

(19)



Europäisches Patentamt
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(11) Publication number:

0 574 079 A1

(12)

EUROPEAN PATENT APPLICATION(21) Application number: **93201591.0**(51) Int. Cl.⁵: **B31B 5/80, B65B 43/28**(22) Date of filing: **03.06.93**(30) Priority: **05.06.92 JP 38183/92**(43) Date of publication of application:
15.12.93 Bulletin 93/50(84) Designated Contracting States:
CH DE DK FR GB LI NL SE(71) Applicant: **Shikoku Kakoki Co., Ltd.**
10-1, Aza-Nishinokawa,
Tarohachizu,
Kitajima-cho
Itano-gun, Tokushima, 771-02(JP)(72) Inventor: **Ueda, Michio, c/o Shikoku Kakoki Co., Ltd.**
10-1, Aza-Nishinokawa,
Tarohachizu,
Kitajima-cho
Itano-gun, Tokushima 771-02(JP)
Inventor: **Wakabayashi, Shigeru, c/o Shikoku Kakoki Co., Ltd.**
10-1, Aza-Nishinokawa,
Tarohachizu,
Kitajima-cho
Itano-gun, Tokushima 771-02(JP)
Inventor: **Abe, Kazuo, c/o Shikoku Kakoki Co., Ltd.**
10-1, Aza-Nishinokawa,**Tarohachizu,**
Kitajima-cho
Itano-gun, Tokushima 771-02(JP)
Inventor: **Hirose, Shoji, c/o Shikoku Kakoki Co., Ltd.****10-1, Aza-Nishinokawa,**
Tarohachizu,
Kitajima-cho
Itano-gun, Tokushima 771-02(JP)
Inventor: **Nishioka, Shoji, c/o Shikoku Kakoki Co., Ltd.****10-1, Aza-Nishinokawa,**
Tarohachizu,
Kitajima-cho
Itano-gun, Tokushima 771-02(JP)
Inventor: **Fujikawa, Yasuji, c/o Shikoku Kakoki Co., Ltd.****10-1, Aza-Nishinokawa,**
Tarohachizu,
Kitajima-cho
Itano-gun, Tokushima 771-02(JP)(74) Representative: **Vollebregt, Cornelis Jacobus et al**
Algemeen Octrooibureau
P.O. Box 645
NL-5600 AP Eindhoven (NL)(54) **Carton feeder.**

(57) An apparatus for feeding cartons which comprises a guide for holding the carton in alignment with a mandrel outwardly thereof while rendering the carton free to move inward toward the mandrel or outward away therefrom, a slider reciprocatingly movable inward and outward along the guide, a carton pushing pawl pivotally mounted on the slider so as to be pivotally movable between a position of engagement with the carton as held by the guide

and a nonengagement position, and a spring for urging the pawl to pivotally move toward the engagement position. With the outward movement of the slider, the pawl is pivotally moved from the engagement position to the nonengagement position against the spring by coming into contact with the inner end of the carton as held by the guide and further moves along the outer surface of the carton from its inner end to the outer end thereof.

EP 0 574 079 A1

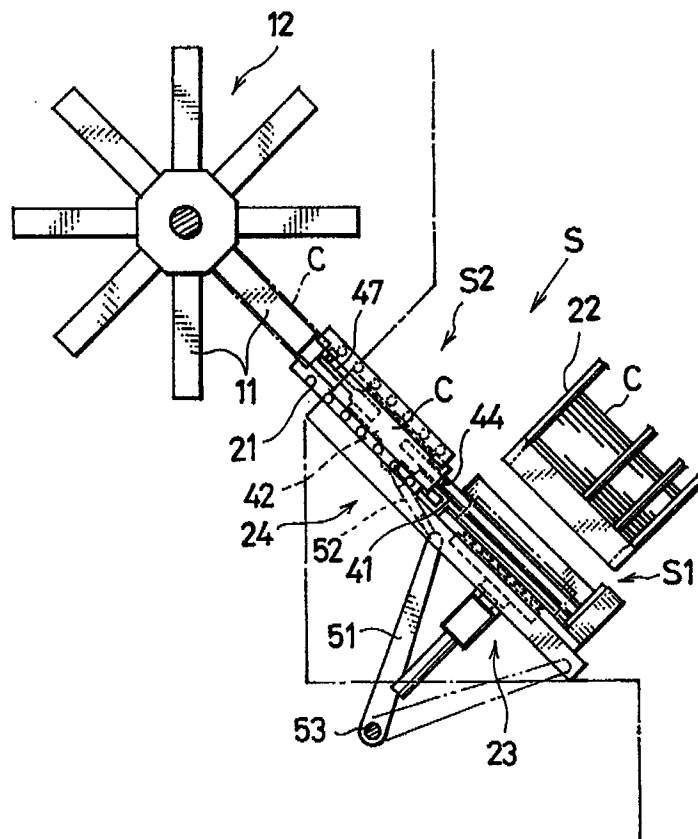


FIG.1

BACKGROUND OF THE INVENTION

The present invention relates to an apparatus for feeding cartons to be filled with milk or the like to carton bottom forming mandrels by fitting the carton around the mandrel.

Such carton feeders conventionally comprise a guide for holding the carton in alignment with the mandrel outwardly thereof while rendering the carton free to move inward toward the mandrel or outward away therefrom, a slider reciprocatingly movable inward and outward along the guide, a carton pushing pawl pivotally mounted on the slider so as to be pivotally movable between a position of engagement with the carton as held by the guide and a nonengagement position, and means for pivotally moving the carton pushing pawl toward the engagement position when the slider moves inward and pivotally moving the pawl toward the nonengagement position when the slider moves outward. The pivotally moving means comprises a drive device including a hydraulic cylinder attached to the slider, and a control device for operating the drive device as timed with the inward and outward movement of the slider.

