



## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<p>(21) International Application Number: PCT/SE98/01285</p> <p>(22) International Filing Date: 30 June 1998 (30.06.98)</p> <p>(30) Priority Data: 9702530-8 1 July 1997 (01.07.97) SE</p> <p>(71) Applicant (for all designated States except US): AB ÅKERLUND &amp; RAUSING [SE/SE]; P.O. Box 22, S-221 00 Lund (SE).</p> <p>(72) Inventors; and (75) Inventors/Applicants (for US only): LARSSON, Lennart [SE/SE]; Kornettgatan 18A, S-211 50 Malmö (SE). STRÖM, Göran [SE/SE]; Östra Odarslöv, S-225 90 Lund (SE).</p> <p>(74) Agents: GRAUDUMS, Valdis et al.; Albihs Patentbyrå Göteborg AB, P.O. Box 142, S-401 22 Göteborg (SE).</p>		<p>(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, GM, GW, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).</p> <p><b>Published</b> With international search report.</p>
<p>(54) Title: PACKAGING MACHINE</p>		
<p>(57) Abstract</p> <p>The invention relates to a packaging machine comprising a horizontal conveyor and stations along this for processing packaging blanks, preferably case blanks, up to ready cases filled with product. The conveyor is constructed around pivotal gear bearings (roller path bearings) or the like, whereby one of the bearing races defines a circular conveyor path, and holders or carrier fingers for the case blanks are arranged on the driven race in the bearing arrangement. The arrangement allows a packaging machine structure where the essential elements are constituted by standard components, and by placing a plurality of bearing rings vertically above one another in the machine frame, possibilities for a flexible camshaft arrangement and format adjustment in the height direction are offered, as well as an open and easily accessible structure being obtained for maintenance and repair. In an alternative embodiment, the camshaft arrangement can comprise a camshaft placed in the centre of the pivotal ring bearing.</p>		

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## TITLE:

5 Packaging machine

The invention relates to a packaging machine of the type in which packaging cases (folding boxes) of cardboard or corresponding material are extracted from a magazine, the cases are erected and placed in holders on an endless conveyor track, along which track processing stations are arranged for performing necessary process operations on the cases, including filling these in order to provide finished cases, filled with product, in a delivery station of the packaging machine.

## BACKGROUND TO THE INVENTION

Machines of this type have been on the market for a long time, and one type of such machines has been produced since the 1950s and has been marketed by the applicant of the present invention. This type of machine is marketed under the trademark "ESPRESSO" and is well known within the purchasing circle.

The packaging cases which the machine delivers are cases without any type of inner bag and the cases are sealed powder-tight by means of a bottom which has a membrane closure and a correspondingly closed top, said cases having found widespread use, not only for powder type products but also for deep-frozen products, e.g. fruit juices.

This case type is a leader from an environmental and recycling viewpoint and gives extraordinary possibilities for fulfilling present and future environmental requirements.

This packaging type however requires a machine which is specific for the purpose and such have of course been developed and been put on the market for many years. At the time when the first machine types were produced, the need

was already seen to make the machines robust, operationally reliable and useable in all types of difficult environments and climates. The machines are thus made from robust machine parts and with heavy duty drive shafts, gearboxes, camshafts etc.

This machine type works horizontally and the cases are transported to the different processing stations by an endless metal ribbon, chain or the like, which runs over two chain wheels, one of which is driven by a drive motor. The conveyor track has two opposed straight track portions and, in principle, processing of the bottom of the case is performed along one portion, filling of the cases is done in the connecting part-circular portion, and in the following straight conveyor portion the case tops are completed for feeding the cases out in a delivery station at the end of this straight conveyor portion.

For achieving processing in the two straight portions of the conveyor track, there are camshafts in the machine frame, connected via a gearing arrangement to the drive motor; a lower horizontal camshaft and an upper horizontal camshaft. On these shafts there are cam discs which manoeuvre the processing tools in the various processing stations.

The costs of the known machines are comparatively high and it has previously not been possible to make significant compromises concerning the relatively complex but functionally reliable construction, in order to achieve a cheaper machine.

#### STATE OF THE ART:

As an example of a machine of the type discussed in the introduction, the machine according to Swedish laid-open application 390 154 can be mentioned. The machine according to said publication is a further development of the

original concept and has the purpose of making continuous operation also possible. The machine is however equipped with the traditional conveyor for the case holders and it has the conventional arrangement of drive shafts and camshafts. The problem with these known conveyors is that in certain environments they require a great deal of servicing, e.g. in the form of lubrication and cleaning, and in certain cases they can break down even to the point of destruction.

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Another type of drive of the holders for the packaging containers is disclosed in Swedish laid-open application 430 407, where the drive of the holders occurs by means of a pinion engaged with a drive pulley having peripheral teeth, which pulley is supported by bearings on a central shaft in a traditional manner. Such a support means that a large mass to be handled is present in the conveyor and the machine, which amongst other things requires corresponding dimensioning of the other machine parts, or causes heavy wear.

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On this drive pulley there is an additional pulley on which a gear ring is arranged in order to drive an eccentric for special purposes in connection with longitudinal sealing of the packages.

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GB patent no. 1233818 operates in a circular "conveyor track" and is constructed from a central drum horizontally supported on bearings. On the drum shaft there is a cam disc (plate) for producing cam functions acting radially from the centre. This machine also has a large mass which is to be rotated, and to handle this situation, in as far as possible, a larger number of processing stations has been put in the generatrix direction.

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## OBJECT OF THE INVENTION:

The object of the invention is to obviate the  
aforementioned problems of known packaging machines and to  
provide a new type of conveyor with its associated  
5 processing stations in a packaging machine, which is  
particularly suitable for the manufacture of packaging  
cases of the aforementioned type.

10 The new concept increases operational reliability and  
offers great flexibility in its design, and provides  
conditions for optimal manufacturing and operating costs.

## SUMMARY OF THE INVENTION:

15 The object of the invention is achieved by a packaging  
machine having the basic structure defined in the preamble  
of claim 1. The unique features of the invention are  
defined in the characterizing part of claim 1, further  
developments being defined in the dependent claims.

## 20 BRIEF DESCRIPTION OF THE DRAWINGS:

The invention will now be described with reference to the  
embodiments in the accompanying drawings, in which:

25 Fig. 1 schematically shows the principle for  
driving the conveyor and case holders  
applied thereon,

30 Fig. 2 schematically shows the principle for  
driving a camshaft arrangement with  
means for producing a movement  
transmission to the processing tools,

35 Fig. 3 schematically shows double conveyor  
elements together with the drive for  
these,

- Fig. 4 schematically shows an arrangement with two camshafts, together with the drive for these in the form of electronic servo operation,
- 5 Fig. 5 shows servo operation of the camshaft arrangement and the drive shaft for the conveyor in one embodiment of the invention,
- 10 Fig. 6 schematically shows an alternative embodiment of the drive for the camshaft elements,
- 15 Fig. 7 shows a further embodiment of a double conveyor and camshaft arrangement with a mechanical drive,
- 20 Fig. 8 shows an arrangement for drive power take off and transfer of movement to the processing tools, for example in the embodiment according to Fig. 5, and
- 25 Fig. 9 shows an arrangement where a camshaft is placed centrally in the conveyor track.

