(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 590 732 A1**

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **93202787.3**

(51) Int. Cl.5: **B65B 43/18**

(22) Date of filing: **29.09.93**

(30) Priority: **29.09.92 JP 67780/92**

(43) Date of publication of application:
06.04.94 Bulletin 94/14

(84) Designated Contracting States:
CH DE DK GB LI NL SE

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(54) Blank feeder.

(57) A blank feeder for feeding blanks B to a pair of blank bottom forming mandrel wheels arranged in parallel comprises a pair of right and left feed units corresponding to the respective mandrel wheels. Each of the feed units comprises a magazine having at a front end thereof a forward outlet opposed to the corresponding mandrel wheel from behind for accommodating a multiplicity of blanks B as closely arranged side by side from the front end rearward, the blanks B being folded flat so as to be unfoldable to a tubular form of square to rectangular cross section, means for taking out the blanks B in the magazine successively one by one from the foremost position through the outlet while unfolding the blank to the tubular form, and means for transporting the taken-out tubular blank B to the corresponding mandrel wheel. The magazines of the rights and left feed units are so arranged that the center lines R and L of the magazines with respect to the width thereof extend away from each other rearward approximately in a V-form when seen from above.

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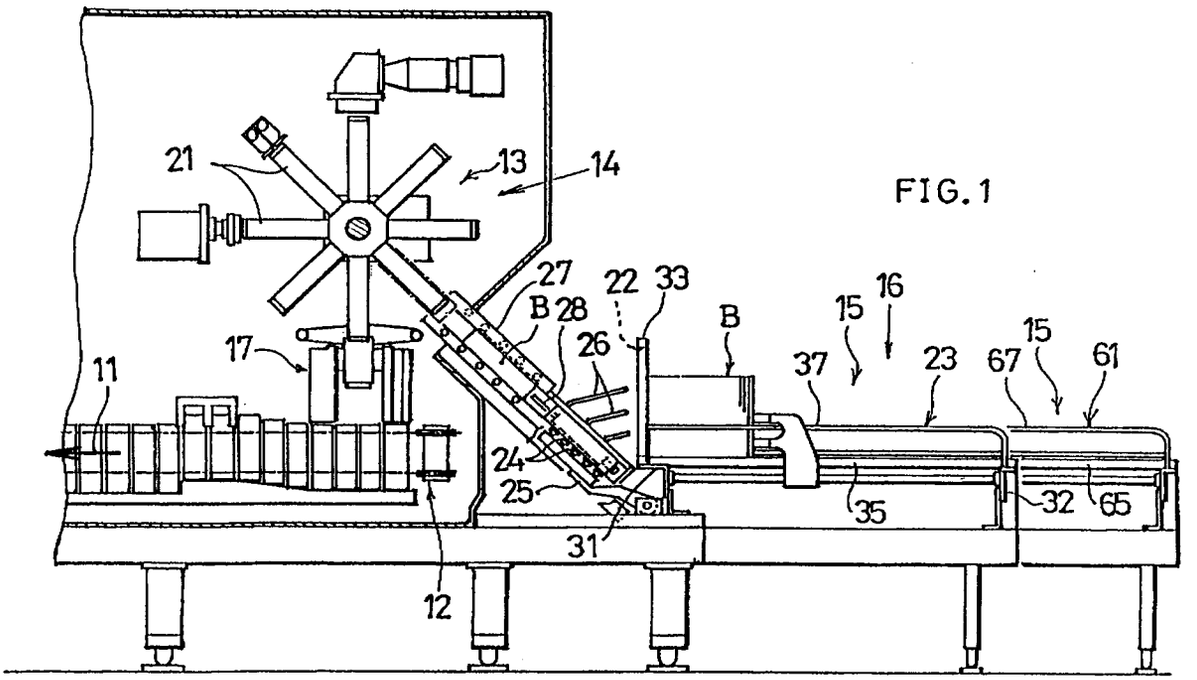
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FIG.1

BACKGROUND OF THE INVENTION

The present invention relates to a feeder for supplying a pair of opposite parallel blank bottom forming mandrel wheels with blanks for containers to be filled, for example, with milk, more particularly blanks which are folded flat so as to be unfoldable to a tubular form of square to rectangular cross section.

