrounding the flattened bag (4').

15. A method according to claim 14, in which the flattened bag (4') has a transverse bottom seal (63) and in which the separable parts (24, 25) of the container (3) are arranged so that on closure with a flattened bag (4') between them the transverse bottom seal (63) is trapped between bottom portions of the separable parts (24, 25). 5
16. A method according to any one of claims 3 to 15, in which in which one of the separable parts (24) includes a plenum chamber (47) beneath the bottom of the chamber which is in communication with the chamber around the flattened bag (4') and is connected to a vacuum connection pipe (57) carrying a bellows connector (58), in which the other separable part (25) includes a plenum chamber (48) beneath the bottom of the chamber which is in communication with the chamber and is connected to a vacuum connection pipe (59) carrying a bellows connector (60), in which a vacuum box is mounted adjacent the path of travel of the container (3), the vacuum box having a operating face with one or more orifices which is disposed substantially parallel to the path of travel of the container, and in which a flexible belt having apertures spaced along its length passes across the operating face of the vacuum box, the spacing of the apertures and the timing of the belt being arranged so that, as the container (3) with a bag (4') therein passes the vacuum box, the bellows connectors (58, 60) can communicate with the vacuum box thereby to evacuate the plenum chambers (47, 48) and the chamber around the flattened bag (4') so as to open the flattened bag (4'). 10 15 20 25 30 35
17. A method according to any one of claims 1 to 16, in which the support container (3) has a substantially parallelepipedal interior shape in its closed condition. 40
18. A method according to any one of claims 1 to 17, in which the flattened bag (4') has a longitudinal seal formed by sealing together opposite side edges of a web of a sealable material and has a gusseted bottom. 45 50
19. A method according to claim 18, in which the gussets in the flattened bag (4') are defined in part by diagonal seals (67, 68).
20. A method according to any one of claims 1 to 19, in which the flattened bag is pre-creased along lines (63', 63'') substantially parallel to the closed end of the bag (4') corresponding to the top and bottom 55

edges of the package.

21. A method according to any one of claims 1 to 20, in which said container (3) is arranged to be moved along a predetermined path with the flattened bag (4') disposed edgewise to the direction of movement of the container (3) and in which first and second top closure members (61, 62) are disposed above the predetermined path so as to lie adjacent to the open end of the container (3) and form a top cover for the chamber.
22. A method according to claim 21, in which the first and second juxtaposed members (61, 62) are laterally spaced one from another by a distance of from about 2 mm to about 7 mm.
23. A method according to claim 22, in which the first and second juxtaposed members (61, 62) are laterally spaced one from another by a distance of from about 4 mm to about 6 mm.
24. Apparatus for opening a flattened bag comprising:
a support container (3) for a bag (4') to be opened, said container (3) defining a partially enclosed chamber with an open end;
means (64) for introducing a flattened bag (4') into the container (3), the bag (4') having an openable end and a closed end (63), so as to position the flattened bag (4') in the container (3) with its closed end (63) in the chamber and with its openable end extending towards or through the open end of the chamber; and
means (58, 60) for applying suction to the chamber so as evacuate the chamber at spaced regions (51, 52) in said chamber corresponding to peripheral regions of the closed end (63) of the bag (4'), thereby to cause the bag (4') to open and conform to the internal shape of the chamber.
25. Apparatus according to claim 24, in which the chamber has a base substantially opposite said open end and at least two side walls (24a to 24c, 25a to 25c) extending from the base towards said open end, said means for applying suction being arranged so as to apply suction from narrow regions (51, 52) adjacent the transition between said base (24d, 25d) and said side walls (24a to 24c, 25a to 25c).
26. Apparatus according to claim 24 or claim 25, in which the container (3) is open topped and comprises first and second separable parts (24, 25) laterally separable one from another, said first and second separable parts (24, 25) including bottom wall means (24d, 25d; 201, 202) and side wall

means (24a to 24c, 25a to 25c), the bottom wall means (24d, 25d; 201, 202) cooperating in the closed condition of the open topped support container (3) to form a bottom wall for the support container (3).

27. Apparatus according to claim 26, in which the bottom wall means (24d, 25d) of the first and second separable parts (24, 25) are arranged to trap a portion (63) of a flattened bag (4') between them as the separable parts (24, 25) close so as to locate the flattened bag (4') in the container (3) in its closed condition.

28. Apparatus according to claim 27, in which the means (64) for moving the flattened bag (4') is arranged to deliver the flattened bag (4') into the container (3) so that, when the container (3) closes, the bottom seal (63) of the flattened bag (4') is trapped between opposed portions (24d, 25d; 201, 202) of the support container (3).

29. Apparatus according to claim 26 or claim 27, in which said opposed portions comprise a fixed portion (201) on one of the separable parts (25) and a pivotable portion (202) pivotally mounted on said one of the separable parts (25) so as to be pivotable between a closed condition in which said fixed and pivotable portions (201, 202) cooperate to grip said portion (63) of said flattened bag (4') and an open position in which said fixed portion (201) and said pivotable portion (202) are spaced one from another to allow the flattened bag (4') to enter the container (3).

30. Apparatus according to claim 29, in which the pivotable portion (202) is biased towards its open position.

31. Apparatus according to claim 29 or claim 30, in which said pivotable portion (202) is arranged so as to engage a bottom wall portion (24d) of the other separable part (24) and move towards its closed position as the two separable parts (24, 25) close to support said flattened bag (4').

32. Apparatus according to claim 31, in which the bottom wall means (24d, 25d; 201, 202) are each associated with a plenum chamber (47, 48) connected to respective vacuum connection means (57, 58, 59, 60) and communicating with the chamber around the flattened bag (4') by means of passageways (51, 52, 53, 54) adjacent the side wall means (24a to 24c, 25a to 25c) of the separable parts (24, 25);

whereby, upon evacuating the plenum chambers (47, 48) through the vacuum connection means (57, 58, 59, 60), the chamber around the

flattened bag (4') can be evacuated and the flattened bag (4') opened.

33. Apparatus according to claim 32 or claim 33, in which the support container (3) has a substantially parallelepipedal interior shape in its closed condition.

34. Apparatus according to any one of claims 26 to 33, in which the second separable part (24) is pivotally linked to the first separable part (25) by means of a parallelogram linkage (26, 27, 28) and in which lateral separation of the separable parts (24, 25) occurs by virtue of the second separable part (24) swinging laterally outwardly and downwardly away from the first separable part (25).

