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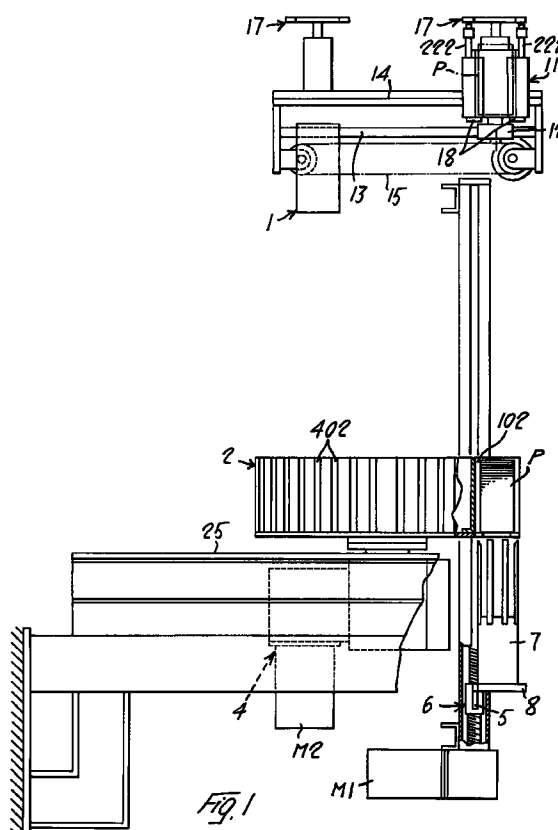
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(54) **Device for feeding packs of slips, such as labels or the like, into cigarette packaging machines or the like**

(57) A device for feeding packs of slips, such as labels (so-called blanks) or the like, in particular into cigarette packaging machines, comprises: a feed hopper (1) which can accommodate at least one pack (P) of labels which is oriented substantially vertically, means (2, 7, 11) for feeding packs (P) of slips to the hopper, preferably from the top, and means for collecting the slips one after another from the base of the hopper. According to the invention there is provided at least one store (2, 2') for a plurality of packs (P) of slips, which takes the packs (P) one after another to a collection station in which the packs (P) are oriented identically to the packs (P) in the feed hopper (1), and are aligned with the latter in the same vertical plane, whereas means (7, 11) are provided for transferring one pack (P) of slips at a time from the store (2) to the feed hopper (1), and which move the packs (P) parallel to one another, preferably along the said vertical plane.



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Description

The invention relates to a device for feeding packs of slips, such as labels (so-called blanks) or the like, in particular into cigarette packaging machines, and comprises: a feed hopper which can accommodate at least one pack of slips which is oriented substantially vertically, means for feeding packs of slips to the hopper, preferably from the top, and means for collecting the slips one after another from the base of the hopper.

The object of the invention is to produce a feed device of the type initially described, such that by relatively simple means, the operations of feeding packs of slips can be automated to a large extent, reducing manual service operations to a minimum, and to a very short period of time, and in particular if possible avoiding having to frequently interrupt the operative machine production cycle.

The above aims are achieved according to the invention by means of a device of the type initially described, in which there is provided a store for a plurality of packs of slips, and which takes the packs one after another to a collection station in which the packs are oriented identically to the packs in the feed hopper, and are aligned with the latter in the same vertical plane, whereas means are provided for transferring one pack of slips at a time from the store to the feed hopper, which move the packs parallel to one another.

The store is advantageously of the type which rotates around a vertical axis which is parallel to the axis of the packs of labels, and is provided with a plurality of vertical peripheral cells, each of which accommodates one pack, the cells being oriented such that the pack of slips in the feed hopper and a pack of slips in the store, in a pre-determined position of rotation of the latter, are aligned on the same vertical side in the same vertical alignment plane, whereas means are provided for transferring in two directions at right angles to one another, preferably vertically and horizontally, and which move the packs along paths which are at least parallel to the said plane, and preferably along the said plane of vertical alignment.

The store can be disposed at a level lower than the feed hopper, and can be activated in rotational steps, taking each cell to a collection station, such that, by means of a lift, each pack is moved parallel to itself and on a vertical path as far as a horizontal translator which is provided in the same vertical plane as the lift, and at a level directly above the feed hopper. The translator transfers each pack parallel to itself into a vertically coinciding position above the aperture of the feed hopper, whereas the pack is inserted in the feed hopper, parallel to itself, by being dropped.

The translator means and the lift means can be activated alternately in the two directions, travelling synchronously with one another a transport path and a return path.

The subject of the invention also consists of other features which further improve the above-described device, and which are the subject of the sub-claims.

The specific features of the invention and the resulting advantages will become apparent in greater detail from the description of some preferred embodiments, illustrated by way of non-limiting example in the attached drawings, in which:

Figure 1 is a front elevation of the device according to the invention, in a direction perpendicular to a vertical plane, along which the transfer paths of the packs of labels extend;

Figure 2 is a schematic plan view from above of the lift means and the label-holder rotary store;

Figure 3 is a cross-section according to a transverse vertical plane, at a support slide thereof and of the label-holder rotary store;

Figure 4 is a plan view of an enlarged segment of the rotary store;

Figure 5 is a plan view from above and on a considerably enlarged scale of a vertical cell of the rotary store, with the lift means engaged in the said cell;

Figure 6 is a front elevation of the horizontal transfer means;

Figure 7 is a cross-section according to a plane transverse to the direction of movement of the horizontal transfer means;

Figure 8 shows the horizontal transfer means in the open condition for insertion or unloading of a pack of labels;

Figures 9 and 10 are plan views of the horizontal transfer means, respectively in the closed position of retention of the pack of labels, and in the open position of loading or unloading of the pack of labels; and

Figure 11 is a perspective view of a variant of the label store with support means in the form of automatic means for replacing an empty store by a full store.

With reference to the figures, a device for feeding packs of labels, for example so-called blanks, to a hopper 1 for feeding the labels to an applicator unit of a packaging machine, comprises a store 2 for a plurality of packs P of labels, or the like. The feed hopper 1 has an accommodation aperture with a cross-section which corresponds to the shape in plan view of the labels oriented vertically, such as to accommodate at least one vertical pack of labels. The store 2 is mounted so as to rotate around a vertical axis, and has co-axially to the axis of rotation a ring of peripheral cells 102. The peripheral cells 102 are angularly equidistant to one another, and are oriented in the axial direction of the store 2. The store 2 is rotated in steps by means of a drive unit generally indicated 4, taking the axial cells 102 to a collection station one after another. In this station each cell 102 is oriented such that the pack P of labels is parallel to the pack P of labels in the feed hop-

per 1, whereas the pack of labels P in the feed hopper 1, and the pack of labels in the cell 102 of the store 2 are aligned with one another on the same side, in a common vertical plane.

The axial cells 102 of the store 2 are open on the upper and lower head sides, and have a transverse cross-section, the profile of which complements the shape in plan view of the labels, at least corresponding to vertical strips along the angle areas which form guide and retention walls. The packs of labels P are supported inside the aperture of the cells 102, overlapping the pack P of labels from beneath. Preferably the said support fins 302 are provided on the base side of the cells 102, and only in the position of the angle areas of the transverse cross-sections of the cells 102.

