



Europäisches Patentamt
European Patent Office
Office européen des brevets



Publication number: **0 545 483 A1**

EUROPEAN PATENT APPLICATION

Application number: **92203665.2**

Int. Cl.⁵: **B65B 43/58, B65B 59/00, B65B 43/59**

Date of filing: **27.11.92**

Priority: **29.11.91 JP 316945/91**

Date of publication of application: **09.06.93 Bulletin 93/23**

Designated Contracting States: **CH DE DK FR GB LI NL SE**

Applicant: **Shikoku Kakoki Co., Ltd.**
10-1, Aza-Nishinokawa Tarohachizu
Kitajima-cho
Itano-gun Tokushima(JP)

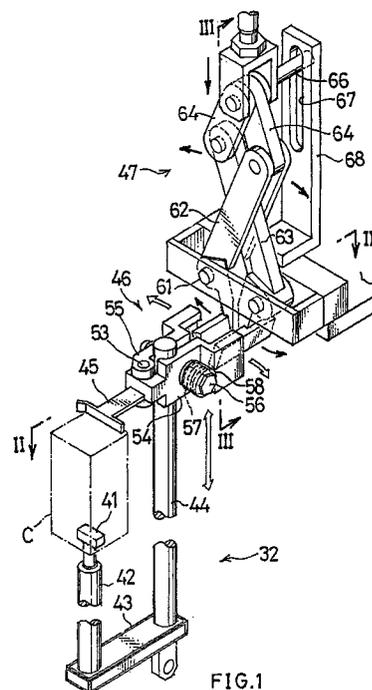
Inventor: **Ueda, Michio, c/o Shikoku Kakoki Co.,Ltd.**
10-1, Aza-Nishinokawa, Tarohachizu
Kitajima-cho, Itano-gun, Tokushima(JP)
Inventor: **Wakabayashi,Shigeru, c/o Shikoku**

Kakoki Co.,Ltd.
10-1, Aza-Nishinokawa, Tarohachizu
Kitajima-cho, Itano-gun, Tokushima(JP)
Inventor: **Fujikawa, Yasuji, c/o Shikoku Kakoki Co.,Ltd.**
10-1, Aza-Nishinokawa, Tarohachizu
Kitajima-cho, Itano-gun, Tokushima(JP)
Inventor: **Abe, Kazuo, c/o Shikoku Kakoki Co.,Ltd.**
10-1, Aza-Nishinokawa, Tarohachizu
Kitajima-cho, Itano-gun, Tokushima(JP)

Representative: **Vollebregt, Cornelis Jacobus, Ir. et al**
P.O. Box 645
NL-5600 AP Eindhoven (NL)

Apparatus for filling containers with a specified amount of liquid.

An apparatus for filling a plurality of kinds of containers C having different heights with a liquid in specified amounts corresponding to the respective different heights of the containers C has a filling nozzle 31 disposed above a path of transport formed by a container conveyor 11, and a lifter 32 for moving the container C to be filled upward from the conveyor 11 and downward over a stroke length corresponding to the height of the container C. The lifter 32 comprises a container pushing-up vertical lift rod 42 disposed below the filling nozzle 31 and having a container support 41 at its upper end, a container depressing lift rod 44 extending beside the vertical lift rod 42 upward beyond the level of the upper end of the vertical lift rod 42 and having a container holder 45, and means for adjusting a difference in level between the container support 41 and the container holder 45 so that the level difference become approximately equal to the height of the container C to be filled.



EP 0 545 483 A1

BACKGROUND OF THE INVENTION

The present invention relates to an apparatus for filling a liquid in specified amounts, and more particularly to an apparatus adapted to fill a plurality of kinds of containers having different heights with a liquid in specified amounts corresponding to the respective different heights of the containers.

FIG. 6 shows a known apparatus of the type mentioned which has a filling nozzle 72 disposed above a path of transport formed by a container conveyor 71, and a lifter 73 provided with cams 81, 82 which are equal in number to the number of kinds of containers having different heights and which correspond to the respective kinds of containers. The lifter 73 is adapted to move the container C to be filled upward from the conveyor 71 and downward over a stroke length corresponding to the height of the container C. The lifter 73 comprises a container pushing-up vertical lift rod 75 disposed below the filling nozzle 72 and having a container support 74 at its upper end, a container depressing lift rod 77 extending beside the vertical lift rod 75 upward beyond the level of the upper end of the rod 75 and having a container holder 76, and means for adjusting a difference in level between the container support 74 and the container holder 76 so that the level difference becomes approximately equal to the height of the container C to be filled. The level adjusting means has a hydraulic cylinder 78 having a piston connected to the vertical lift rod 75 and a body connected to the depressing lift rod 77 so as to alter the position of the two lift rods 75, 77 relative to each other longitudinally thereof.