30 Fig. 1 schematically shows the principle of construction of a conveyor in one embodiment of the invention.

A deck 11 is supported on uprights 10, and the outer race 13 of a circular bearing 14 is fixed to this deck by means of a bolted connection 12. The bearing 14 is of the type  
35 which normally occurs in e.g. wind power plants, digging machines, or armoured vehicles with a rotatable turret and is thus a standard product available at a reasonable cost.

The circular bearing 14 can have a diameter of the order of 1-1.5 m. The inner race 15 of the bearing has a peripheral gear ring 16 and is coupled to the outer race 13 by rolling elements 17.

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A drive motor 18 is also supported in the machine frame, which drive motor can for instance be a servo-motor and which is provided with a gearing arrangement, for example a planetary gearing 19 and a belt transmission 20 on the output shaft from the gearing, which transmission is arranged for driving a shaft 21. On the shaft 21 there is a drive pinion 22 which is in mesh with the gear ring 16 of the inner race 15. The shaft 21 is supported in bearings at its upper end in the deck 11 and is otherwise supported by the machine frame 10 in a manner not shown.

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A number of case holders 23 are fixed on the inner race 15, which holders support the case blanks 24.

The case blanks are extracted in a flat state from a magazine (not shown) placed in a supply station along the packaging machine conveyor which is formed by the bearing arrangement 13, 15. A number of processing stations are arranged along the conveyor track, for example a station for folding out the bottom end flaps of the cases, a station for sealing a membrane closure on to the folded-out flaps, a station for folding in the bottom flaps, a station for folding out the top flaps of the cases, a station for filling the cases through the open top, a station for sealing a membrane closure on to the top flaps, a station for folding in the top flaps and a station for feeding out filled and ready cases.

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These processing stations are spaced out with a predetermined separation along the periphery of the circular conveyor. In order to achieve the necessary processing operations there are processing tools in the

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actual stations. Reference is made to these and their drives in a later part of the description.

It should be noted that Fig.1 only shows the principle of the conveyor arrangement, and it is of course implicit that the case holders 23, for example, do not have to be holders which grip around the cases, but they can equally be holders of the carrier finger type, which advance the cases along a sliding path in the circular conveyor track/path.

For the processing tools in the processing stations along the conveyor track, some type of drive arrangement and a device for determining operational speed is required.

Fig. 2 shows an embodiment of an arrangement suitable for said purpose. A fixed deck 25 is supported in the machine frame 10, said deck comprising bottom 26, top 27 and side panels 28. A bearing 29 being basically of the same type as that in Fig. 1 and provided with a gear ring, is fixed by means of a bolted connection 30 to the bottom 26 of the deck 25.

A drive motor 31 is coupled via a worm drive 32 to a shaft 33, on which a pinion 34 is mounted in a rotationally-fixed manner for driving the inner race 35 of the bearing 29 by means of its peripheral gear ring 36. The shaft 33 is supported by bearings in the deck 25 and in the machine frame (not shown). Above the inner race 36 at a vertical distance from the outer race of the bearing 29, a pinion or gear ring 37 is bolted for circular movement with the inner race. The pinion or the gear ring 37 is in mesh with pinion 38, supported by the top 27 and arranged in suitable positions in the processing stations along the conveyor track. The conveyor and respectively the conveyor path for the cases have only been shown schematically in Fig.2 by the chain dotted line 39.

The parts of the packaging machine of the invention shown in Figs. 1 and 2 and which have been described up to this point, respectively represent the basic principle for the conveyor arrangement and one embodiment of a camshaft arrangement for controlling and driving of processing tools in processing stations along the conveyor track.

Fig. 3 shows a further development of the case conveyor of Fig. 1. The deck 11 supporting the bearing 14 has been supplemented with a lower deck 40, on which the outer race 13' of a bearing 14', identical to the bearing 14, has been bolted by means of a bolted connection 41. For this purpose the shaft 21 is provided with an additional rotationally-fixed pinion 22' which meshes with the gear ring 16' of the inner race 15'. For this purpose, the shaft 21 is made as a splined shaft and a positional adjustment of the deck 40 in the vertical direction is thus possible up to an end position which is shown in dashed lines in the figure. A holder arrangement (not shown) is provided on the shaft 21 for fixing the deck in the desired position.

In Fig. 3 the circular conveyor is thus formed by two identical bearings coaxially arranged one above the other, where the driven inner race 15 of the bearing 14 supports the upper holder 23 for the cases, and the bearing race 15' supports the lower holder 23'.

From Fig. 3 it is clear that the bearing 14' and its deck in principle form the mirror image of the bearing 14 and the deck 11.

Fig. 4 shows a camshaft arrangement comprising upper and lower decks and intended for the case conveyor shown in Fig. 3. The deck 25 in Fig. 4 corresponds to the deck 25 in Fig. 2, and the double bearing races comprising the conveyor arrangement have been indicated by the chain dotted line 39. On the same shaft 33 as in Fig. 2, an

additional deck 42 is arranged in a vertically displaceable manner as shown by the dashed lines. On the deck 42, the outer race of a bearing 29' identical to the bearing 29 is fixedly bolted by a bolted arrangement 30' and the inner race 35 of the bearing is driven by a pinion 34' which is rotationally-fixed on to the shaft 33. In a corresponding manner to that in deck 25, a pinion or gear ring 37' is fixedly bolted to the rotatable inner ring 34', which pinion or gear ring 37' follows the circular rotational movement of the bearing race 35. In mesh with this pinion 37' along the periphery of the circular movement path there are additional pinions 38' arranged in suitable positions in the processing stations, which pinions 38' in a manner similar to the pinions 38, are intended to control and/or drive the processing tools.

From Fig. 4 it is clear that the deck 42 and its contents forms a mirror image of the deck 25.

Fig. 5 shows a complete arrangement of two conveyor pivotal ring bearings (roller path bearings) and two camshaft pivotal ring bearings, 14, 14' and 29, 29' respectively. From the figure it is clear that the upper camshaft bearing 29 and the upper conveyor bearing 14 have their outer races bolted together by means of bolted connections 43 through the bottom 26 of the deck 25. In a similar way, the lower conveyor bearing 14' is bolted to the outer race of the lower camshaft bearing.

In the shown embodiment, the pair of inner races in the upper bearing pair 14, 29 is intended for conveyance of, and respectively contribution to processing of, the top of the cases, while the pair of lower conveyor race and camshaft race are intended for the bottom of the cases.

Since the lower race pair is adjustable in the vertical direction, a minimum of operations is required for handling cases with differing height formats.

5 In the embodiment of Fig. 5, the driving of the shaft 33 at constant speed is performed by the motor 31 and the gearing 32, and an absolute position sensor 44 (Fig. 4) transmits the current position of the camshaft race to the servo-motor 44' which carries out necessary operations, for  
10 example intermittent displacement of the case holders 23 in the circular movement path by means of the planetary gearing 44''.