The cells 102 are open along their entire axial length, on their radially outermost side, by means of an axial slot 402, through which there projects the free end of a horizontal support arm 8 of a lifting cage 7. The arm 8 projects from a slide 5 which is mounted so as to slide on vertical guides, and is activated in a sliding manner in both directions by a motor M1 by means of a drive of the screw/nut-screw type, for example, generally indicated 6. The lifting cage 7 and the cells 102 have shapes which are complementary to one another, such that the lifting cage 7 has an aperture for accommodating the pack of labels P, and can also move axially through the cells 102, passing from one side to the other of the rotary store 2.

Advantageously, as shown in Figure 5, the base 107 of the lifting cage 7 on which the labels are supported complements the transverse cross-section of the base side of the cells 102, in particular also with reference to the support fins 302. Additionally, the shapes of the cells 102 and the lifting cage 7 are advantageously such that they have complementary vertical wall areas which retain the pack of labels P laterally. In particular, with reference to the example illustrated, the vertical walls which retain the packs P laterally in the cells 102 consist of vertical wall strips which form the angle areas of the cells, whereas the lifting cage 7 has vertical lateral retention rods 207 which are provided in the intermediate areas of the said vertical wall strips of the cells 102, in which position the cells 102 have lateral passage recesses 502 which extend from the upper side to the lower side of the cells 102. According to a further feature, the lateral retention rods 207 are attached to the base 107 of the lifting cage 7 by means of lateral extensions 307 of the support base 107 of the cage 7.

The structure of the rotary store 2 as described above is particularly simple when the store consists of a base plate with a circular shape indicated 602, in which there are provided openings which form the lower open side of the cells 102, whereas the lateral walls of the cells 102 consist of a ring of radial elements 702 which separate two adjacent cells 102 from one another, and the shape of which is such as to form the opposite inner walls of two adjacent cells 102. The shape of the open-

ing in the disc 602 is such that the disc is integral with the support fins 302 for the packs of labels.

In the central area of the disc 602 and co-axially relative to the ring of cells (102, 702), there is provided a bushing 9 for coupling with a driven shaft 10. The upper part of the bushing 9 ends in a grasping knob 109, whereas means 209, 309 are provided for detachable and snap locking of the store 2 on the shaft 10, both axially and relative to rotation of the store 2 together with the shaft 10.

In the upper end of travel position, the lifting cage 7 is at a level higher than the upper edge of the feed hopper 1, whereas a horizontal translation transfer unit is provided in order to take the packs of labels P to the position of insertion into the feed hopper 1, by being dropped.

The horizontal transfer unit has a chamber 11 which is tubular or in the shape of a C, which is oriented vertically, similarly to the stack P of labels, is open at least at the base end, and has a transverse cross-section which is substantially complementary to, or slightly larger than the shape of the labels in plan view. The transfer unit is at a level such that in the upper end of travel position, the lifting cage 7 penetrates fully inside the chamber 11, taking the pack P of labels into a position slightly higher than the base of the chamber 11. The base of the transfer unit or of the chamber 11 is at a level directly above the upper feed mouth of the hopper 1.

It will be appreciated that since the packs of labels must be fed inside the chamber 11 of the transfer unit by the lifting cage 7, whereas they must be retained in the transfer unit against dropping by gravity when the lifting cage 7 is moved away, on the base of the chamber 11 there are provided at least three and preferably four support fins 18 which are substantially the same as those 302 of the cells 102, and which can be detached or at least moved alternately from an active support position, in which they project inside the chambers 11, overlapping the pack P of labels from below (Figure 10), to an inactive position in which they do not project beneath the pack P of labels (Figure 9), permitting insertion from beneath with the lifting cage 7.

With reference to Figures 6 to 10, the removable support fins 18 are provided in each angle area of the chamber 11, and each of them is supported by an arm 19. The fins 18 can preferably be moved in a direction transverse to the direction of transfer, being supported such that they project towards the chamber 11, each on the angled end of an associated arm 19 which is oriented in the direction of transfer, and which extends externally and parallel to the corresponding side of the chamber 11 in the direction of transfer, and along the lower edge. The arms 19 end at the angle area, and are mounted on slides 20, 20' which are supported so as to slide in both directions transversely to the direction of transfer. The slides 20, 20' consist of plates mounted in a sliding manner transversely to the direction of advance, and in the example illustrated they are guided

so as to slide along the sides of the chamber 11 which are transverse to the direction of transfer. The slides 20 are compressed by springs 21 in directions opposite to one another, and in particular in a direction of reciprocal approach. Consequently in a stable condition, the fins 18 are in an active position of supporting the pack of labels P.

The two opposite slides 20, 20' on each narrow side of the chamber 11 are shaped in the form of upper ridges opposite one another such as to form two opposite edges 120 which are inclined and diverge from one another upwards, and with these edges 120 there interacts a separator unit which comprises a roller-holder 122 separator head 22. The head 22 is mounted on a vertical rod 222 which is activated by a thruster 17.

The separator head 22 is disposed on both of the narrow sides, transversely to the direction of transport of the chamber 11, whereas downward movement of the head against the opposite inclined surfaces 120 of the slides moves the arms 19 away, and thus provides distancing or displacement against the action of the resilient means 21 in the inactive position of the removable support fins 18 (Figures 7 to 10).

Advantageously, in order to control movement of the removable support fins 18, there is provided a single thruster 17 which simultaneously controls both the separator heads 22, such that all the support fins 18 move substantially simultaneously into the active or inactive position.

The thruster 17 can be a pneumatic or hydraulic actuator cylinder or the like which is oriented with its rod 117 vertically, and which moves vertically a large fin 217 which interacts with the two upwardly projecting ends of the rods 222. In the lowered position of the large fin 17, the support fins 18 are open, whereas in the raised position of the large fin 217, the support fins 18 are in the active position.

The chamber 11 of the horizontal transfer unit projects onto a slide 12 which is engaged on two horizontal guides 13, 14 which are parallel to one another and vertically apart. Below the guide 13, there is provided a belt 15 which is returned on pulleys 16, at least one of which is motorized, and has an upper section 115 which is horizontal and parallel to the guides 13, 14, and to which section 115 the slide 12 is attached at 112.

The upper guide 14 consists of an overturned U-shaped groove in which the slide 12 engages with at least one roller 212 which rotates around a vertical axis.

Advantageously, since activation in the opening direction, i.e. the direction of movement into the inactive position of the support fins 18 of the pack P into the chamber 11 of the transfer unit, must take place only when the pack P is inserted by means of the lifting cage, and when the pack P is unloaded by gravity into the feed hopper 1, the thrusters 17 which control the support fins 18 are stationary at the corresponding ends of the path of the chamber 11.

According to a further advantageous feature, the transverse cross-sections of the cells 102, the lifting

cage 7, the chambers 11 of the transfer unit, and the feed hopper 1, are not identical, but with reference to the path of the pack P of labels, the transverse cross-section of the said parts is gradually increased slightly, such as to prevent any slight offsetting of the labels in the packs P from causing obstacles or disruptions of passage of the packs P, and consequently incorrect positioning or jamming.