35. Apparatus according to any one of claims 26 to 34, in which the bottom wall means (24d, 25d; 201, 202) are arranged to separate along a first substantially vertical longitudinal plane and in which the side wall means (24a, 24c) of the second separable part (24) is arranged to separate from the side wall means (25a, 25c) of the first separable part (25) at at least one longitudinal end of the support container (3) along a vertical longitudinal plane that is laterally offset from the first substantially vertical longitudinal plane.

36. Apparatus according to claim 35, in which the bottom wall means (24d, 25d; 201, 202) are arranged to separate along a first substantially vertical longitudinal plane and in which the side wall means (24a, 24c) of the second separable part (24) is arranged to separate from the side wall means (25a, 25c) of the first separable part (25) at one longitudinal end of the support container (3) along a second vertical longitudinal plane that is laterally offset from the first substantially vertical longitudinal plane and at the other longitudinal end of the support container (3) along a third longitudinal plane that is laterally offset to the other side of the first substantially vertical plane from the second substantially vertical plane.

37. Apparatus according to any one of claims 26 to 36, further including means (29, 31, 30, 32) for locking the support container (3) closed.

38. Apparatus according to any one of claims 26 to 37, further including:

means (2) for moving the container (3) in open condition at a first predetermined substantially constant speed along a path in a conveying direction (A) through a bag loading station; means (64) for moving the flattened bag (4') along a path in the same direction (A) through

the bag loading station at a second predetermined speed which is greater than the first predetermined speed and between the two separable parts (24, 25) of the support container (3);

5

means (74) for slowing the flattened bag (4') as it enters the open support container (3) to the first predetermined speed; and

means for closing the support container (3) by bringing the separable parts (24, 25) together.

10

39. Apparatus according to claim 38, in which one of the separable parts (24) includes a plenum chamber (47) beneath the bottom of the chamber which is in communication with the chamber around the flattened bag (4') and is connected to a vacuum connection pipe (57) carrying a bellows connector (58), in which the other separable part (25) includes a plenum chamber (48) beneath the bottom of the chamber which is in communication with the chamber and is connected to a vacuum connection pipe (59) carrying a bellows connector (60), in which a vacuum box is mounted adjacent the path of travel of the container (3), the vacuum box having a operating face with one or more orifices which is disposed substantially parallel to the path of travel of the container, and in which a flexible belt having apertures spaced along its length passes across the operating face of the vacuum box, the spacing of the apertures and the timing of the belt being arranged so that, as the container (3) with a bag (4') therein passes the vacuum box, the bellows connectors (58, 60) can communicate with the vacuum box thereby to evacuate the plenum chambers (47, 48) and the chamber around the flattened bag (4') so as to open the flattened bag (4').

15

20

25

30

35

40. Apparatus according to any one of claims 24 to 39, in which the support container (3) has a substantially parallelepipedal interior shape in its closed condition.

40

41. Apparatus according to any one of claims 24 to 40, in which said container (3) is arranged to be moved along a predetermined path with the flattened bag (4') disposed edgewise to the direction of movement of the container (3) and in which first and second top closure members (61, 62) are disposed above the predetermined path so as to lie adjacent to the open end of the container (3) and form a top cover for the chamber.

45

50

42. Apparatus according to claim 41, in which the first and second juxtaposed members (61, 62) are laterally spaced one from another by a distance of from about 2 mm to about 7 mm.

55

43. Apparatus according to claim 41, in which the first

and second juxtaposed members (61, 62) are laterally spaced one from another by a distance of from about 4 mm to about 6 mm.