As an alternative to the drive of the camshaft races shown  
15 in Fig. 5, Fig. 6 shows an embodiment where each of the outer races 45, 45' of the camshaft bearings is driven by its own servo-motor 46 and 47 respectively. The drive of both the inner races of the conveyor bearings 14, 14' is performed by an additional separate servo-motor 48. For  
20 achieving the transmission function to the processing tools in the processing stations in the embodiment of Fig. 6, there is no need for an extra pinion or gear ring on a driven inner race, but instead the directly driven outer race performs the function of transmission to the  
25 processing tools with control of the programmable servo-motors 46, 47. Similarly, neither is any mechanical coupling needed between the camshaft arrangement and the drive shaft for the conveyor, since the motors can be pre-programmed for intended operation and synchronisation of  
30 the processing operations in the processing stations.

The arrangement in Fig. 6 gives a high degree of freedom and, if desired, the packaging machine can be made to be continuously operating.

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The embodiment of Fig. 7 corresponds to the principle in the embodiment of Fig. 5 with the exception of the drive

for the camshaft arrangement and the drive shaft for the conveyor races. Instead of a motor with an absolute sensor, a revolution-controllable motor 49 is provided which drives shaft 33 via an angle gearing 50 and which drives, via angle gearing 51 and indexing box 52, the conveyor races for intermittent operation synchronised with the control of the camshaft arrangement and/or the drive of the operating tools. Instead of an indexing box, another gearbox can be used e.g. one which allows continuous operation.

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In the embodiments with pinions or gear rings on the driven inner camshaft race, a power take-off device according to Fig. 8 is suitably arranged in the processing stations.

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The pinion 46 is intended to mesh with associated pinions 38 along the circular movement path of the camshaft race and, via an angle drive 47, to drive an output shaft 48. In turn, this shaft 48 drives processing tools directly or via a transmission mechanism.

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As is clear from the foregoing description of embodiments, the invention allows a multitude of variations within the framework of the basic concept of a circular element defining the path of movement for a conveyor in a packaging machine. As opposed to known solutions, the conveyor element is not mounted on bearings in the centre, but at a radial distance from the centre, which in terms of cost gives many possibilities for variations in the detailed design and, not least, gives a machine which is manageable from a service point of view.

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The shown camshaft arrangement can e.g. be replaced with a camshaft placed in the centre of the conveyor track, which has a number of cam discs and curved discs for transmission of movement to the processing tools in the processing stations.

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Such an arrangement is shown in Fig. 9. A fixed deck 11 is supported in the machine frame 10 by means of an arrangement of guides 10' and holders 10''. In this deck, the outer race 13 of a pivotal ring bearing 14 is suspended by means of a bolted connection 12. The inner race 15 has a plate 23' fixed to it which carries holders 23'' for cases 24.

The inner race 15 is in mesh with a drive pinion 22 on the output shaft of a star coupling 52. The star coupling is driven via a shaft 21 from an angle gearing 51 via an additional gearing 50 from a drive motor 49.

A lower deck 53 is supported in bearings for vertical movement on said guides 10', and a ram arrangement 10'' operates against the lower deck 53 and against an upper deck 54. The rams are arranged so that, during vertical adjustment, the decks 53, 54 are displaced equal distances from the horizontal plane of the machine defined by the case holders 23''.

In the centre of the ring bearing 14 there is a vertical camshaft 33' which is driven from the motor 49 via an angle gearing 50. The camshaft 33' is divided by a sleeve 55 applied to the shaft so as to be rotationally fixed thereto, said sleeve 55 allowing vertical displacement of the two shaft parts.

Arranged on said shaft parts and fixed against rotation with respect thereto are cam discs 56, 57, movement-transmitting devices (not shown) co-operating with these discs to transmit the necessary movements for the various processing tools in the stations along the conveyor track to the cases on the conveyor race.

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These cam discs 56, 57 thus follow the displacement of the decks 53, 54 and thereby take up positions at equal

distances from the central plane 23'', which allows a simple adjustment of the machine to different case heights.

5 A number of different embodiments of the invention have been described and it is intended that the described embodiments shall only serve as an exemplification and that the invention is only limited by that which is defined in the accompanying claims.

## CLAIMS:

5

1. Packaging machine, comprising a machine frame (10) for supporting an endless horizontal conveyor (14), holders (23) for packaging cases arranged on the conveyor, an arrangement (18-20) for driving the conveyor, an arrangement for supplying and erecting case blanks, stations arranged along the conveyor's path of movement, said stations having processing tools for performing processing into ready cases (24) filled with product, and an arrangement for delivering the filled cases, characterized in that the conveyor comprises a circular element (15) which defines the endless conveyor path and which is mounted in bearings (17) radially at a distance from the centre of the circular element, preferably peripherally in said path of movement.

2. Packaging machine according to claim 1, characterized in that the circular element constitutes one race (15) of a bearing (14).

3. Packaging machine according to claim 2, characterized in that said one race has a gear ring (16), and in that said drive arrangement has means (22) for driving engagement with the gear ring.

4. Packaging machine according to claim 3, characterized in that a camshaft arrangement (33', 56, 57) is arranged for controlling and/or driving processing tools in at least one of the processing stations, and in that said camshaft arrangement comprises a camshaft (33') placed in the centre of the endless conveyor path.

5. Packaging machine according to claim 3, characterized in that a camshaft arrangement (33, 34, 35, 37, 38, 45, 46,



47, 45') is arranged for controlling and/or driving processing tools in at least one of the processing stations, and in that said camshaft arrangement comprises a circular camshaft element (35) with the same central axis as said conveyor bearing race (15).

6. Packaging machine according to claim 5, characterized in that the circular camshaft element constitutes one race (35) in an additional bearing (29).

7. Packaging machine according to claim 6, characterized in that said camshaft bearing race (35) has a gear ring (36), and in that means (34) are arranged for driving engagement with the gear ring of the camshaft.

8. Packaging machine according to claim 7, characterized in that the camshaft bearing race (35) has an additional gear ring (37), and in that a pinion (38) is arranged in at least one processing station for meshing with said additional gear ring, and in that a movement transmitting arrangement (46-48) is coupled to the pinion (38) and arranged for driving the processing tool in said station.

9. Packaging machine according to claim 8, characterized in that the conveyor bearing race (14) and the camshaft bearing race (29) define a fixed horizontal plane.

10. Packaging machine according to claim 9, characterized in that an additional pair of a conveyor bearing race (14') and camshaft bearing race (29') are arranged at a vertical distance from the first pair, and in that means (21) are arranged for positioning said pair of additional races in the vertical direction.

11. Packaging machine according to claim 10, characterized in that the gear ring (16) is positioned on the inside of

the conveyor bearing race (14), and in that said means for driving engagement comprises a pinion (22) supported on a shaft (21) which is supported in the machine frame inside the conveyor bearing race.

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12. Packaging machine according to claim 11, characterized in that said means for driving engagement with the camshaft gear ring (35) comprises a camshaft drive pinion (34) provided on an additional shaft (37) inside the conveyor bearing race.

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13. Packaging machine according to claim 7, characterized in that a separate motor (46, 47) is arranged for driving each of the camshaft rings (35, 35', 46, 47) and in that the motor has means for meshing with the camshaft gear ring (45).

