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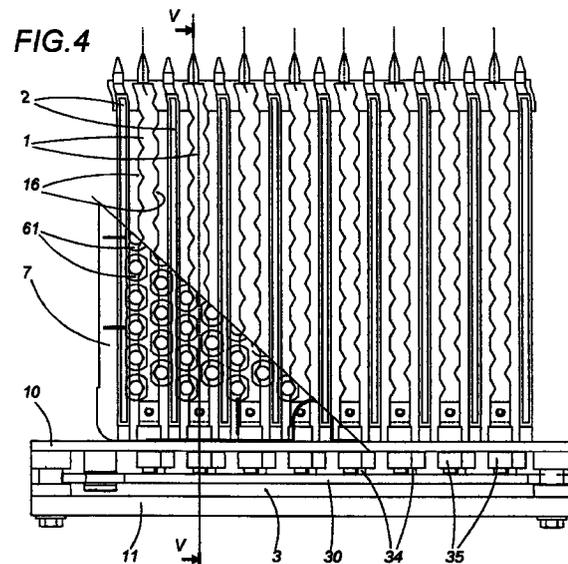
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(54) **Device for centring cylinders of single-use syringes in automatic filling and packaging machines**

(57) A device for centring a plurality of cylinders (6) of single-use syringes in automatic filling and packaging machines, which cylinders are seated in through holes (70) provided in a support (7), comprises: a plurality of foils (1) having their edges provided with recesses (16) and positioned with the longitudinal axes parallel and lying on at least one plane, which foils are hinged at one end in such a way as to be able to effect rotations around their own longitudinal axes, a plurality of non shaped rods (2), positioned parallel and alternated to the foils (1) on the same plane or on the same planes, which rods co-operate with the recesses provided in the edges of the foils to form seats for locking the cylinders in place; a mechanical actuator (3), acting on the ends of the foils with a system of levers and/or gears, which actuator can assume two positions, in correspondence with which the foils are oriented with the surfaces lying in the plane or in the planes containing the longitudinal axes and respectively with the surfaces orthogonal to said plane(s).



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Description

The present invention relates to a device for centring the cylinders of single-use syringes in automatic filling and packaging machines. The invention specifically refers to a device for centring the cylinders of single-use syringes seated in through holes provided in supports used within said automatic machines.

It is well known that to fill and package single-use syringes, automatic machines are used comprising multiple operating stations wherein, among other operations, liquid is metered in the cylinders and said cylinders are assembled with needles and pistons. For greater productivity, each station generally operates on sets of multiple cylinders seated in suitable supports. Currently in widespread use are supports essentially comprising a tray made of plastic material wherein vertical through holes are provided, arranged, aligned and equidistant, on parallel rows and fitted, at the upper part of the tray, with cylindrical inlets of the holes. Each syringe cylinder, fitted with needle and protective cap, is inserted in a hole, with the ring bearing on the edge of the inlet and the lower part projecting underneath the support.

Supports of the type described above allow to operate on sets of many tens of cylinders (typically 100-160) and they make highly efficient the automatic machines used. In practice, however, some drawbacks have been noted, due to the play of the cylinders within the inlets and the holes, particularly in supports of larger size, wherein hole density is very high.

The needles of the cylinders are provided with protective caps, of greater diameter than the cylinders and requiring suitable holes and inlets in order to allow seating the cylinders (with needles and caps) in the support. Because of this, the longitudinal axis of a cylinder may not coincide with the axis of the hole wherein it is seated and it may also orient itself obliquely with respect to the vertical. This causes malfunctions in various phases of the packaging operation, for instance in the stations wherein filling occurs by means of pipes programmed to dispense liquid in correspondence with the holes and in the stations wherein, similarly, the sealing elements and the rods of the pistons are to be inserted into the cylinders.

The aforesaid drawbacks are solved with a device according to Claim 1 for centring syringe cylinders.

The advantages and features of the present invention shall be more readily apparent in the detailed description that follows, made with reference to the accompanying drawings, which schematically show an embodiment provided purely by way of non limiting example, wherein:

- Figure 1 shows a top plan view of a device according to the invention in a first operative configuration;
- Figure 2 shows a view according to II-II in Figure 1;
- Figure 3 shows a front view of the device in Figure

1;

- Figure 4 shows a top plan view of the device in a second operative configuration;
- Figure 5 shows a view according to V-V in Figure 4 and it is analogous to Figure 2;
- Figure 6 shows a front view of the device in Figure 4 and it is analogous to Figure 3;
- Figure 7 shows a front view of a mechanical actuator provided in the device;
- Figure 8 shows a view according to VIII-VIII in Figure 7.