With the conventional carton feeder described, the hydraulic cylinder is attached to the slider, so that the reciprocatingly movable portion including the slider has a great weight, which results in a great load for driving the slider. Moreover, the drive device and control device for pivotally moving the carton pushing pawl are complex in construction.

SUMMARY OF THE INVENTION

The main object of the present invention is to overcome the above problems and provide a carton feeder comprising a slider of reduced weight, and a drive device and a control device which are simplified in construction for pivotally moving a carton pushing pawl.

The present invention provides an apparatus for feeding cartons which comprises a guide for holding the carton in alignment with a mandrel outwardly thereof while rendering the carton free to move inward toward the mandrel or outward away therefrom, a slider reciprocatingly movable inward and outward along the guide, a carton pushing pawl pivotally mounted on the slider so as to be pivotally movable between a position of engagement with the carton as held by the guide and a nonengagement position, and means for pivotally moving the carton pushing pawl toward the engagement position when the slider moves inward and pivotally moving the pawl toward the nonengagement position when the slider moves outward. The apparatus is characterized in that the pivotally moving means comprises a spring for biasing the

carton pushing pawl in a direction to pivotally move the pawl from the nonengagement position to the engagement position, the carton pushing pawl being pivotally movable with the outward movement of the slider from the engagement position to the nonengagement position against the biasing force of the spring by coming into contact with the inner end of the carton as held by the guide and further movable with the slider from the inner end of the carton to the outer end thereof along the outer surface of the carton.

With the carton feeding apparatus of the present invention, the pivotally moving means comprises a spring for biasing the carton pushing pawl in a direction to pivotally move the pawl from the nonengagement position to the engagement position, is pivotally moved with the outward movement of the slider from the engagement position to the nonengagement position against the biasing force of the spring by coming into contact with the inner end of the carton as held by the guide and is further moved by the slider from the inner end of the carton to the outer end thereof along the outer surface of the carton. Accordingly, there is no need to attach a drive source to the slider for pivotally moving the carton pushing pawl, but the slider needs to be provided with the spring only. This reduces the weight of the reciprocatingly movable portion including the slider.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevation of a carton feeder of the present invention and means provided therearound;

FIG. 2 is a side elevation of the carton feeder of the invention;

FIG. 3 is a plan view of the same feeder;

FIG. 4 is a view in cross section taken along the line IV-IV in FIG. 3;

FIG. 5 is a view in cross section taken along the line V-V in FIG. 3;

FIG. 6 is a perspective view showing carton pushing pawls as attached to a slider and the portion of the feeder in the vicinity of the inner end of the slider; and

FIG. 7 is a fragmentary plan view partly broken away and showing the same.

DESCRIPTION OF THE PREFERRED EMBODIMENT

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

FIG. 1 shows an intermittently driven rotary body 12 having radial mandrels 11 for forming carton bottoms. One of the mandrels 11 is stopped as inclined outwardly downward at a feed station S,

at which a carton feeder is disposed. The feed station S comprises an outer receiving position S1 and an inner standby position S2 which are outward from and in alignment with the mandrel 11 stopped at the station.

The carton feeder comprises a guide 21 for holding a carton C in alignment with the mandrel 11 outwardly thereof while rendering the carton free to move inward or outward, a magazine 22 disposed obliquely above the guide 21 and containing flat cartons C as stacked up, a transfer device 23 for withdrawing cartons C one by one from the magazine 22, transferring the withdrawn carton C to the receiving position S1 while opening the carton from the flat form to a tubular form of rectangular to square cross section and causing the guide 21 to hold the tubular carton C, and a loader 24 for transporting the carton C as held by the guide 21 from the receiving position S1 to the mandrel 11 via the standby position S2.

Referring to FIGS. 3 to 5, the guide 21, magazine 22 and transfer device 23, except for the loader 24, each serve as one of two units which are identical in construction although oriented in opposite directions transversely of the feeder.

Since the devices other than the guide 21 and the loader 24 are not relevant directly to the present invention, the guide 21 and the loader 24 only will be described below.

The guide 21 comprises a pair of outer upper and lower guide rails 31, 32 arranged at the outer receiving position S1, and a pair of inner upper and lower guide rails 33, 34 arranged at the inner standby position S2. As shown in FIG. 4, the outer guide rails 31, 32 are formed respectively with opposed guide recessed portions 35, 35 shaped in conformity with the corner of the carton C opened to the tubular form. As seen in FIG. 5, on the other hand, the inner guide rails 33, 34 each have a guide face carrying a row of guide rollers 36 instead of the recessed portion 35. The lower 34 of the inner upper and lower guide rails 33, 34 is provided at its outer end with a retainer piece 37 for preventing the carton from moving reversely. The retainer piece 37 has a projection 38 projecting into the path of transport of the carton.

The loader 24 comprises a guide rod 41 extending between the right and left guides 21 in parallel to the path of transport, a sleeve-like slider 42 slidably fitted around the guide rod 41, right and left two outer carton pushing pawls 44 extending laterally away from each other and fixed to the outer end of the slider 42 on opposite sides thereof each by an outer bracket 43 L-shaped when seen from above for pushing the carton C as held by the guide 21 at the receiving position S1 from this position S1 to the standby position S2, and right and left two inner carton pushing pawls 47 pivotally

movable toward or away from each other and attached to the inner end of the slider 42 on opposite sides thereof each by an inner bracket 45 L-shaped when seen from above for pushing the carton C as held by the guide 21 at the standby position S2 from this position S2 to the mandrel 11.