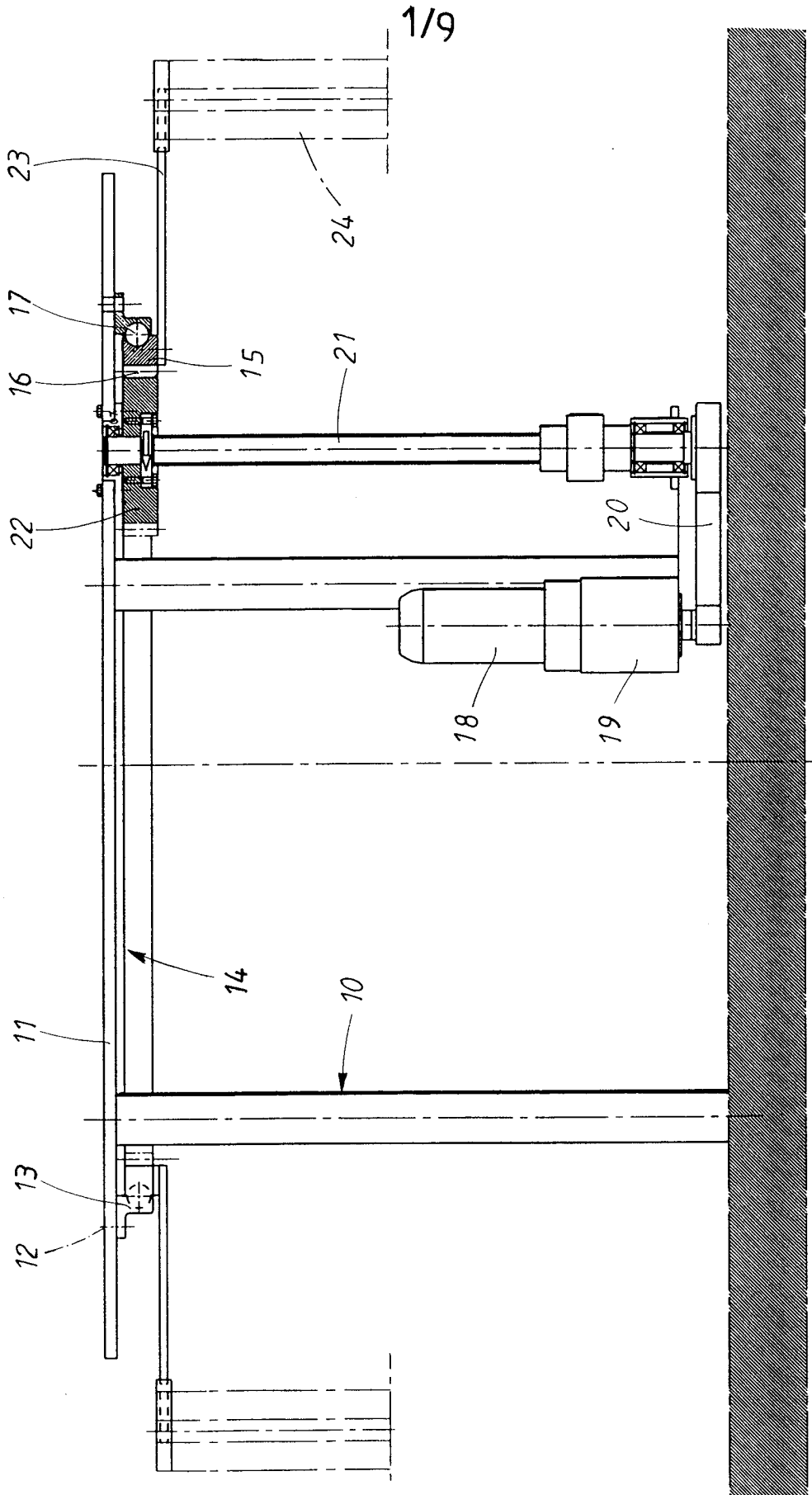
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14. Packaging machine according to any one of claims 1-3, characterized in that at least one of said processing stations is controlled and/or driven from a servo-motor or the like.

20

15. Packaging machine according to claim 14, characterized in that said stations are equipped with driving means for respective processing tools, and in that a single programmable servo-motor or the like is provided for controlling said drive means.

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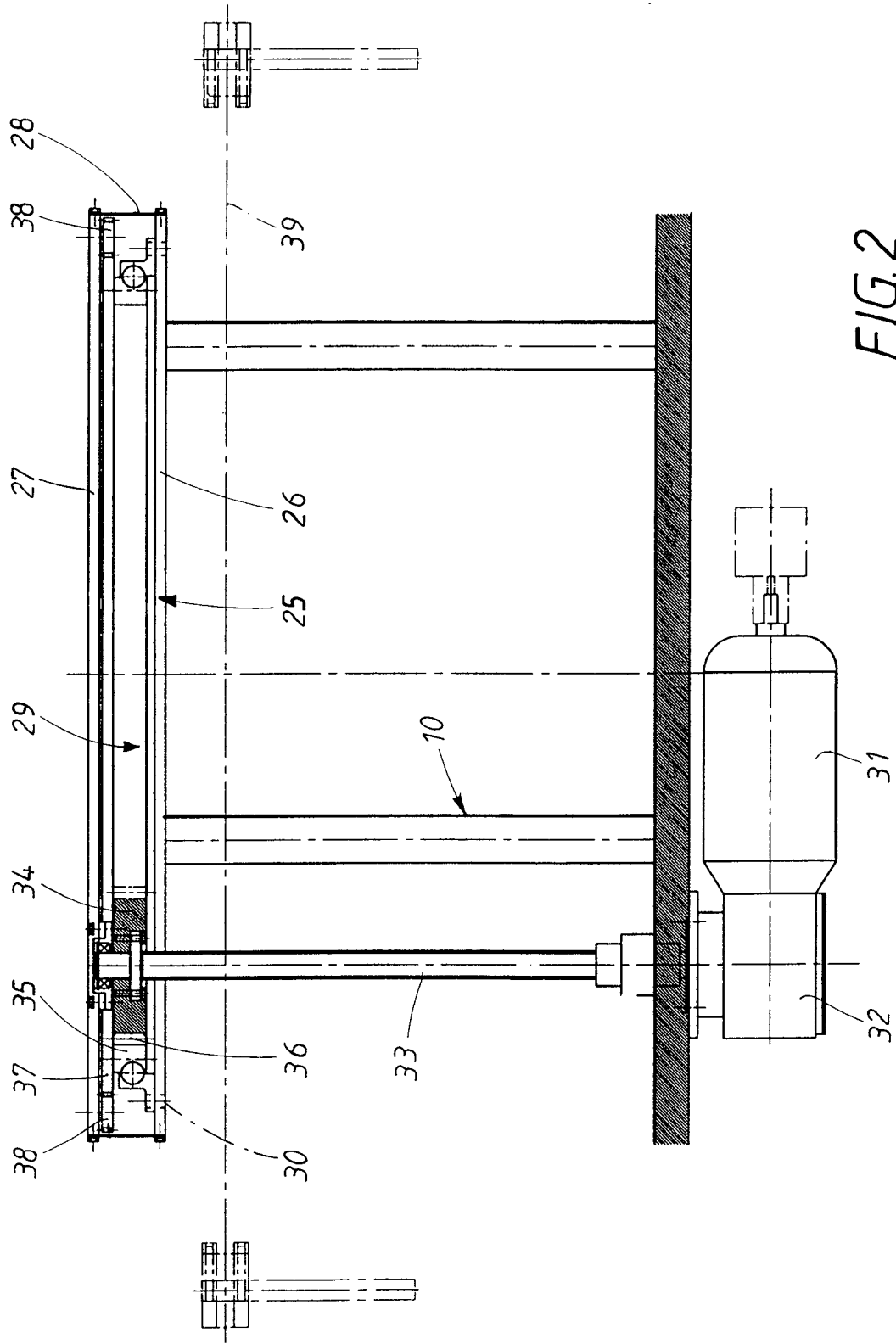


