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(54) **PACKAGING MACHINE**

VERPACKUNGSMASCHINE

MACHINE A EMBALLER

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GB-A- 1 233 818                    US-A- 1 555 360  
US-A- 2 206 157                    US-A- 4 094 124**

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## Description

**[0001]** 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

**[0002]** 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.

**[0003]** 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.

**[0004]** This case type is a leader from an environmental and recycling viewpoint and gives extraordinary possibilities for fulfilling present and future environmental requirements.

**[0005]** 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.

**[0006]** 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.

**[0007]** 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.

**[0008]** 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:

**[0009]** As an example of a machine of the type discussed in the introduction. The machine disclosed in DE-A-1 586 155 may be mentioned. The preamble of claim 1 is based on said machine. The machine according to Swedish laid-open application 390 154 can also 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.

**[0010]** 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.

**[0011]** 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.

**[0012]** 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.

## OBJECT OF THE INVENTION:

**[0013]** 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 processing stations in a packaging machine, which is particularly suitable for the manufacture of packaging cases of the aforementioned type.

**[0014]** 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:

**[0015]** 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.

#### BRIEF DESCRIPTION OF THE DRAWINGS:

**[0016]** The invention will now be described with reference to the embodiments in the accompanying drawings, in which:

- Fig. 1 schematically shows the principle for driving the conveyor and case holders applied thereon,
- Fig. 2 schematically shows the principle for driving a cam arrangement with means for producing a movement transmission to the processing tools,
- Fig. 3 schematically shows double conveyor elements together with the drive for these,
- Fig. 4 schematically shows an arrangement with two cams, together with the drive for these in the form of electronic servo operation,
- Fig. 5 shows servo operation of the cam arrangement and the drive shaft for the conveyor in one embodiment of the invention,
- Fig. 6 schematically shows an alternative embodiment of the drive for the cam elements,
- Fig. 7 shows a further embodiment of a double conveyor and cam arrangement with a mechanical drive,
- 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
- Fig. 9 shows an arrangement where a camshaft provided with cams is placed centrally in the conveyor track.

**[0017]** Fig. 1 schematically shows the principle of construction of a conveyor in one embodiment of the inven-

tion.

**[0018]** A deck 11 is supported on uprights 10, and the outer ring 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 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.

**[0019]** The circular bearing 14 can have a diameter of the order of 1-1.5 m. The inner ring 15 of the bearing has a peripheral gear ring 16 and is coupled to the outer ring 13 by rolling elements 17.

**[0020]** 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.

**[0021]** A number of case holders 23 are fixed on the inner ring 15, which holders support the case blanks 24.

**[0022]** 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.

**[0023]** 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 actual stations. Reference is made to these and their drives in a later part of the description.

**[0024]** 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.

**[0025]** 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.

**[0026]** 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.

**[0027]** 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 ring 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 ring 35 at a vertical distance from the outer race of the bearing 29, a gear ring 37 is bolted for circular movement with the inner race. 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.

**[0028]** 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 said type drive arrangement for processing tools and a device for determining operational speed, i.e. a cam arrangement for controlling and driving of processing tools in processing stations along the conveyor track.

**[0029]** 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 ring 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 ring 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.

**[0030]** In Fig. 3 the circular conveyor is thus formed by two identical bearings coaxially arranged one above the other, where the driven inner ring 15 of the bearing 14 supports the upper holder 23 for the cases, and the bearing ring 15' supports the lower holder 23'.

**[0031]** 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.

**[0032]** Fig. 4 shows a cam 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 rings 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 ring 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 gear ring 37' is fixedly bolted to the rotatable inner ring 34', which gear ring 37' follows the circular rotational movement of the bearing ring 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.

**[0033]** From Fig. 4 it is clear that the deck 42 and its contents forms a mirror image of the deck 25.

**[0034]** Fig. 5 shows a complete arrangement of two conveyor gear ring bearings (roller path bearings) and two cam gear ring bearings, 14, 14' and 29, 29', respectively. From the figure it is clear that the upper cam bearing 29 and the upper conveyor bearing 14 have their outer rings 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 ring of the lower cam bearing.

**[0035]** In the shown embodiment, the pair of inner rings 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 ring and cam ring are intended for the bottom of the cases.

**[0036]** Since the lower ring pair is adjustable in the vertical direction, a minimum of operations is required for handling cases with differing height formats.

**[0037]** 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 cam ring to the servo-motor 44' which carries out necessary operations, for example intermittent displacement of the case holders 23 in the circular movement path by means of the planetary gearing 44'.

**[0038]** As an alternative to the drive of the camshaft rings shown in Fig. 5, Fig. 6 shows an embodiment where each of the outer rings 45, 45' of the cam 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 achieving the transmission function to the processing tools in the processing stations in the embodiment of Fig. 6, there is no need for a gear ring on a driven inner ring, but instead the directly driven outer ring performs the function of transmission to the processing tools with control of the programmable servomotors 46, 47. Similarly, neither is any mechanical coupling needed between the cam arrangement and the drive shaft for the conveyor, since the motors can be preprogrammed for intended operation and synchronisation of the processing operations in the processing stations.

[0039] The arrangement in Fig. 6 gives a high degree of freedom and, if desired, the packaging machine can be made to be continuously operating.

[0040] The embodiment of Fig. 7 corresponds to the principle in the embodiment of Fig. 5 with the exception of the drive for the cams arrangement and the drive shaft for the conveyor rings. 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 rings for intermittent operation synchronised with the control of the cam 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.

[0041] In the embodiments with gear rings on the driven inner cam ring, a power take-off device according to Fig. 8 is suitably arranged in the processing stations.

[0042] The pinion 46 is intended to mesh with associated pinions 38 along the circular movement path of the cam ring 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.

[0043] 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.

[0044] The shown cam arrangement can e.g. be replaced with a cam arrangement having 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.

[0045] 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 ring 13 of a gear ring bearing 14 is suspended by means of a bolted connection 12. The inner ring 15 has a plate 23' fixed to it which carries holders 23" for cases 24.

[0046] The inner ring 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.

[0047] 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".

[0048] In the centre of the gear 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.

[0049] 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.

[0050] 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.