With reference to Figures 2 and 3, the rotary store 2, and in association with the latter the rotary drive unit generally indicated 4, can be mounted on a slide 25 which is supported such that it can be extracted outside the operative position on lateral guides 26, in order to enable the rotary store 2 to be moved away from the remaining operative parts of the machine (not shown in detail), and thus allow the store to be replaced more easily.

Advantageously, in order to extract the rotary store 2, the slide 25 can be mounted notably on a double pair of guides, 26, 26'.

On the other hand, Figure 11 shows an embodiment in which on a beam or plate 27 which can rotate in the form of a turntable around a vertical axis, there are mounted two rotary stores 2, 2', each of which is provided with its own drive motor M2, M2'. The axis of the plate 27 is in a position such that the innermost store 2' relative to the machine is operative, whereas the store 2 is in the rest position. By this means, the empty store 2 can be easily replaced by a full store, whereas when the store 2' is empty, the position of the two stores, 2, 2' can be exchanged by rotating the plate 27 by means of the motor M3. Thus, the full store 2 will go into the operative position, whereas the empty store 2' will go into the position in which it can be replaced by a full store.

With reference to the device according to the invention, the rotary store 2, the vertical lift and the horizontal transfer unit are activated synchronously with one another by known means. In particular, the rotary store 2 advances by one step, taking the subsequent cell to the collection station only after the lifting cage 7 has completed the vertical transfer path of the previous pack P of labels from the rotary store 2 to the horizontal transfer unit, and has then returned to the position beneath the rotary store 2 through the empty cell 102 from which the pack P of labels has been taken. At the end of return travel, the horizontal transfer unit travels the horizontal transfer path of the pack P of labels into the feed hopper 1. After unloading into the latter the pack P of labels, the horizontal transfer unit 11 can return to the position of collection of the subsequent pack P of labels from the lifting cage 7, before the latter has reached the end part of the vertical transfer path. All of this can be carried out very quickly, and in a time which corresponds to a pre-determined partial use of the stack of labels in the feed hopper 1. Rotation of the store 2, drive of the horizontal transfer unit and that of the lift are advantageously independent of one another, whereas synchronization is provided by an electronic control circuit to which the supply units of the motors

and the movement detection sensors of the said parts are connected.

Claims

1. Device for feeding packs of slips, such as labels (so-called blanks) or the like, in particular into cigarette packaging machines, comprising: a feed hopper (1) which can accommodate at least one pack (P) of labels which is oriented substantially vertically, means (2, 7, 11) for feeding packs (P) of slips to the hopper, preferably from the top, and means for collecting the slips one after another from the base of the hopper, characterized in that there is provided at least one store (2, 2') for a plurality of packs (P) of slips, which takes the packs (P) one after another to a collection station in which the packs (P) are oriented identically to the packs (P) in the feed hopper (1), and are aligned with the latter in the same vertical plane, whereas means (7, 11) are provided for transferring one pack (P) of slips at a time from the store (2) to the feed hopper (1), and which move the packs (P) parallel to one another.
2. Device according to Claim 1, characterized in that the store (2) is of the type which rotates around a vertical axis which is parallel to the axis of the packs (P) of labels, and is provided with a plurality of vertical peripheral cells (102), each of which accommodates one pack, the cells (102) being oriented such that the pack (P) of slips in the feed hopper (1) and a pack (P) of slips in the store (2), in a predetermined position of rotation of the latter, are aligned on the same vertical side in the same vertical plane, whereas means (7, 11) are provided for transferring in two directions at right angles to one another, preferably vertically and horizontally, and which move the packs (P) along paths which are at least parallel to the said plane, and preferably along the said plane of vertical alignment.
3. Device according to Claim 1 or 2, characterized in that the store (2) can be disposed at a level lower than the feed hopper (1), and can be activated in rotational steps, taking each cell (102) to a collection station, such that, by means of a lift, each pack (P) is moved parallel to itself and on a vertical path as far as a horizontal translation transfer unit (11) which is provided in the same vertical plane as the lift (7), and at a level directly above the feed hopper (1), which horizontal translation transfer unit (11) transfers each pack (P) parallel to itself into a vertically coinciding position above the feed hopper (1).
4. Device according to one or more of the preceding claims, characterized in that the vertical transfer unit consists of a lifting cage (7), with an accommodation aperture, the inner cross-section of which complements the surface of the labels, and the

outer cross-section of which complements the inner cross-section of the cells (102) of the store (2).

5. Device according to Claim 4, characterized in that the lifting cage is supported in a projecting manner in a position which coincides vertically with a cell (102) of the rotary store (2) in a predetermined collection station, and can be moved through the said cell (102) from top to bottom of the store (2) or vice versa, being supported in a projecting manner (8) and from the exterior, into the said position which coincides with the cell (102), by an arm (8), the end of which that supports the cage (7) penetrating substantially radially inside the cells (102) through an outer axial peripheral slot (402).
6. Device according to one or more of Claims 4 or 5, characterized in that the support base for the pack (P) of labels of the cells (102) and of the lifting cage (7) consists of parts (302, 107, 307) which are substantially complementary to one another, and which do not interfere with one another, whereas the vertical lateral retention walls of the cells (102) and of the lifting cage (7) consist of vertical wall strips (207) which are provided in complementary areas alternating with one another around the perimeter of the pack (P) of labels.
7. Device according to Claim 6, characterized in that the cells (102) have a shape which is complementary to the pack (P) of labels, at least in the angle areas, whereas in the intermediate areas they have recesses (502) which extend for the entire axial length of the chambers (102), and into which there pass rods (07) which are attached to the lifting cage (7), and form the lateral retention strips of the pack (P) of labels.
8. Device according to one or more of the preceding claims, characterized in that at least in some areas, preferably in the angle areas of the cells (102) of the rotary store (2), there are provided stationary support fins (302) for the pack (P) of labels, whereas the lifting cage (7) has axial apertures which are complementary to the said support fins (302).
9. Device according to one or more of the preceding claims, characterized in that the horizontal transfer unit (11) has a vertical tubular chamber or which at least has a cross-section in the form of a C, for a pack of labels (P), which is mounted on a slide (12) which is guided (13, 14) in a horizontally transferable manner (15, 115) from a position which coincides vertically with the upper end of travel position of the lifting cage (7) and a position which coincides vertically above the feed hopper (1), the tubular chamber (11) being provided with a transverse cross-section which is substantially the same as that of the cells (102) of the rotary store (2), and is

such as to permit insertion of the lifting cage (7) in the store, whereas with the chamber (11) there are associated lower support fins (18) for the pack (P) of labels, which are supported on the latter together with control units (19, 20, 20', 22), for movement alternately into an active support position, in which they are superimposed beneath the pack (P) of labels, and an inactive position in which they do not interfere with the pack (P) of labels.

10. Device according to one or more of the preceding claims, characterized in that the activating means (17) of the control units are stationary at the two end of travel positions of the chamber (11).

11. Device according to Claim 9 or 10, characterized in that the removable support fins (18) are subjected to the action of resilient means (21) which compress the latter stably in the active support position of the pack (P) of labels, whereas the fins (18) are taken into the inactive position by activating means (17) which act in contrast to the resilient means (21).

