

[54] **DEVICE FOR SEALING CONTAINERS
HAVING AN ECCENTRICALLY LOCATED
POURING SPOUT**

2,962,846 12/1960 Marindin 53/67

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[22] Filed: **Mar. 6, 1972**

[57] **ABSTRACT**

[21] Appl. No.: **232,162**

A device for applying stoppers or stoppering seals to containers having an eccentrically mounted pouring spout is disclosed, in which a motive unit which can be displaced between an operative and an inoperative position, and vice versa, carries a sensing member intended to scan the position of the pouring spout so as to set the stoppering or sealing unit proper in the exact position for sealing the container. The operation of such a machine can be completely automatized.

[30] **Foreign Application Priority Data**

March 6, 1971 Italy 21425A/71

[52] U.S. Cl. 53/67, 53/367

[51] Int. Cl. B65b 57/02, B65b 7/28

[58] Field of Search 53/64, 67, 68, 69,
53/70, 71, 367

[56] **References Cited**

4 Claims, 10 Drawing Figures

UNITED STATES PATENTS

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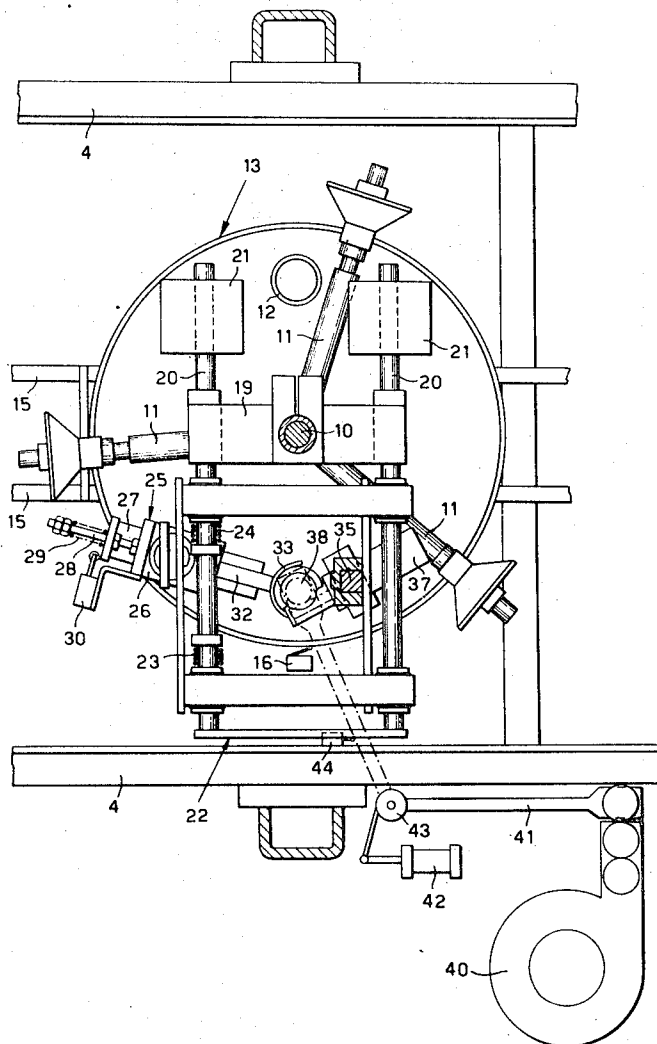


