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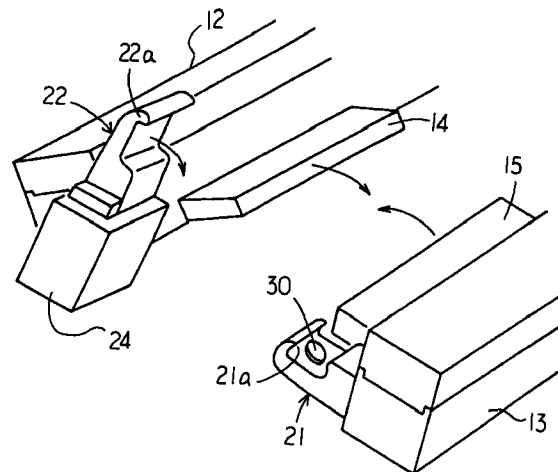
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**(54) Press in a filling and packaging apparatus**

(57) There is provided a press (20) capable of surely applying the pressure for a long period of time in the lateral sealing process in a high-speed filling and packaging apparatus for manufacturing package containers each having a rectangular shape, etc. in cross section and filled with a fluid content such as juice. The press (20) comprises seal bars (14 and 15) and a pair of engaging members (21 and 22) for producing a sealing pressure when they engage with each other for permitting seal bars (14 and 15) to nip a packaging material web (1) which is filled with a fluid content and formed in a tubular shape, wherein the press (20) further comprises a buffer material (30) provided at least one of the engaging members (21 and 22) at a part where a tip end of the other of said engaging members (21 and 22) contacts.

FIG. 3



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## Description

The present invention relates to a press used in a lateral sealing process in a filling and packaging apparatus for manufacturing package containers each having a rectangular shape, etc. in cross section and filled with a fluid content such as juice.

There is known a conventional filling and packaging apparatus comprising a rewinder for supporting a web serving as a packing material (hereinafter referred to simply as packaging material web) in a rolled state, a winding apparatus for winding the web in order from the rewinder, a tube-forming apparatus for forming the wound web in a tubular shape after sterilizing it, a fluid supply pipe for filling fluid content in the packaging material web which was formed in the tubular shape, and a container-forming apparatus for laterally sealing the web and cutting sealed parts of the web to continuously form pillow-like containers each having a rectangular shape in cross section while downwardly supplying the tube filled with the fluid content by the length corresponding to one container, and a container shaping apparatus for bending each end part of the pillow-like containers which are separated into individual ones to shape each pillow-like container in a parallelepiped container to be finally obtained (as disclosed in JP-B 1-23366 and JP-A 58-193206).

The aforementioned container-forming apparatus nips a tube filled with a fluid content by a length corresponding to one container and seals it laterally, and cuts the intermediate portion of the sealed part of the tube as disclosed in JP-B 1-23366, wherein it comprises two pairs of seal bars respectively disposed to oppose each other and a press for producing a sealing pressure between the seal bars when they are positioned in a closing position where they approach to each other.

The above-mentioned conventional press comprises a stationary engaging member having an upward engaging recess and a movable engaging member having a downward engaging protrusion engaging with the engaging recess of the stationary engaging member, wherein the movable engaging member is secured to a piston rod of a hydraulic cylinder, and the piston rod is retreated in a state where the movable engaging member moves pivotally to engage with the stationary engaging member so that a sufficient sealing pressure is produced between the seal bars.

The inventors of the application have developed a superhigh-speed filling and packaging apparatus capable of manufacturing containers at rate far in excess of 6000 pieces per hour which has been made so far, namely, more than 8000 pieces of containers per hour (as disclosed in Japanese Patent Application No. 8-244707). If the lateral sealing is performed at high speed using a conventional press in such a filling and packaging apparatus, the movable engaging member contacts a stationary engaging member while it moves pivotally to produce noisy shock sound, and the mov-

ble and stationary engaging members are damaged to produce breakage at the damaged part.

If the lateral sealing process which is performed at high-speed is repeated, although the engaging members are designed to have a sufficient durability, there is a possibility of producing damage such as cracks at portions where a linear part of the movable engagement member is changed to a circular arc part at the portion where the movable engaging member engage with the stationary engaging member. In such a case, the tip end of the engaging member is broken through the cracks when the engaging members strike against or contact with each other or when they engage with each other to produce a sealing pressure of about 350 Kgf by a hydraulic cylinder.