Such feeders are already known which comprise a pair of opposite feed units corresponding to a pair of mandrel wheels, respectively, and each including a magazine having at a front end thereof a forward outlet opposed to the corresponding mandrel wheel from behind for accommodating a multiplicity of blanks as closely arranged side by side from the front end rearward, the blanks being folded flat so as to unfoldable to a tubular form of square cross section, means for taking out the blanks within the magazine successively one by one from the foremost position through the outlet while unfolding the blank to the tubular form, and means for transporting the taken-out tubular blank to the corresponding mandrel wheel. The magazines of the pair of feed units are so arranged that the center lines of the magazines with respect to the width thereof are parallel to each other when seen from above.

With the conventional device, the center lines of the magazines with respect to the width thereof extend in parallel to each other, so that the space between the magazines is very narrow to entail the problem that extreme difficulties are encountered in performing work such as supply of blanks to the magazines.

SUMMARY OF THE INVENTION

An object of the present invention is to provide a blank feeder wherein work for the magazines can be conducted efficiently.

The present invention provides a blank feeder which comprises a pair of right and left feed units corresponding to a pair of mandrel wheels, respectively, each of the feed units including a magazine having at a front end thereof a forward outlet opposed to the corresponding mandrel wheel from behind for accommodating a multiplicity of blanks as closely arranged side by side from the front end rearward, the blanks being folded flat so as to be unfoldable to a tubular form of square to rectangular cross section, means for taking out the blanks within the magazine successively one by one from the foremost position through the outlet 22 while unfolding the blank to the tubular form, and means for transporting the taken-out tubular blank B to the corresponding mandrel wheel, the feeder being characterized in that the magazines of the right and left feed units are so arranged that the center lines of the magazines with respect to the width thereof extend away from each other rearward approximately in a V-form when seen from above.

With the blank feeder of the present invention, the magazines of the right and left feed units are so arranged that the center lines of the magazines with respect to the width thereof extend away from each other rearward approximately in a V-form when seen from above, so that the space between the two magazines is wider by an amount corresponding to the increase in the spacing therebetween which increases rearward than in the conventional arrangement of the opposite magazines extending in parallel to each other. This ensures facilitated work in the space between the magazines.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevation of a blank feeder embodying the invention;
FIG. 2 is a plan view of the feeder;
FIG. 3 is a perspective view of a left magazine of the feeder;
FIG. 4 is a plan view of the left magazine; and
FIG. 5 is a plan view of a right magazine of the feeder.

DESCRIPTION OF THE PREFERRED EMBODIMENT

An embodiment of the invention will be described below with reference to the drawings. The terms "front" and "rear" are herein used based on FIGS. 1 and 2; the term front referes to the left-hand side of these drawings, and the term rear to the opposite side. The terms "right" and "left" are used for the present device as it is seen from the rear toward the front.

FIGS. 1 and 2 show a container bottom forming section of a packaging machine and the neighboring portion thereof.

The packaging machine comprises a container conveyor 12 having two opposite transport paths 11 extending forward in parallel to each other, a rotary body 14 having right and left two mandrel wheels 13 disposed above the rear end of each transport path 11, and a blank feeder 16 having right and left two feed units 15 corresponding to the respective pairs of mandrel wheels 13 and arranged to the rear of the conveyor 12. A container transfer device 17 is disposed between the rear end of the conveyor 12 and the rotary body 14.

The right and left units 15 of the blank feeder 16 has basically the same construction, so that the left unit 15 shown in FIG. 1 will be described. The

unit 15 comprises a magazine 23 disposed obliquely above and outwardly of a phantom rearward extension line of a bottom forming mandrel 21 which is brought to a halt at a feed station and which obliquely extends rearwardly downward. The magazine 23 has an inward outlet 22 at the front end and accommodating a multiplicity of flat blanks B which are closely arranged side by side from the front end toward the rear end of the magazine 23. The feed unit further comprises a transport arm 25 having vacuum cups 24 for taking out blanks B from the magazine 23 one by one and transporting each blank B onto the rearward extension line, guide rails 26 for guiding the blank B while it is being transported by the arm 25 so as to unfold the blank B from the flat form to a tubular form of square to rectangular cross section, a holder 27 for holding the blank B as unfolded to the tubular form and positioned on the extension line, and a loader 28 for fitting the blank B held by the holder 27 around the mandrel 21.