[0051] 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

1. Packaging machine, comprising a machine frame (10) for supporting a circular element (15) defining an endless conveyor path and which is mounted in bearings (17) radially at a distance from the centre of the circular element, holders (23) for packaging cases arranged on the circular element, an arrangement (18-20) for driving the circular element, an arrangement for supplying and erecting case blanks, stations arranged along the path of movement of the circular element, said stations having processing tools for performing processing into ready cases (24) filled with product, and an arrangement for delivering the filled cases, wherein the circular element constitutes one ring (15) of a bearing (14) **characterized in that** said ring (15) is provided with a gear ring (16), and that said drive arrangement has means (22) for driving engagement with the gear ring (16).
2. Packaging machine according to claim 1, **characterized in that** a cam 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 cam arrangement comprises a camshaft (33') placed in the centre of the circular element (15).
3. Packaging machine according to claim 2, **characterized in that** a cam 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 cam arrange-

ment comprises one gear ring (35) in an additional gear ring bearing (29) with the same central axis as said gear ring bearing (14) defining the endless conveyor path and **in that** means (34) are arranged for driving engagement with the gear ring (35) of the said additional gear ring bearing (29).

4. Packaging machine according to claim 3, **characterized in that** the said gear ring of said additional gear ring bearing (29) 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.
5. Packaging machine according to claim 4, **characterized in that** the conveyor path defining gear ring bearing (14) and said additional gear ring bearing (29) define fixed horizontal planes in the machine frame (10).
6. Packaging machine according to claim 5, **characterized in that** an additional pair of a conveyor path defining gear ring bearing (14') and a said additional gear ring bearing (29') are arranged at a vertical distance from the first pair, and **in that** means (21) are arranged for positioning said additional pair of bearings in the vertical direction.
7. Packaging machine according to claim 6, **characterized in that** the gear ring (16) of said gear ring bearing defining the conveyor path is positioned on the inside ring (14) of the gear ring bearing, 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 gear ring of said gear ring bearing defining the conveyor path.
8. Packaging machine according to claim 7, **characterized in that** said means for driving engagement with the said ring (35) of said additional gear ring bearing (29) comprises a drive pinion (34) provided on an additional shaft (37) inside the gear ring of said gear ring bearing defining the conveyor path.
9. Packaging machine according to claim 3, **characterized in that** a separate motor (46, 47) is arranged for driving each of said rings (35, 35', 46, 47) of said additional gear ring bearings (45).
10. Packaging machine according to claim 1, **characterized in that** at least one of said processing stations is controlled and/or driven from a servo-motor or the like.
11. Packaging machine according to claim 10, **charac-**

**terized 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.

#### Patentansprüche

1. Verpackungsmaschine mit einem Maschinenrahmen zur Halterung eines kreisförmigen Elements (15), welches einen endlosen Förderweg bildet und in Lagern (17) radial in einem Abstand von dem Zentrum des kreisförmigen Elements angebracht ist, mit Haltern (23) für Verpackungen, die auf dem kreisförmigen Element angeordnet sind, einer Anordnung (18-20) für den Antrieb des kreisförmigen Elements, einer Anordnung für die Zuführung und das Aufrichten von Verpackungsrohlingen, Stationen, die längs des Weges der Bewegung des kreisförmigen Elements angeordnet sind, wobei die Stationen Verarbeitungswerkzeuge haben für das Verarbeiten in fertige Verpackungen (24), die mit Produkt gefüllt sind, und mit einer Anordnung für die Zulieferung von gefüllten Verpackungen, wobei das kreisförmige Element einen Ring (15) eines Lagers (14) darstellt, **dadurch gekennzeichnet, daß** der Ring (15) mit einem Zahnkranz (16) versehen ist und daß die Antriebsanordnung Mittel (22) für den Antriebseingriff mit dem Zahnkranz (16) hat.
2. Verpackungsmaschine nach Anspruch 1, **dadurch gekennzeichnet, daß** eine Nockenordnung (33', 56, 57) für die Steuerung und/oder den Antrieb von Verarbeitungswerkzeugen in mindestens einer der Verarbeitungsstationen angeordnet ist und daß die Nockenordnung eine Nockenwelle (33') aufweist, die im Zentrum des kreisförmigen Elements (15) angeordnet ist.
3. Verpackungsmaschine nach Anspruch 2, **dadurch gekennzeichnet, daß** eine Nockenordnung (33, 34, 35, 37, 38, 45, 46, 47, 45') für die Steuerung und/oder den Antrieb von Verarbeitungswerkzeugen in mindestens einer der Verarbeitungsstationen angeordnet ist und daß die Nockenordnung einen Zahnkranz (35) in einem zusätzlichen Zahnkranzlager (29) mit derselben Mittelachse aufweist wie das Zahnkranzlager (14), welches den endlosen Förderweg bildet, und daß Mittel (34) für den Antriebseingriff mit dem Zahnkranz (35) des zusätzlichen Zahnkranzlagers (29) angeordnet sind.
4. Verpackungsmaschine nach Anspruch 3, **dadurch gekennzeichnet, daß** der Zahnkranz des zusätzlichen Zahnkranzlagers (29) einen zusätzlichen Zahnkranz (37) hat und daß ein Ritzel (38) in mindestens einer Verarbeitungsstation angeordnet ist zum Kämmen mit dem zusätzlichen Zahnkranz und

daß eine Bewegungsübertragungsanordnung (46-48) mit dem Ritzel (38) gekoppelt und für den Antrieb des Verarbeitungswerkzeuges in der Station angeordnet ist.

5. Verpackungsmaschine nach Anspruch 4, **dadurch gekennzeichnet, daß** das den Förderweg bildende Zahnkranzlager (14) und das zusätzliche Zahnkranzlager (29) feste horizontale Ebenen in dem Maschinenrahmen (10) bilden.
6. Verpackungsmaschine nach Anspruch 5, **dadurch gekennzeichnet, daß** ein zusätzliches Paar eines den Förderweg bildenden Zahnkranzlagers (14') und eines zusätzlichen Zahnkranzlagers (29') in einem vertikalen Abstand von dem ersten Paar angeordnet ist und daß Mittel (21) für das Positionieren des zusätzlichen Paares von Lagern in der vertikalen Richtung angeordnet sind.
7. Verpackungsmaschine nach Anspruch 6, **dadurch gekennzeichnet, daß** der Zahnkranz (16) des Zahnkranzlagers, welches den Förderweg bildet, auf dem Innenring (14) des Zahnkranzlagers angeordnet ist und daß das Mittel für den Antriebseingriff ein Ritzel (22) aufweist, welches auf einer Welle (21) gehalten ist, die in dem Maschinenrahmen innerhalb des Zahnkranzes des Zahnkranzlagers, welches den Förderweg bildet, gestützt wird.
8. Verpackungsmaschine nach Anspruch 7, **dadurch gekennzeichnet, daß** das Mittel für den Antriebsingriff mit dem Ring (35) des zusätzlichen Zahnkranzlagers (29) ein Antriebsritzel (34) aufweist, welches auf einer zusätzlichen Welle (37) innerhalb des Zahnkranzes des Zahnkranzlagers, welches den Förderweg bildet, vorgesehen ist.
9. Verpackungsmaschine nach Anspruch 3, **dadurch gekennzeichnet, daß** ein getrennter Motor (46, 47) für den Antrieb jedes der Ringe (35, 35', 46, 47) der zusätzlichen Zahnkranzlager (45) angeordnet ist.
10. Verpackungsmaschine nach Anspruch 1, **dadurch gekennzeichnet, daß** mindestens eine der Verarbeitungstationen von einem Servomotor oder dergleichen gesteuert und/oder angetrieben wird.
11. Verpackungsmaschine nach Anspruch 10, **dadurch gekennzeichnet, daß** die Stationen mit Antriebsmitteln für entsprechende Verarbeitungswerkzeuge ausgestattet sind und daß ein einzelner programmierbarer Servomotor oder dergleichen für die Steuerung des Antriebsmittels vorgesehen ist.