With reference to Figures 1 through 6, a device according to the invention is used for centring cylinders 6 of syringes, fitted with needles protected by a cap 60 and seated in holes 70, passing vertically in a support tray 7 made of plastic material. The holes 70 are provided, at the upper end of the tray, with cylindrical inlets 71, on whose edge bear the rings 61 of the cylinders 6. In accordance with the disposition of the holes 70, the cylinders 6 are aligned equidistant in parallel rows, with the cylinders of one row translated, with respect to those of the adjacent row, by a distance equal to half the distance between the cylinders.

The centring device essentially comprises:

- a plurality of foils 1, parallel and able to revolve around their own longitudinal axes,
- a plurality of fixed rods 2, which are parallel, coplanar and alternated to the foils 1,
- an actuator 3 (see Figures 7,8) acting on the foils 1 in such a way as to cause them to rotate from a position wherein their surfaces are vertical (see Figures 1-3) to a position wherein their surfaces are horizontal (see Figures 4-6) and vice versa.

The distance between the foils 1 and the rods 2 varies according to the position of the foils themselves, from a maximum value exceeding the diameter of the cylinders 6 to a minimum value which is such as to lock the cylinders between foils and rods.

The device is associated to the support tray 7 inserting the foils 1, in the position with the surfaces vertical, and the rods 2 between the rows of cylinders 6 below the plane of the tray (see Figures 1 - 3). The rotation, obtained by means of the actuator 3, of the foils 1 in the position with the surfaces horizontal causes the cylinders 6 to lock in place (see Figures 4-6).

Advantageously the foils 1 are provided with shaped edges, which co-operate with the edges of the rods 2 to form a plurality of centring seats for the cylinders 6. In particular the edges of the foils 1 are fitted with a plurality of recesses 16, each destined to receive a cylinder 6 (see Figures 2,4).

The foils 1 and the rods 2 have a revolving and respectively fixed end engaged to a plate 10. L-shaped brackets 17, fastened to plate 10, can be provided to support the second ends of the foils 1 and of the rods 2.

In the example shown the actuator 3 is of a mechanical type and it comprises (see Figure 7,8):

- an inverted Y-shaped lever 2, with its fulcrum secured to plate 10 by means of a screw 20 and with a bushing 21 whereon it oscillates, through a hub 22, between two positions of stable equilibrium; one and the other positions are reached, by means of the control 100 external to one and the other arm of the Y, thanks to a traction spring 23 connected between a screw 24 screwed onto the plate 10 and a bolt 25 able to be tightened through a vertical slot 26 of the leg of the Y;
- a cursor 30, controlled by the bolt 25, able to slide parallel to the plate 10 on screws with roller or bushing 31 fastened to the plate 10 and passing through two slots 32 provided in the cursor 30;
- a plurality of cranks 35 fitted with pins 34 for connection to the cursor 30 and with inserted the ends 36 of arms 37 coaxial to as many foils 1; each arm 37 is able to revolve in a bushing 39 inserted in the plate 10 and it has the end, opposite to the one inserted in the crank 35, fastened with a screw 40 to a foil 1.

Acting on the lever 2 causes the motion of the cursor 30, which determines the rotation of the cranks 35 and of the foils 1, which orient themselves with the surface from vertical to horizontal, with the deriving centring of the cylinders 6, and vice versa.

A second plate 11 is advantageously provided opposed and engaged to plate 10, from the opposite side with respect to the foils 1 and to the rods 2, to protect the mechanical actuator 3 positioned within the interstice between the two plates 10,11.

It is wholly evident that mechanical actuators equivalent to the one shown, as well as electro-mechanical actuators, can be used to drive the revolving foils 1. Moreover the fixed rods 2 could be replaced with as many revolving foils.

The invention thus conceived can be subject to further modifications and variations, without thereby departing from the scope of the inventive concept. Moreover, all components may be replaced with technically equivalent elements.