As shown in greater detail in FIGS. 3 and 4, the magazine 23 of the left unit 15 comprises front and rear support frames 31, 32 spaced apart by a predetermined distance and each inverted L-shaped in cross section, a gate member 33 provided upright on the front support frame 31 and surrounding the outlet 22 along with the front support frame 31, a pair of opening claws 34 attached to the respective vertical bars of the gate member 33, a pair of bottom guides 35 which are bars parallel to and spaced apart from each other and interconnecting the support frames 31, 32 as attached to the top side of these frames, and L-shaped barlike side guides 36, 37 each extending between and attached to the rear support frame 32 and an intermediate portion (with respect to the height) of the vertical bar of the gate member 33.

A pair of horizontal guide rods 41 extend between and are attached to the front and rear support frames 31, 32 at the middle of height of these frames. A slider 42 is supported by the guide rods 41. A rodless cylinder 43 has a main body 44 fixed to the slider 42, and a cylinder tube 45 positioned between the two guide rods 41 and extending between and attached to the support frames 31, 32. A pair of brackets 46 extend upright from opposite ends of the slider 42. A pair of pressure pawls 47 are pivoted to each bracket 46. The pawls 47 are each biased rearward by an unillustrated spring.

A front pulley 51 is mounted directly on the bottom guides 35 and positioned close to the front ends thereof. A rear pulley 52 is attached by take-ups 53 to the bottom guides 35 close to their rear ends. An endless belt 54 is reeved around the front and rear pulleys 51, 52.

The right unit 15 has a magazine 61 shown in FIG. 5. Like the magazine 23 of the left unit, the magazine 61 comprises front and rear support frames 62, 63, gate member 64, bottom guides 65, side guides 66, 67, etc.

With reference to FIGS. 2 and 4, the magazine 23 of the left unit 15 has a center line L with respect to the width thereof which line L is parallel to a reference line S extending from the front rearward.

When seen from above as in FIGS. 2 and 4, the magazine 23 of the left unit 15 has a center line L with respect to the width thereof. The center line R intersects the reference line S at an angle θ of greater than 10 deg so as to be a greater distance away from the line S rightward as it extends rearward. Although the gate member 64 is orthogonal to the reference line S, the front and rear support frames 62, 63 are positioned on the center line R, and the bottom guides 65 and the side guides 66, 67 extend along the center line R.

The bottom guides 35 and the side guides 36, 37 of the magazine 23 of the left unit 15, although parallel to the reference line S as described above, may be inclined in a direction opposite to the direction of the magazine 61 of the right unit 15. Such modifications are acceptable insofar as the right and left magazines 61, 23 extend away from each other rearward in a V-form when seen from above as shown in FIG. 2.

Claims

1. A blank feeder for feeding blanks B to a pair of blank bottom forming mandrel wheels (13) arranged in parallel, the feeder comprising a pair of right and left feed units (15) corresponding to the respective mandrel wheels (13), each of the feed units (15) including:

a magazine (23,61) having at a front end thereof a forward outlet (22) opposed to the corresponding mandrel wheel (13) from behind for accommodating a multiplicity of blanks B as closely arranged side by side from the front end rearward, the blanks B being folded flat so as to be unfoldable to a tubular form of square to rectangular cross section,

means for taking out the blanks B within the magazine (23) successively one by one from the foremost position through the outlet (22) while unfolding the blank to the tubular form, and

means for transporting the taken-out tubular blank B to the corresponding mandrel wheel (13),