A pivotal arm 51 has an outer end linked by a connecting rod 52 to the slider 42 and a base end fixed to a horizontal shaft 53 rotatable by an unillustrated drive mechanism (see FIG. 1).

The right and left outer carton pushing pawls 44 are each in the form of a strip and have an outer end extending into the path of transport of the carton which is guided by the guide 21.

As shown in detail in FIGS. 6 and 7, the inner bracket 45 is provided at its inner end with opposed horizontal walls 61. Connected between these walls 61 are a spring mount plate 62 positioned at their outer ends and a pivot 63 close to these outer ends.

A rectangular parallelepipedal mount block 64 is positioned between the opposed walls 61 and rotatably mounted on the pivot 63. Each inner carton pushing pawl 47 is in the form of a strip plate having a base end fixed to the block 64 and extending inward from the block 64. The pawl 47 carries a contact roller 65 close to its inner end. (The roller 65 projects upward from the left pawl 47 or downward from the right pawl 47 as shown in FIG. 6.) Each inner carton pushing pawl 47 has a V-shaped engaging notch 66 formed in its inner end.

A stopper arm 67 extending outward as opposed to the spring mount plate 62 has a base portion fixed to the mount block 64. The spring mount plate 64 and the stopper arm 67 have attached to their opposed surfaces a recessed spring retainer 68 and a projecting spring retainer 69, respectively. A coiled compression spring 71 is provided between the two retainers 68, 69. Extending through the stopper arm 67 in screw-thread engagement therewith is a stopper bolt 72 positioned close to the outer end thereof and bearing at its forward end against the base portion of the inner bracket 45. A position adjusting nut 73 is screwed on the stopper bolt 72. The arrangement described renders the inner pawl 47 pivotally movable between an engagement position indicated in solid lines in FIG. 7 and a nonengagement position indicated in broken lines in the drawing, further biasing the pawl 47 toward the engagement position. The engagement position of the pawl 47 is adjustable by rotating the stopper bolt 72 with the position adjusting nut 73 loosened.

Now, suppose the slider 42 is in the outer limit position of its stroke, and two cartons C are held by the guide 21 at the receiving position S1 and the standby position S2, respectively. When the

slider 42 is moved inward from this state, the outer carton Pushing pawl 44 comes into contact with the outer end of the carton C at the receiving position S1 and the inner carton pushing pawl 47 comes into contact with the outer end of the carton C at the standby position S2, pushing the two cartons C inward. Upon the slider 42 reaching the inner limit position of its stroke, the carton C in the receiving position S1 is transferred to the standby position S2, and the carton C in the standby position S2 is fitted around the mandrel 11.

Subsequently, the slider 42 moves rearward, whereupon the outer pawl 44 moves outward as it is, while the roller 65 on the inner pawl 47 is brought into contact with the inner end of the carton C in the standby position S2 to compress the spring 71, whereby the inner pawl 47 is pivotally moved from the engagement position to the nonengagement position. In this state, the roller 65 is rolled along the outer surface of the carton C and moved past the carton C, whereupon the inner pawl 47 returns to the original engagement position. Even if the carton C acts to move by being pushed outward upon the roller 65 coming into contact with the carton C, the retainer piece 37 prevents this movement.

When the slider 42 has returned to the outer limit position, another carton C is delivered from the magazine 22 and held in the receiving position S1. The feeder thus returns to the initial state described to complete one cycle of feeding operation.

Claims

1. An apparatus for feeding tubular cartons C having a rectangular to square cross section to bottom forming mandrels (11) by fitting the carton around the mandrel while the mandrel is stopped at a feed station (S) the carton feeding apparatus comprising:

a guide (21) for holding the carton (C) in alignment with the mandrel (11) outwardly thereof while rendering the carton free to move inward toward the mandrel or outward away therefrom,

a slider (42) reciprocatingly movable inward and outward along the guide (21),

a carton pushing pawl (47) pivotally mounted on the slider (42) so as to be pivotally movable between a position of engagement with the carton (C) as held by the guide (21) and a nonengagement position, and

means for pivotally moving the carton pushing pawl (47) toward the engagement position when the slider (42) moves inward and pivotally moving the pawl (47) toward the nonengagement position when the slider (42)

moves outward,

the carton feeding apparatus being characterized in that the pivotally moving means comprises a spring (71) for biasing the carton pushing pawl (47) in a direction to pivotally move the pawl (47) from the nonengagement position to the engagement position, the carton pushing pawl (47) being pivotally movable with the outward movement of the slider (42) from the engagement position to the nonengagement position against the biasing force of the spring (71) by coming into contact with the inner end of the carton (C) as held by the guide (21) and further movable with the slider from the inner end of the carton (C) to the outer end thereof along the outer surface of the carton (C).

2. An apparatus as defined in claim 1 wherein the carton pushing pawl (47) has an inner end formed with a notched portion engageable with the rear end of the carton C as held by the guide (21).
3. An apparatus as defined in claim 1 or 2 wherein the carton pushing pawl (47) is provided close to an inner end thereof with a roller (65) rollable on the outer surface of the carton (C) as held by the guide (21) when the pawl (47) moves along the outer surface of the carton (C) from its inner end to the outer end thereof.
4. An apparatus as defined in claim 1 wherein a retainer member (37) is provided for preventing the carton (C) as held by the guide (21) from moving reversely when the carton pushing pawl (47) comes into contact with the inner end of the carton (C).
5. An apparatus as defined in claim 1 wherein a stopper (72) is provided for determining the engagement position to control the range of pivotal movement of the carton pushing pawl (47) and the engagement position to be determined by the stopper (72) is adjustable.