The breakage of the engaging member does not occur in proportion to the working time thereof but suddenly occurs at an unexpected time. Further, since the cracks produced in the engaging members are very small, it is difficult to find out such cracks before the filling and packaging apparatus is operated or during the sealing operation. As a result, it was impossible to prevent the production of the inferiorly sealed package containers because the press does not operate normally to perform the incomplete lateral sealing and the contents filled in the package containers are leaked.

The present invention is to provide a press capable of surely applying the pressure for a long period of time in the lateral sealing process, particularly in a high-speed filling and packaging apparatus.

The inventors of the application have endeavored themselves to study for solving the above problems, and have found that a hole is defined not in the tip end of the movable engaging member but the stationary engaging member against which the tip end of the movable engaging member strikes, and a buffer material is provided in the hole so that the life span of the movable member employed by the lateral sealing apparatus in the high-speed filling and packaging apparatus is increased dramatically although there is expected that the rigidity of the stationary engaging member lowers when the hole is defined therein, and finally they completed the invention based on this finding.

That is, the present invention relates to a press comprising seal bars and a pair of engaging members, wherein the press produces a sealing pressure by a cylinder unit, etc. via the engaging members when they engage with each other for permitting the seal bars to nip a packaging material web which is filled with a fluid content and formed in a tubular shape, wherein the press further comprises a buffer material provided at least on one of the engaging members at a part where a tip end of the other of the engaging members contacts.

Further, the present invention relates to the press comprising seal bars and a pair of engaging members, wherein the press produces a sealing pressure by a cylinder unit, etc. via the engaging members when they

engage with each other for permitting the seal bars to nip a packaging material web which is filled with a fluid content and formed in a tubular shape, wherein one of the engaging members comprises a movable engaging member which moves pivotally relative to the seal bar wherein the buffer material is engaged in or protruded from the stationary engaging member.

The present invention also relates to a filling and packaging apparatus provided with the aforementioned press.

Fig. 1 is a schematic perspective view of a high-speed filling and packaging apparatus;

Fig. 2 is a perspective view of a lateral sealing apparatus;

Fig. 3 is a schematic perspective view of a press of the present invention;

Fig. 4 is a plan view of the press of the present invention; and

Fig. 5 is a longitudinal sectional view of the press of the present invention.

A press according to a preferred embodiment will be now described with reference to the attached drawings. However, the present invention is not limited to the embodiment set forth hereunder and drawings.

A filling and packaging apparatus for which the press of the present invention is particularly adapted comprises, as shown in Fig. 1, a rewinder for supporting a packaging material web 1 in a rolled state, a winding apparatus for winding the web in order from the rewinder, a tube-forming apparatus for forming the wound web in a tubular shape after sterilizing it, a liquid supply pipe 2 for filling a fluid content in the packaging material web which was formed in the tubular shape, and a lateral sealing apparatus 4 for laterally sealing the web and cutting sealed parts of the web to continuously form pillow-like containers 3 while downwardly supplying the tube filled with the fluid content by the lengths corresponding to one container, a cutting apparatus 5 disposed under the lateral sealing apparatus for cutting sealed parts of pillow-like containers in a suspended state to separate the containers one by one, and a container shaping apparatus for bending the end parts of each separated pillow-like container to shape each pillow-like container 3 in a parallelepiped container 6 to be finally obtained.

As the lateral sealing apparatus 4, it is possible to use the apparatus as disclosed in the aforementioned JP-B 1-23366, wherein it comprises, as shown in Fig. 2, vertical rods 10 which are movable upward and downward and also turnable reversely, movable frames 11 which are movable together with the vertical rods 10 and are secured to the vertical rods 10, a pair of front and back pressure arms 12 and 13 which are respectively supported by the movable frames 11 at the lower portions thereof so as to move pivotally about a pair of parallel horizontal axes, a pair of front and back seal

bars 14 and 15 which are respectively secured to and oppose each other over the pressure arms 12 and 13, an arm-closing device 16 for moving the pressure arms 12 and 13 pivotally between a closing position where the seal bars 14 and 15 approach to each other and an opening position where the seal bars 14 and 15 move away from each other, and a press 20 for pulling the pressure arms 12 and 13 toward each other in the closing position to produce the sealing pressure between the seal bars 14 and 15.

