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(12) # EUROPEAN PATENT APPLICATION

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(54) **Apparatus for rotating a member disposed at the end of the rod or the body of the cylinder or a cylinder-piston system.**

(57) Apparatus for rotating a member (30,45) solid with and made to translate by the rod (27,41A) or body of the cylinder (29C,41C) of a cylinder-piston system (29,41), characterized in that the rod (27,41A) is connected to the piston (28,41P) so as to be able to rotate idly relative thereto and in that the outer surface either of the rod (27,41A) or the body of the cylinder (29C,41C) is of prismatic (or slotted that is splined) construction and slides guided within a suitable prismatic (or slotted) seat formed inside a bush (36,36') that can rotate, suitably supported, inside a stationary structure (42,42'), coaxial with said system (29,41), said structure (42,42') being solid with the frame to which the stationary part of the system is fixed, and said bush (36,36') being driven into rotation by a gear (44,44') solid therewith or by equivalent means.

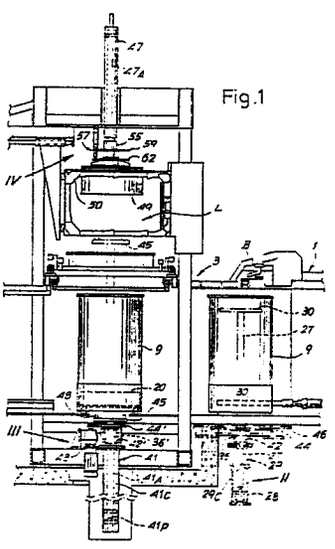

Fig.1

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Description

"APPARATUS FOR ROTATING A MEMBER DISPOSED AT THE END OF THE ROD OR THE BODY OF THE CYLINDER OF A CYLINDER-PISTON SYSTEM"

The invention refers to an apparatus able to rotate "remote",that is, so to speak, from a distance, a member disposed at the end of the rod or the body of cylinder of a cylinder-piston system, that is, without making use of a means to rotate said member placed in the vicinity of said ends and fixed thereto.

According to the invention, in an apparatus for rotating a member solid with and made to translate by the rod of body of a cylinder of a cylinder-piston system, the rod is connected to the piston in such a way as to be able to rotate idly relative thereto and the outer surface either of the rod or the body of cylinder is made prismatic (or slotted that is splined) and slides guided within a suitable prismatic (or slotted) seat formed inside a bush which can rotate, suitably supported, inside a stationary structure, coaxial with said system, said structure being solid with the frame to which the stationary part of the system is secured, and said bush being driven into rotation by a gear solid therewith or by equivalent means.

Advantageously, the member which must be rotated is solid with and made to transflate by the rod, the cylinder body being stationary, and the rod is connected with the piston through a set of thrust and guide bearings keyed on its end inside the cylinder and housed in suitable seats inside the piston, said stationary structure within which the bush rotates being substantially located on the extension of cylinder.

According a practical embodiment, the rod has square cross-section, with more or less rounded corners.

As an alternative, the outline of the rod cross-section may be a polygon with more than four sides, especially hexagonal.

Usually, the bush within which the rod slides is driven into rotation by a pinion keyed on the output shaft of a motor-reducer whose casing is solid with the body of the cylinder, said pinion meshing with a gear solid with the same bush.

The drawing shows a possible embodiment of the invention. In the drawing:

Fig. 1 shows schematically a plant for the pressing of coiled packings of textile rove, in which the apparatuses according to the invention are applied; and

Figs. 2, 3 and 4 show the enlarged details II, III and IV of Fig. 1, relative to said apparatuses.

According to what illustrated in the attached drawing, in a pressing plant like the one shown in Fig. 1, the apparatus according to the model provides an easy and extremely simple solution of the problem of rotating a mobile bottom of a container or a plate for the pressing inside a press, or of rotating any other member, during a translation movement thereof obtained by means of a common cylinder-piston system, or even during the dwell of said mobile member at whatever position along the working run of the rod of said system.