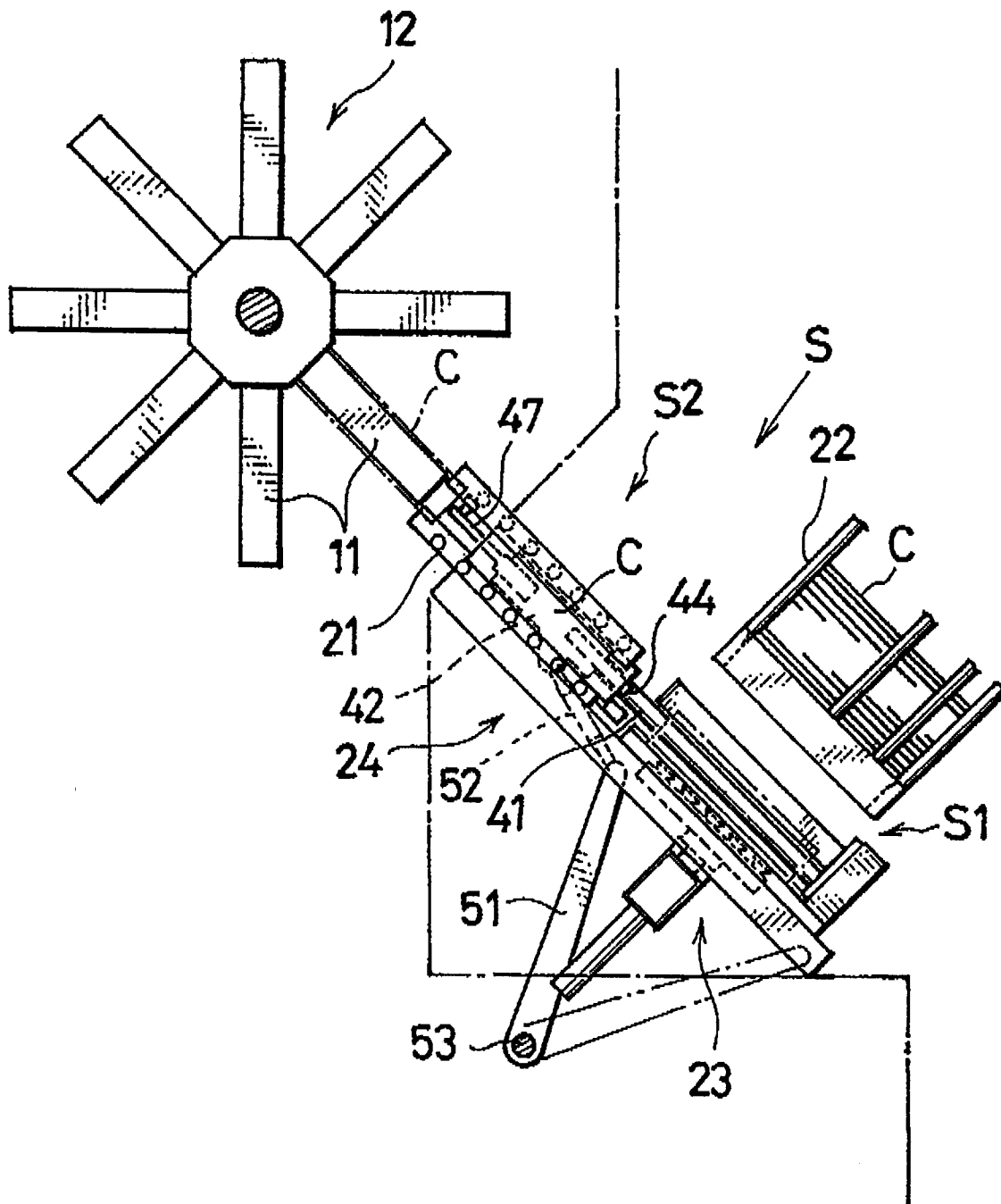


FIG.1

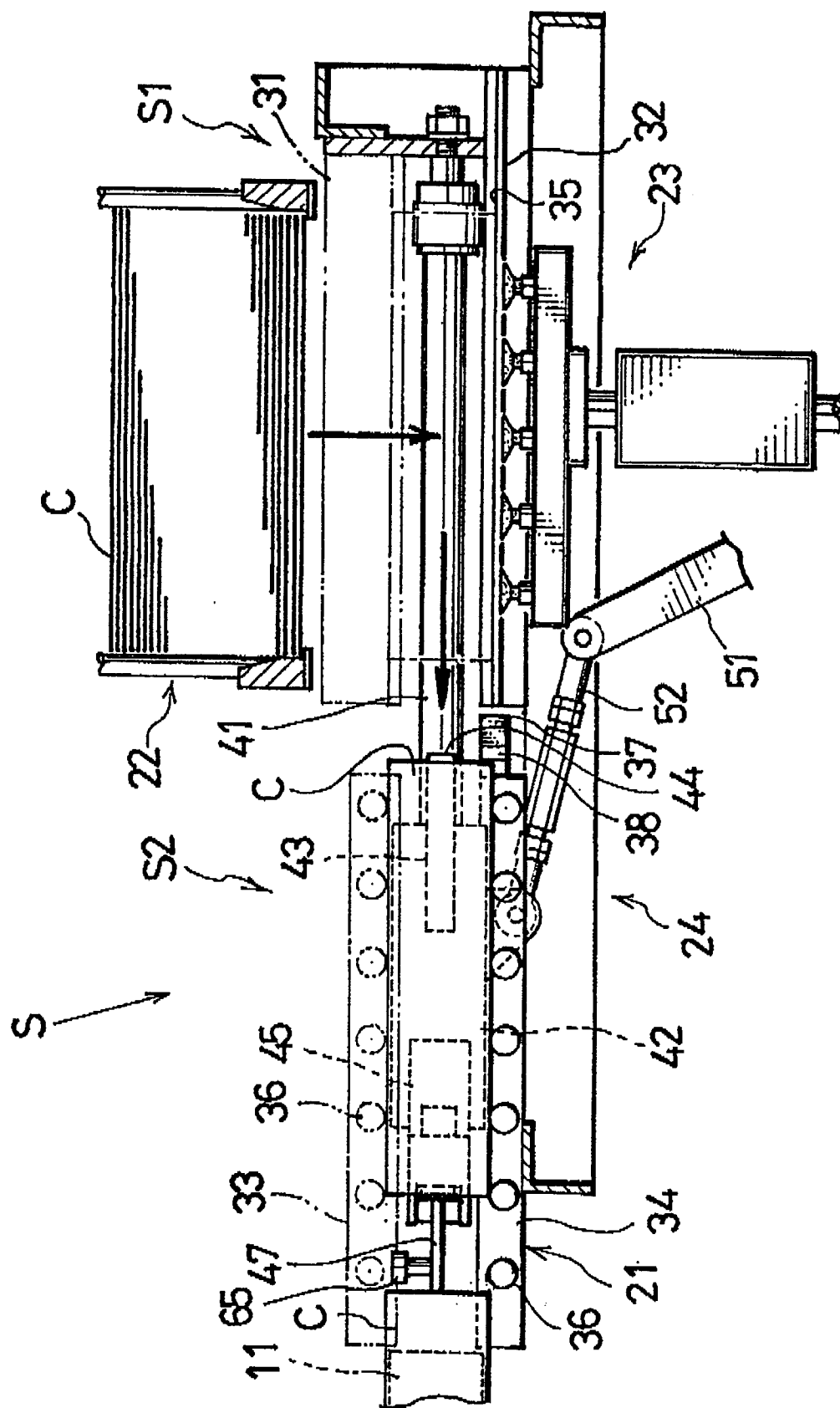


FIG. 2

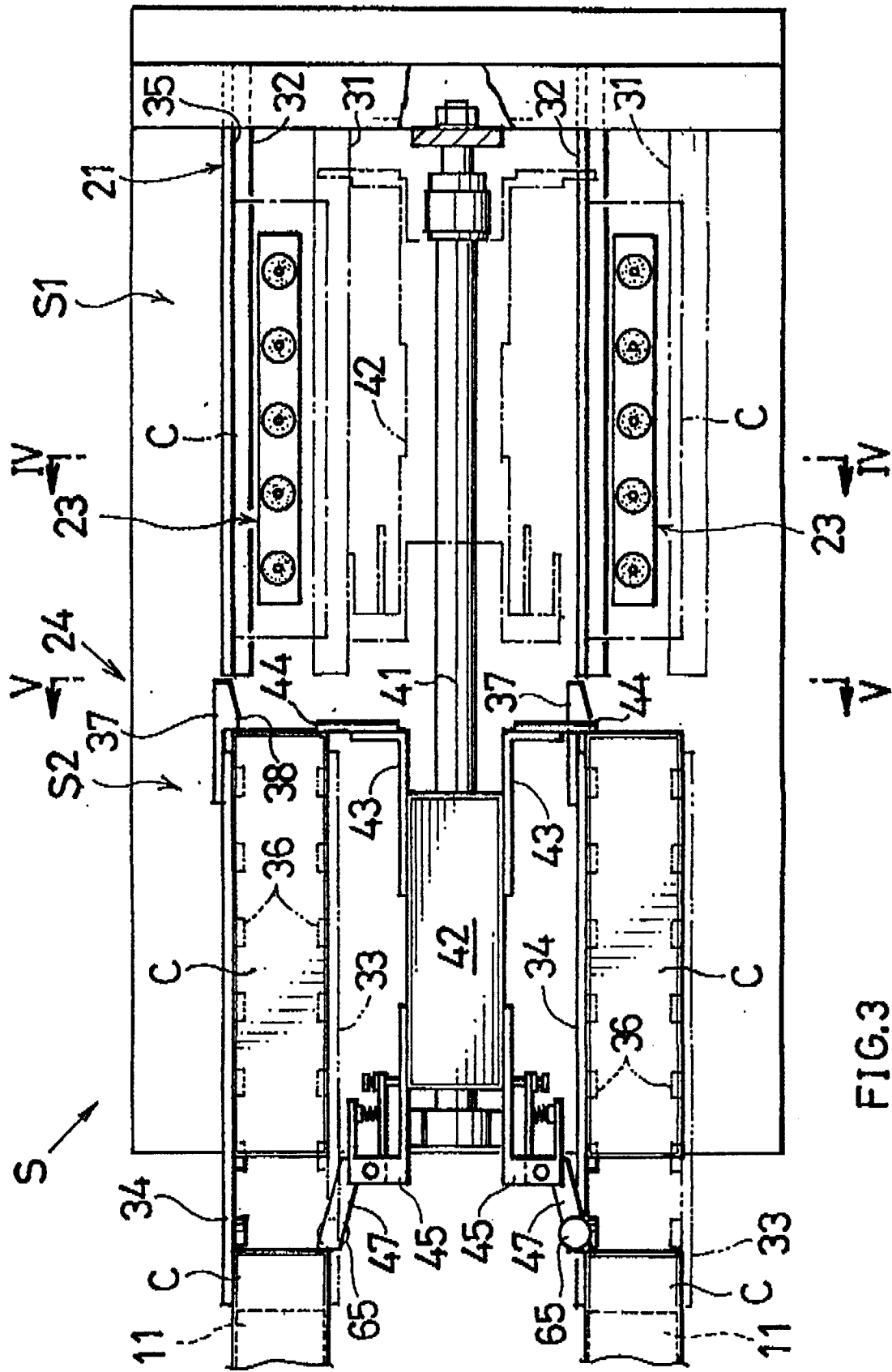


FIG.3

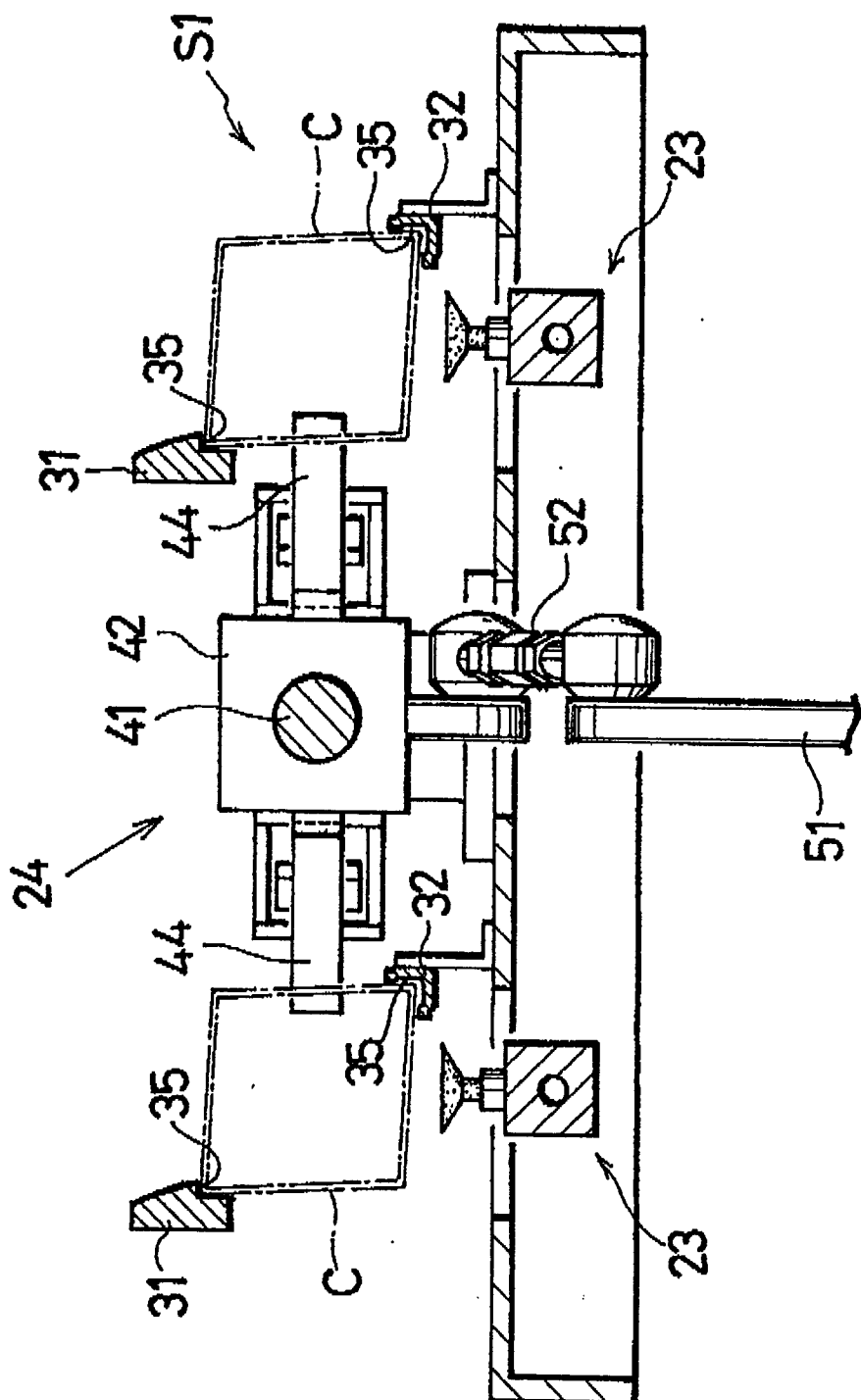


FIG. 4

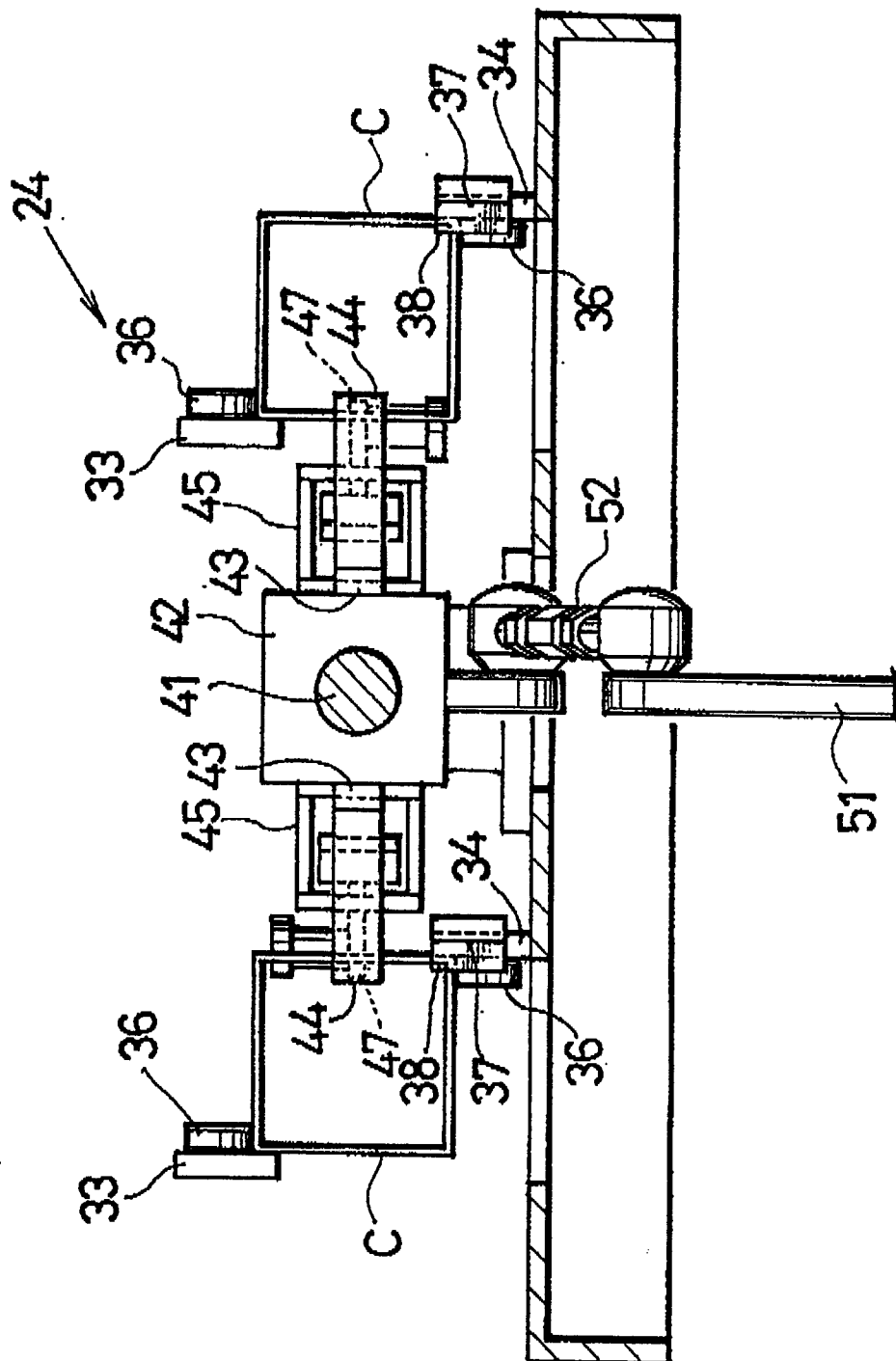


FIG. 5