FIG. 2

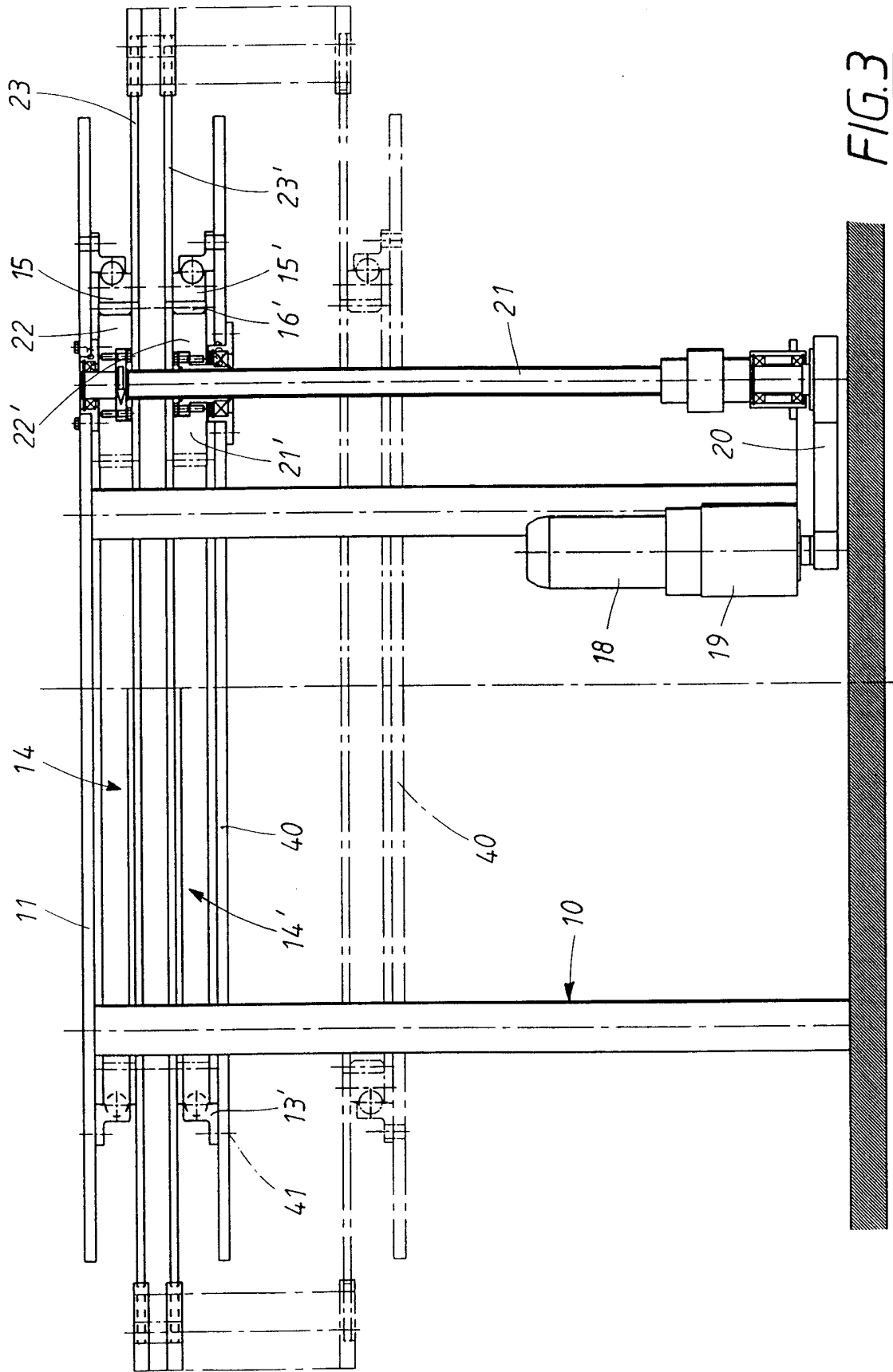


FIG. 3

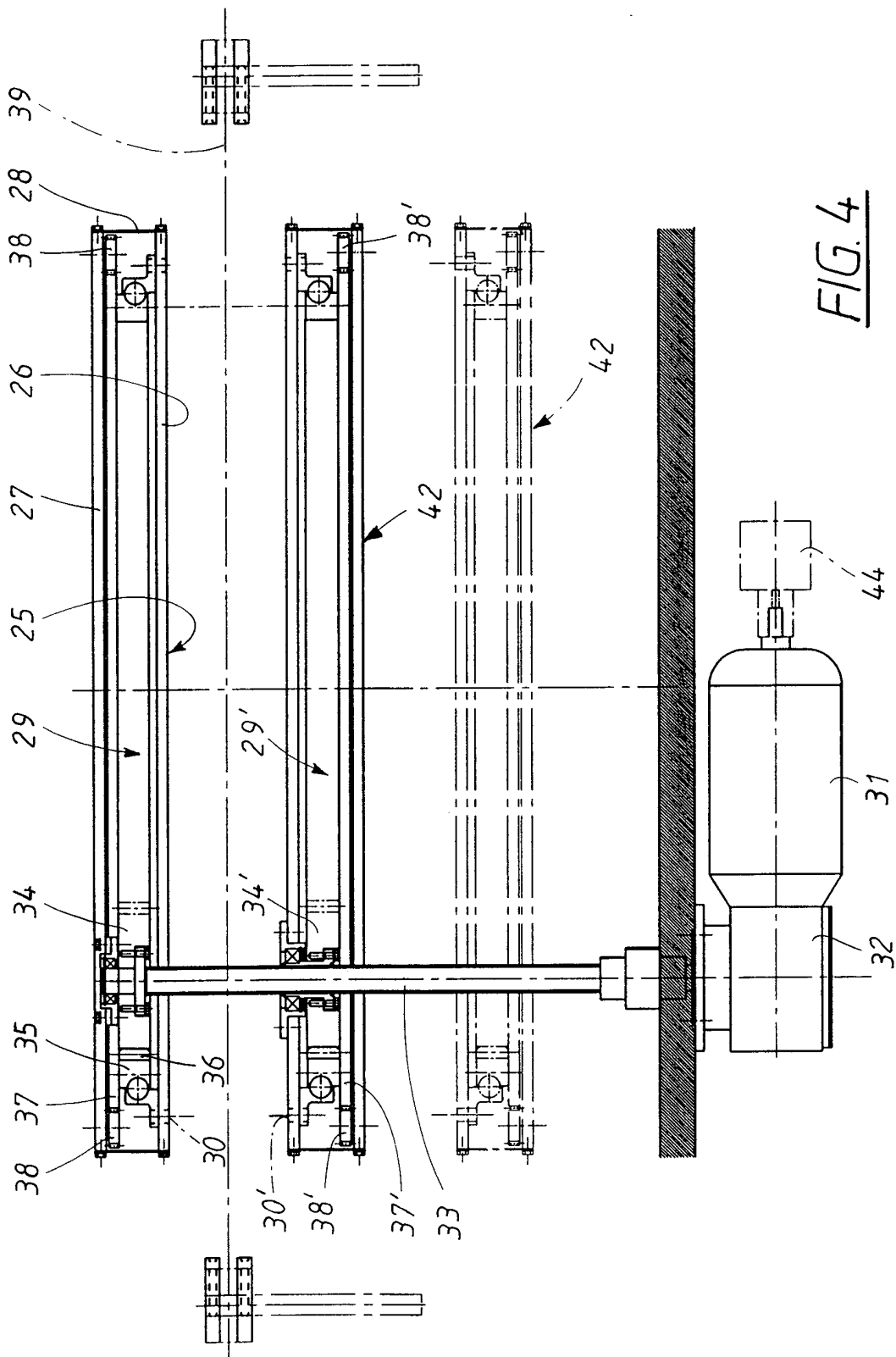