Fig. 1 shows containers, indicated by 9 made up solely of cylindrical walls lacking in the bottom part, within which a respective dish or mobile bottom 20 is free to slide for the lifting and the lowering. The container 9 on the right (in the drawing) is at a position in which it is filled, in successive layers, with coils of textile rove, coming from the machine 1 which delivers such rove continuously from a mouthpiece B, especially oscillating. For the formation of coils and of the successive coils formed superimposed layers, the dish 20, after a complete initial lift, must be able to lower down of one step on each completed layer, while continuously rotating for the coils formation. The lifting and the lowering are obtained by means of a cylinder-piston system 29; on the rod 27 of system 29 which a discoidal plate 30 is fixed which, upon its lifting, leans against the dish 20. The dish 20 is friction-driven into rotation by the plate 30 that is caused to rotate by the rod 27 which is solid therewith. The rod 27 is engaged with the piston 28 (Fig. 2) so as to idly rotate relative thereto, through a pair of guide and thrust ball bearings 22, 24, keyed on its lower end - whose diameter is relatively reduced - and housed in corresponding seats in a cavity 28C inside of and coaxial with the piston 28. The outer surface of the rod 27 is characteristically of prismatic construction, (for example having square or hexagonal cross-section) or even slotted, so that the rod itself may slide within the hole 34, also of corresponding prismatic or slotted construction, of a sleeve 36 being relatively developed in height. The sleeve 36 can rotate, supported by a pair of guide ball bearings 38 in the inside of a stationary hollow cylindrical member 42 which, through a lower flange 42F, is fixed to the cylindrical wall 29C of the cylinder-piston system 29 so as to form more or less an extension thereof (in the drawing). Solid with the sleeve 36 there is a discoidal plate 44 on the shaped edge of which a ring gear 46 is fixed that can be driven into rotation by a pinion (not shown) solid with a driven shaft (not shown) operated by the machine mechanism. It is thus evident that the rod 27 (and the plate 30 along with it) can be made to rotate by the sleeve 36 supported by the bearings 38 even while the same rod moves upwards and downwards driven by the piston 28, its outer prismatic (or slotted) surface sliding, through a prismatic coupling, inside the hole 34 also prismatic (or slotted) of the sleeve 36, being restrained from moving upwards by bearings 38. As it is clear from Fig. 2, the plate 30, in its position of maximum lowering, comes to rest on the plate 44 - just inside the edge shaping thereof on which the ring gear 46 results fixed - with which it forms a united plan surface to allow the transfer of the container 9, after its filling up to a subsequent position.

Again with reference to Fig. 1, when a container 9, filled with the procedures above mentioned, finds