12. Device according to one or more of the preceding Claims 9 to 11, characterized in that at each side of the chamber (11), oriented transversely to the direction of translation, there is associated a pair of fins (18) which is supported in a projecting manner beneath the corresponding opposite angle areas of the said transverse side by a pair of slides (20, 20') which are mounted so as to slide along the said lateral sides of the chamber (11), and are immobilized stably in the direction opposite that of reciprocal approach of the fins (18) of the respective pair, by resilient means (21), whereas separator units (22) are provided for separating the said fins (18) of each pair which interact with the slides (20, 20'), by penetrating between inclined opposite surfaces (120) of the two slides (20, 20'), in a diverging manner.

13. Device according to Claim 12, characterized in that the inclined surfaces (120) diverge upwardly, whereas the separator head (22) can be moved in a sliding manner vertically in both directions, the activating means (17) of the said thrust head (22) consisting of a pneumatic, hydraulic or the like thruster on the upper end of rods (222) of the separator heads (22).

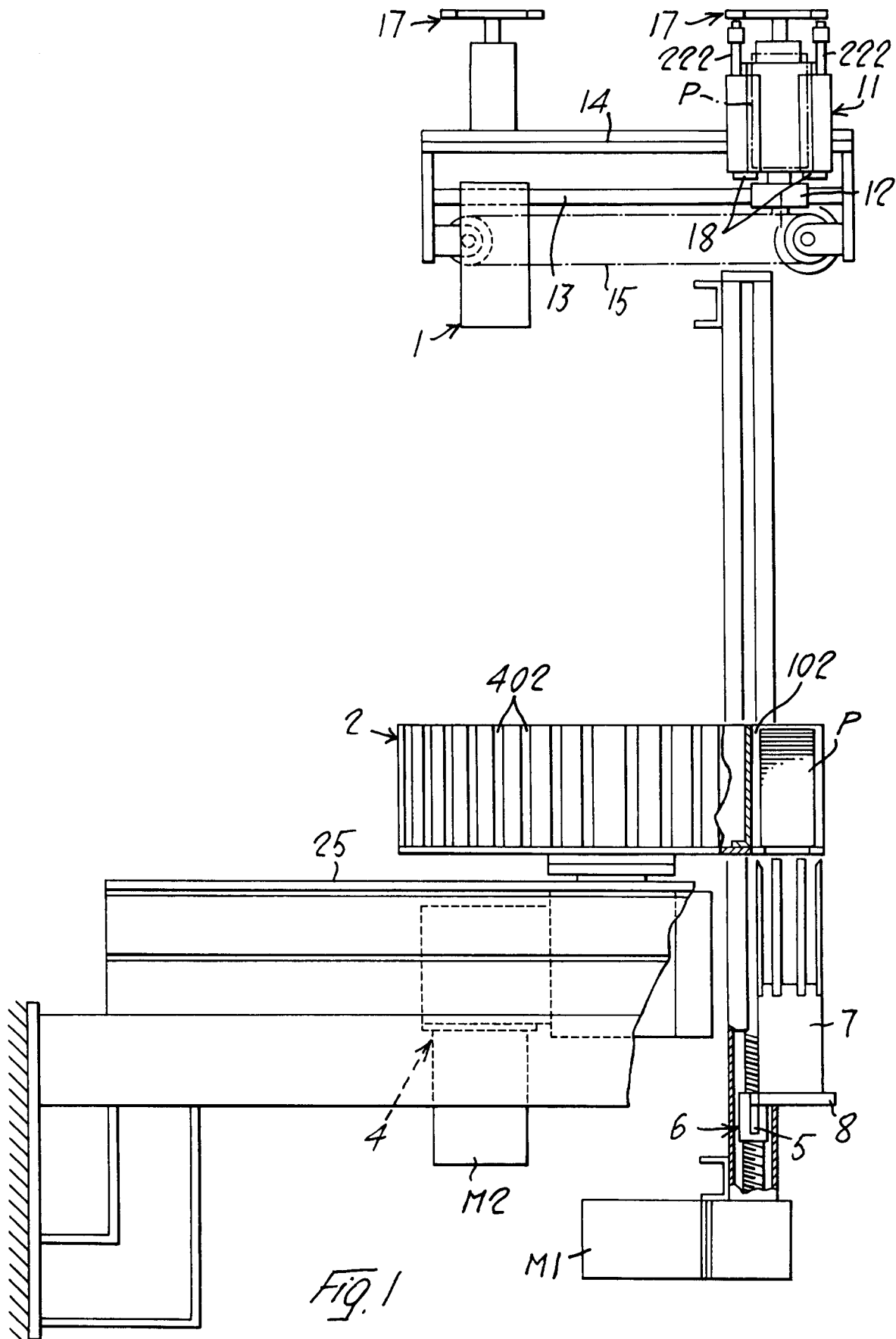
14. Device according to one or more of Claims 9 to 13, characterized in that the chamber (11) has two pairs of removable support fins (18), each of which can be controlled by means of a thrust head (22), the thrust units (17, 217) being provided with means for simultaneous control of all the support fins (18) which are associated with the chamber (11).