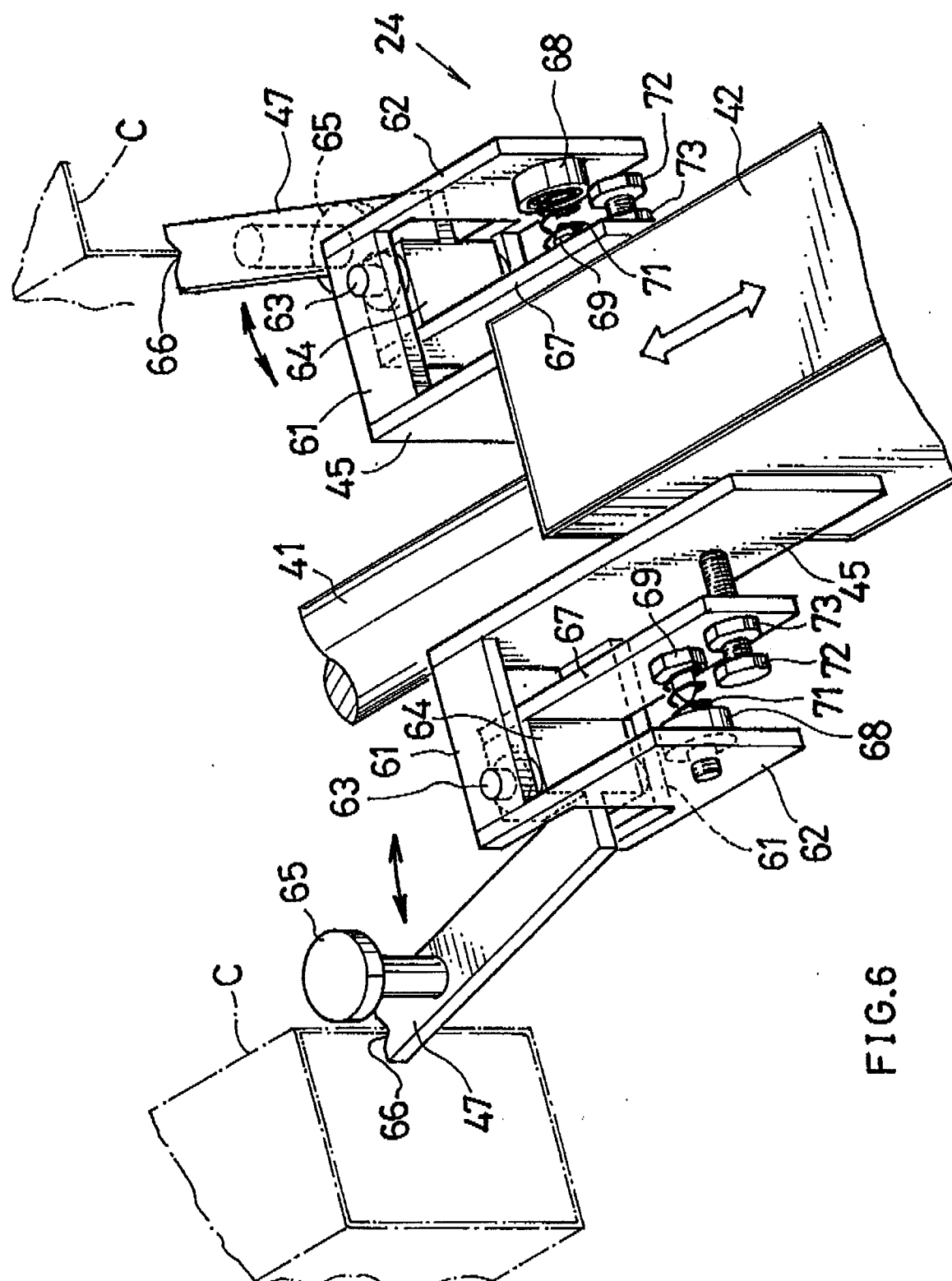


FIG. 6

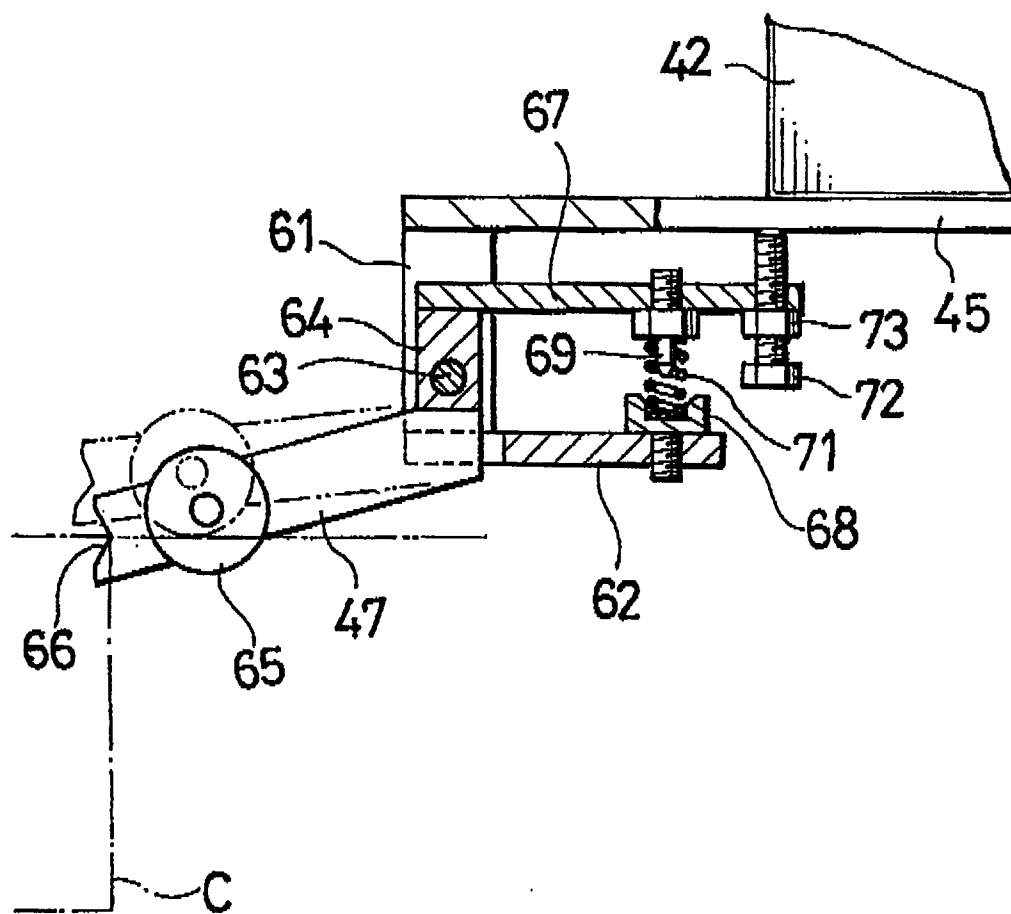


FIG.7



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EUROPEAN SEARCH REPORT

Application Number

EP 93 20 1591

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	US-A-4 448 008 (L A PANKRATZ ET AL) * the whole document * ---	1,4	B31B5/80 B65B43/28
A	US-A-4 244 281 (I L KAUFFMAN) * column 16, line 2 - column 22, line 37 * ---	1,2,4	
A	EP-A-0 061 211 (TETRA PAK) * the whole document * ---	1	
A	GB-A-1 162 553 (HASKON) * page 5, line 51 - page 7, line 57 * ---	1,3	
A	EP-A-0 256 172 (SHIKOKU) * column 2, line 51 - line 48; figure 5 * ---	1	
A	EP-A-0 376 408 (SHIKOKU) * column 7, paragraph 55 - column 8, paragraph 10 * ---	1	
T	EP-A-0 492 734 (SHIKOKU) * the whole document * ---		TECHNICAL FIELDS SEARCHED (Int. Cl.5)
T	EP-A-0 490 458 (SHIKOKU) * the whole document * -----		B31B B65B B30B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 10 SEPTEMBER 1993	Examiner PHILPOTT G.R.
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			