itself in the pressing position, on the left (in the drawing), there is again the need to rotate the container dish (or mobile bottom) 20. Substantially, the dish 20, pushed by a plate 45 solid with a rod 41A of a cylinder-piston system 41, located in a lower position, must be able to be lifted in order to press the material inside the cylindrical wall of the container 9 against an upper dish 49 of the press, which has gone down as far as to contact the upper edge of said wall by means of another cylinder-piston system 47. After pressing, a further upwardly displacement of the pressed material, placed between the dish 20 and the dish 49, is performed, until it reaches the binding position L, that is, with the upper and lower walls of said dishes respectively at the same level of the guides of a common binding machine 50 supported by the press framework. For the binding operation, the surfaces of both the dish 20 and the dish 49 are provided with slots, mostly diametral, (for example, three slots staggered of 120° one with respect to the other) for the passage of the element, usually ribbon-like and of relatively solid construction (as a plastics strap) utilized for the bindings. The arrangement is such as to have, upon the beginning of pressing, the channels of dish 20 and the corresponding ones of the dish 49 exactly superimposed, that is, with the respective center lines disposed on a vertical plane forming dihedrals for example of 120° with other similar planes; for each binding operation, the two dishes must be made to rotate through such an angle that the two channels belonging to the two dishes come to lie on the same vertical plane of the guides of the binder. For such purpose, it is necessary first of all that the plate 45 transmits its own motion of rotation to the dish 20 not by friction but with no possible slidings, by a joint made up of teeth or pins 48 apt to be precisily inserted into corresponding hollow seats formed in the lower surface of the dish 20. It is further necessary that, similarly to what has been described with reference to Fig. 2, the rotation of the plate 45 may be determined by such means, like a motor-reducer 43, whose lifting along with the same plate is prevented. To this aim, as shown in Fig. 3, the plate 45 is fixed on top of rod 41A of the cylinder-piston system 41 which rod is thus solid therewith. Characteristically, the outer surface of the rod 45 is prismatic, (or slotted), for the sliding of said rod pushed by piston 41P, within the correspondingly prismatic for slotted hole 34′, of a sleeve 36′ restrained from moving upwards. The sleeve 36′ may rotate, supported by a pair of ball bearings 38′ inside a fixed hollow cylindrical member 42′ which is secured, through a lower flange 42′F so as to form almost the extension thereof, to the cylindrical wall 41C of the cylinder-piston system 41. Solid with the sleeve 36′ a gear 44′ is provided which can be driven into rotation by the pinion of the output shaft of the motor-reducer 43 fixed in lower position to the frame of press 3. The prismatic (or slotted) rod 41A is able to rotate relative to the piston 41P, as it is rotatively secured thereto through a pair of guide and thrust ball bearings 22, 24, keyed on the lower end thereof, of relatively reduced diameter. Said bearings are in turn housed in corresponding seats of a cylindrical cavity 41R inside of and coaxial with the piston 41P. As a consequence, by suitable controls transmitted to the motor-reducer 43, it is possible to rotate the rod 41A and thus the plate 45 and the dish 20 through a predetermined angle according to the requirements dictated by the positioning of the channels with respect to the binder, whatever lifting position the plate 45 has taken up and, therefore, even in the position shown with dashed line in Fig. 3, which is the position in which the plate 45 supports the dish 20 to keep the material pressed for the binding. It is evident that, before the dish 20 begins to raise for the pressing, an initial rotation of plate 45 will cause the coupling that is engagement of the joint made up of teeth (or pins) 48 (which fit into the corresponding seats of dish 20); this is important inasmuch as the rotation of dish 20 has to rotate the pressed material and also cause, by the friction contact thereof with the pressing surfaces, the rotation of the upper dish 49 of the press. This dish 49 is in fact fixed free to rotate at the end of rod 47A of the cylinder-piston system 47 (Fig. 4), owing to the presence of a pair of guide and thrust bearings 52. However, there exists the possibility that the rotations of dish 49, obtained by friction as stated above, will result slightly incomplete as far as the perfect superimposition of the channels of the two dishes for each binding is concerned. To overcome this possible drawback, a pneumatic positioner member 57 is provided, fixed to a flange 59 projecting from the hub 55 being solid with the rod 47A. The positioner member 57 comprises a cylinder-piston system 61 whose rod exhibits a truncated-cone end towards the dish 49, able to be inserted into suitable seats, also of truncated-cone shape, circumferentially disposed on a disc 62, at angular distances equal to the angular displacements that the dish 49 has to perform with maximum accuracy. The disc 62 is fixed above the dish 49 and is in parallelism relationship and solid therewith. At the end of each angular displacement of the dish 20, for example through 120°, carried out prior to each binding operation, the positioner 57 is put into operation so that the truncated-cone end of the rod of system 61, by penetrating the seat of the disc 62 which has come into alignment therewith owing to the friction-operated rotation of plate 49, causes that small additional rotation in one direction or the other necessary for the channel for the binder of the dish 49 to become exactly superimposed to the corresponding channel of the dish 20.