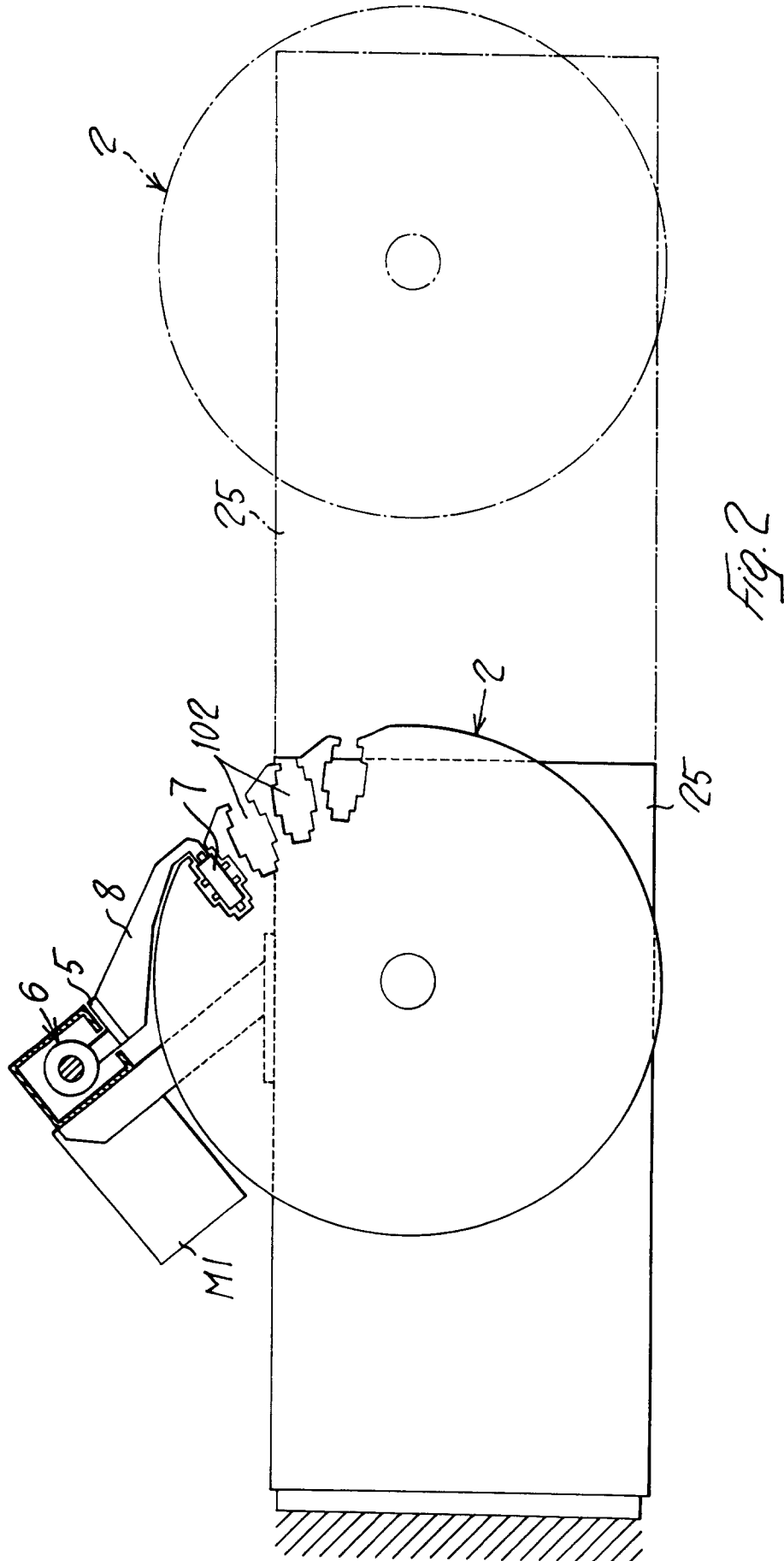
15. Device according to one or more of the preceding claims, characterized in that, at least on the wall parts which retain or guide the pack (P) of labels, the cells (102), the chamber (11) and the feed hopper (1) have transverse cross-sections which differ from one another with reference to the minimum provided for the pack of labels (P), the transverse cross-section of the chamber (11) of the horizontal transfer unit being slightly larger than that of the cells (102), and the transverse cross-section of the feed hopper (1) being slightly larger than that of the chamber (11) of the horizontal transfer unit.

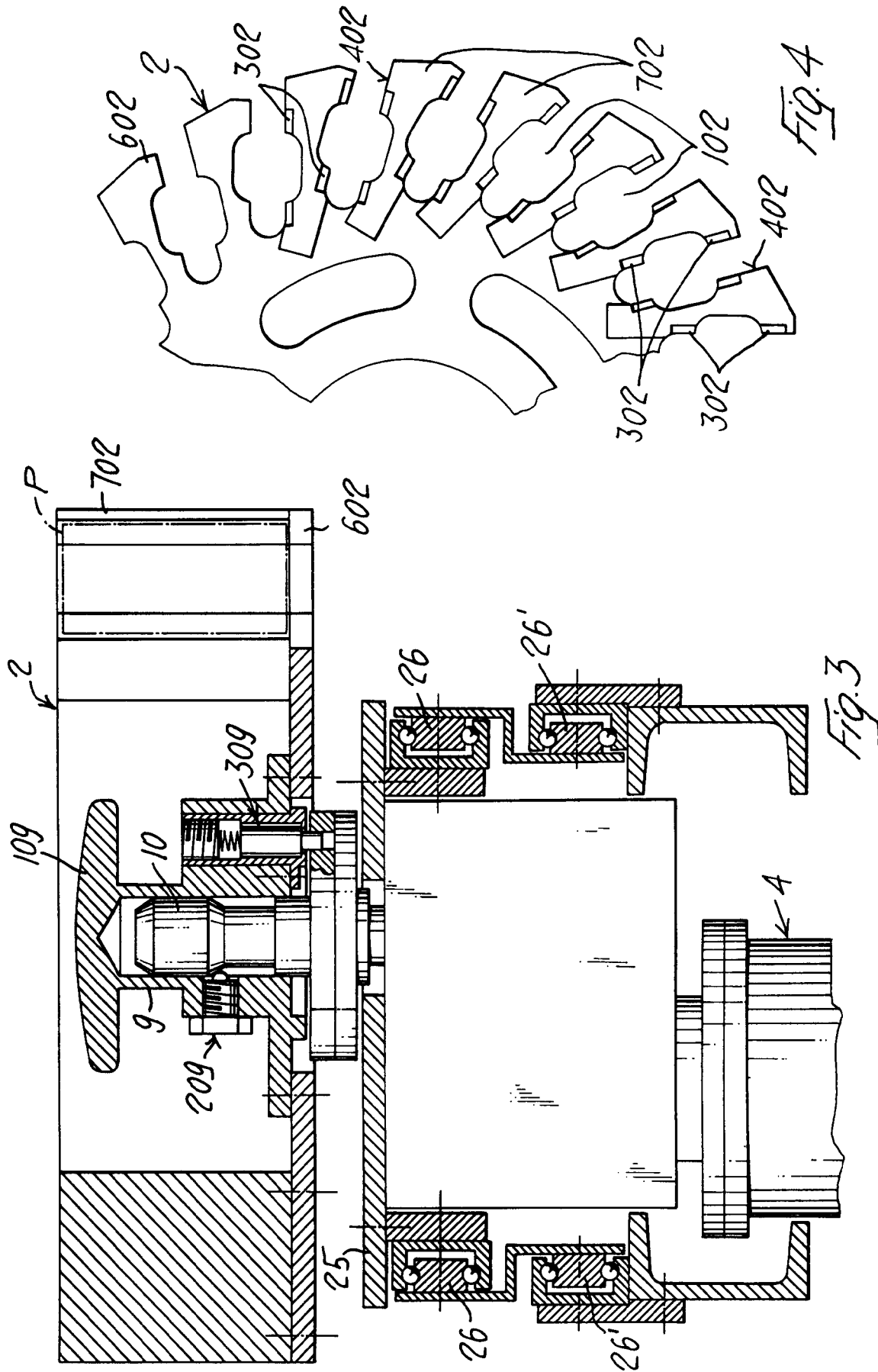
16. Device according to one or more of the preceding claims, characterized in that the rotary store (2) is mounted on a slide (25) which slides (26) in a direction transverse to its axis, and in the direction of extraction from the machine as a whole, whereas the rotary store (2) has means for removable connection (209, 309) to a rotary drive shaft (10) which is connected to a motorized drive unit (4), as well as means (109) for grasping the rotary store (2).