For the above conventional apparatus to handle different kinds of containers C of varying heights, the position of the two lift rods 75, 77 relative to each other is altered by the hydraulic cylinder 78. The hydraulic cylinder 78, which is essential for this purpose, moves upward and downward with the upward and downward movement of the two lift rods 75, 77. Accordingly, the portion which is movable upward and downward together with the lift rods 75, 77 has a great weight, which requires a great drive force for effecting this movement at a higher speed, making it difficult to realize a high-speed movement.

SUMMARY OF THE INVENTION

The main object of the present invention is to provide an apparatus for filling specified amounts of liquid of the type described which is reduced in the weight of the lifter portion to be moved upward and downward with the container pushing-up and depressing lift rods.

The present invention provides an apparatus for filling a plurality of kinds of containers having different heights with a liquid in specified amounts corresponding to the respective different heights of the containers, the apparatus having a filling nozzle disposed above a path of transport formed by a container conveyor, and a lifter for moving the container to be filled upward from the conveyor and downward over a stroke length corresponding to the height of the container, the lifter comprising a container pushing-up vertical lift rod disposed below the filling nozzle and having a container support at its upper end, a container depressing lift rod extending beside the vertical lift rod upward beyond the level of the upper end of the vertical lift rod and having a container holder, and means for adjusting a difference in level between the container support and the container holder so that the level difference becomes approximately equal to the height of the container to be filled. The apparatus is characterized in that the level difference adjusting means has a chuck provided on the container holder and releasably held to the depressing lift rod, the chuck being free to move relative to the depressing lift rod when released therefrom.

With the apparatus of the present invention, the level difference adjusting means has a chuck provided on the container holder, releasably held to the depressing lift rod, and freely movable relative to the depressing lift rod when released therefrom, so that the position where the container holder is attached to the depressing lift rod can be altered according to the height of containers to be filled to make the level difference between the container support and the container holder equal to the height. This renders the apparatus serviceable for containers of different heights without necessitating a hydraulic cylinder, consequently ensuring a reduction in the weight of the lifter portion to be moved upward and downward along with the container pushing-up and depressing lift rods.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a fragmentary perspective view of an apparatus embodying the invention;

FIG. 2 is a view in section taken along the line II-II in FIG. 1;

FIG. 3 is a view in section taken along the line III-III in FIG. 1;

FIG. 4 is a diagram for illustrating a filling operation for large containers;

FIG. 5 is a diagram for illustrating a filling operation for small containers; and

FIG. 6 is a diagram corresponding to FIG. 4 or 5 and illustrating a conventional apparatus.

DESCRIPTION OF THE PREFERRED EMBODIMENT

An embodiment of the invention will be described next with reference to the drawings.

FIG. 4 shows a filling station of a packaging machine. A filling apparatus 12 embodying the invention is provided at this station.

The packaging machine is designed to produce different kinds of containers which are same in cross sectional area, but are given varying heights and thereby made different in capacity. The machine is provided with a container conveyor 11 extending via the filling station, and the filling apparatus 12 disposed at the filling station.

The container conveyor 11 has holders 11 for holding containers C by restraining the container C from moving horizontally while permitting the container to move freely vertically, and a liftable rail 22 extending below the path of movement of the holders 21 in parallel thereto for supporting the bottoms of the containers C held by holders 21 and guiding the containers.

The level of the rail 22 is adjustable by an unillustrated level adjusting device so that the different kinds of containers C of varying heights have their upper ends positioned at a constant level during transport.

The filling apparatus 12 comprises a filling nozzle 31 disposed above the path of transport formed by the container conveyor 11, and a lifter 32 for moving the container C upward from the conveyor 11 and downward over a stroke length corresponding to the height of the container C.

The liquid to be filled is fed by an unillustrated metering cylinder to the filling nozzle 11 in an amount at a time which amount corresponds to the height of the container C.

The lifter 32 comprises a container pushing-up vertical lift rod 42 provided below the filling nozzle 31 and having a container support 41 at its upper end, a container depressing lift rod 44 connected to the vertical lift rod 42 by a horizontal bar 43 so as to move therewith upward and downward and extending beside the vertical lift rod 42 upward beyond the level of the upper end of the rod 42, a container holder 45 attached to the depressing lift rod 44 by a chuck 46, and a release mechanism 47 for releasing the chuck 46.