As it results from the foregoing, both in the cases of the exemplary plant of the drawing, and in all the cases in which it is necessary to obtain the rotation of a member whose displacement is operated by a cylinder-piston system, the apparatus according to the model allows very significant simplifications: in fact it permits, with relatively simple, little expensive and of small dimensions means, the rod of said system to be rotated whatever its position may be, thereby achieving also the rotation of any member operated by the same rod and solid therewith. This avoids to be obliged to supply, according to the prior art, the end of the rod, for example, of a motor-reducer apt to rotate the rod-operated member which,

again according to the prior art, used to result idle relative thereto. In this way, not only it is possible to avoid the room - which may constitute an obstacle - taken by the motor-reducer, but also, what may often be more important, the hindrance and precarious situation of the necessarily flexible connections which have to transmit the controls to the motor-reducer.

In some cases, the apparatus according to the model may result reversed, in the sense that the member driven into rotation by the cylinder-piston system may also be connected with and pushed by the cylinder which is mobile, the rod being instead stationary with respect to the machine frame. In this case the rod is always connected with the piston so as to rotate idly with respect thereto, but the wall of the cylinder body (which is the part of the system which moves relative to the rod) is instead made prismatic and said prismatic wall slides within a guide seat also prismatic, formed inside a bush like one of those indicated by 36 or 36′. Such bush can rotate supported by bearings like those indicated by 38 or 38′ inside a stationary member like 42 or 42′, said member being coaxial with the cylinder-piston system and suitably secured to the same frame with respect to which the rod results stationary.

Claims

1) Apparatus for rotating a member (30,45) solid with and made to translate by the rod (27,41A) or body of the cylinder (29C,41C) of a cylinder-piston system (29,41), characterized in that the rod (27,41A) is connected to the piston (28,41P) so as to be able to rotate idly relative thereto and in that the outer surface either of the rod (27,41A) or the body of the cylinder (29C,41C) is of prismatic (or slotted that is splined) construction and slides guided within a suitable prismatic (or slotted) seat formed inside a bush (36,36′) that can rotate, suitably supported, inside a stationary structure (42,42′), coaxial with said system (29,41), said structure (42,42′) being solid with the frame to which the stationary part of the system is fixed, and said bush (36,36′) being driven into rotation by a gear (44,44′) solid therewith or by equivalent means.

2) Apparatus according to claim 1, characterized in that the member (20,45) to be rotated is solid with and made to translate by the rod (27,41A), the body of the cylinder (29C,41C) being stationary, and that the rod (27,41A) is connected with the piston (28,41P) through a set of thrust and guide bearings (22,24;22′,24′) keyed on its end inside the cylinder and housed in suitable seats inside the piston, said stationary structure (42,42′) within which the bush (36,36′) rotates being substantially located on the cylinder extension.

3) Apparatus according to claim 2, characterized in that the rod (27,41A) is of square cross-section, with more or less rounded corners.

4) Apparatus according to claim 2, characterized in that the outline of the rod (27,41A) cross-section is a polygon with more than four sides, especially hexagonal.

5) Apparatus according to claim 2, characterized in that said bush (36′) is driven into rotation by a pinion keyed on the output shaft of a motor-reducer (43) whose casing is solid with the cylinder body (41C), said pinion meshing with a gear (44′) solid with said bush (36′).