Two movable frames 11 synchronously move upward and downward alternately in a different direction with a given stroke. That is, when one movable frame 11 moves upward, the other movable frame 11 moves downward. When the movable frame 11 is located at the upper limit position of the ascending stroke, the seal bars 14 and 15 mutually close so that a tube 7 is forcibly pressed and sealed with a prescribed width in a lateral sectional shape. When the seal bars 14 and 15 descend together with the movable frame 11 while they press the tube 7, the tube 7 is fed by the length corresponding to one container. When the movable frame 11 reaches the lower limit position, the seal bars 14 and 15 open to release the tube 7.

Next, the press 20 will be now described more in detail with reference to Figs. 2 to 5.

As shown in Figs. 2 and 3, the press 20 comprises a pair of right and left stationary engaging members which are respectively integrally formed with the seal bar 15 of the pressure arm 13 at both sides thereof and each having an upper engaging recess 21a, and movable engaging members 22 which are respectively integrally formed with the seal bar 14 of the pressure arm 12 at both sides thereof and each having a downward engaging protrusion 22a which engages with the engaging recess 21a of the stationary engaging member 21.

A cylinder unit 23 has a hydraulic cylinder 24, and the movable engaging member 22 is secured to a piston rod 25 of the hydraulic cylinder 24, as shown in Fig. 4. The hydraulic cylinder 24 includes an air supply pipe 26a for supplying air to an air pressure chamber 26 for always biasing the piston rod 25 in a retreating position, and an oil supply pipe 27a for supplying oil to an oil pressure chamber 27 for retreating the piston rod 25 against the biasing force when the stationary engaging member 21 and the movable engaging member 22 engage with each other.

Each of the hydraulic cylinders 24 is integrally provided at both ends of a horizontal rotary shaft which penetrates a prismatic block 28 of the pressure arm 12 and is integrated with the block 28, and which is rotatably supported via a pair of bushes 29.

The stationary engaging member 21 has a buffer material 30 provided at a part where the tip end of the movable engaging member 22 contacts the stationary engaging member 21 when the movable engaging member 22 pivotally moves as shown in Fig. 5. The

buffer material 30 has a large diameter part 30a and a small diameter part 30b which respectively have a circular shape in cross section, and a notch 31 is defined in the small diameter part 30b. An engaging hole is defined in the stationary engaging member 21 at the part and a neighborhood thereof where the tip end of the movable engaging member 22 contacts for engaging the buffer material 30 therein, and a large diameter hole and a small diameter hole are respectively defined in the stationary engaging member 21 corresponding to the large diameter part 30a and small diameter part 30b.

In addition to the aforementioned arrangement of the buffer material 30, the buffer material may be disposed on the movable engaging member 22 at the portion where the tip end of the stationary engaging member 21 contacts the movable engaging member 22 by the pivotal movement of the movable engaging member 22. That is, although the buffer material 30 may be disposed at the portion where the tip end of at least one of the engaging members contacts the other of the engaging members, it is preferable that the buffer material 30 is disposed on the stationary engaging member 21 because of the possibility that the buffer material 30 comes off or the like when the buffer material 30 is disposed on the movable engaging member 22 which pivotally moves at high-speed.

However, the arrangement of the buffer material 30 at the tip end of at least one of the engaging members causes the mechanical shock to concentrate, and also causes the buffer material 30 to be very fatigued and deteriorated, and also causes the reduction of the intensity of the sealing pressure since the buffer material 30 serves as a cushion when the stationary engaging member 21 and movable engaging member 22 engage with each other, and hence such arrangement is not preferable.

The shape of the buffer material 30 is not limited to the circular one in cross section, but may be appropriately set to a square one in cross section, etc. It is possible to use any one of elastic materials which can absorb the mechanical shock and which is excellent in wear resistance as a material of the buffer material 30, for example, a synthetic resin such as high-density polyethylene and urethane rubber, etc.

The buffer material 30 is engaged in the large diameter hole from the small diameter part 30b thereof until the large diameter part 30a thereof contacts the bottom surface of the large diameter hole. The buffer material 30 is fixed to the stationary engaging member 21 when the tip end of a plate 28 which is fixed to the lower surface of the stationary engaging member 21 by a bolt is inserted into the notch 31 of the buffer material 30 which is positioned under the lower surface of the stationary engaging member 21.