A pivotal arm 49 has an outer end connected to the horizontal bar 43 by a link 48, and a base end fixed to a horizontal rotary shaft 52 which is coupled to the output shaft of a servomotor 51.

As shown in detail in FIGS. 1 and 2, the chuck 46 comprises a first chuck member 54 and a second chuck member 55 connected to each other by a vertical pin 53 at their base portions and respectively formed in opposed faces with re-

cessed portions 54a, 55a holding the depressing lift rod 44 therebetween.

The first chuck member 54 is joined to a base portion of the container holder 45 and extends in a direction opposite to this portion. The two chuck members 54, 55 respectively have bolt holes 54b, 55b positioned closer to their forward ends than the recessed portions 54a, 55a and in alignment with each other. A fastening bolt 56 is inserted through these bolt holes 54b, 55b. A compression spring 57 and a cap 58 are fitted around the bolt 56 close to its head, and stopper nuts 59 are screwed on the threaded end of the bolt. The two chuck members 54, 55 are provided at their respective forward ends with spaced-apart portions 54c, 55c.

As shown in greater detail in FIGS. 1 and 3, the chuck release mechanism 47 comprises a first chuck release lever 62 and a second chuck release lever 63 which have lower ends extending into the space between the spaced-apart portions 54c, 55c of the chuck members 54, 55 and each of which is supported at an intermediate portion of its length by a horizontal pin 61. The upper portion of the first chuck release lever 62 above the supported point thereof is formed by a pair of parallel bars, while the upper portion of the second chuck release lever 63 above its supported point extends through a space between the bars. Thus, the upper portions of the release levers 62, 63 intersect each other. The release levers 62, 63 have upper ends which are connected to the piston rod of a hydraulic cylinder 65 by a pair of link bars 64. A retaining pin 66 is fixed to the connecting end of the piston rod. A guide member 68 having a vertical slot 67 with the retaining pin 66 fitted therein is provided on a suitable support member.

The chuck release mechanism 47 as held at rest is shown in solid lines in FIG. 3. In this state, the piston rod of the hydraulic cylinder 65 is held retracted, and the lower ends of the chuck release levers 62, 63 are away from the respective spaced-apart portions 54c, 55c of the chuck members 54, 55. When the piston rod of the hydraulic cylinder 65 is advanced from this state as indicated in dot-and-dash lines in FIG. 3, the upper ends of the release levers 62, 63 are pushed downward to move the lower ends of the levers 62, 63 away from each other. This moves the two chuck members 54, 55 away from each other against the force of the spring, relieving the depressing lift rod 44 of the force with which the lift rod is held between the chuck members. Consequently, the container holder 45 becomes movable by the chuck 46 relative to the depressing lift rod 44.

Next, the apparatus will be described with reference to a case wherein a liquid is to be filled into large and small two kinds of containers C1 and C2.

FIG. 4 shows the large container C1 having a great height H1. The apparatus is so adjusted that the rail 22 and the container support 41 are at the same level, and that the container holder 45 is at a slightly higher level than the upper end of the container C1. When the liquid is to be filled, the pivotal arm 49 is lifted by the operation of the servomotor 51 to raise both the lift rods 42, 44 by a stroke length S1 and lift the container C1 off the conveyor 11. With the container C1 lifted to an upper limit position, there is a predetermined distance E between the bottom surface of the container C1 and the lower end of the nozzle 31. As the liquid level in the container C1 rises with the start of filling operation, the container C1 is gradually lowered to maintain the distance E between the rising liquid level and the lower end of the nozzle 31. The container C1 is completely filled with the liquid upon the return of the container C1 to the conveyor 11.

Next, when the container C2 of small height H2 is to be alternatively filled as shown in FIG. 5, the container depressing lift rod 44 is released from the chuck 46, and the two lift rods 42, 44 are raised by a distance equal to the difference between the heights H1 and H2 of the containers C1 and C2, i.e., $h = H1 - H2$. This alters the position of the container holder 45 relative to the depressing lift rod 44 by an amount corresponding to the difference h. In this state, the chuck 46 is caused to hold the lift rod 44, with the level of the rail 22 also adjusted to the level of the container support 41. In the present case, the container C2 is lifted and lowered over a stroke length S2. $S2 = S1 - (H1 - H2)$. The distance E between the bottom surface of the container C2 at an upper limit position and the nozzle lower end is the same as in the case of the large container C2.