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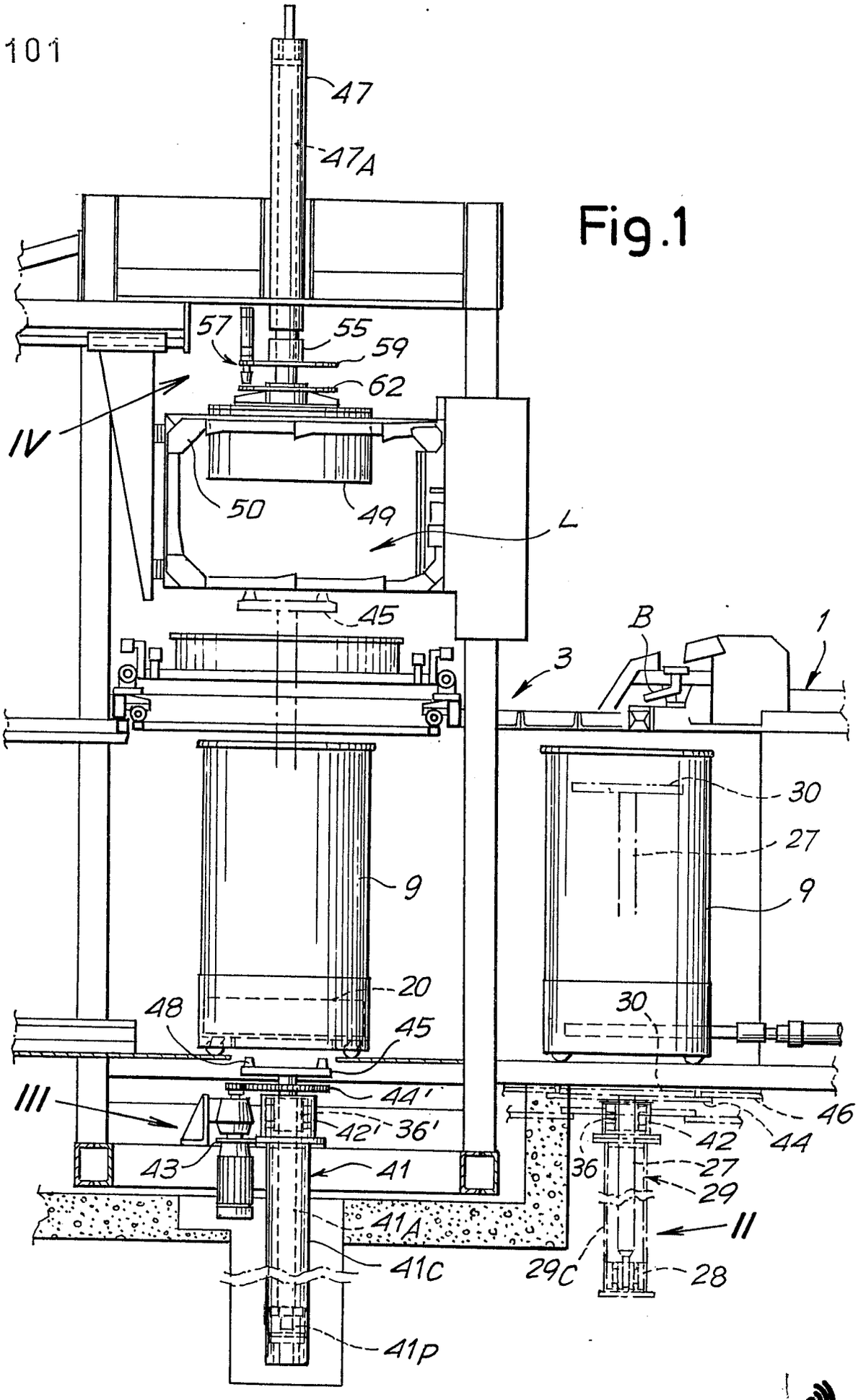