FIG. 4

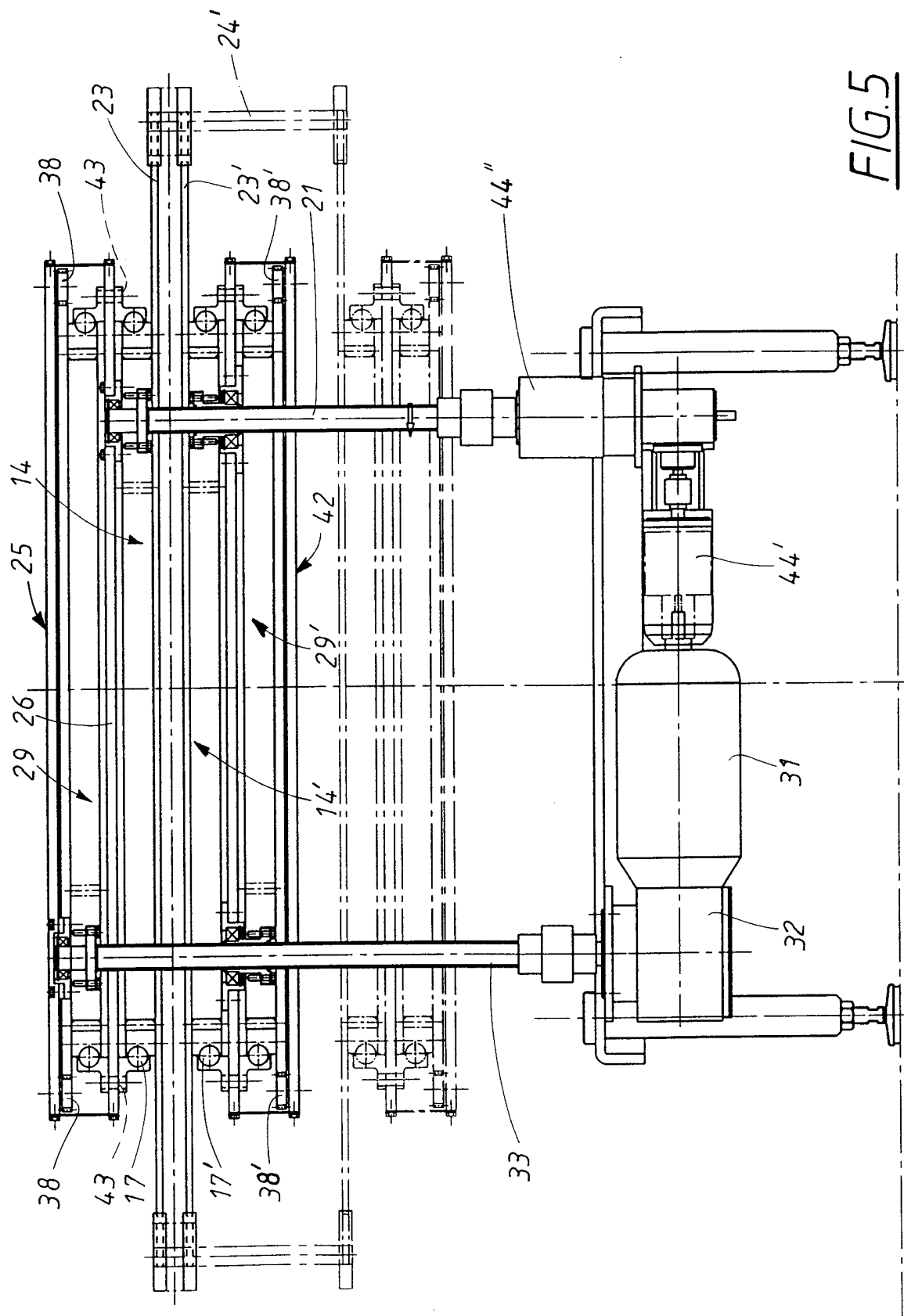


FIG. 5