The buffer material 30 has a length capable of penetrating the stationary engaging member 21 in the above embodiment but it may have any length if it can

be fixed to the stationary engaging member 21 not to come off from the stationary engaging member 21, for example, the buffer material 30 may have a length capable of engaging in the stationary engaging member 21 at a part thereof or may have a thickness to the extent that it can be bonded to the surface of the stationary engaging member 21.

It is preferable that a part of the large diameter part 30a of the buffer material 30 protrudes from the upper surface 21b of the stationary engaging member 21 when the buffer material 30 is fixed to the stationary engaging member 21. As a result, the tip end of the movable engaging member 22 contacts the buffer material 30 in a state where the buffer material 30 protrudes from the upper surface 21b of the stationary engaging member 21 so that the movable engaging member 22 does not directly strike against the stationary engaging member 21.

The lateral sealing process is described next. When the pressure arms 12 and 13 pivotally move from the opening position to the closing position, the movable engaging member 22 remains in the forward upward inclined position from the state where it crosses at right angles with the pressure arms 12 and 13. When the pressure arms 12 and 13 reach the portion close to the closing position, the movable engaging member 22 turns together with the hydraulic cylinder 24 and changes its position from the upward inclined position to a horizontal position, and the tip end thereof contacts the buffer material 30 provided on the stationary engaging member 21.

When the piston rod 25 is retreated from the hydraulic cylinder 24 by the supply of oil serving as operation fluid from the oil supply pipe 27a to the oil pressure chamber 27, the movable engaging member 22 moves together with the piston rod 25 while it slides on the buffer material 30 so that the stationary engaging member 21 and movable engaging member 22 engage with each other to pull toward each other. As a result, the seal bars 14 and 15 on which the stationary engaging member 21 and movable engaging member 22 are fixedly mounted are also pulled toward each other, thereby producing a sealing pressure between the seal bars so that the tube 7 is pressurized to complete the lateral sealing.

When the oil serving as operation fluid is discharged from the oil pressure chamber 27 through the oil supply pipe 27a before the pressure arms 12 and 13 move pivotally from the closing position to the opening position, air is always supplied to the air pressure chamber 26 through the air supply pipe 26a so that the biasing force always operates to advance the piston rod 25, thereby releasing the engagement between the stationary engaging member 21 and movable engaging member 22. As a result, the movable engaging member 22 is changed in position from the state where it crosses at right angles with the pressure arm 12 to the state where it is inclined forward upward. Thereafter the similar

operations are repeated.

According to the present invention, even if it is applied to a high-speed filling and packaging apparatus capable of manufacturing containers over the 8000 packs or more per hour, the pressure application can be surely performed for a long period of time in the lateral sealing process, and improves a working environment which has produced unpleasant noise. 5

The features disclosed in the foregoing description, in the claims and/or in the accompanying drawings may, both separately and in any combination thereof, be material for realising the invention in diverse forms thereof. 10

## Claims 15

1. A press (20) comprising seal bars (14 and 15) and a pair of engaging members (21 and 22) for producing a sealing pressure when they engage with each other for permitting said seal bars (14 and 15) to nip a packaging material web (1) which is filled with a fluid content and formed in a tubular shape, said press (20) further comprising a buffer material (30) provided at least on one of said engaging members (21 and 22) at a part where a tip end of the other of said engaging members (21 and 22) contacts. 20 25
2. The press (20) according to Claim 1, wherein the buffer material (30) is engaged in at least one of said engaging members (21 and 22). 30
3. The press (20) according to Claim 1 or 2, wherein the buffer material (30) is provided on at least one of said engaging members (21 and 22) to protrude therefrom. 35
4. The press (20) according to any of Claims 1 to 3, wherein a pair of engaging members (21 and 22) each comprises a movable engaging member (22) which is pivotally movable relative to the seal bar (14 or 15) and a stationary engaging member (21) which is fixed to the seal bar (15 or 14). 40
5. The press (20) according to any of Claims 1 to 4, wherein the buffer material (30) is provided on the stationary engaging member (21). 45
6. The press (20) according to any of Claims 1 to 5, wherein the engaging members (21 and 22) engages with each other by a cylinder unit (23). 50
7. A filling and packaging apparatus provided with the press (20) as set forth in Claims 1 to 6. 55