Fig.1

Fig.2

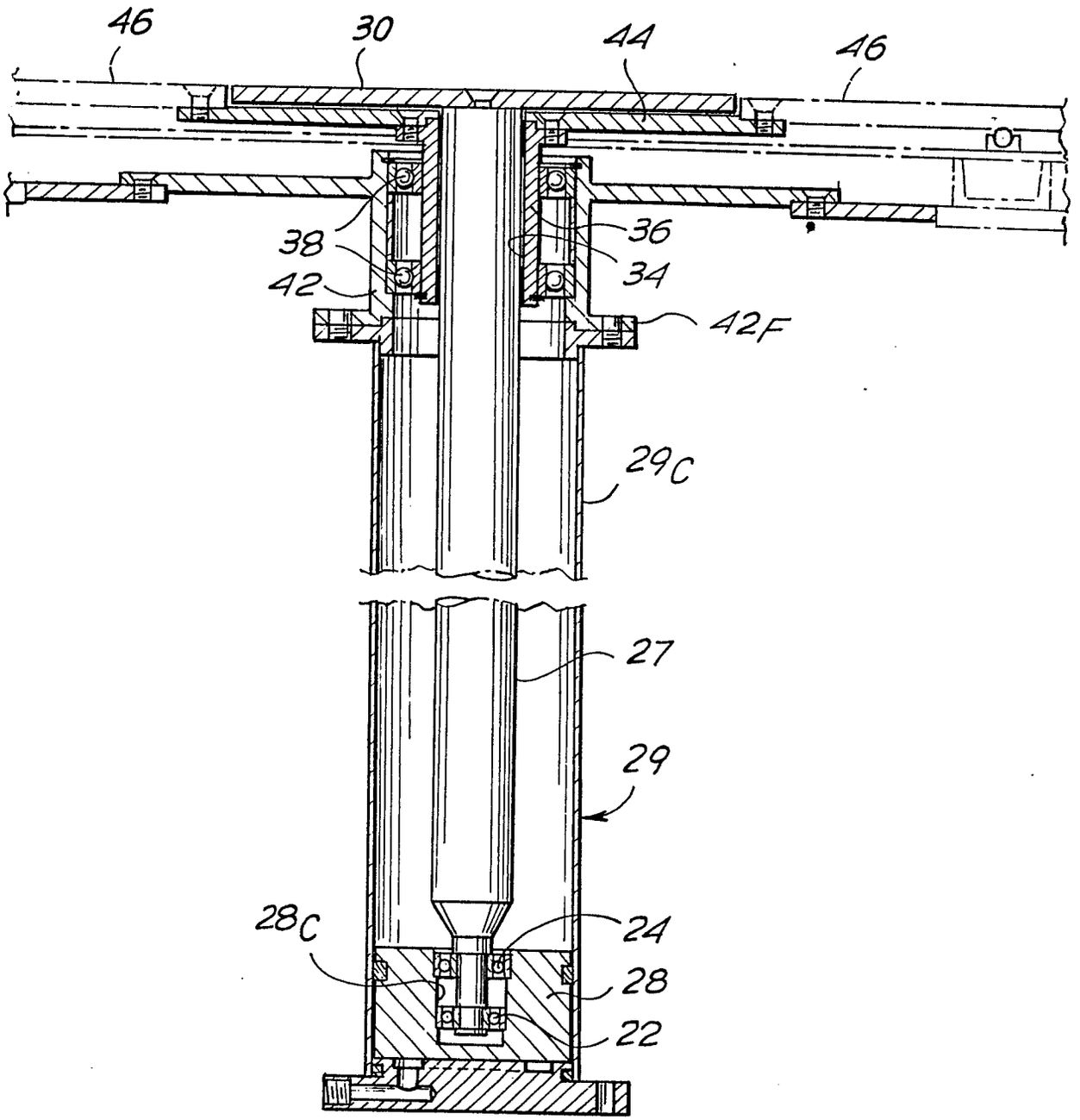


Fig.3

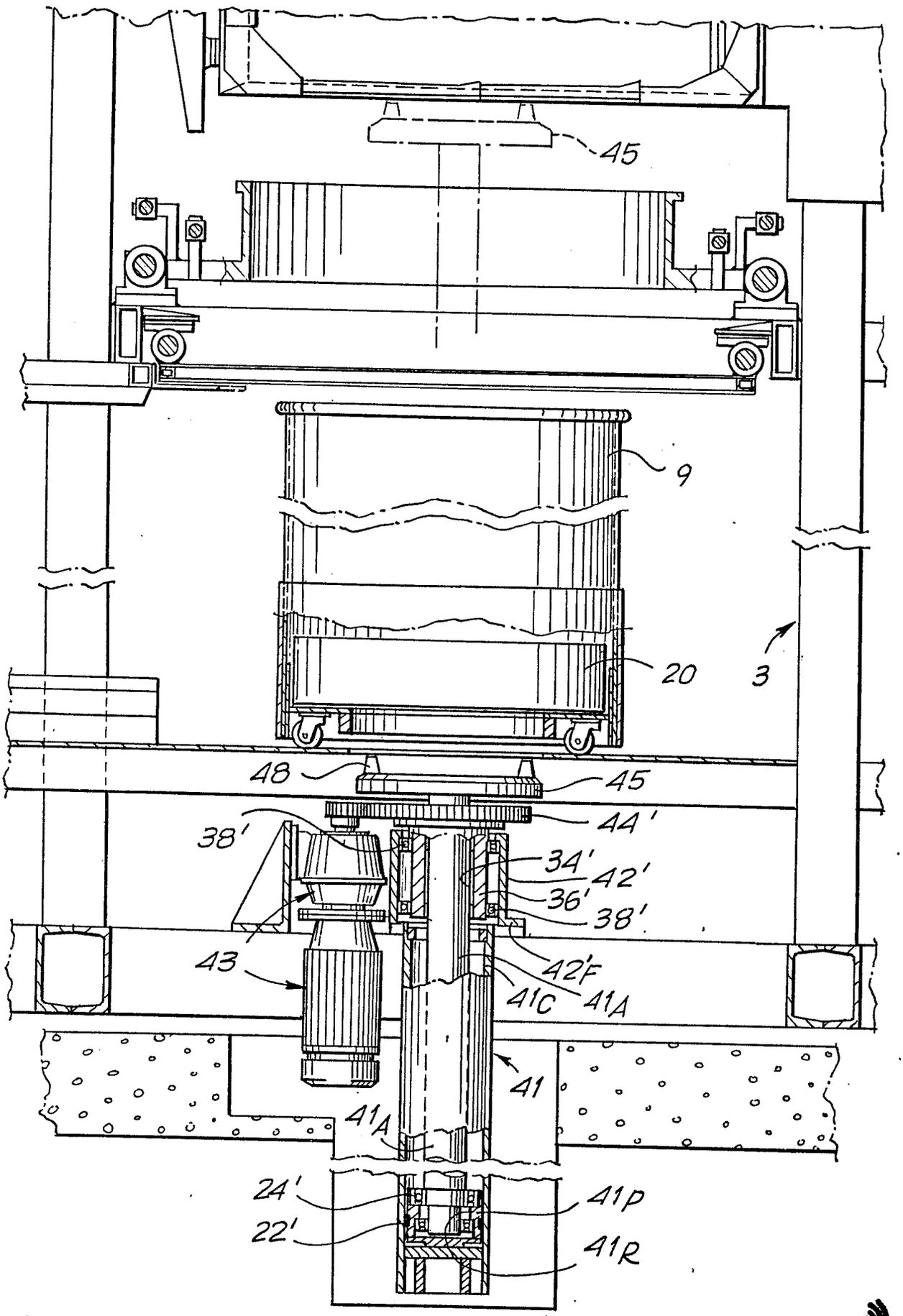
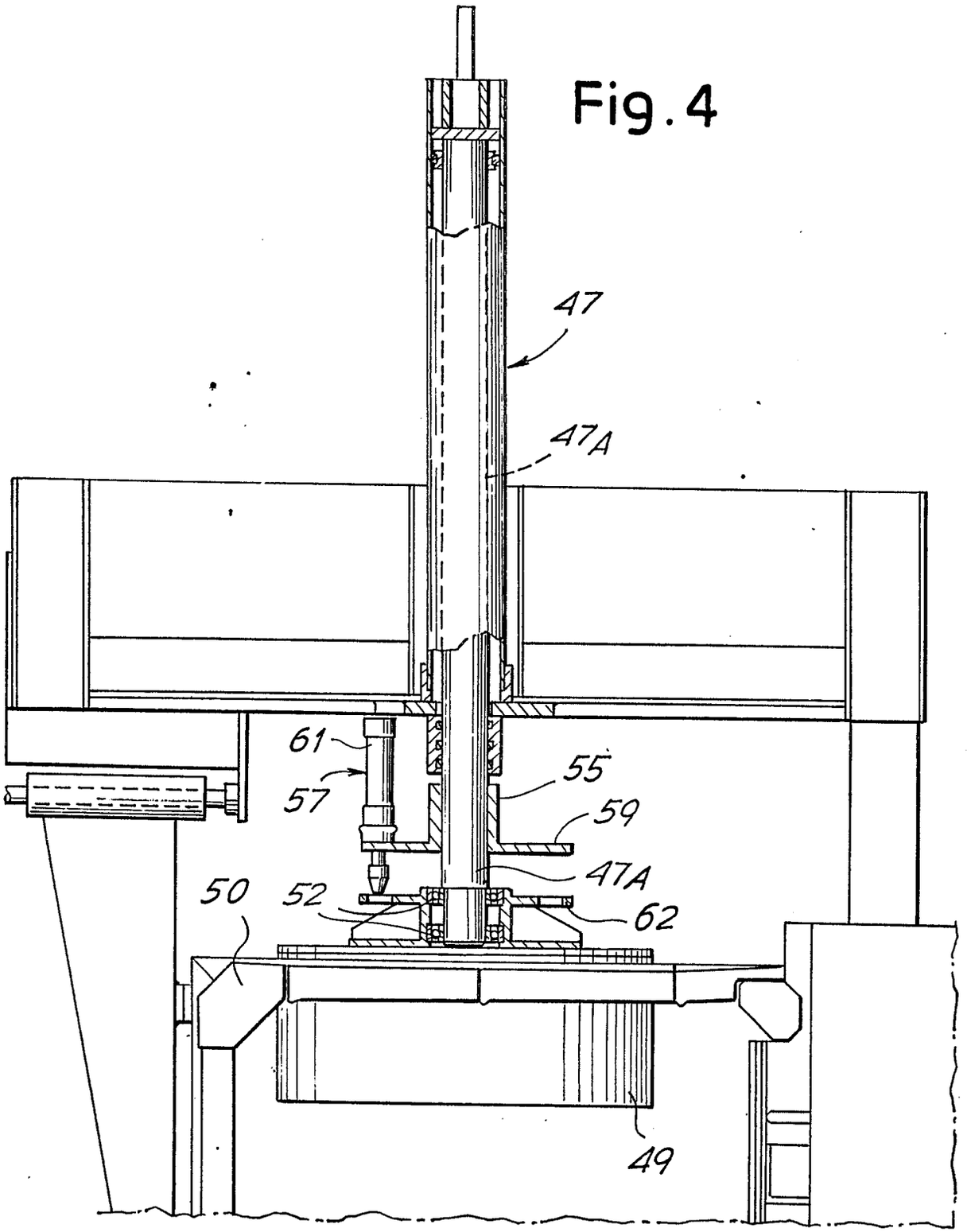


Fig.4



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EUROPEAN SEARCH REPORT

Application number

DOCUMENTS CONSIDERED TO BE RELEVANT

EP 88830031.6

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl 4)
Y	US - A - 4 591 682 (K.TAKEUJI) * Fig. 3,4 * --	1	B 65 H 54/84
Y A	FR - A1 - 2 547 290 (ETAB. F. RASSANT SA.) * Fig. 1-3 * --	1 2	
A	FR - A1 - 2 354 278 (ZINSER TEXTILM. GMBH.) * Totality * ----		

TECHNICAL FIELDS SEARCHED (Int. Cl.4)

B 65 H 54/00
B 66 F 3/00
B 66 F 7/00
F 16 H 21/00
F 16 H 37/00
H 05 B 6/00

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
VIENNA	27-04-1988	JASICEK

CATEGORY OF CITED DOCUMENTS

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