## Revendications

1. Machine d'emballage, comprenant un bâti de machine (10) destiné à soutenir un élément circulaire (15) définissant un trajet de transporteur sans fin et qui est monté dans des paliers (17) radialement à une certaine distance du centre de l'élément circulaire, des moyens de maintien (23) servant à garnir des caisses disposées sur l'élément circulaire, un dispositif (18-20) servant à entraîner l'élément circulaire, un dispositif servant à fournir des flans de caisses et à les construire, des stations disposées le long du trajet de déplacement de l'élément circulaire, lesdites stations comportant des outils de traitement qui servent à les transformer en des caisses prêtes (24) remplies de produit, et un dispositif servant à délivrer les caisses remplies, où l'élément circulaire consiste en une couronne (15) d'un palier (14), **caractérisée en ce que** ladite couronne (15) est dotée d'une couronne d'engrenage (16), et **en ce que** ledit dispositif d'entraînement possède un moyen (22) servant à assurer la venue en prise avec la couronne d'engrenage (16).
2. Machine d'emballage selon la revendication 1, **caractérisée en ce qu'**un ensemble à cames (33', 56, 57) est prévu pour commander et, ou bien, entraîner des outils de traitement se trouvant dans au moins l'une des stations de traitement, et **en ce que** ledit ensemble à cames comprend un arbre à cames (33') placé au centre de l'élément circulaire (15).
3. Machine d'emballage selon la revendication 2, **caractérisée en ce qu'**un ensemble à cames (33, 34, 35, 37, 38, 45, 46, 47, 45') est prévu pour commander et, ou bien, entraîner des outils de traitement se trouvant dans au moins l'une des stations de traitement, **en ce que** ledit ensemble à cames comprend une unique couronne d'engrenage (35) se trouvant dans un palier (29) de couronne d'engrenage ayant le même axe central que ledit palier de couronne d'engrenage (14) qui définit le trajet du transporteur sans fin et **en ce que** des moyens (34) sont prévus pour assurer la venue en prise avec la couronne d'engrenage (35) dudit palier de couronne d'engrenage (29) supplémentaire.
4. Machine d'emballage selon la revendication 3, **caractérisée en ce que** ladite couronne d'engrenage dudit palier de couronne d'engrenage (29) supplémentaire possède une couronne d'engrenage (37) supplémentaire, **en ce qu'**un pignon (38) est disposé dans au moins une station de traitement afin d'engrener avec ladite couronne d'engrenage supplémentaire, et **en ce qu'**un dispositif de transmission de mouvement (46-48) est couplé au pignon (38) et est destiné à entraîner l'outil de traitement

se trouvant dans ladite station.

5. Machine d'emballage selon la revendication 4, **caractérisée en ce que** le palier de couronne d'engrenage (14) définissant le trajet du transporteur et ledit palier de couronne d'engrenage (29) supplémentaire définissent des plans horizontaux fixes dans le bâti (10) de la machine. 5
  
6. Machine d'emballage selon la revendication 5, **caractérisée en ce qu'**une paire supplémentaire formée d'un palier de couronne d'engrenage (14') définissant le trajet du transporteur et d'un palier de couronne d'engrenage (29') supplémentaire sont disposés à une certaine distance verticale de la première paire, et **en ce que** des moyens (21) sont prévus pour positionner ladite paire supplémentaire de paliers suivant la direction verticale. 10  
15
  
7. Machine d'emballage selon la revendication 6, **caractérisée en ce que** la couronne d'engrenage (16) dudit palier de couronne d'engrenage définissant le trajet du transporteur est positionnée sur la couronne interne (14) du palier de couronne d'engrenage, et **en ce que** ledit moyen servant à assurer la venue en prise comprend un pignon (22) porté sur un arbre (21) qui est porté dans le bâti de la machine à l'intérieur de la couronne d'engrenage dudit palier de couronne d'engrenage définissant le trajet du transporteur. 20  
25  
30
  
8. Machine d'emballage selon la revendication 7, **caractérisée en ce que** ledit moyen servant à assurer la venue en prise avec ladite couronne (35) dudit palier de couronne d'engrenage (29) supplémentaire comprend un pignon d'entraînement (34) placé sur un arbre (37) supplémentaire à l'intérieur de la couronne d'engrenage dudit palier de couronne d'engrenage définissant le trajet du transporteur. 35  
40
  
9. Machine d'emballage selon la revendication 3, **caractérisée en ce qu'**un moteur séparé (46, 47) est prévu pour entraîner chacune des couronnes (35, 35', 46, 47) desdits paliers de couronne d'engrenage (45) supplémentaires. 45
  
10. Machine d'emballage selon la revendication 1, **caractérisée en ce qu'**au moins l'une desdites stations de traitement est commandée et, ou bien, entraînée à partir d'un servomoteur, ou analogue. 50
  
11. Machine d'emballage selon la revendication 10, **caractérisée en ce que** lesdites stations sont équipées de moyens d'entraînement destinés aux outils de traitement respectifs, et **en ce qu'**un servomoteur programmable unique, ou analogue, est prévu pour commander lesdits moyens d'entraînement. 55