FIG. 1

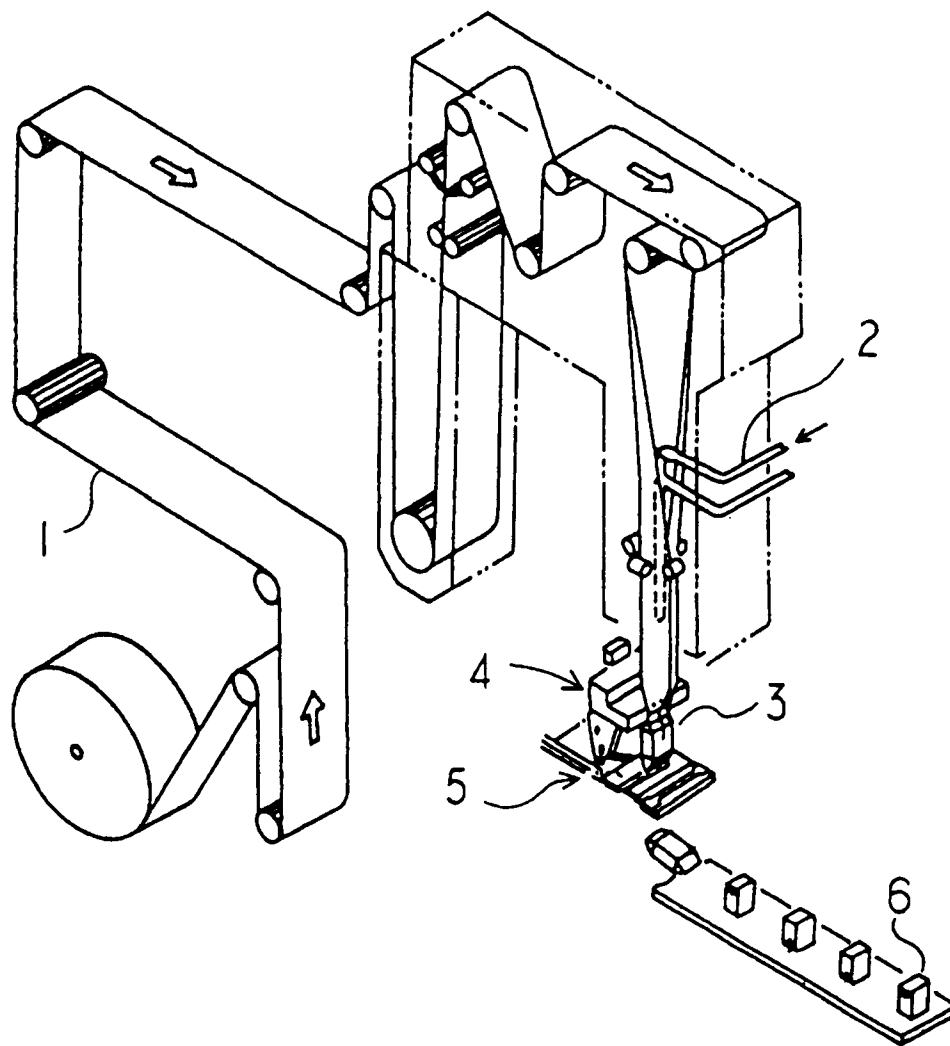


FIG. 2

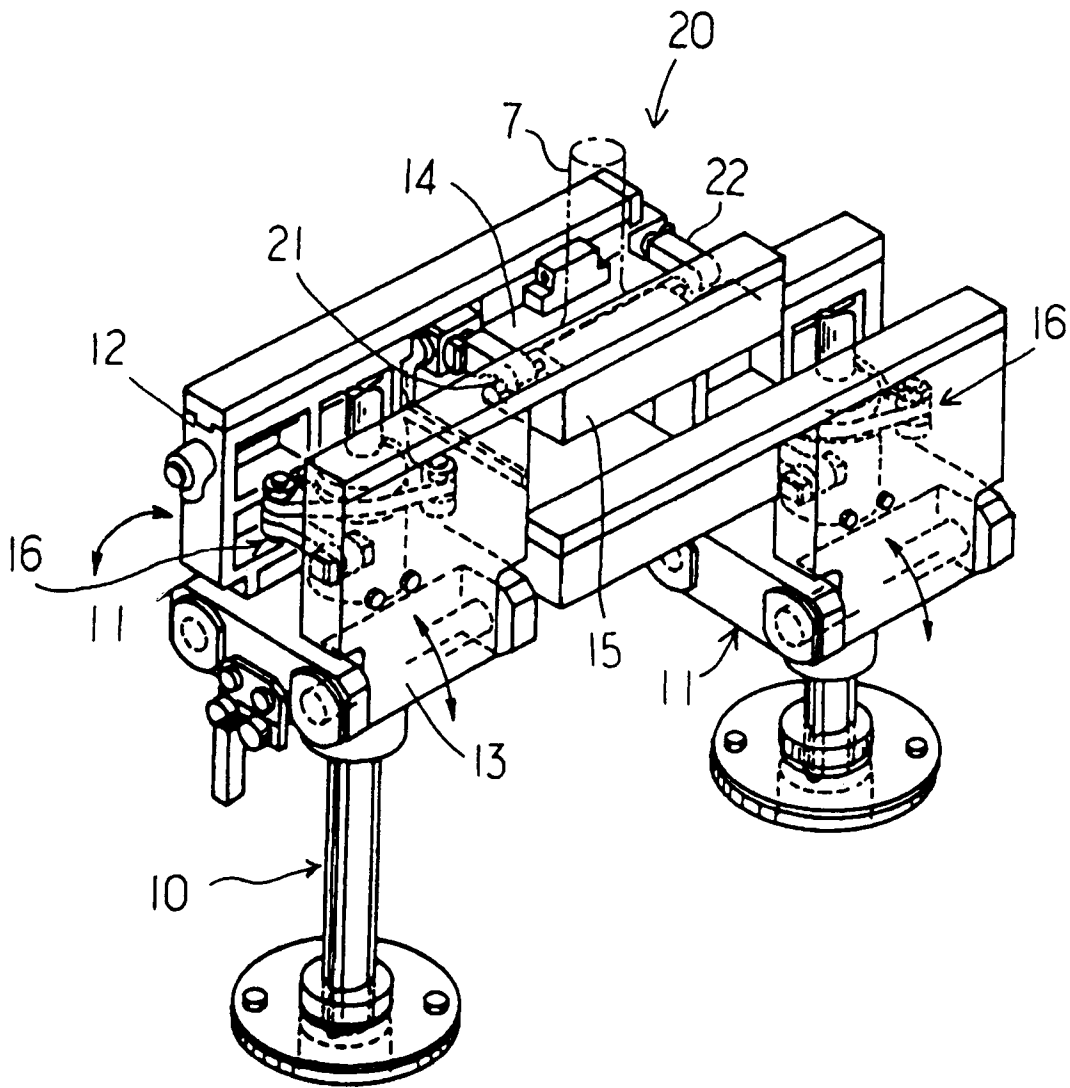


FIG. 3

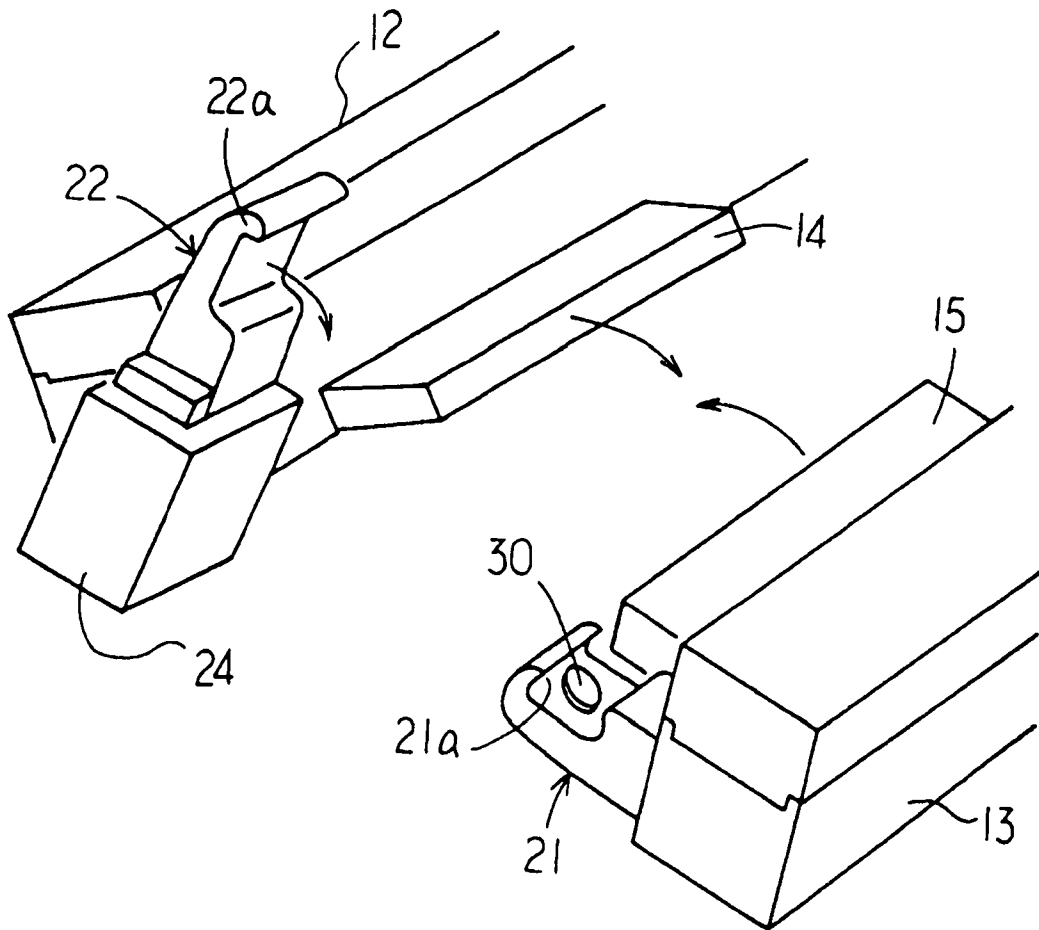


FIG. 4

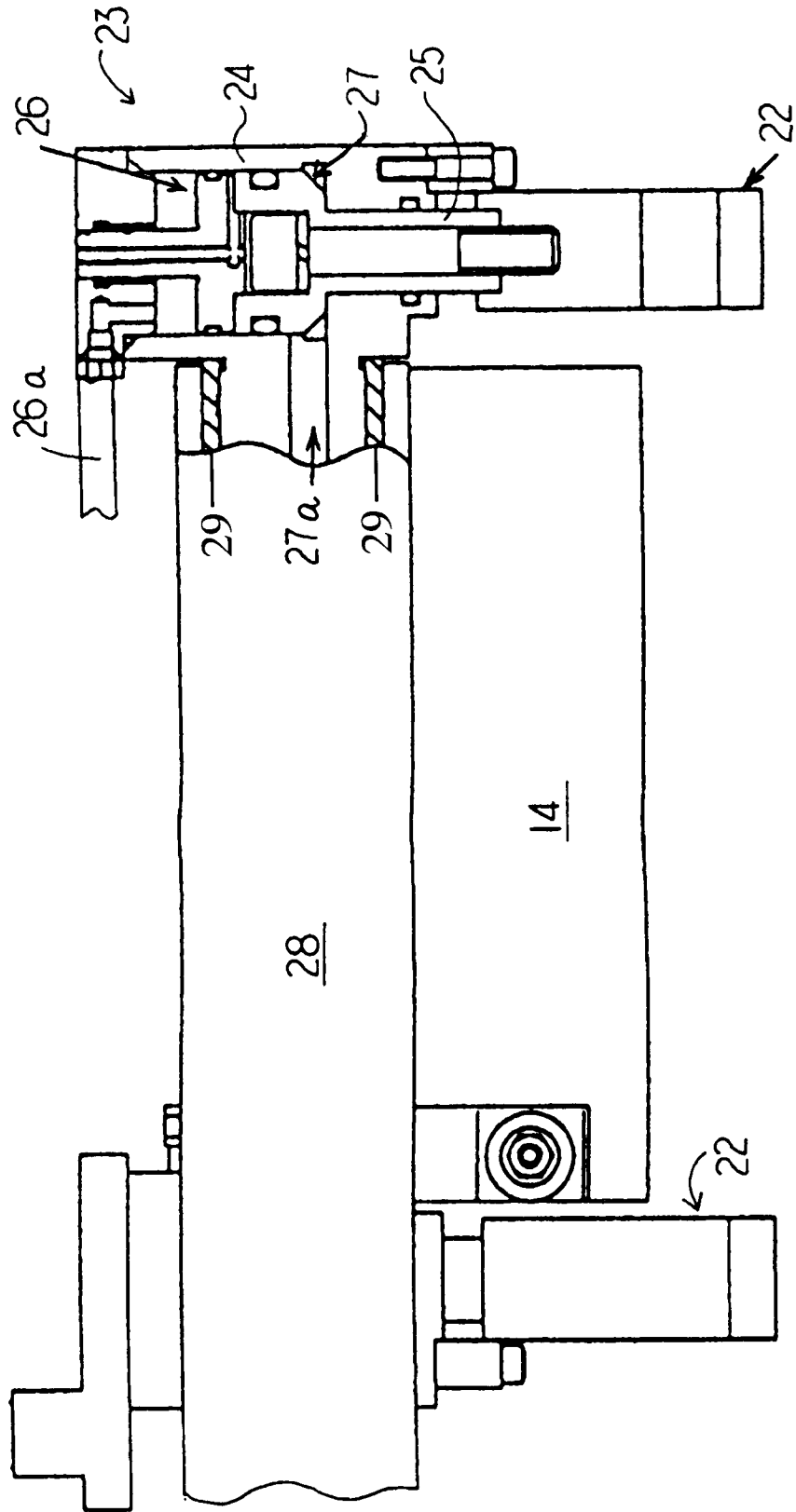
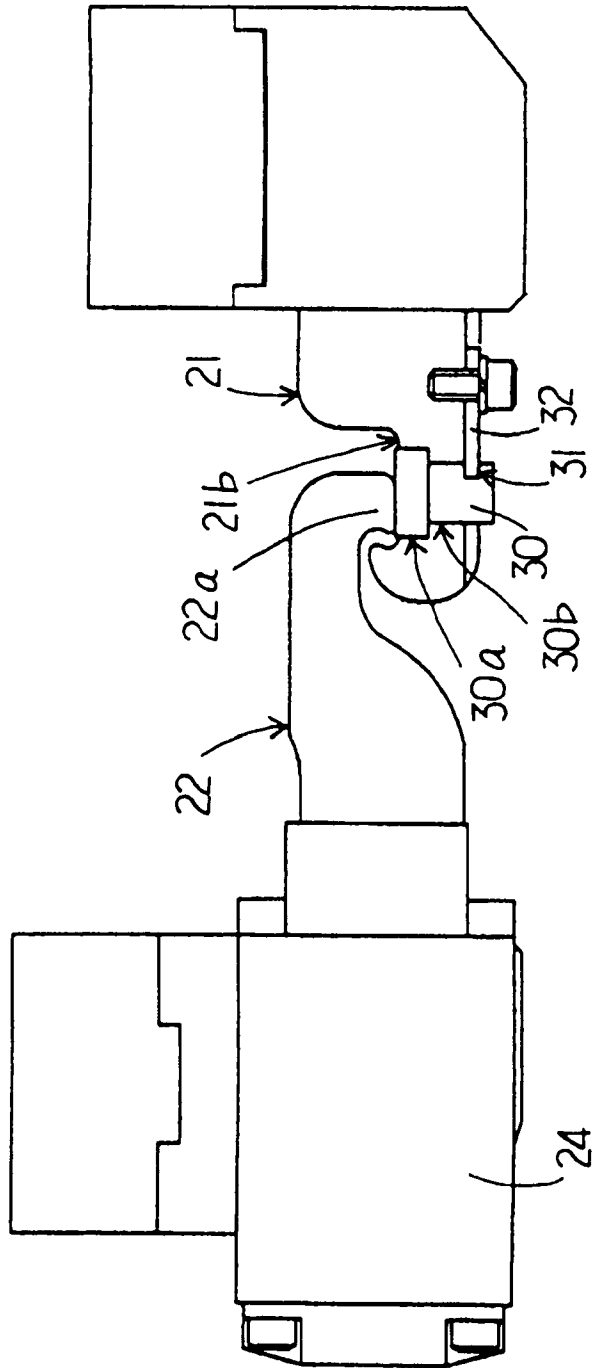


FIG. 5





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EUROPEAN SEARCH REPORT

Application Number  
EP 97 11 6473

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	EP 0 258 953 A (SHIKOKU KAKOKI) 9 March 1988 * column 5, line 16-30; figures 8-10 * -----	1-7	B65B51/30
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			B65B
The present search report has been drawn up for all claims			
Place of search <b>THE HAGUE</b>		Date of completion of the search <b>6 January 1998</b>	Examiner <b>Grentzius, W</b>
<p>CATEGORY OF CITED DOCUMENTS</p> <p>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</p> <p>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                      .....                      &amp; : member of the same patent family, corresponding document</p>			

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