The servomotor 51 used in the foregoing embodiment for moving the lift rods 42, 44 may be replaced by a cam mechanism as in the conventional apparatus previously described.

Claims

1. An apparatus for filling a plurality of kinds of containers C having different heights with a liquid in specified amounts corresponding to the respective different heights of the containers C, the apparatus having a filling nozzle(31)-disposed above a path of transport formed by a container conveyor(11),and a lifter(32)for moving the container C to be filled upward from the conveyor(11)and downward over a stroke length corresponding to the height of the container C, the lifter(32)comprising a container pushing-up vertical lift rod(42)disposed below the filling nozzle(31)and having a container support(41)at its upper end, a container depressing lift rod(44)extending beside the vertical lift rod(42)upward beyond the level of the upper end of the vertical lift rod(42)and having a container holder(45),and means for adjusting a difference in level between the container support(41)and the container holder(45)so that the level difference becomes approximately equal to the height of the container C to be filled, the apparatus being characterized in that the level difference adjusting means comprises a chuck (46)provided on the container holder-(45)and releasably held to the depressing lift rod(44),the chuck being free to move relative to the depressing lift rod(44)when released therefrom.
2. An apparatus as defined in claim 1 wherein a chuck release mechanism(47)is provided at a required portion of a path of movement of the chuck(46)held to the container depressing lift rod(44).
3. An apparatus as defined in claim 1 wherein the chuck(46)comprises a pair of chuck members-(54, 55) movable toward or away from each other and each connected at one end to the container holder(45)by a vertical pin(53), the chuck members(54, 55)being so arranged as to hold the container depressing lift rod(44)-between intermediate portions of the chuck members, and a spring (57)for biasing the two chuck members(54, 55)in a direction to move the other ends thereof toward each other.
4. An apparatus as defined in claim 2 wherein the chuck(46)comprises a pair of chuck members-(54, 55) movable toward or away from each other and each connected at one end to the container holder(45)by a vertical pin (53),the chuck members(54, 55)being so arranged as to hold the container depressing lift rod(44)-between intermediate portions of the chuck members, and a spring (57)for biasing the two chuck members(54, 55)in a direction to move the other ends thereof toward each other, and the chuck release mechanism(47)comprises a pair of chuck release levers(62, 63)each having one end extending into a space between the other ends of the chuck members (54, 55) and a hydraulic cylinder(65)having a piston rod connected to the other ends of the chuck release levers (62, 63)by a pair of link bars(64).
5. An apparatus as defined in claim 3 or 4 wherein a fastening bolt(56)extends through the two chuck members(54, 55),and stopper nuts(59)are screwed on a threaded portion of

the bolt(56),the spring(57)being provided between the head of the bolt(56)and the two chuck members(54, 55).