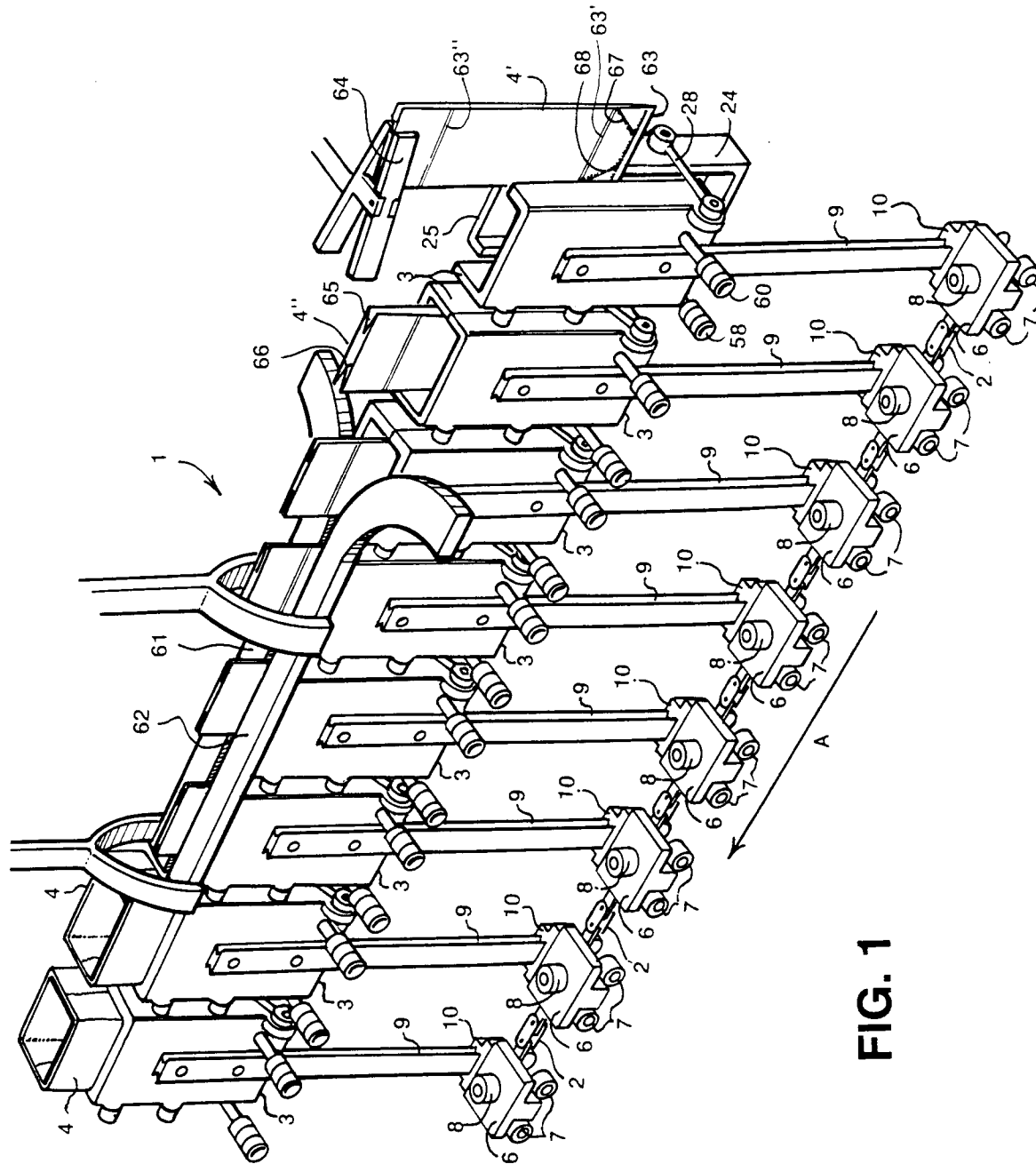


FIG. 1

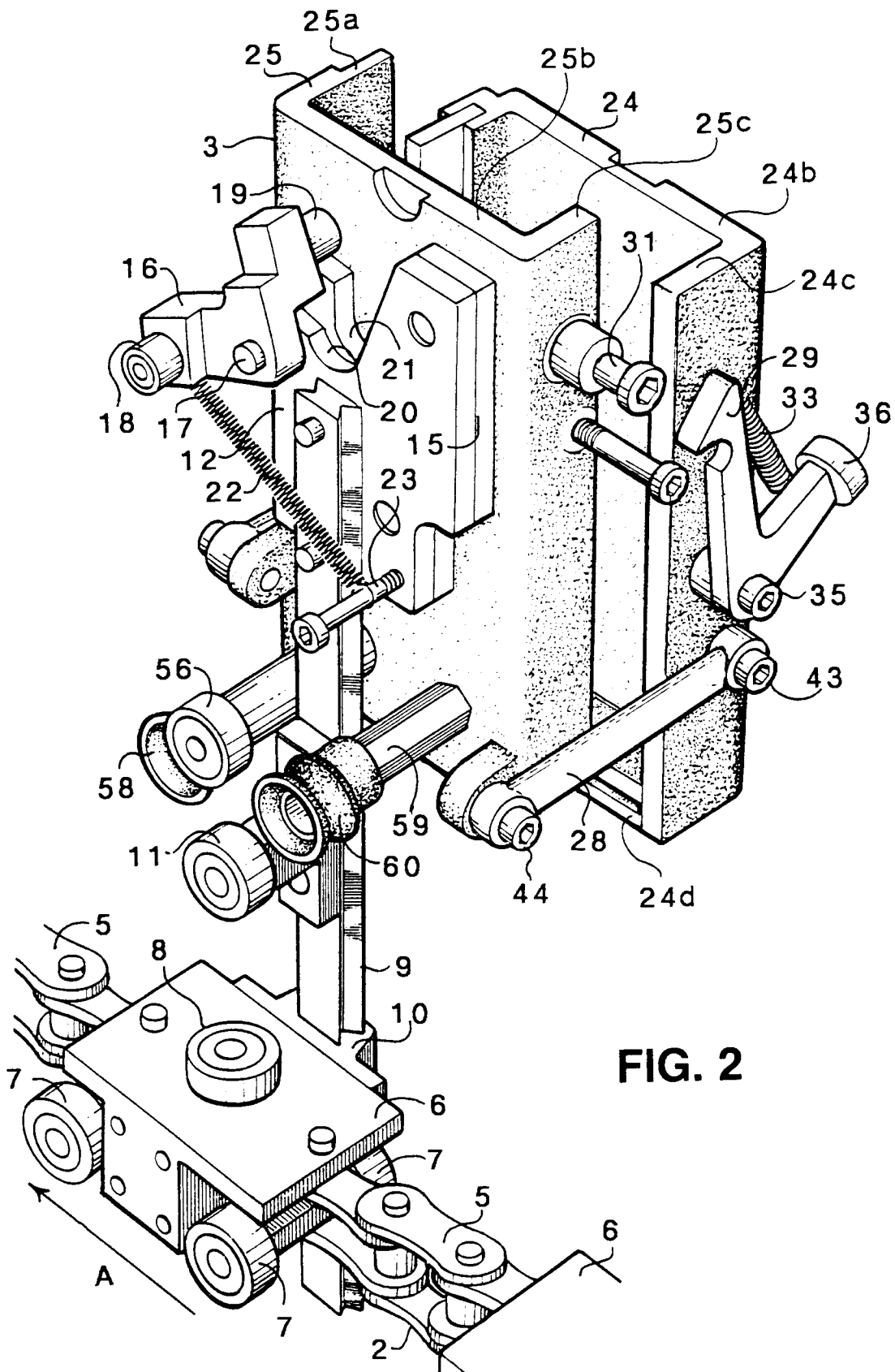


FIG. 2

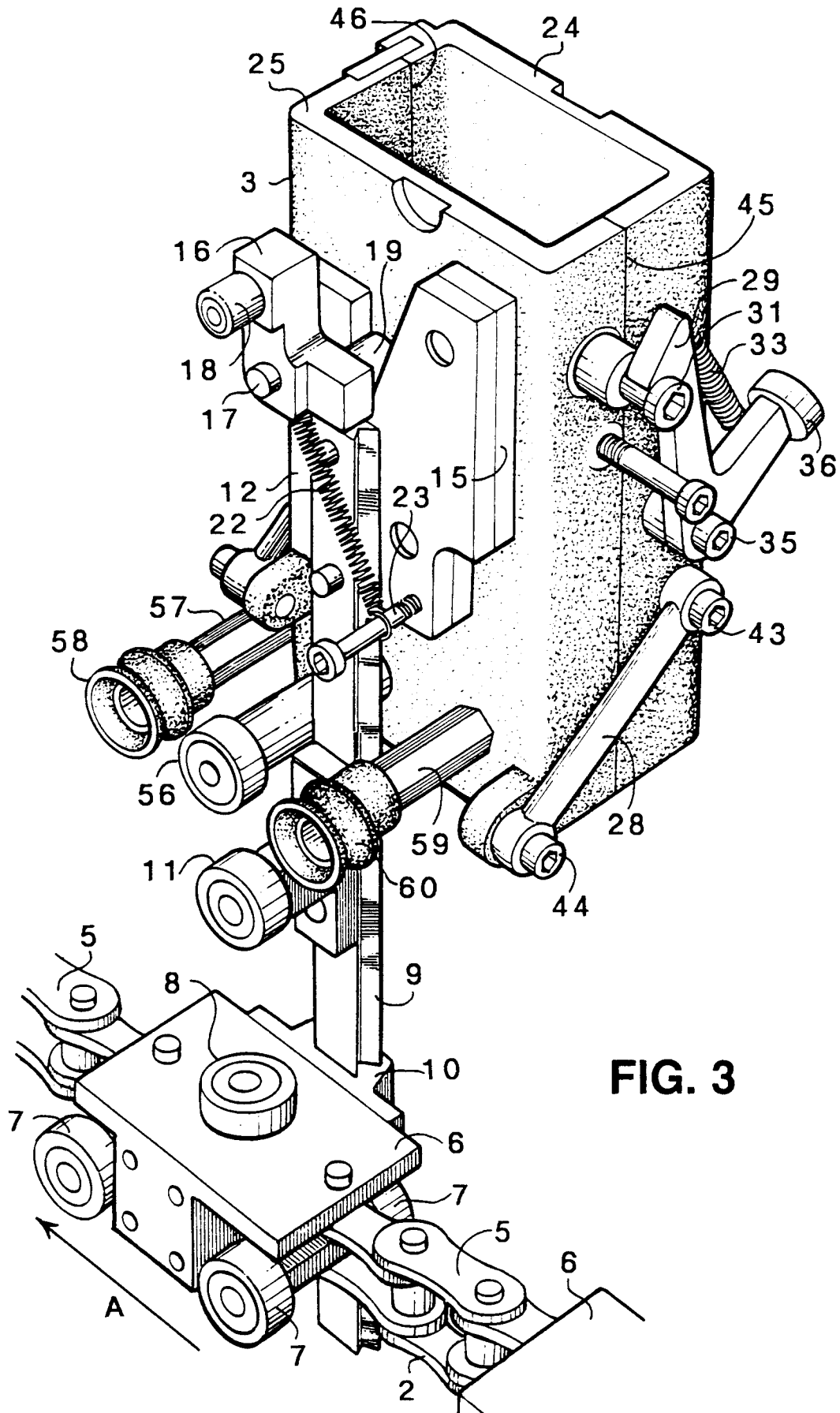


FIG. 3

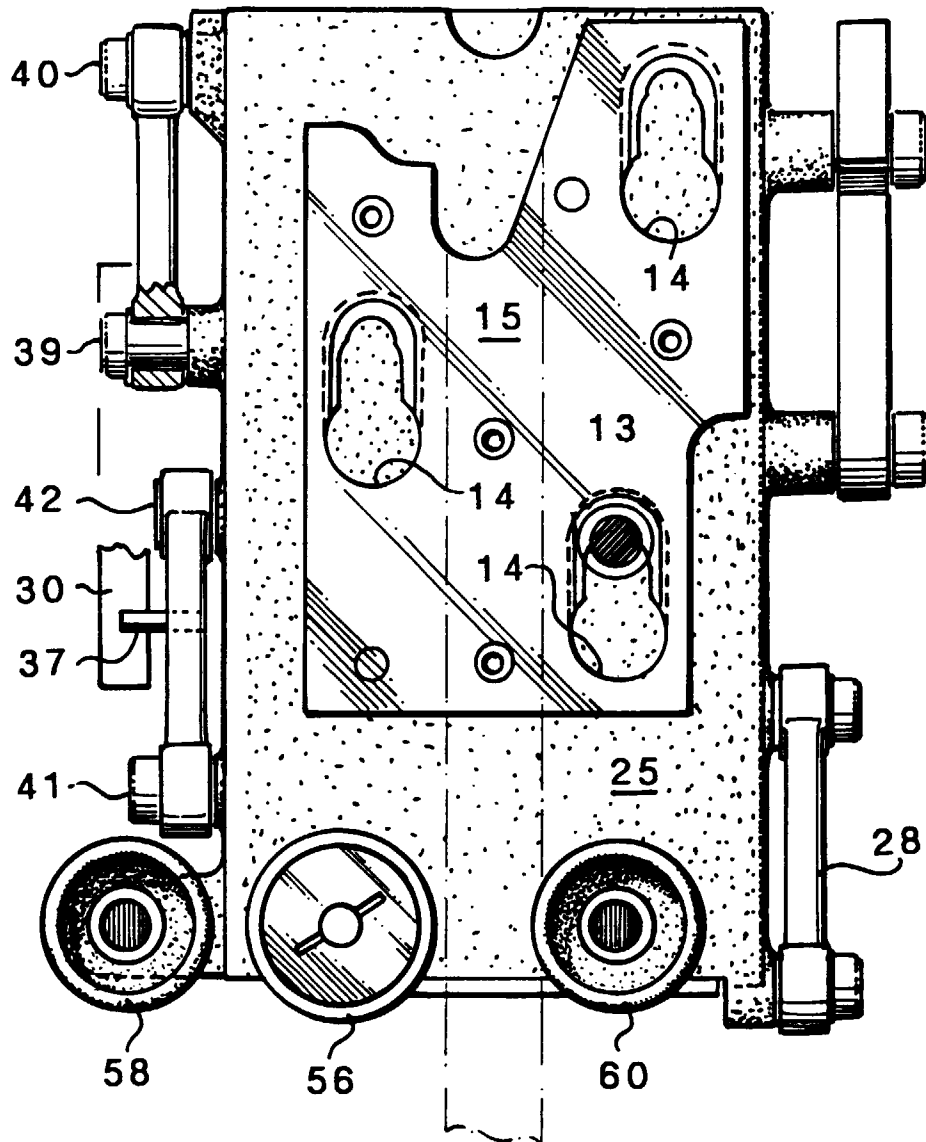


FIG. 4

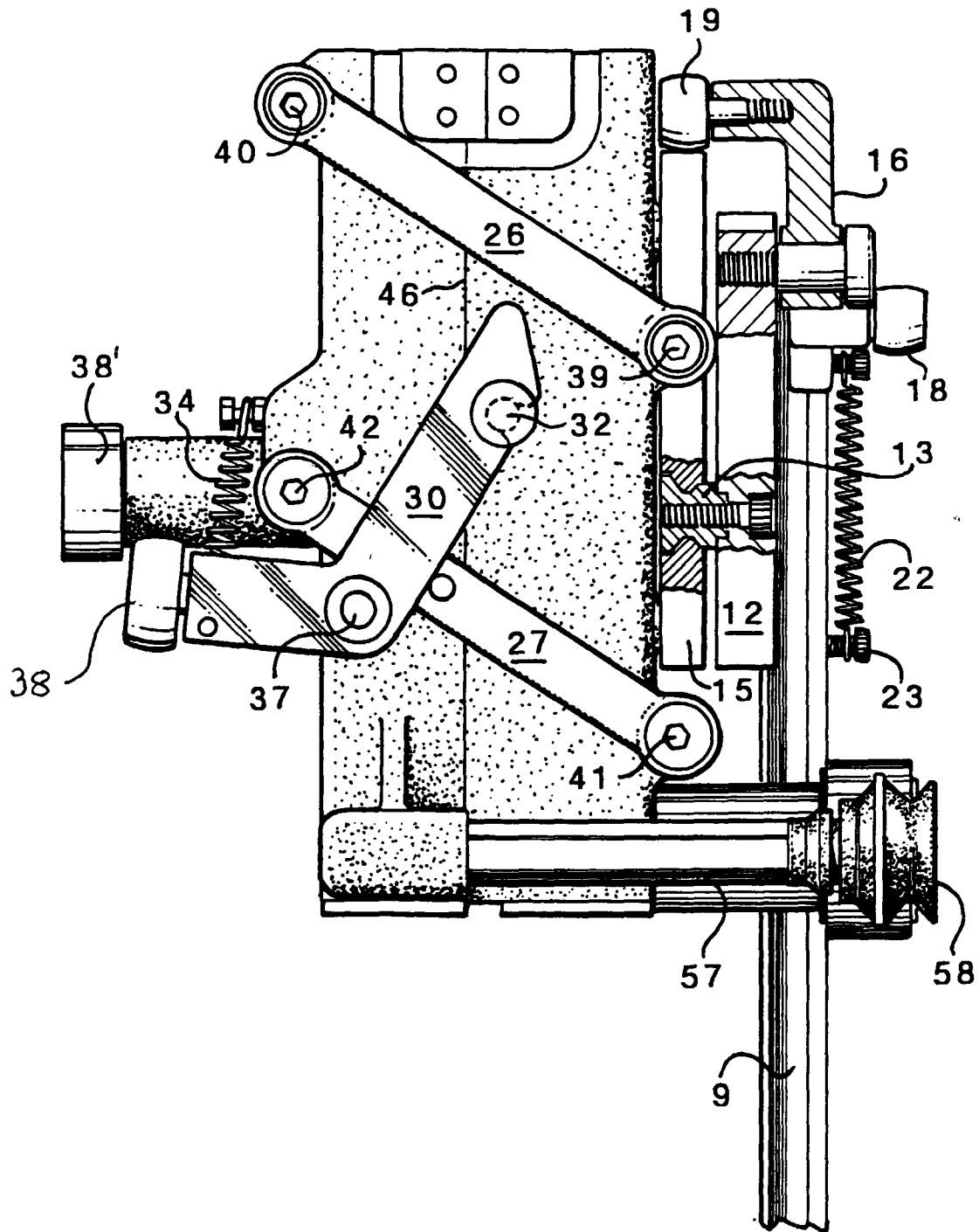


FIG. 5

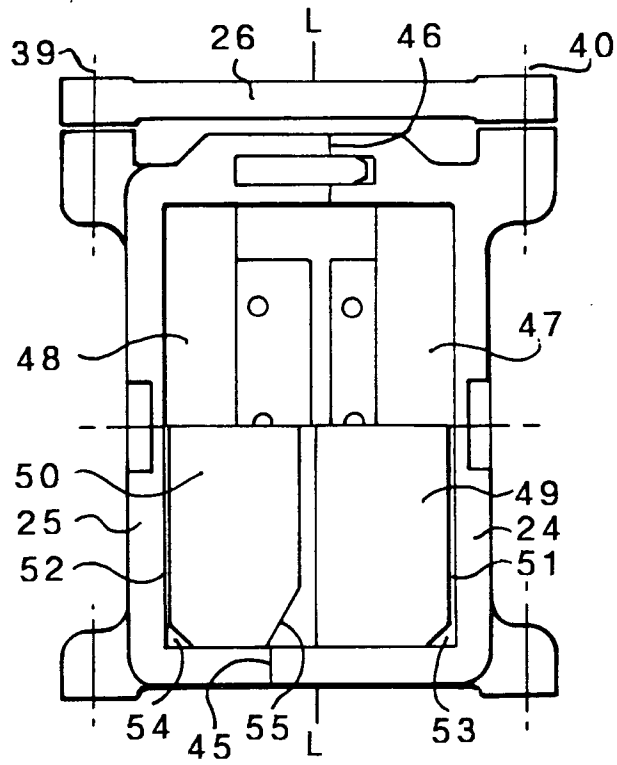


FIG. 6

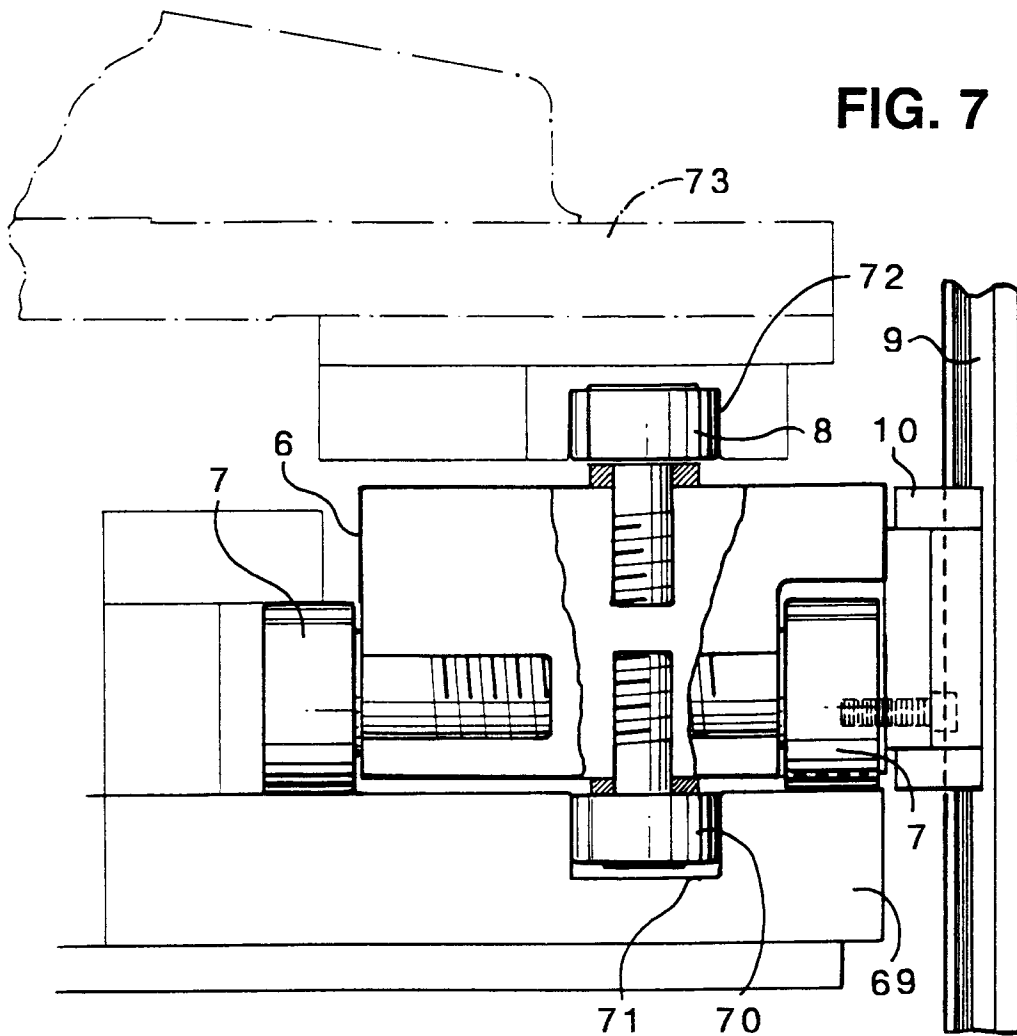