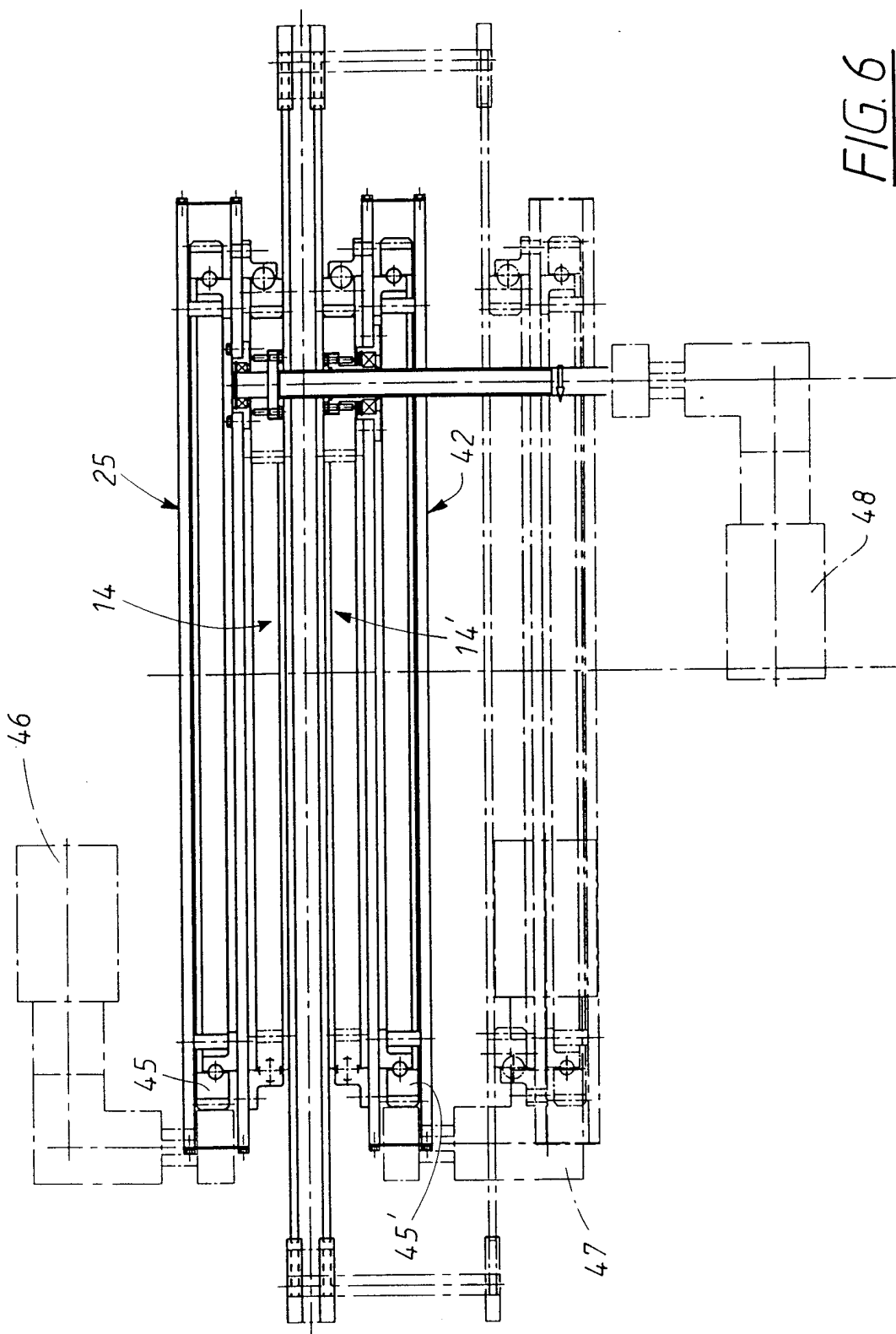
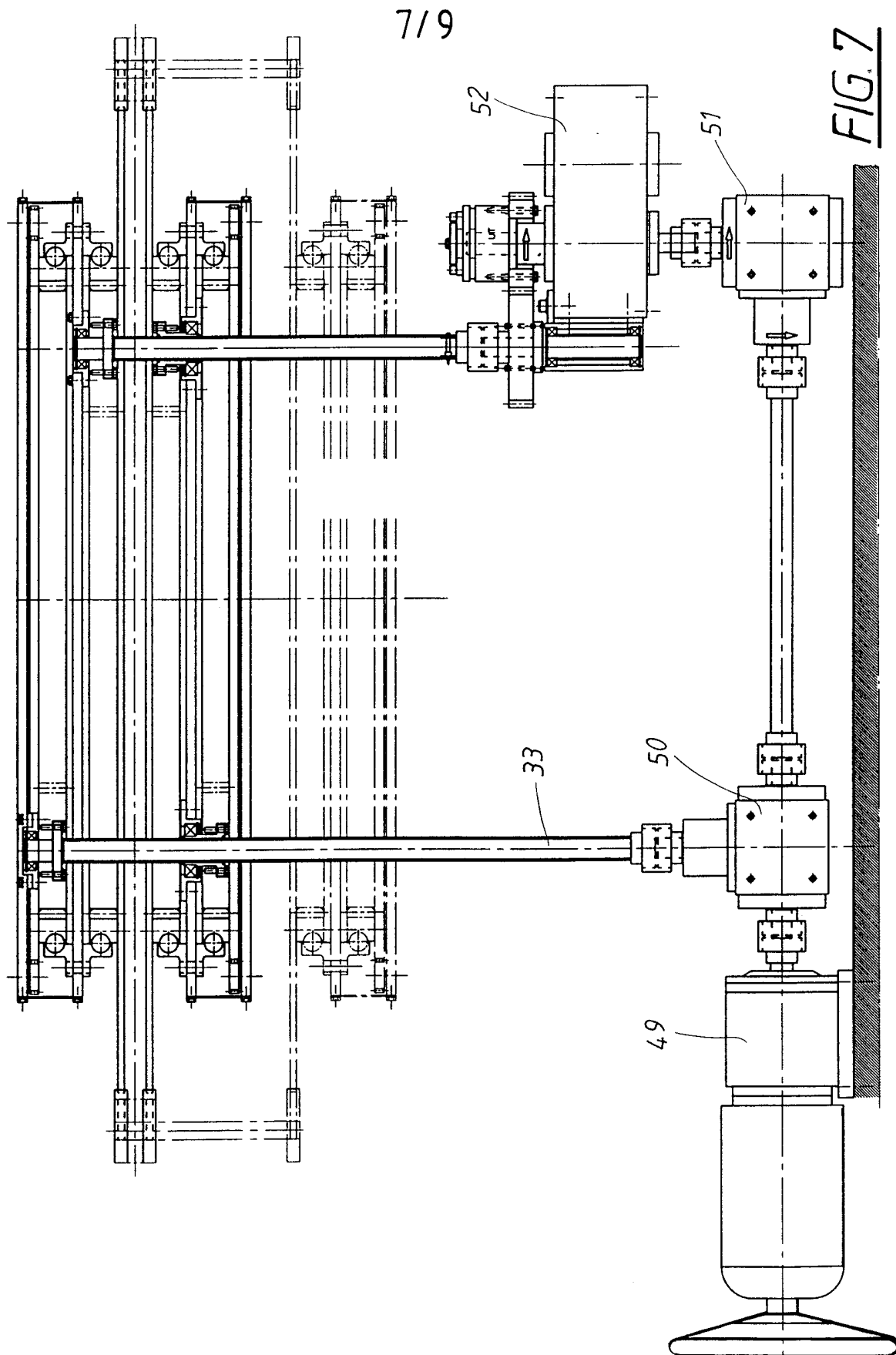