5

10

15

20

25

30

35

40

45

50

55

5

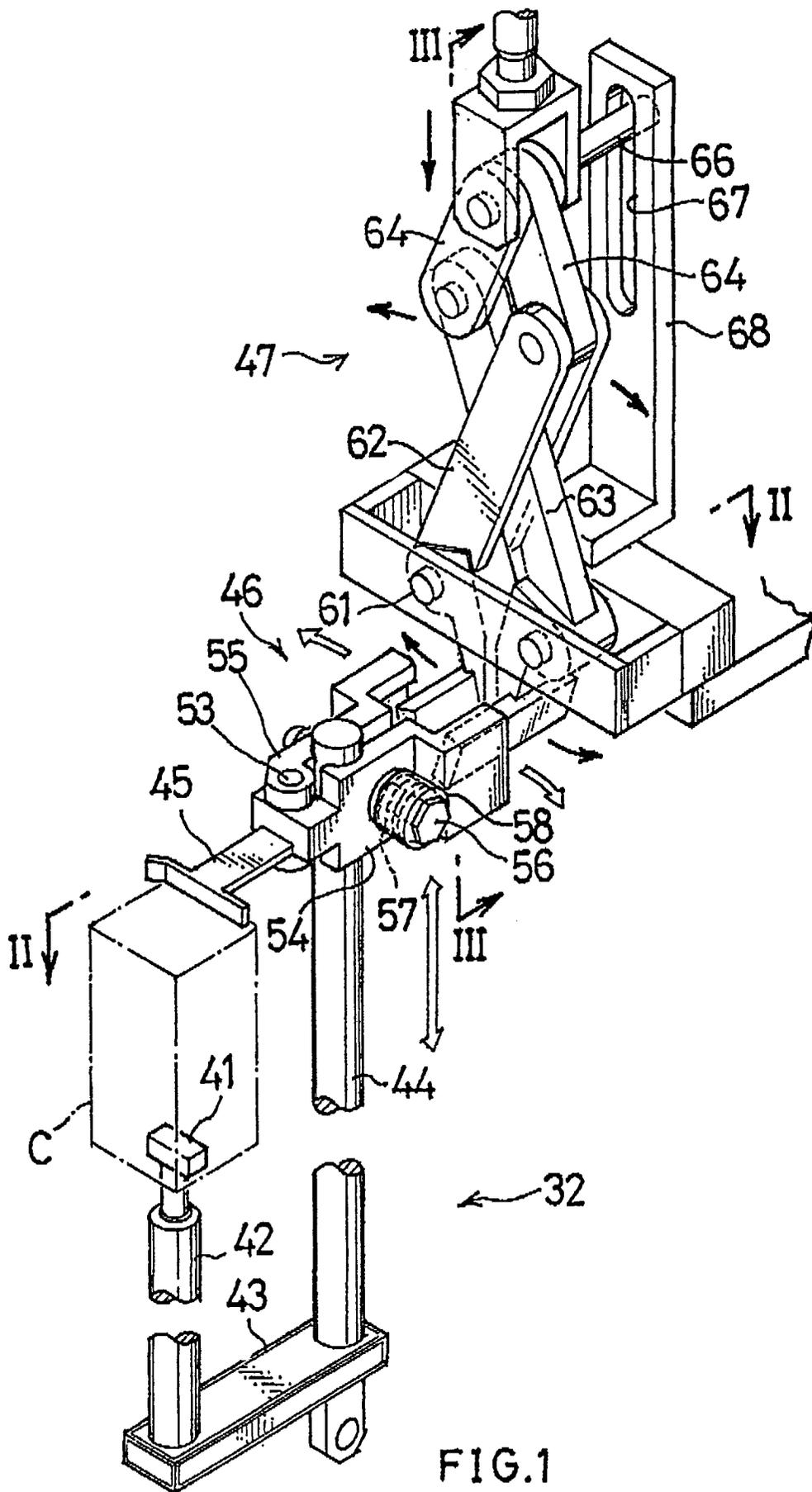


FIG.1

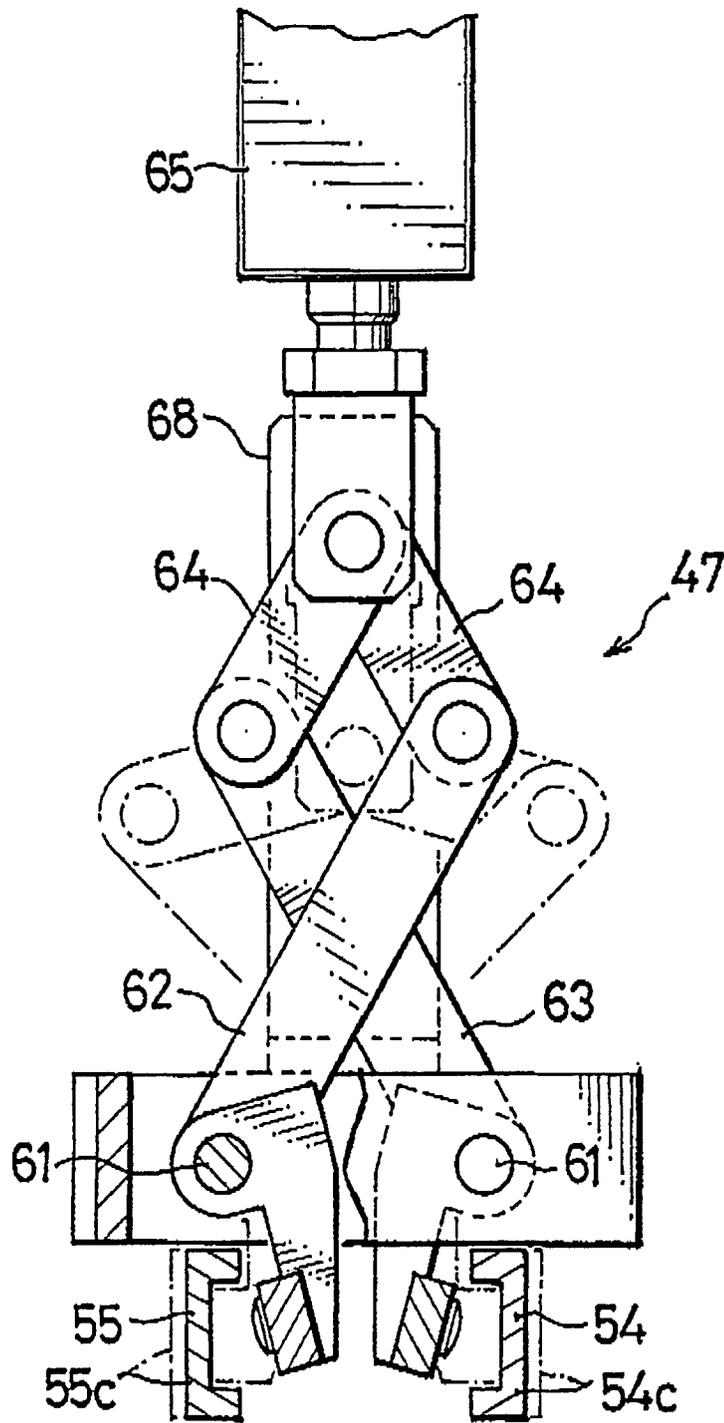


FIG.3

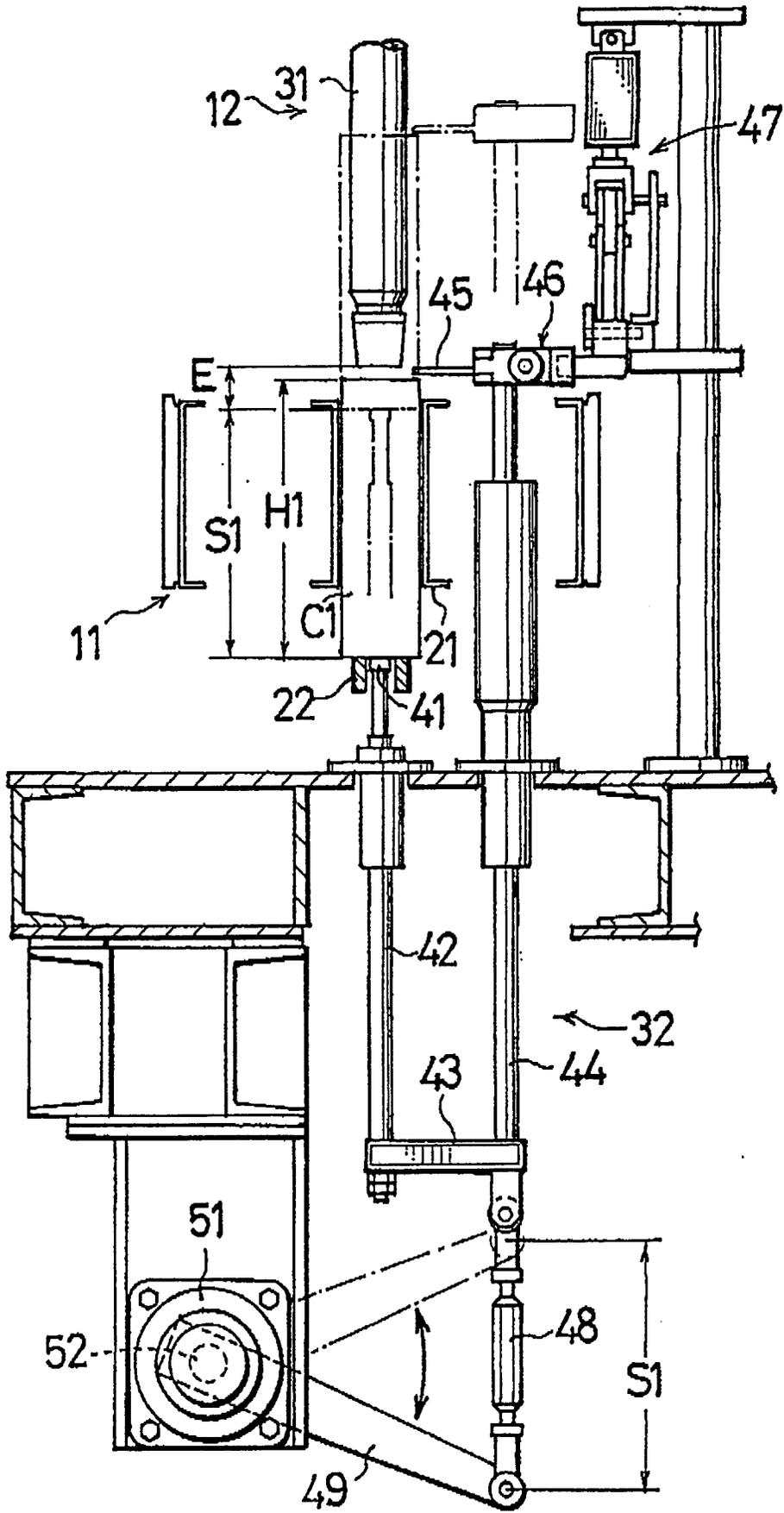