Claims

1. Device for centring a plurality of cylinders (6) for single-use syringes in automatic filling and packaging machines, said cylinders being seated in through holes (70) provided in a support (7), said holes and cylinders being aligned in parallel rows, device characterised in that it comprises:

- first movable elements (1) and second movable elements (2), said first and second elements having variable mutual distances and being

destined to be inserted between the rows of cylinders;

- means (3) for actuating said first elements from a position wherein the distances between the first and the second elements are greater than the diameter of the cylinders to a position wherein the distances between the first and the second elements are such as to cause the cylinders to be locked in place between the elements themselves.

2. Device according to claim 1, characterised in that said first movable elements (1) are provided with at least one shaped edge, which co-operates with the edges of said second fixed elements to form a plurality of locking seats for the cylinders.

3. Device according to claim 2, characterised in that:

- said first movable elements are constituted by a plurality of foils (1) having their edges provided with recesses (16) and positioned with the longitudinal axes parallel and lying on at least one plane, said foils being hinged at one end in such a way as to be able to effect rotations around their own longitudinal axes;
- said second fixed elements comprise a plurality of not-shaped rods (2), positioned parallel and alternated to said foils on the same plane or on the same planes, said rods co-operating with said recesses provided in the edges of said foils to form said seats for locking the cylinders in place,
- said actuating means comprise a mechanical actuator (3), acting on the ends of the foils with a system of levers and/or gears, said actuator being able to assume two positions, in correspondence with which the foils are oriented with the surfaces lying in the plane or in the planes containing the longitudinal axes and respectively with the surfaces orthogonal to said plane(s).

4. Device for centring a plurality of cylinders (6) of single-use syringes in automatic filling and packaging machines, said cylinders being seated in through holes (70) provided in a support (7), said holes and cylinders being aligned in parallel rows, device characterised in that it comprises:

- a plurality of movable elements provided with at least one shaped edge, said elements having variable mutual distances and being destined to be inserted between the rows of cylinders;
- means for actuating said elements from a position wherein the distances therebetween exceed the diameter of the cylinders to a position wherein the distances are such as to lock

the cylinders in place, said shaped edges co-operating to form a plurality of seats for locking the cylinders in place.

5. Device according to claim 4, characterised in that: 5

- said movable elements comprise a plurality of foils having their edges provided with recesses and positioned with the longitudinal axes parallel and lying on at least one plane, said foils being hinged at one end in such a way as to be able to effect rotations around their own longitudinal axes, said recesses co-operating to form said seats for locking the cylinders in place,
- said actuating means comprise a mechanical actuator, acting on the ends of the foils with a system of levers and/or gears, said actuator being able to assume two positions, in correspondence with which the foils are oriented with the surfaces lying in the plane or in the planes containing the longitudinal axes and respectively with the surfaces orthogonal to said plane(s).