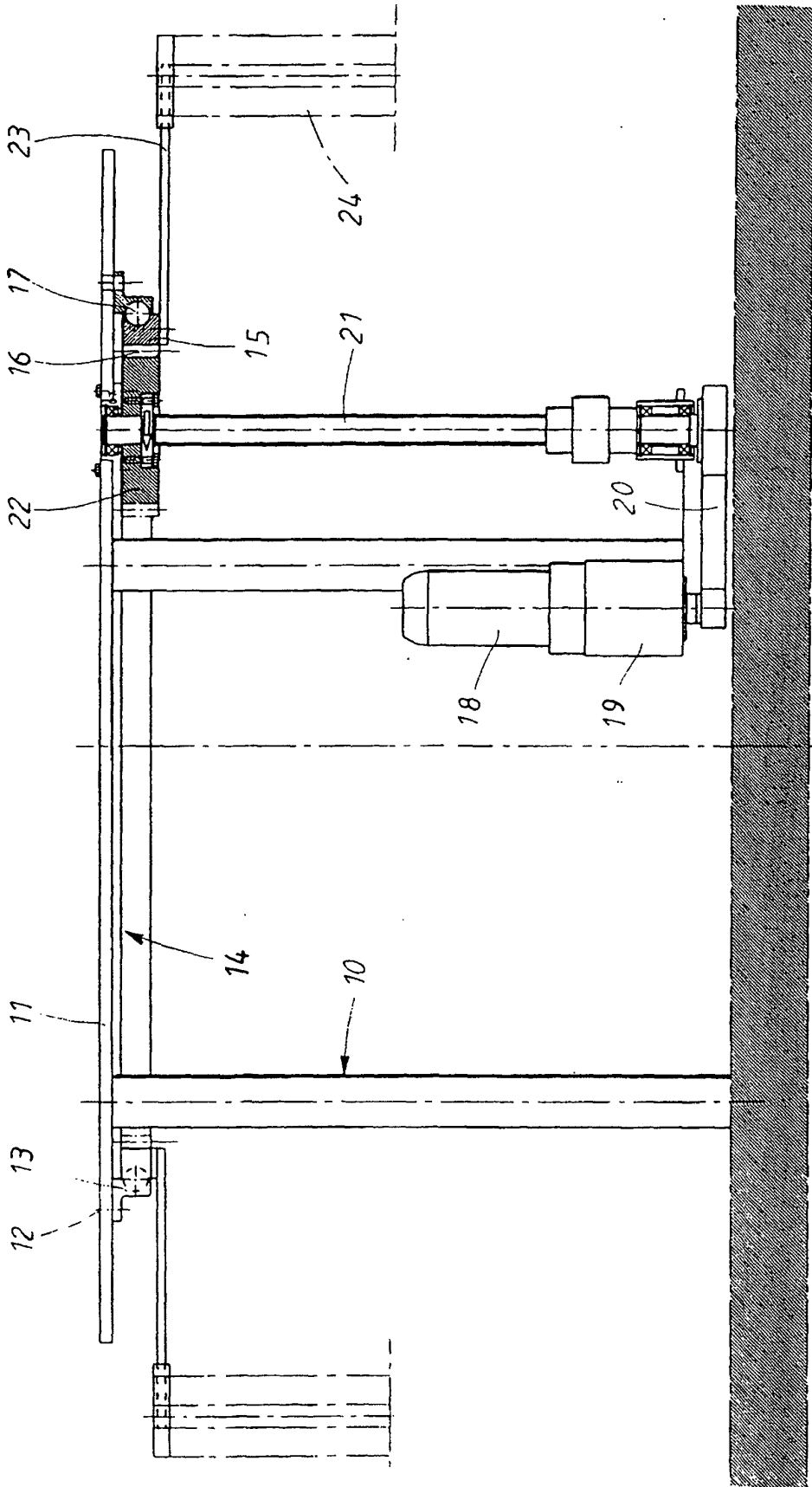


FIG. 1

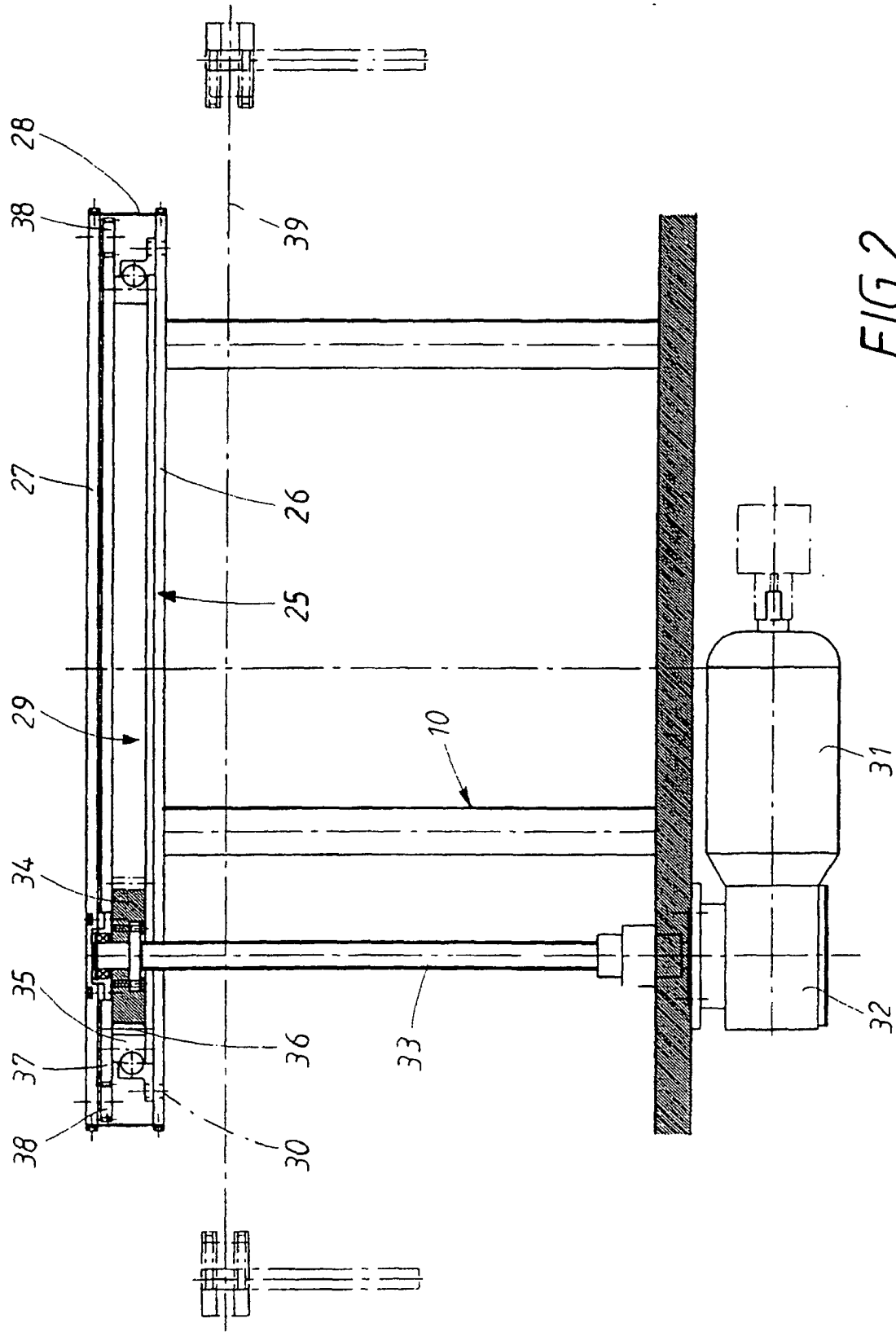