FIG. 6





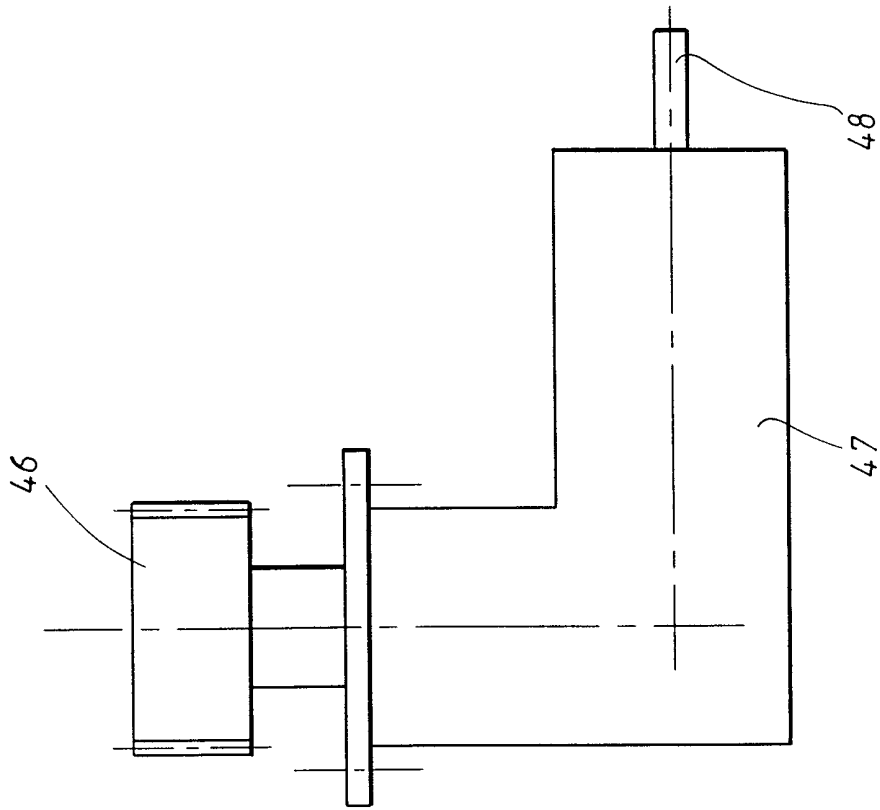


FIG. 8

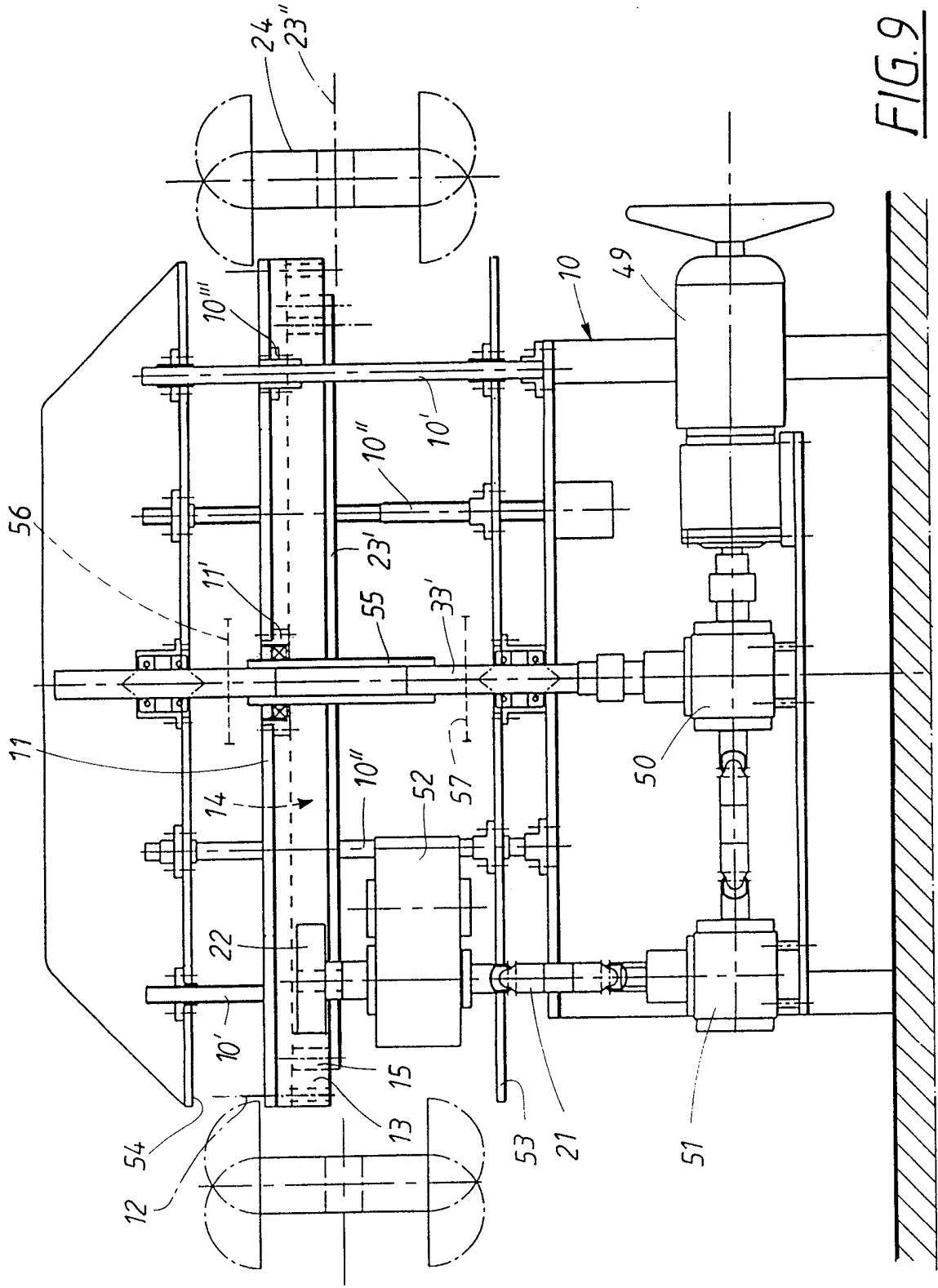


FIG. 9

# INTERNATIONAL SEARCH REPORT

International application No.

**PCT/SE 98/01285**

<b>A. CLASSIFICATION OF SUBJECT MATTER</b>		
<b>IPC6: B65B 65/02, B65B 65/00</b> According to International Patent Classification (IPC) or to both national classification and IPC		
<b>B. FIELDS SEARCHED</b>		
Minimum documentation searched (classification system followed by classification symbols)		
<b>IPC6: B65B</b>		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
<b>SE,DK,FI,NO classes as above</b>		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	GB 1233818 A (KUSTNER FRERES & CIE S.A.), 3 June 1971 (03.06.71)  ---	1-15
A	US 4094124 A (LJUNGCRANTZ), 13 June 1978 (13.06.78)  --- -----	1-15
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> See patent family annex.		
* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed  "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family		
Date of the actual completion of the international search	Date of mailing of the international search report	
<b>22 October 1998</b>	<b>27 -10- 1998</b>	
Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86	Authorized officer  <b>Kristina Pederson</b> Telephone No. +46 8 782 25 00	

# INTERNATIONAL SEARCH REPORT

Information on patent family members

27/07/98

International application No.

PCT/SE 98/01285

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
GB 1233818 A	03/06/71	CH 524503 A	30/06/72
		DE 1942928 A	09/07/70
		FR 2016420 A	08/05/70
-----			
US 4094124 A	13/06/78	AR 212870 A	31/10/78
		AT 46277 A	15/07/79
		AT 355506 B	10/03/80
		AU 504638 B	18/10/79
		AU 2153077 A	27/07/78
		BE 850775 A	26/07/77
		BR 7700480 A	04/10/77
		CA 1046817 A	23/01/79
		CH 610258 A	12/04/79
		CS 191186 B	29/06/79
		DD 127921 A	19/10/77
		DE 2702928 A,C	28/07/77
		DK 22477 A	28/07/77
		DK 146999 B,C	12/03/84
		FI 59964 B,C	31/07/81
		FI 770253 A	28/07/77
		FR 2339532 A,B	26/08/77
		GB 1561181 A	13/02/80
		IN 147192 A	15/12/79
		JP 1317127 C	15/05/86
		JP 52094294 A	08/08/77
		NL 185712 B	01/02/90
		NL 7700862 A	29/07/77
		PT 66115 B	28/06/78
		SE 430407 B,C	14/11/83
		SE 7700801 A	28/07/77
		ZA 7700483 A	28/12/77
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