FIG.4

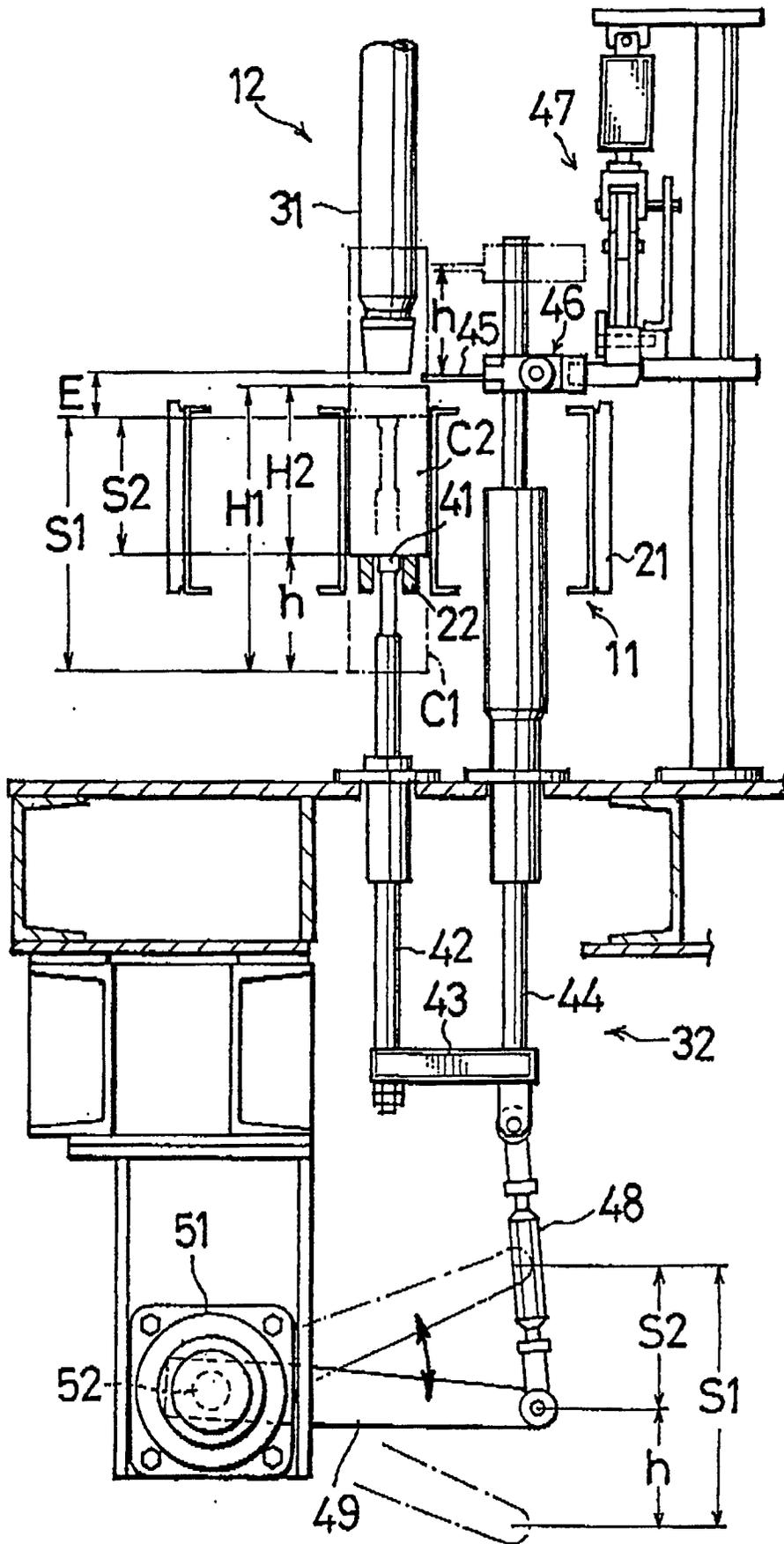


FIG.5

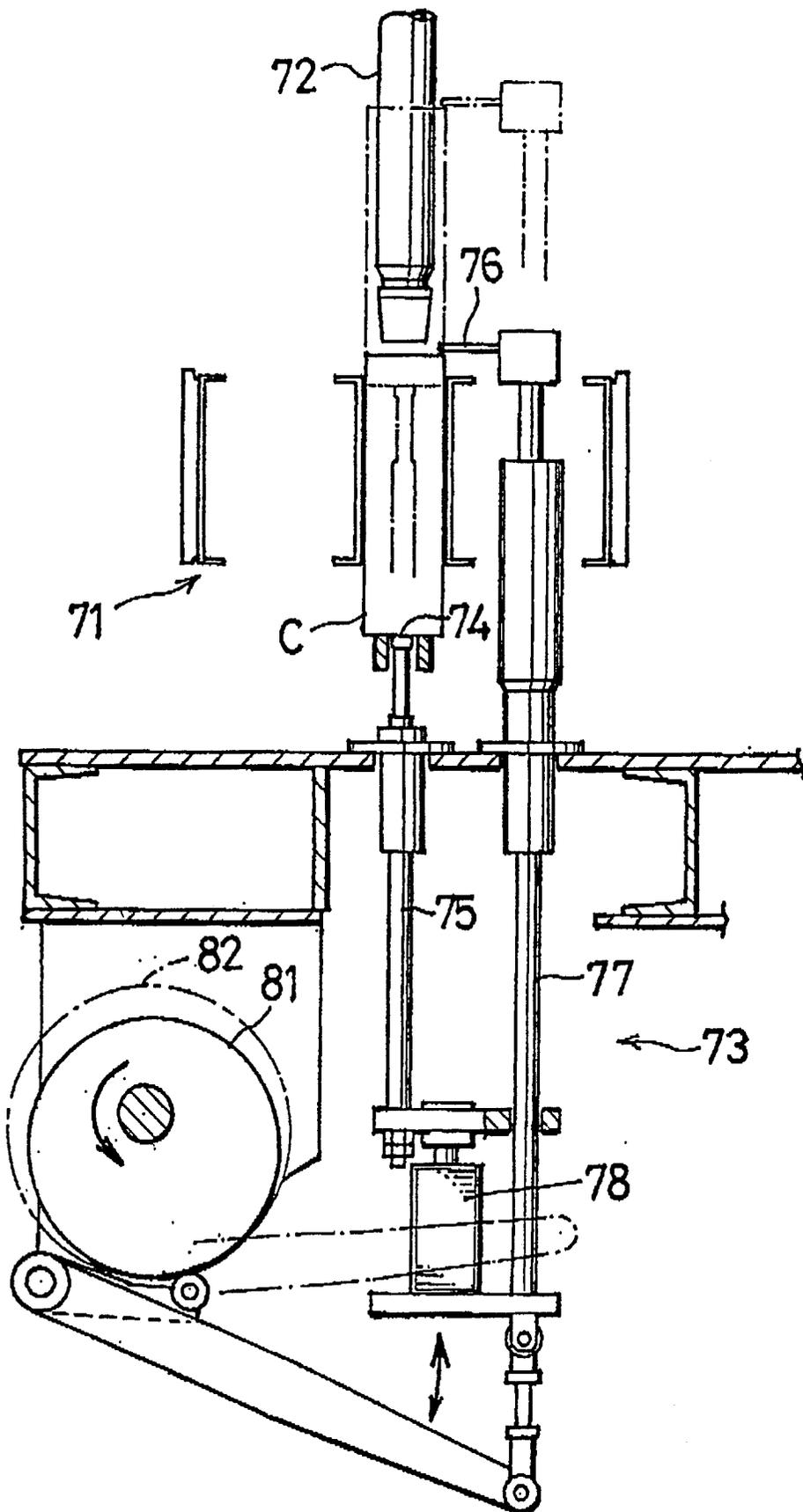


FIG. 6



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.5)
A	EP-A-0 356 149 (ELOPAK) * column 1, line 3 - column 2, line 12; figure 1 * ---	1	B65B43/58 B65B59/00 B65B43/59
A	US-A-2 614 740 (MOSER) * the whole document * -----	1	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			B65B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 09 MARCH 1993	Examiner CLAEYS H.C.M.
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	