FIG. 2

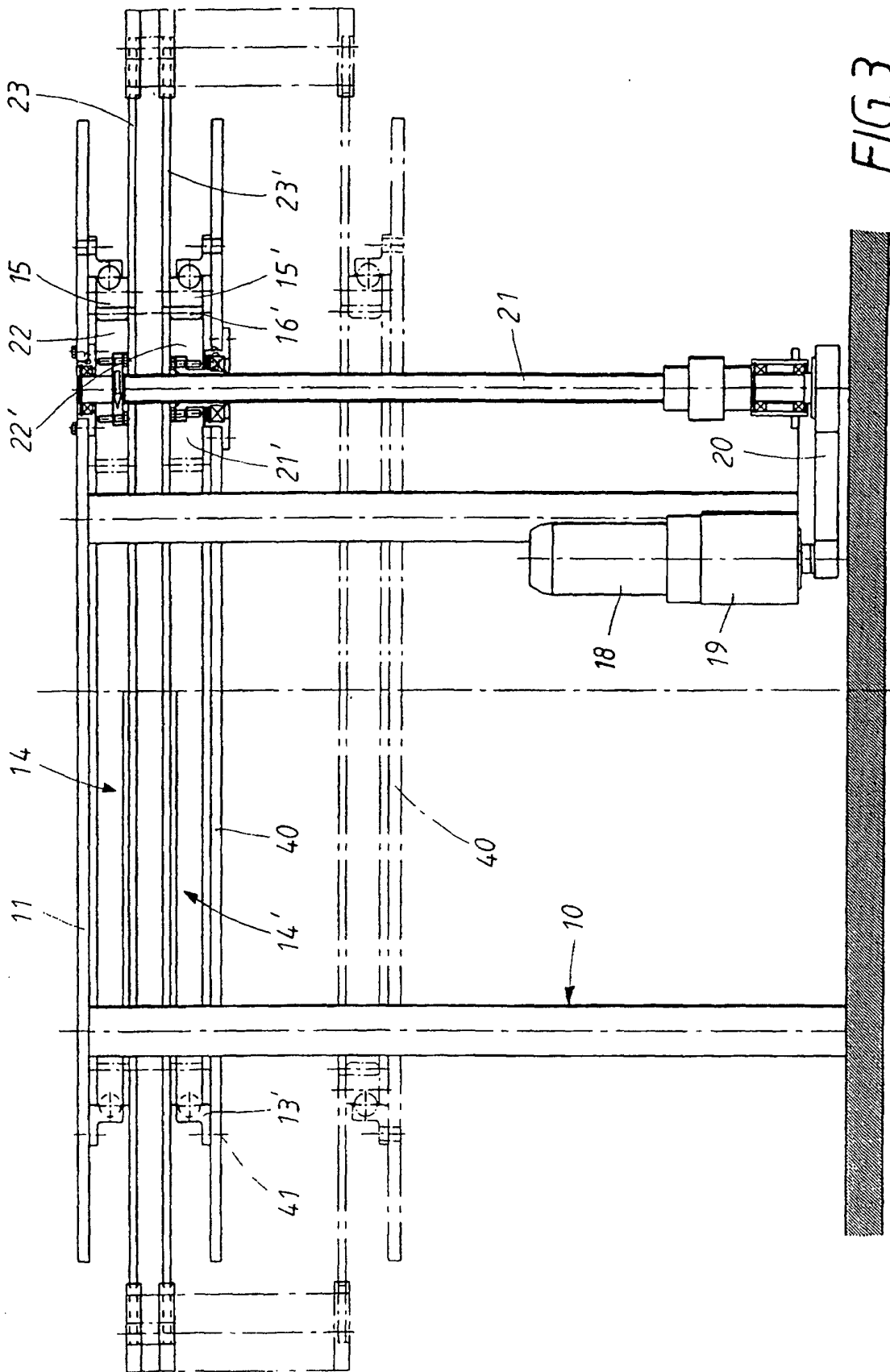
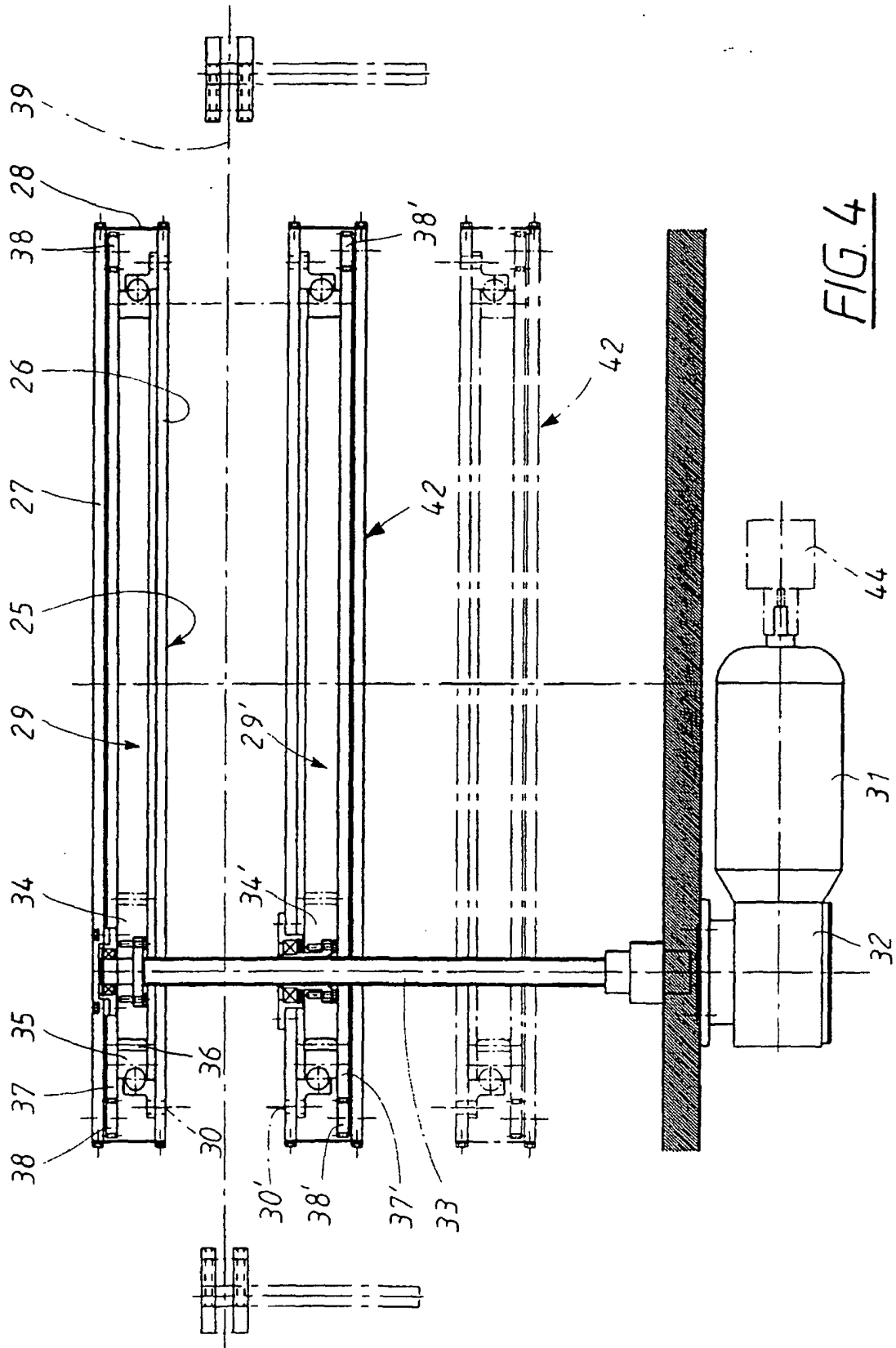