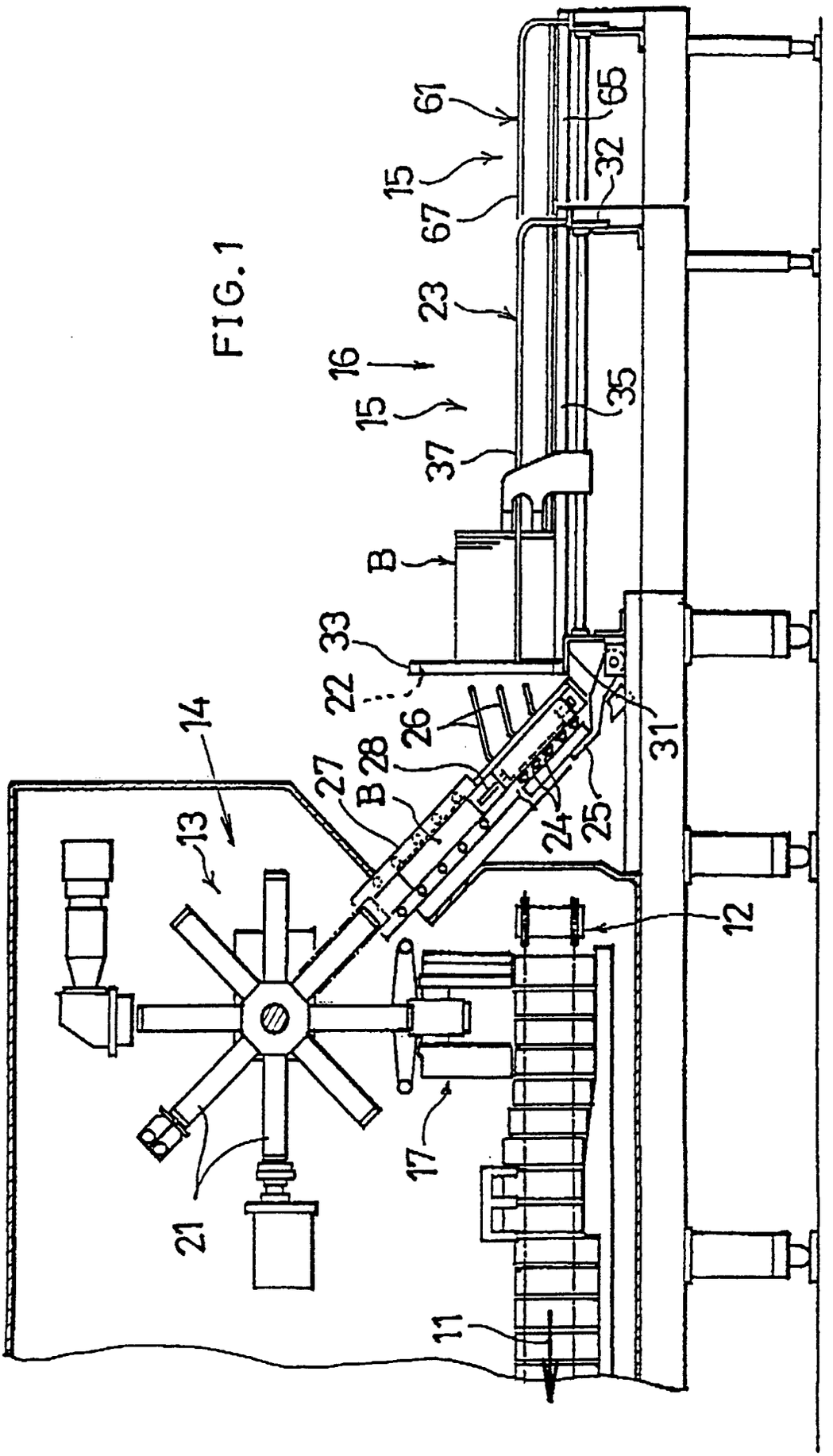
the feeder being characterized in that the magazines (61) and (23) of the right and left feed units (15) are so arranged that the center

lines R and L of the magazines with respect to the width thereof extend away from each other rearward approximately in a V-form when seen from above.

2. A feeder as defined in claim 1 wherein the center line L of the magazine (23) of the left feed unit (15) extends in parallel to a front-to-rear refence line S, and the center line R of the magazine (61) of the right feed unit (15) so extends as to intersect the reference line S.