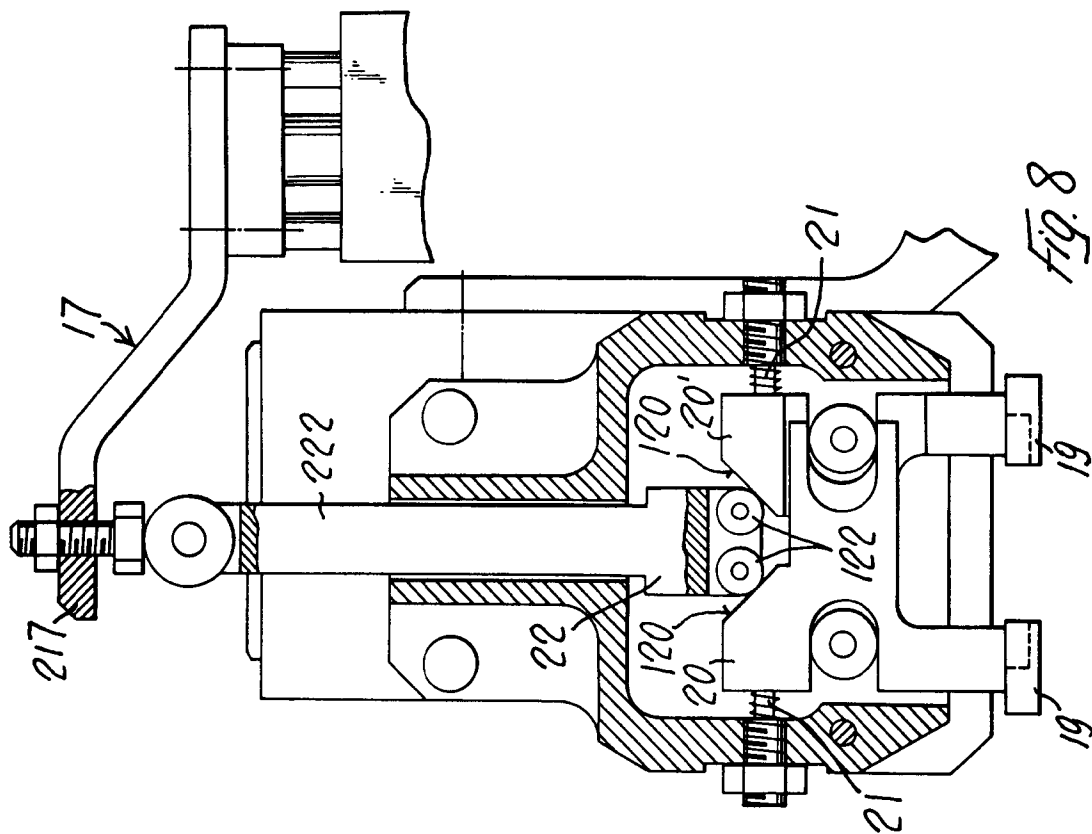
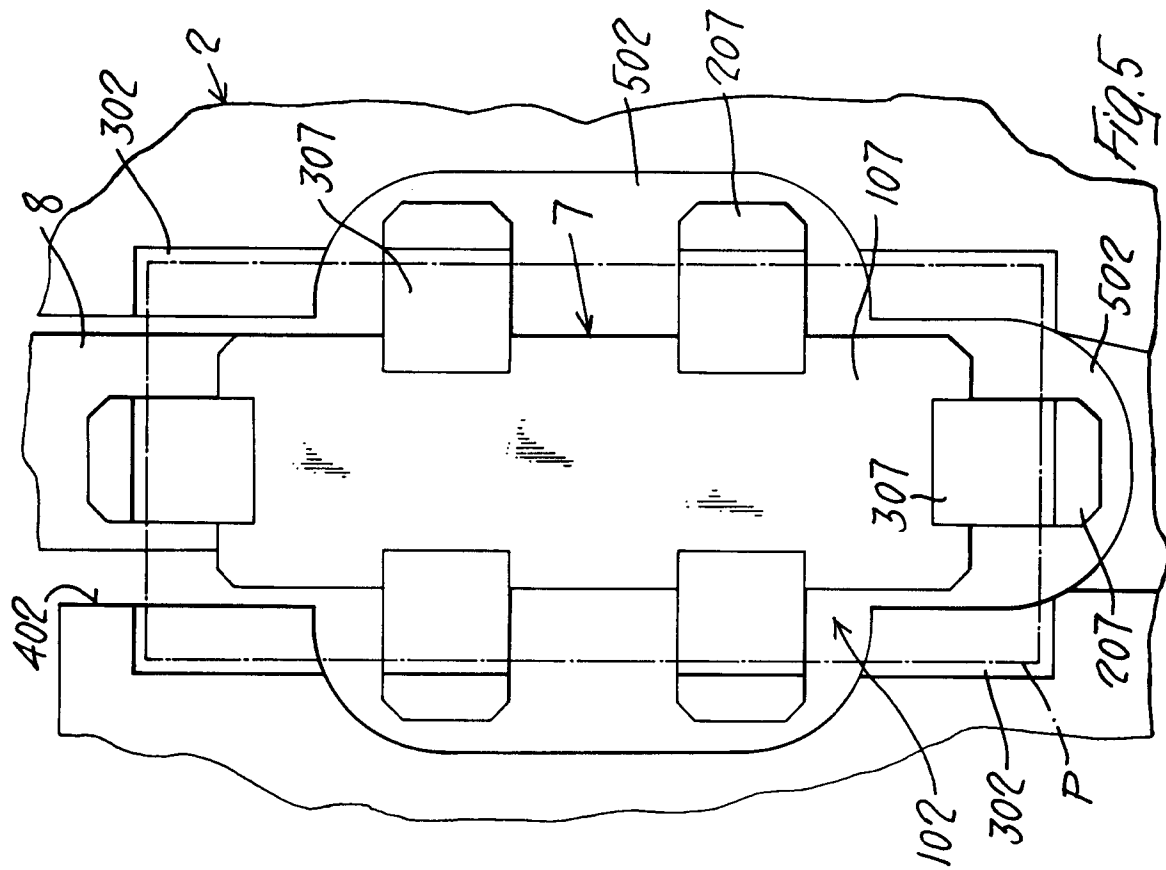
17. Device according to one or more of the preceding claims, characterized in that an automatic rotary exchanger is provided for replacing a full store (2) with an empty store (2').