FIG. 3



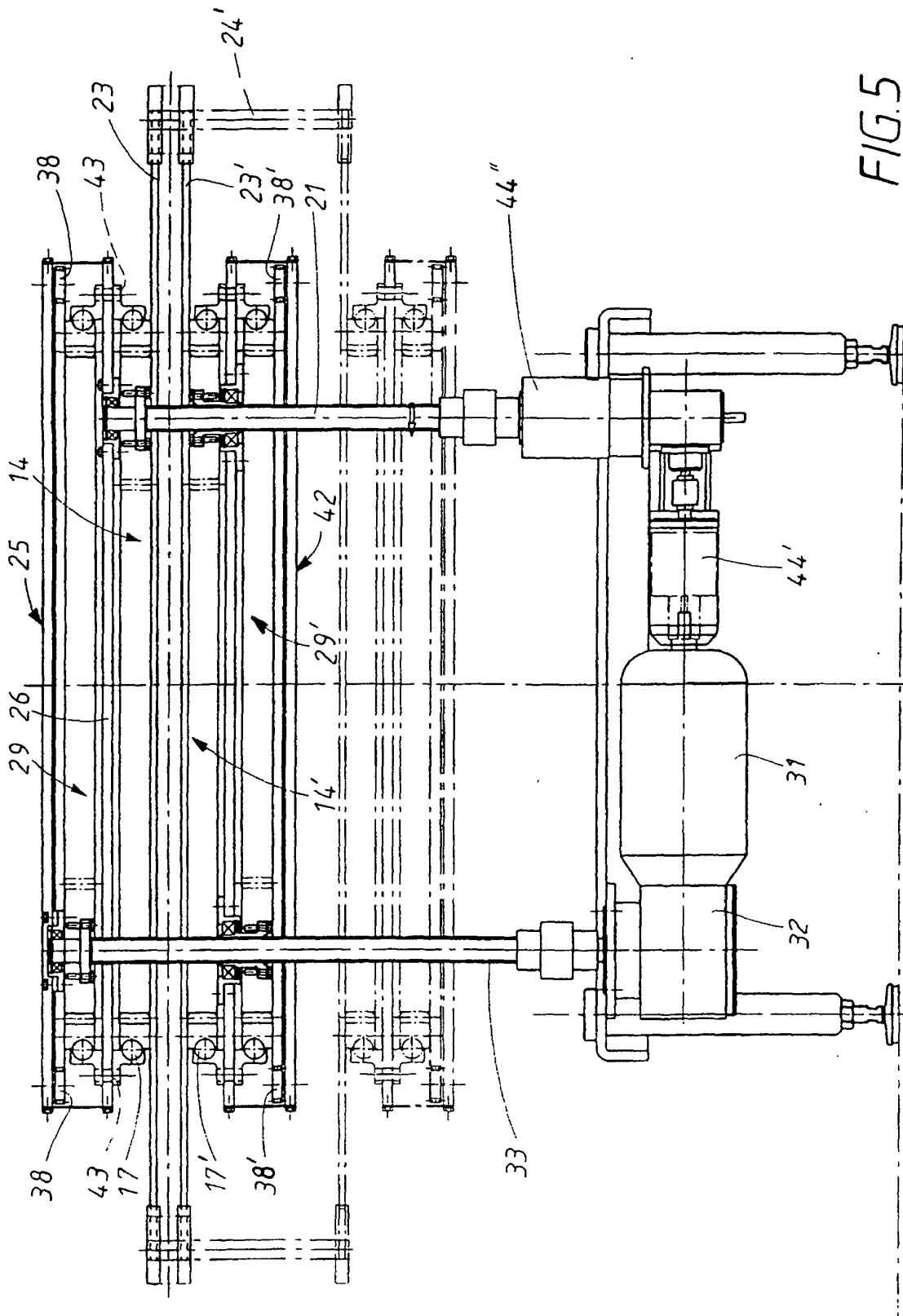


FIG. 5

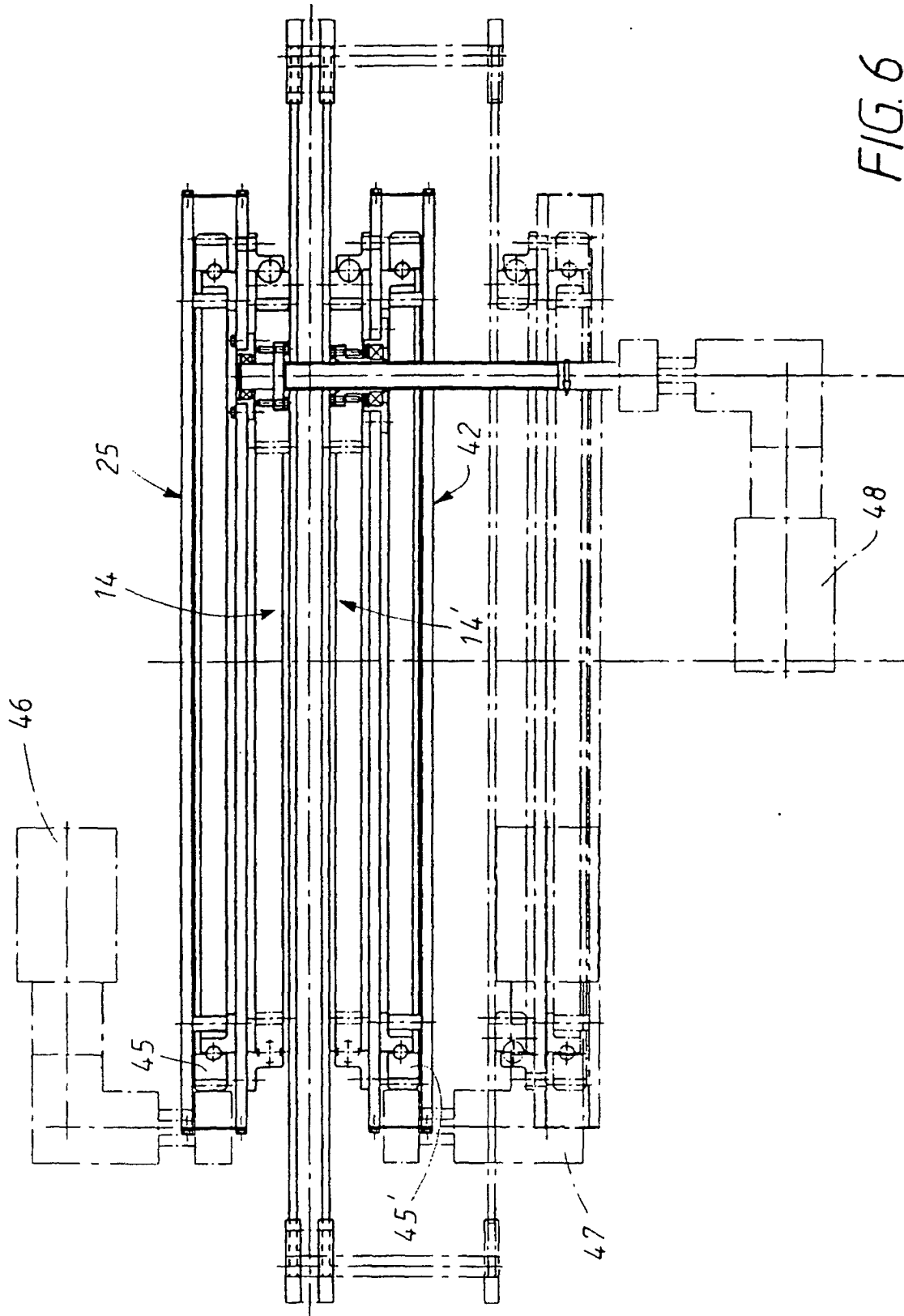