3. A feeder as defined in claim 2 wherein the magazine (61, 23) of each of the right and left feed units (15) has an outlet member (64, 33) orthogonal to the reference line S, and blank feed rails (65-67, 35-37) extending rearward from the outlet member (64, 33) in parallel to the corresponding center line R, L.

FIG. 1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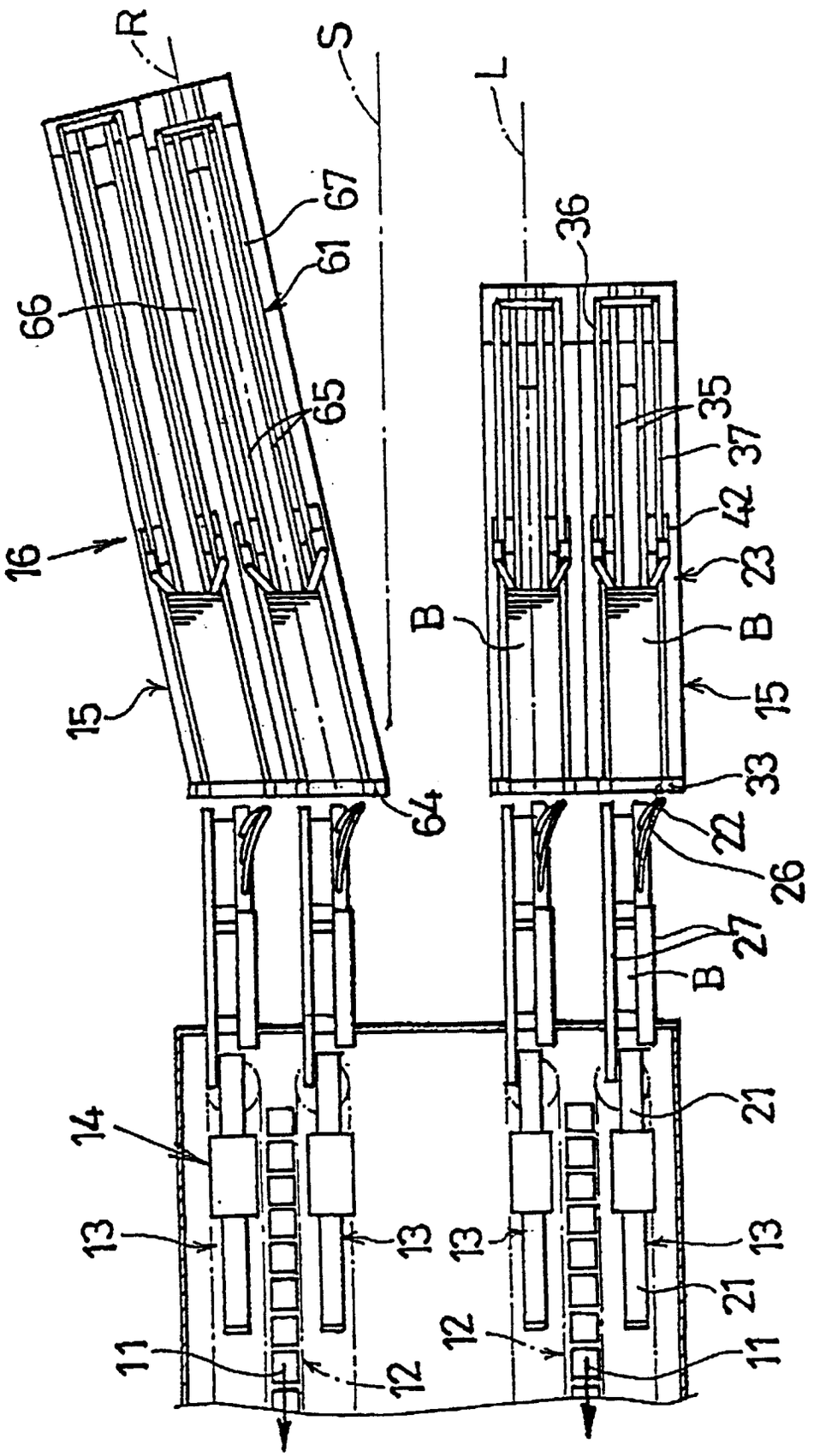
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FIG.2