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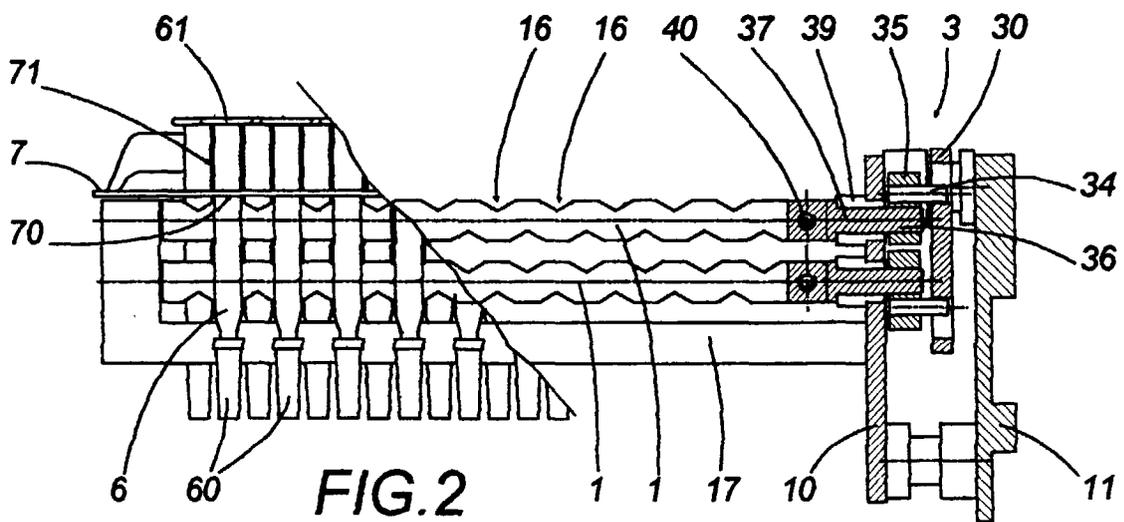
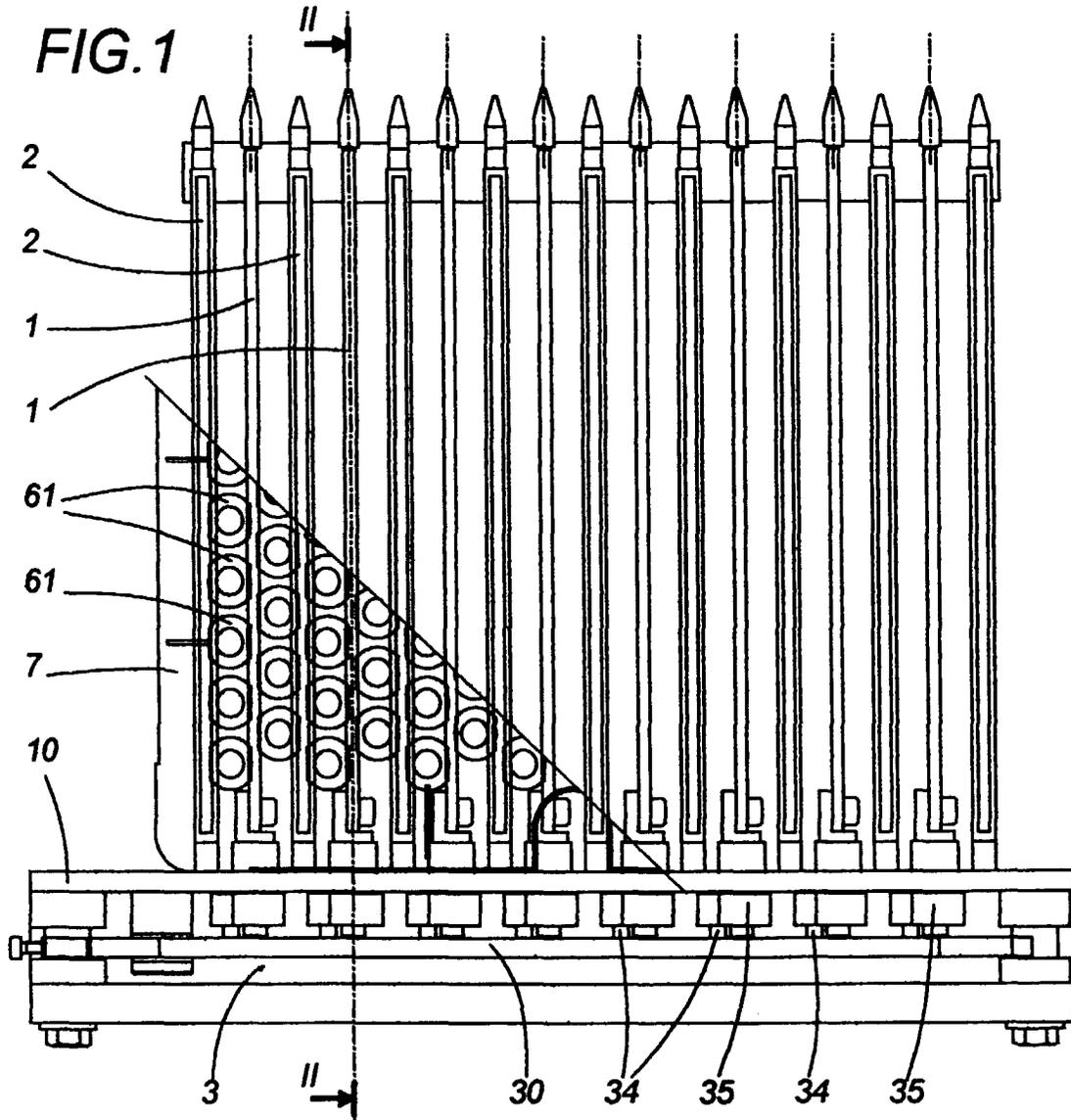