FIG. 6

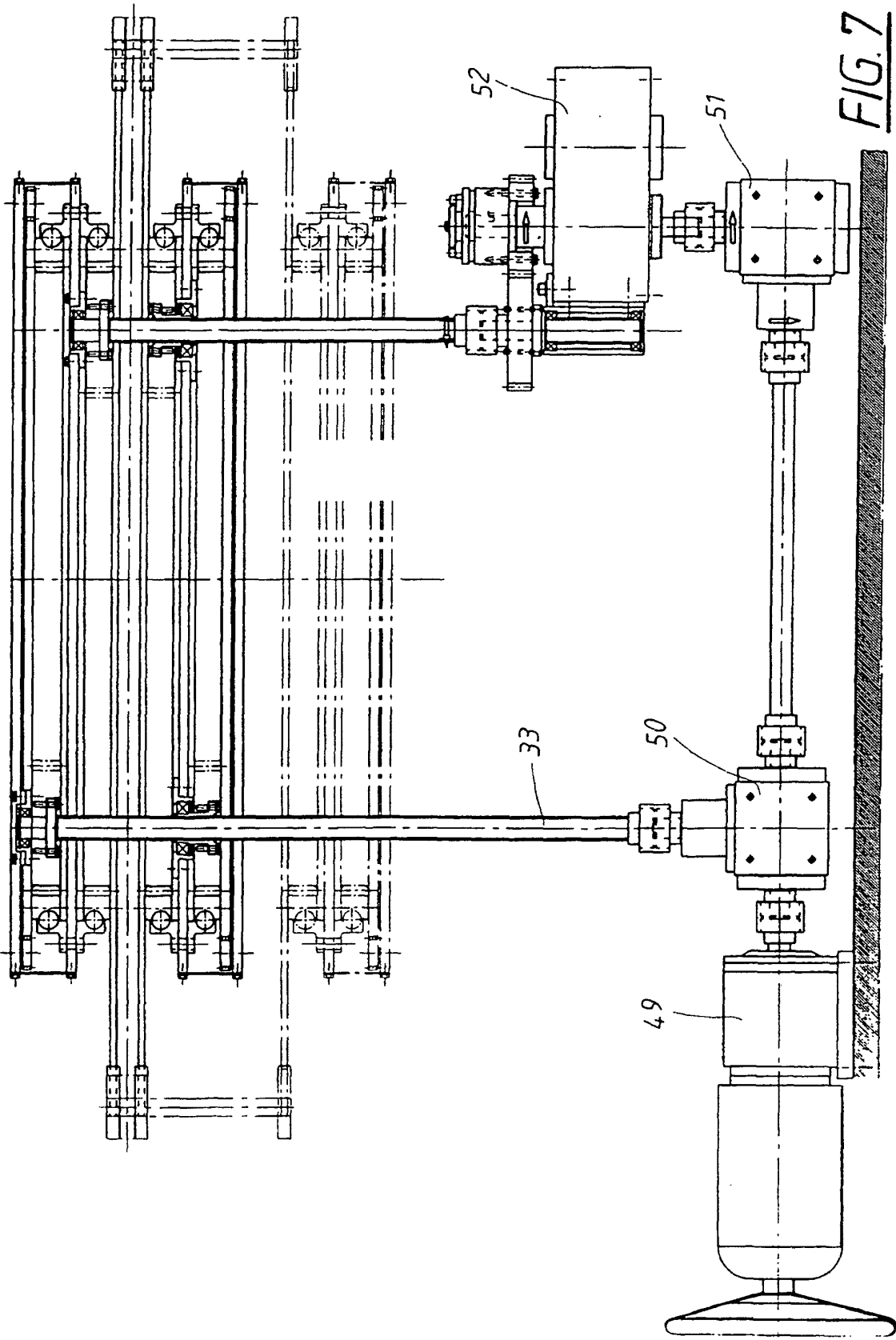


FIG. 7