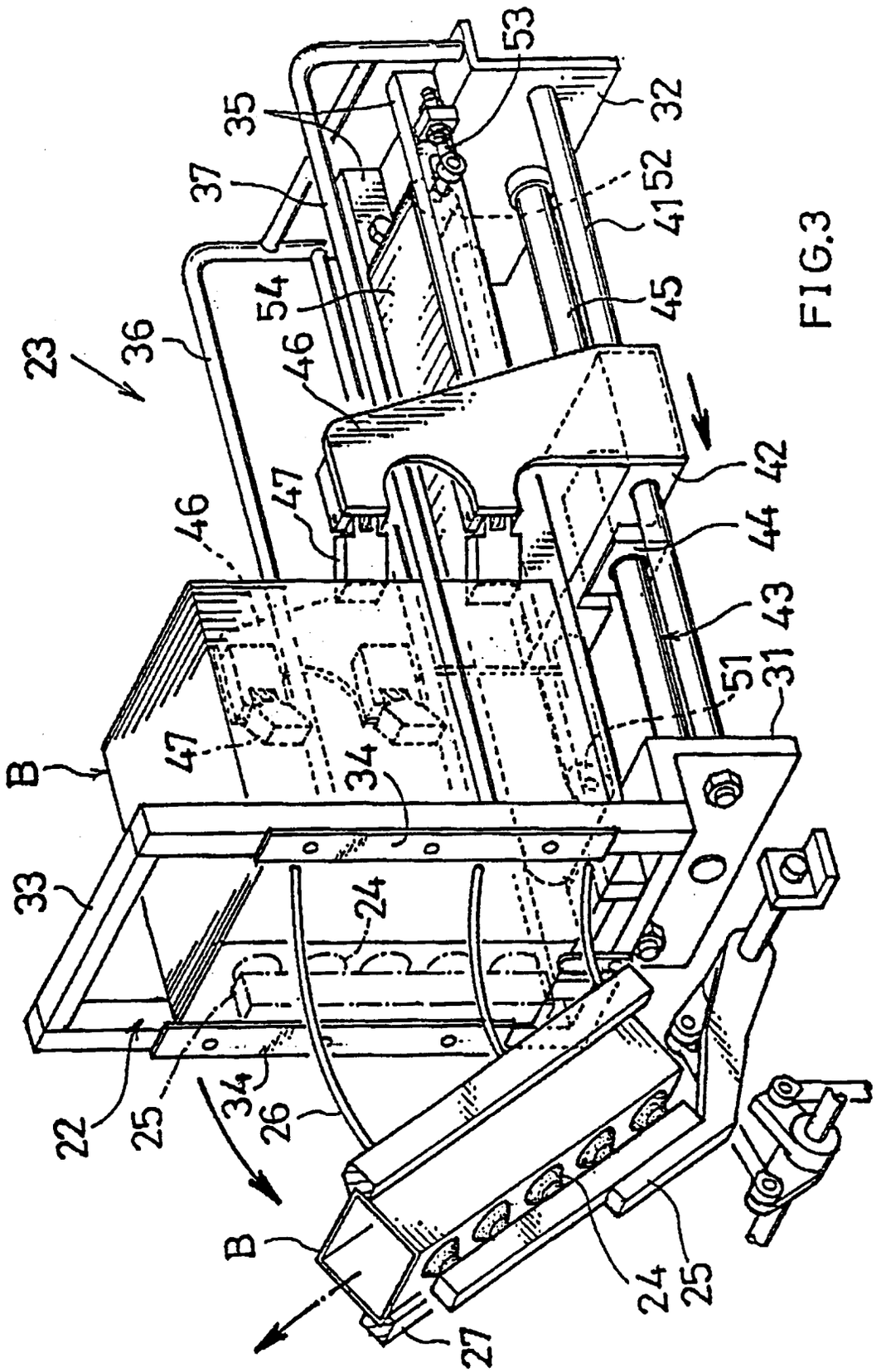

FIG.3

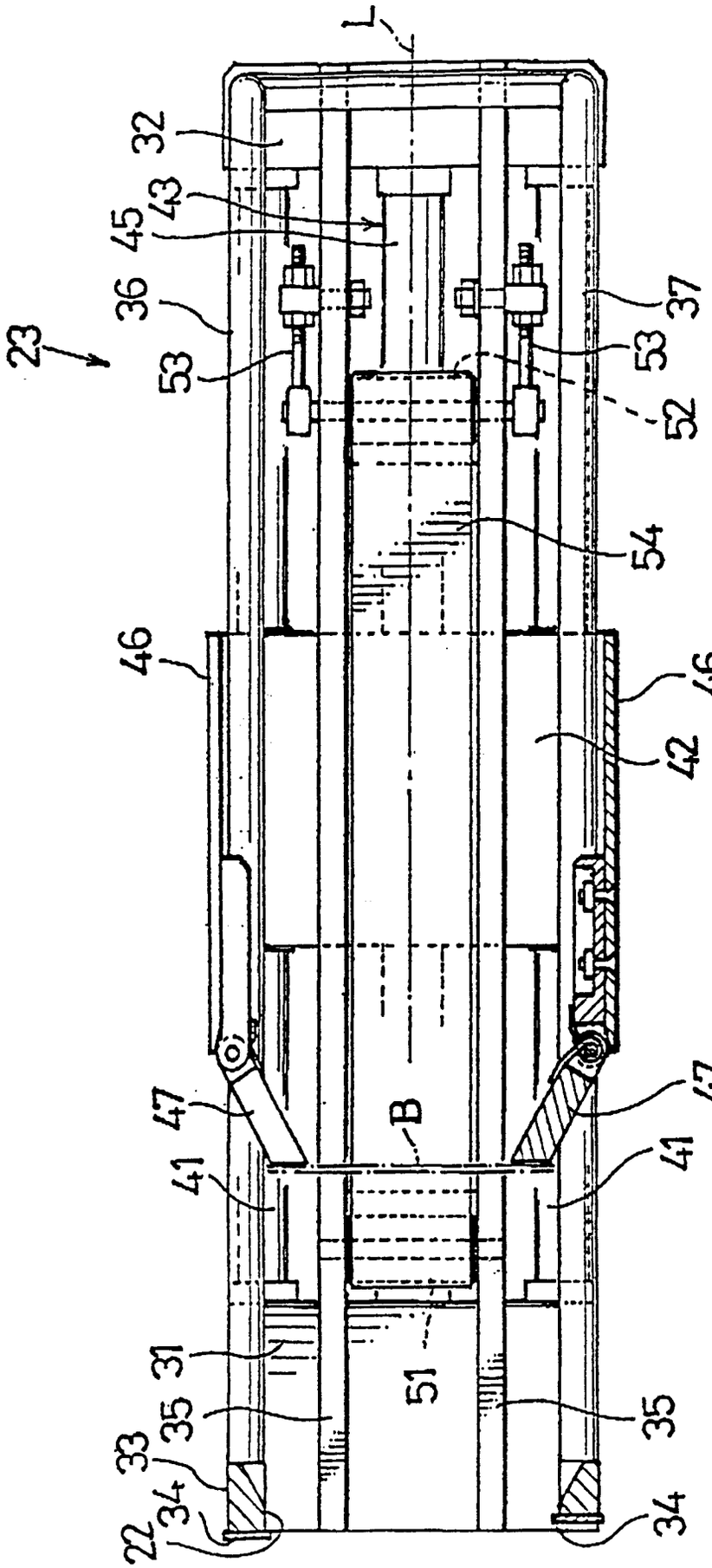
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FIG.4