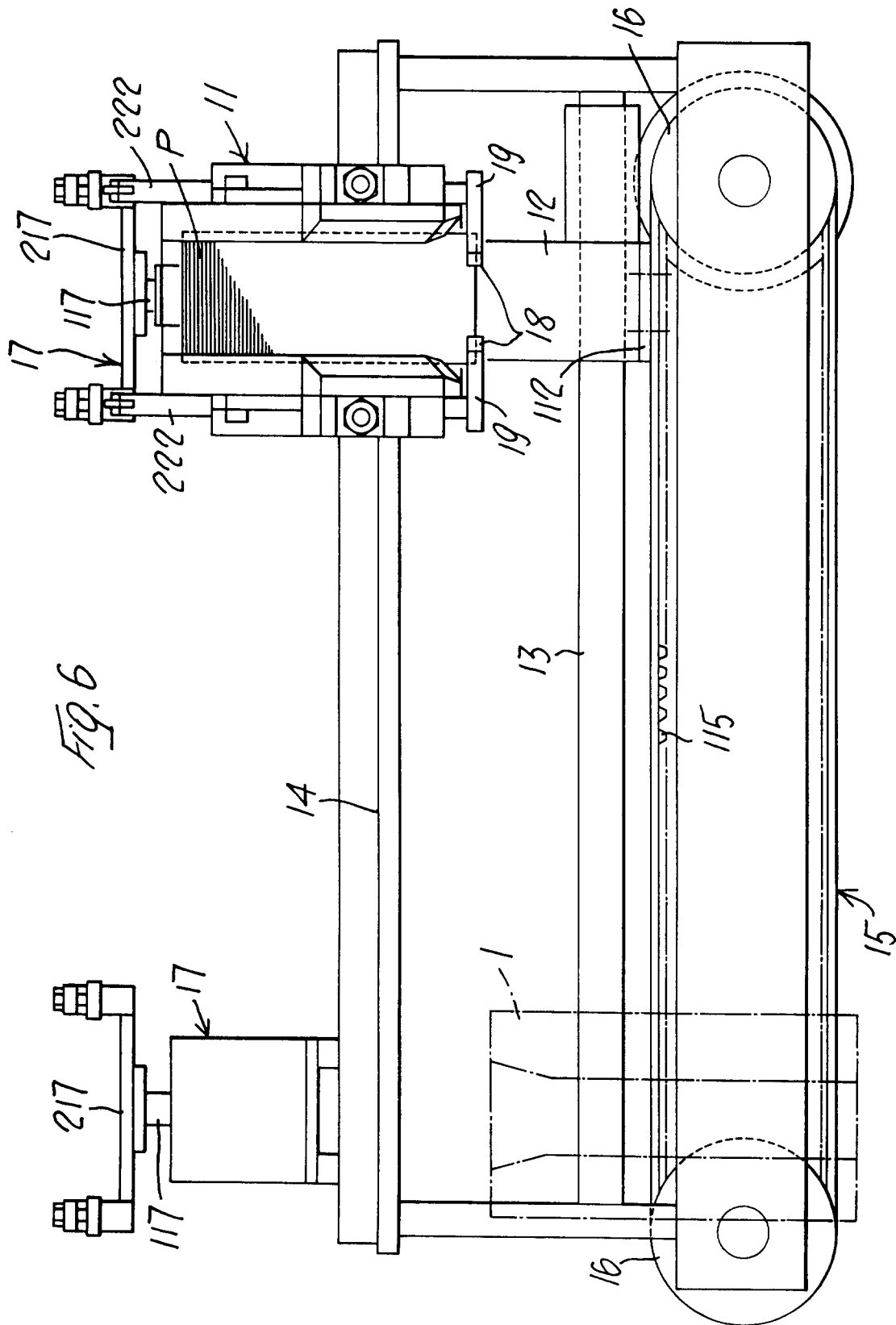
18. Device according to Claim 17, characterized in that the automatic exchanger of the stores (2, 2') consists of a horizontal beam (27) which rotates around a central vertical axis which is rotated by a motor (M3), whereas in a symmetrical position relative to the centre of the beam, on the two opposite ends of the latter, there are provided removable support seats for a rotary store (2, 2') with each of which there is preferably associated a separate rotary drive motor (M2, M2').