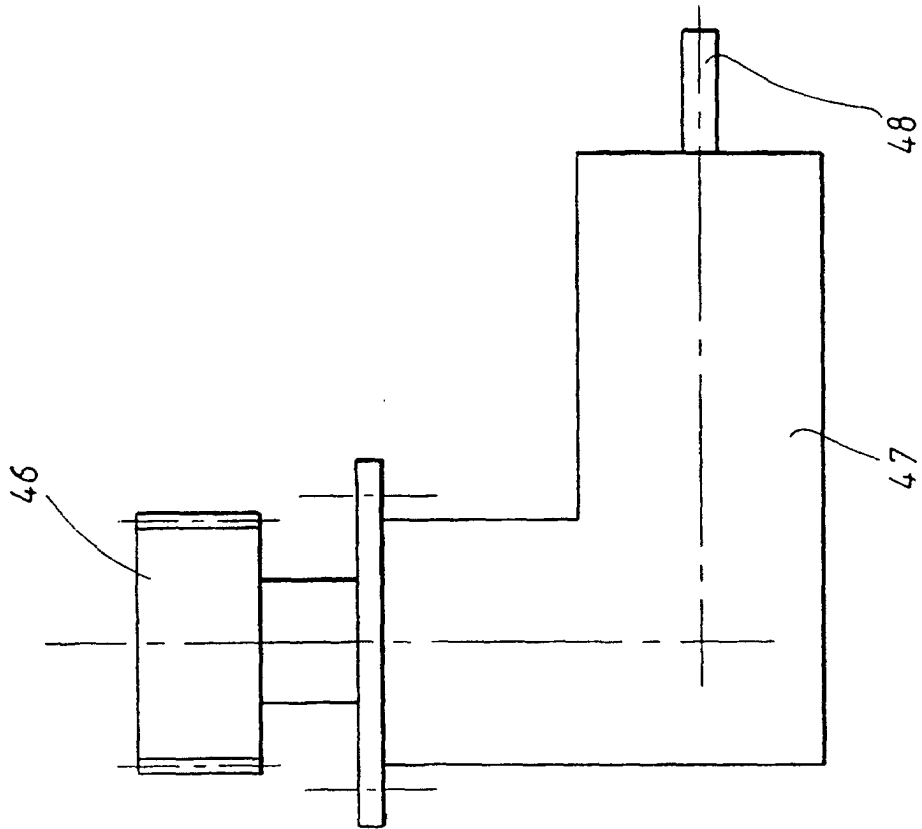


FIG. 8



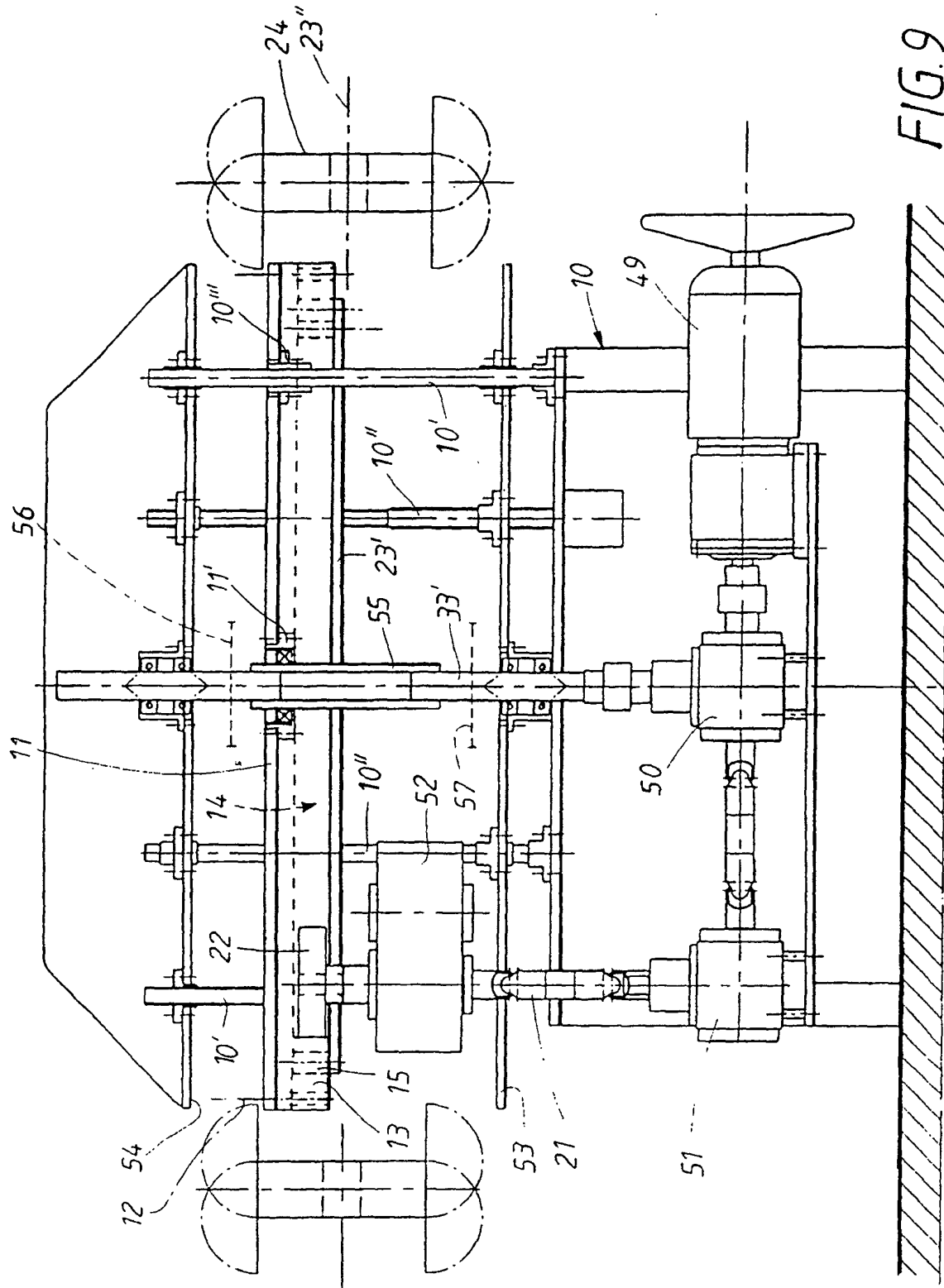


FIG. 9