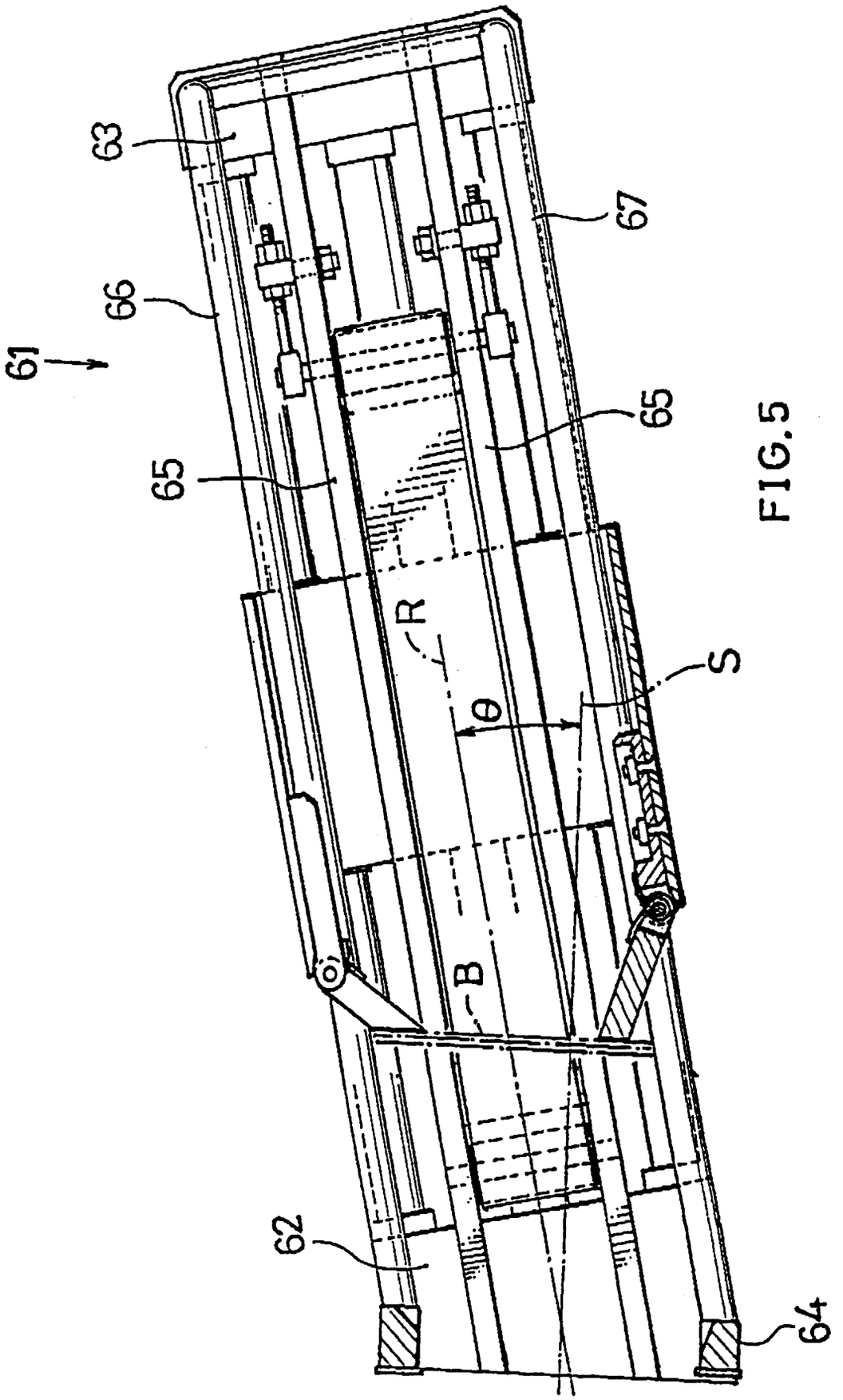

FIG.5

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EUROPEAN SEARCH REPORT

Application Number EP 93202787.3

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 (PANKRATZ et al.) * Fig. 1-3 * --	1	B 65 B 43/18
A	US - A - 5 033 975 (TRAEGAARDH) * Fig. 1,2 * --	1	
A	EP - A - 0 492 734 (SHIKOKU KAKOKI) * Totality * --	1	
A	US - A - 3 305 130 (MEEK) * Fig. 1,2,10 * --	1	
A	DE - A - 3 523 727 (KRAUTTER et al.) * Totality * ----	1	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

B 65 B 43/00
B 31 B 1/00

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
VIENNA	15-11-1993	FIETZ

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
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E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

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