FIG. 7

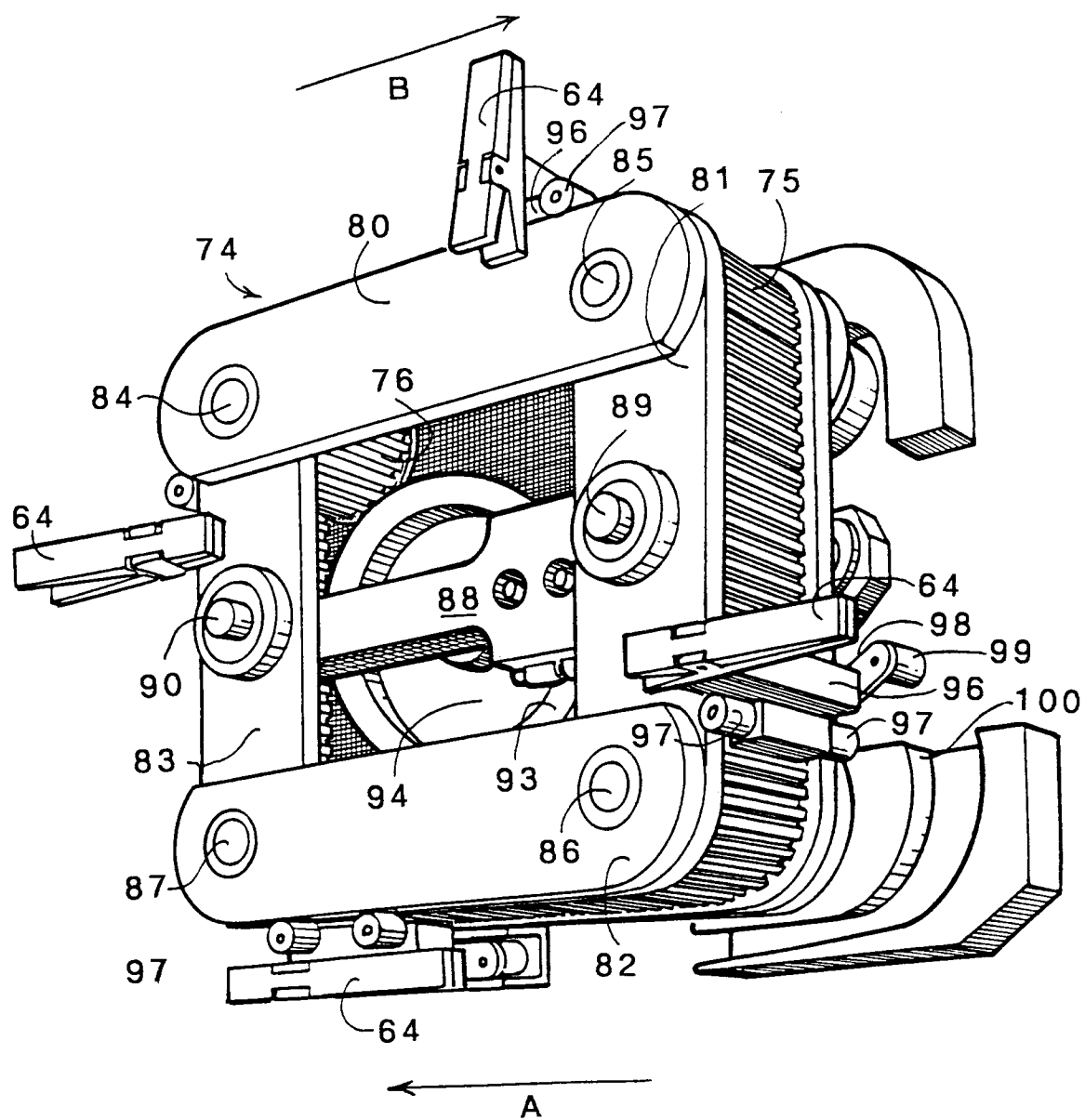


FIG. 8

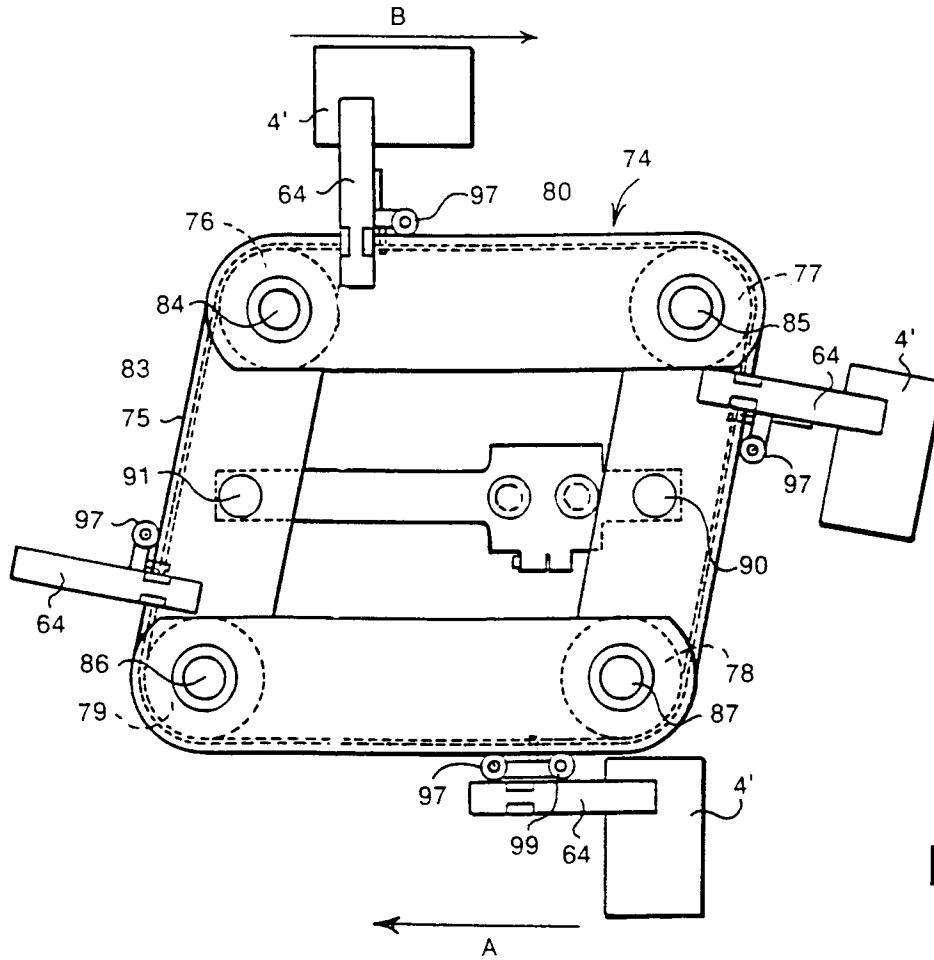


FIG. 9

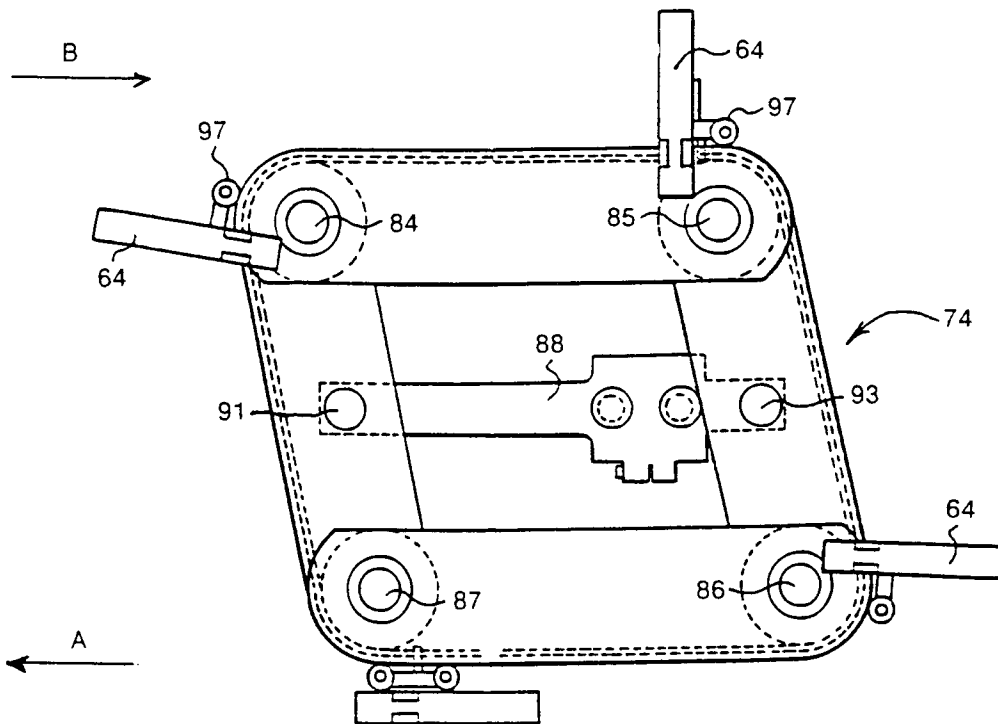


FIG. 10

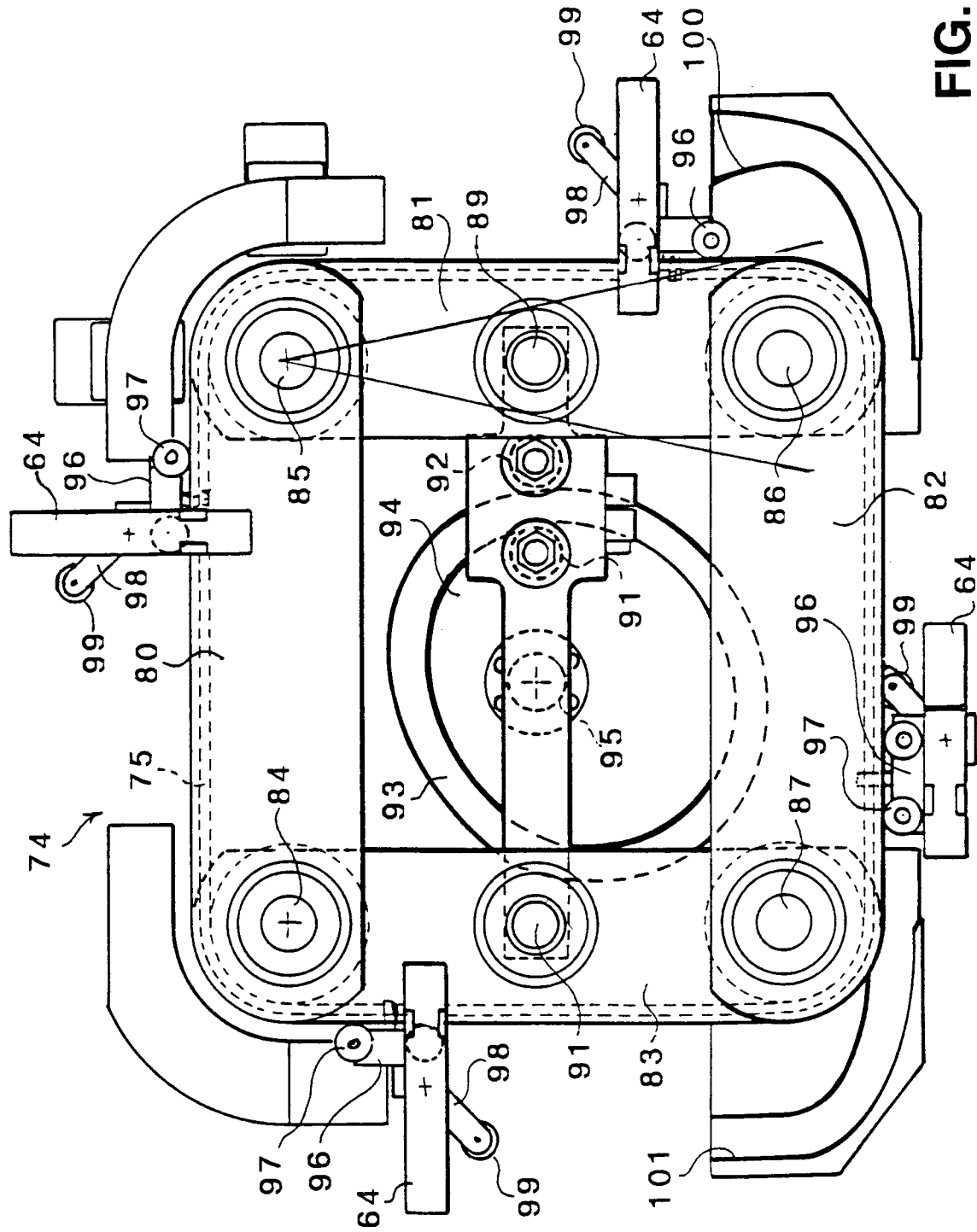


FIG. 11

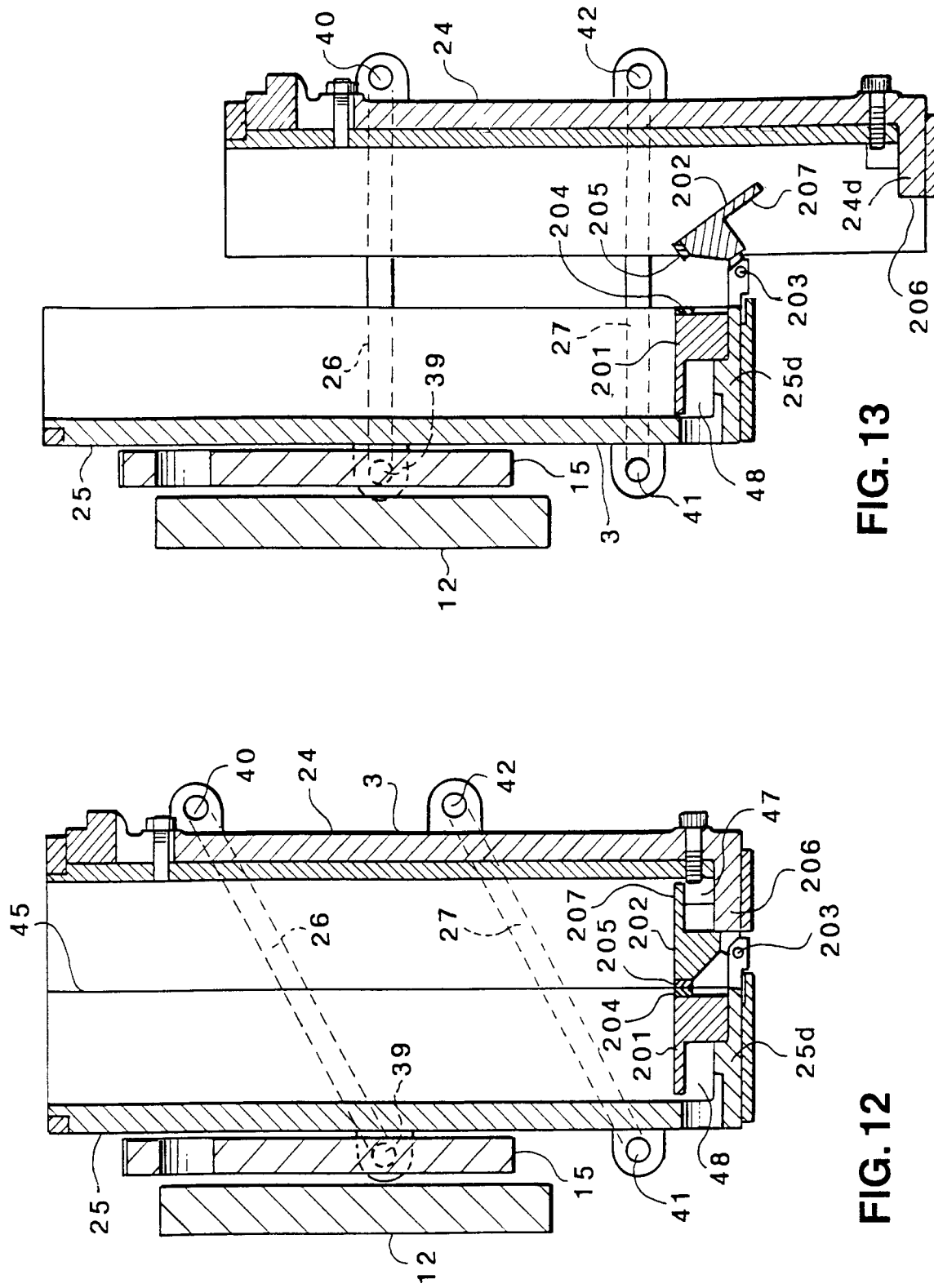


FIG. 13

FIG. 12



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 96 30 8531

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)
A	US 2 281 516 A (T.M. ROYAL) 28 April 1942 * the whole document *	1-5,9, 10,18	B65B43/30
A	US 2 932 142 A (W. SINDZINSKI) 12 April 1960 * column 1, line 44 - column 2, line 10; figures 1,2 *	1,2	
A	DE 44 35 294 A (SIG) 22 June 1995 * column 2, line 4-41; figure 1 *	1,16	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			B65B
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
THE HAGUE		15 April 1997	Grentzius, W
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03.82 (POMC01)



European Patent
Office

CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing more than ten claims.

- ☐ All claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for all claims.
- ☒ Only part of the claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid,
namely claims: **11 - 23**
- ☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirement of unity of invention and relates to several inventions or groups of inventions,
namely:

- ☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.
- ☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respects of which search fees have been paid,
namely claims:
- ☐ None of the further search fees has been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims,

namely claims