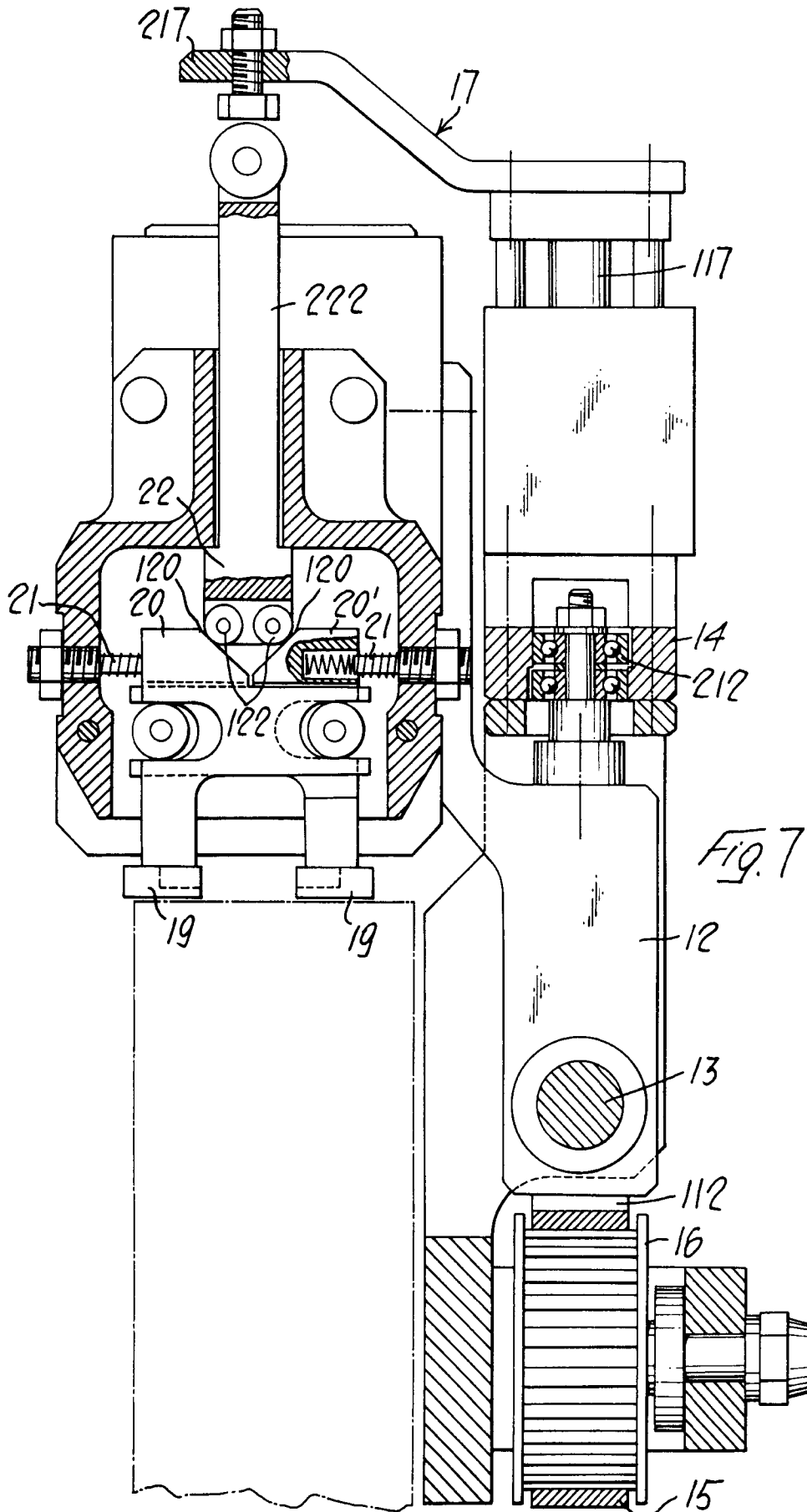












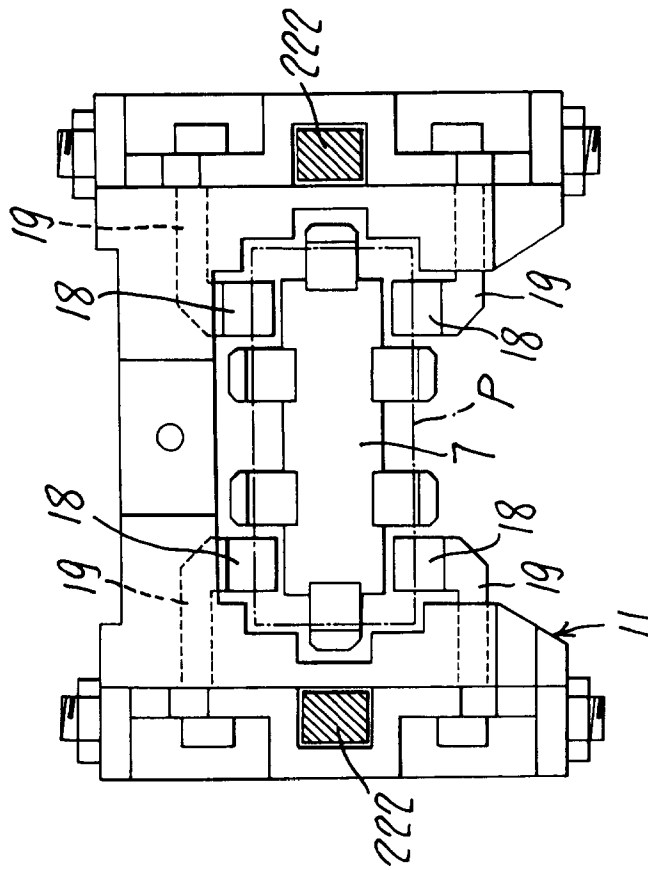


Fig. 9

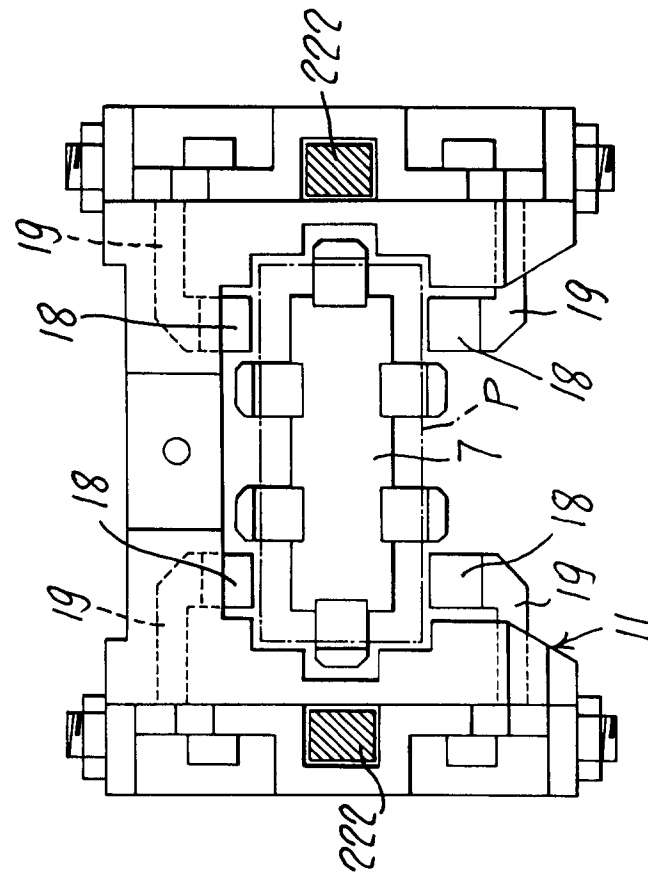
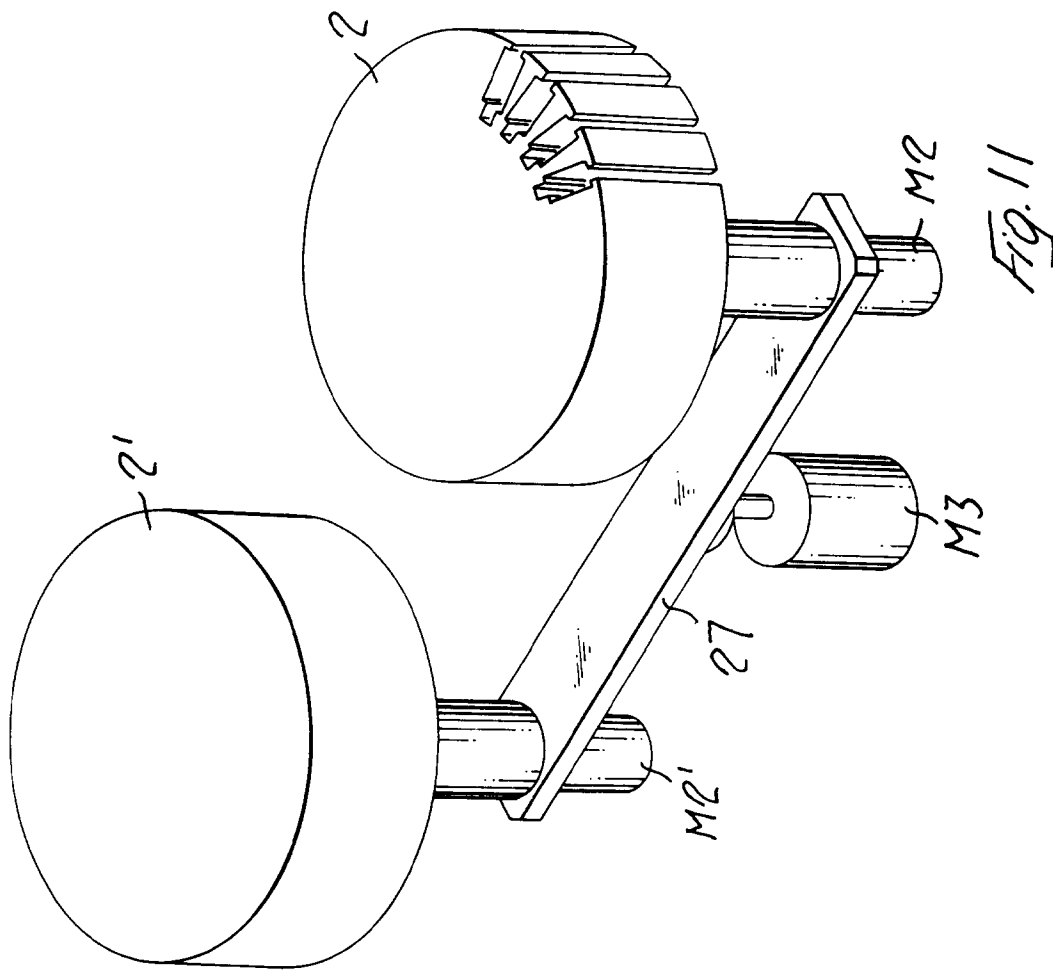


Fig. 10





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 96 10 5615

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.6)
X	DE-A-40 28 150 (GD SPA) 7 March 1991	1	B65H1/30
A	* the whole document *	2-18	
A	EP-A-0 258 597 (FÖCKE & CO) 9 March 1988 * the whole document *	1-18	
A	EP-A-0 356 654 (FÖCKE & CO) 7 March 1990 * the whole document *	1-18	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int.Cl.6) B65H B65B
Place of search		Date of completion of the search	Examiner
THE HAGUE		1 August 1996	Henningsen, O
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