FIG. 3

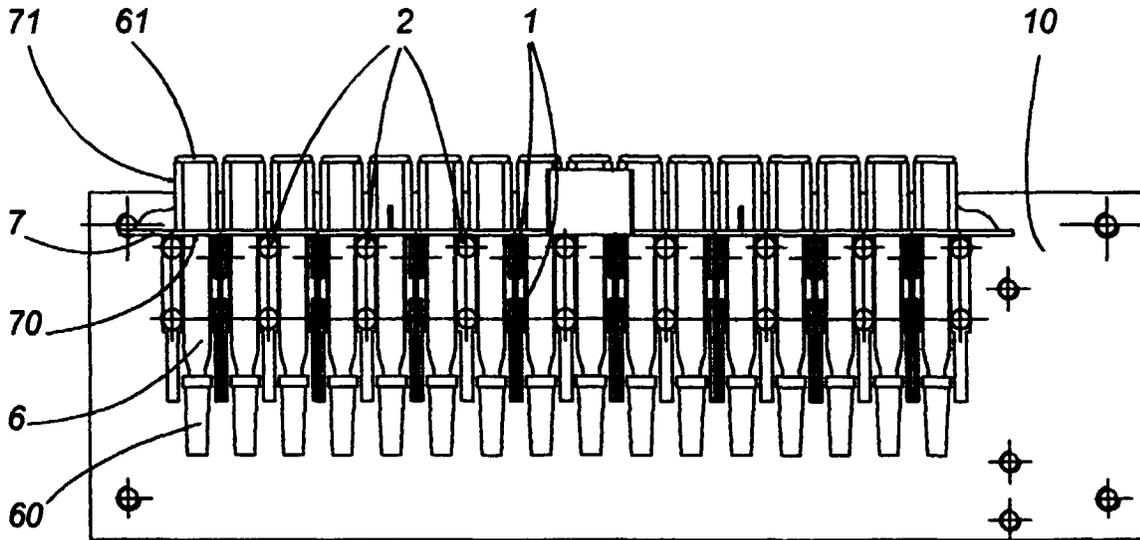


FIG. 6

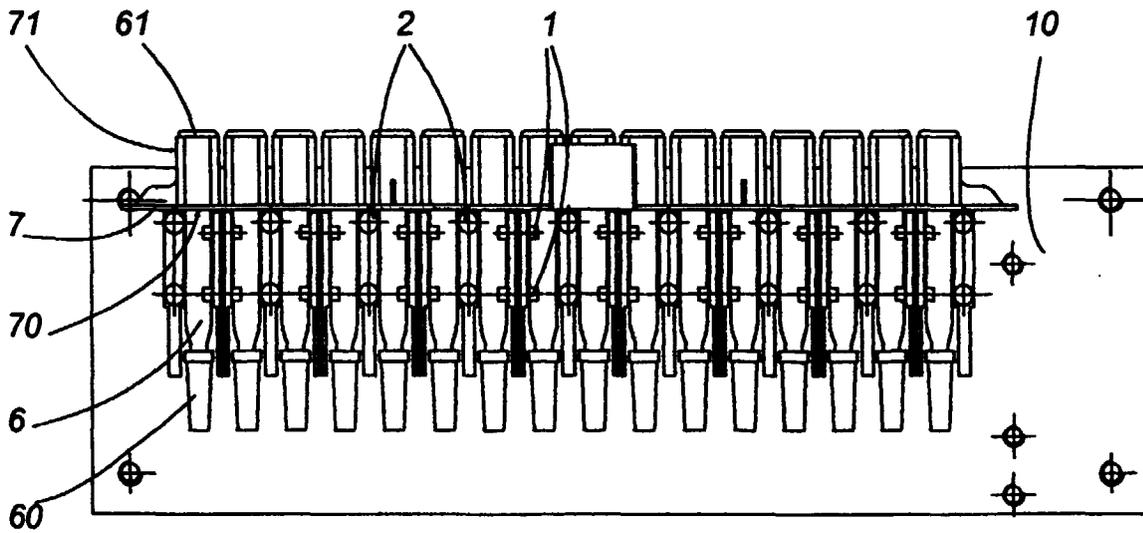


FIG. 7

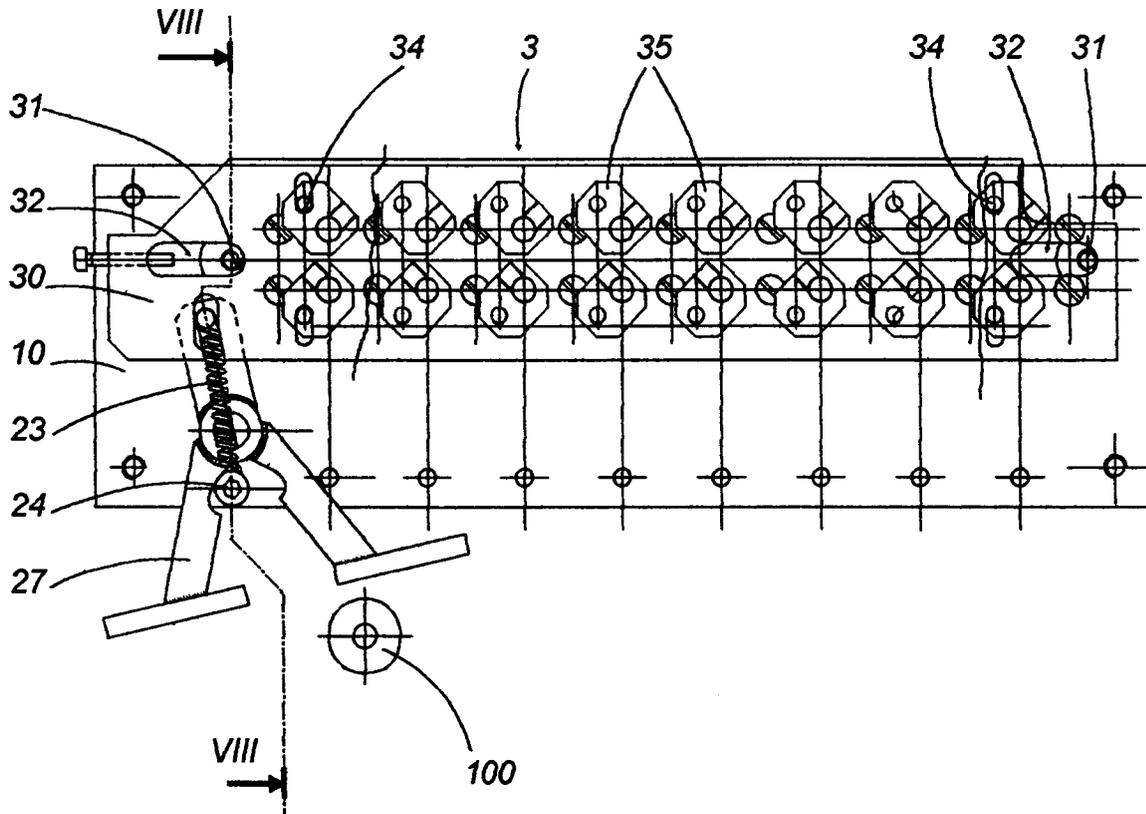
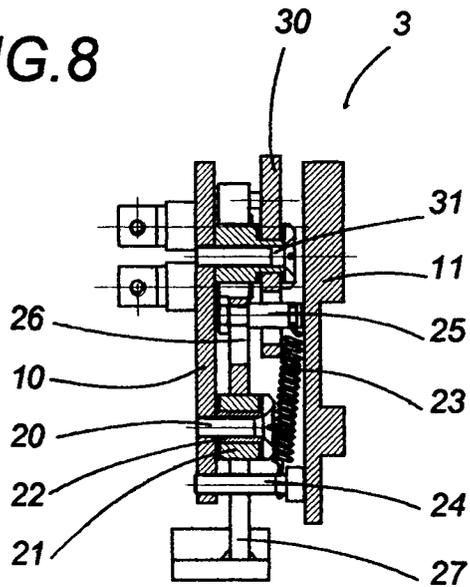


FIG. 8





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EUROPEAN SEARCH REPORT

Application Number
EP 98 10 7917

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)
A	EP 0 345 659 A (M. RUCHOZKI) 13 December 1989 * column 4, line 30 - column 6, line 20; figures * ---	1-5	B65B3/00 B65B43/54
A	DE 12 40 462 B (ENZINGER-UNION-WERKE) * column 8, line 27 - column 10, line 36; figures * ---	1,3-5	
A	US 3 245 194 A (T. CARSKI) 12 April 1966 * column 3, line 37 - column 4, line 27; figures * ---	1,4	
A	DE 36 13 489 A (H. VETTER) 5 November 1987 -----		
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			B65B
Place of search	Date of completion of the search	Examiner	
THE HAGUE	11 August 1998	Jagusiak, A	
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