Fig. 1

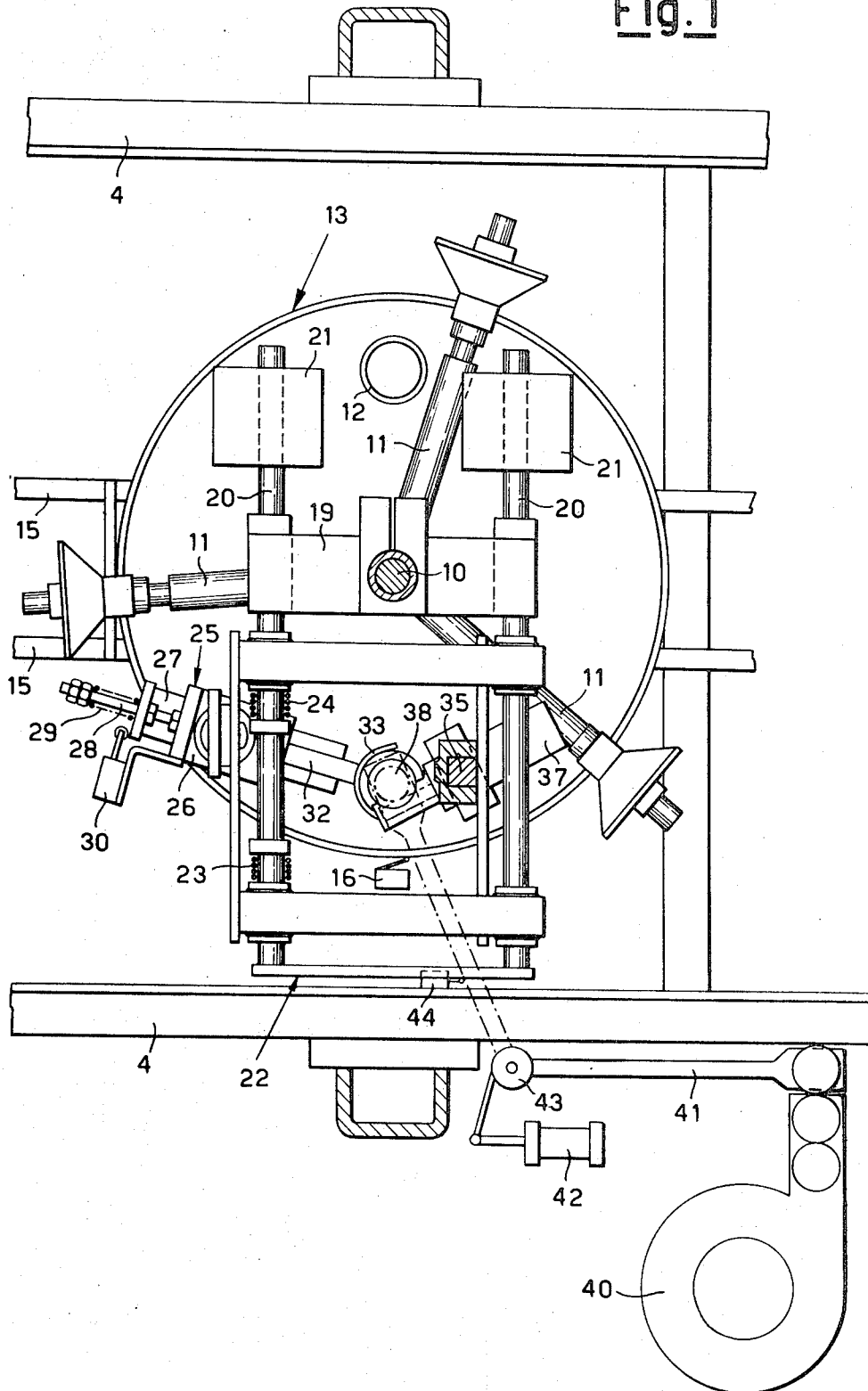


Fig. 2

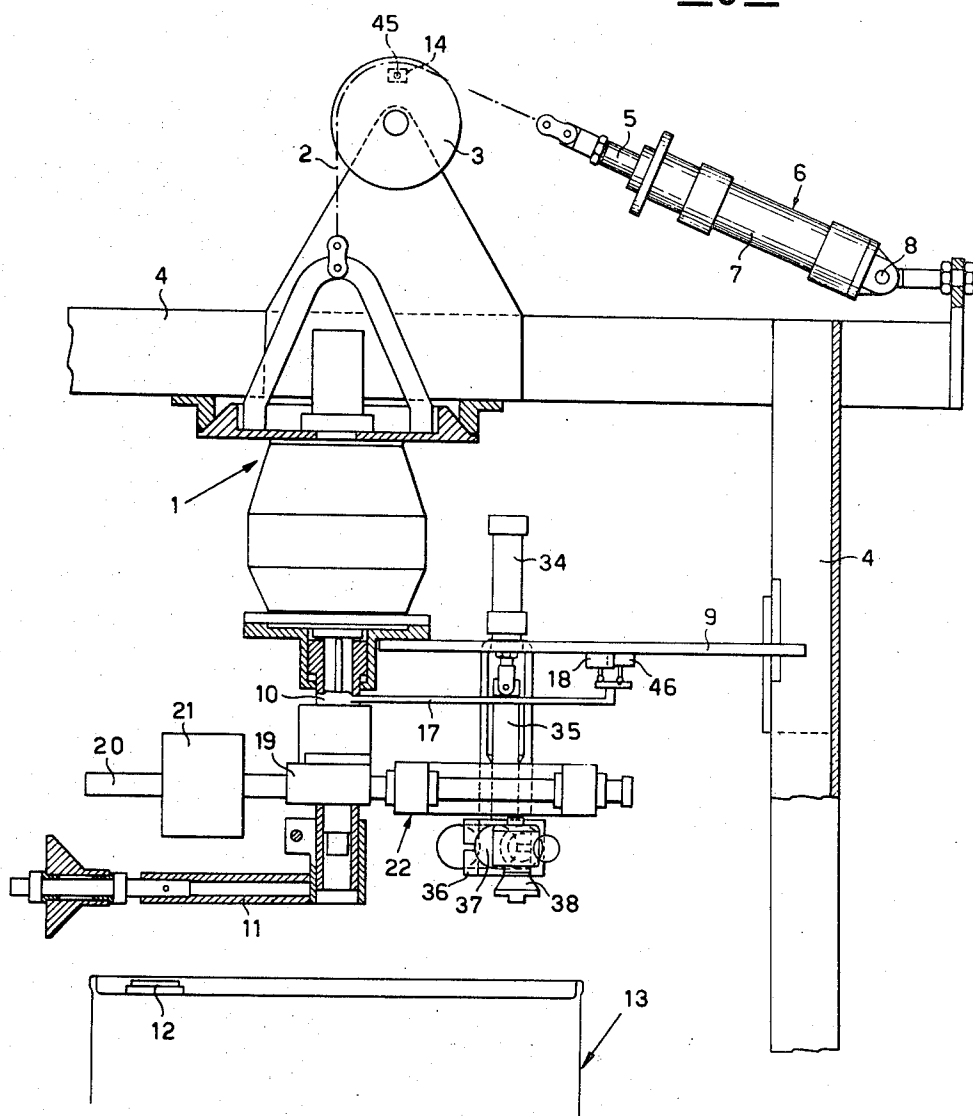


Fig. 3

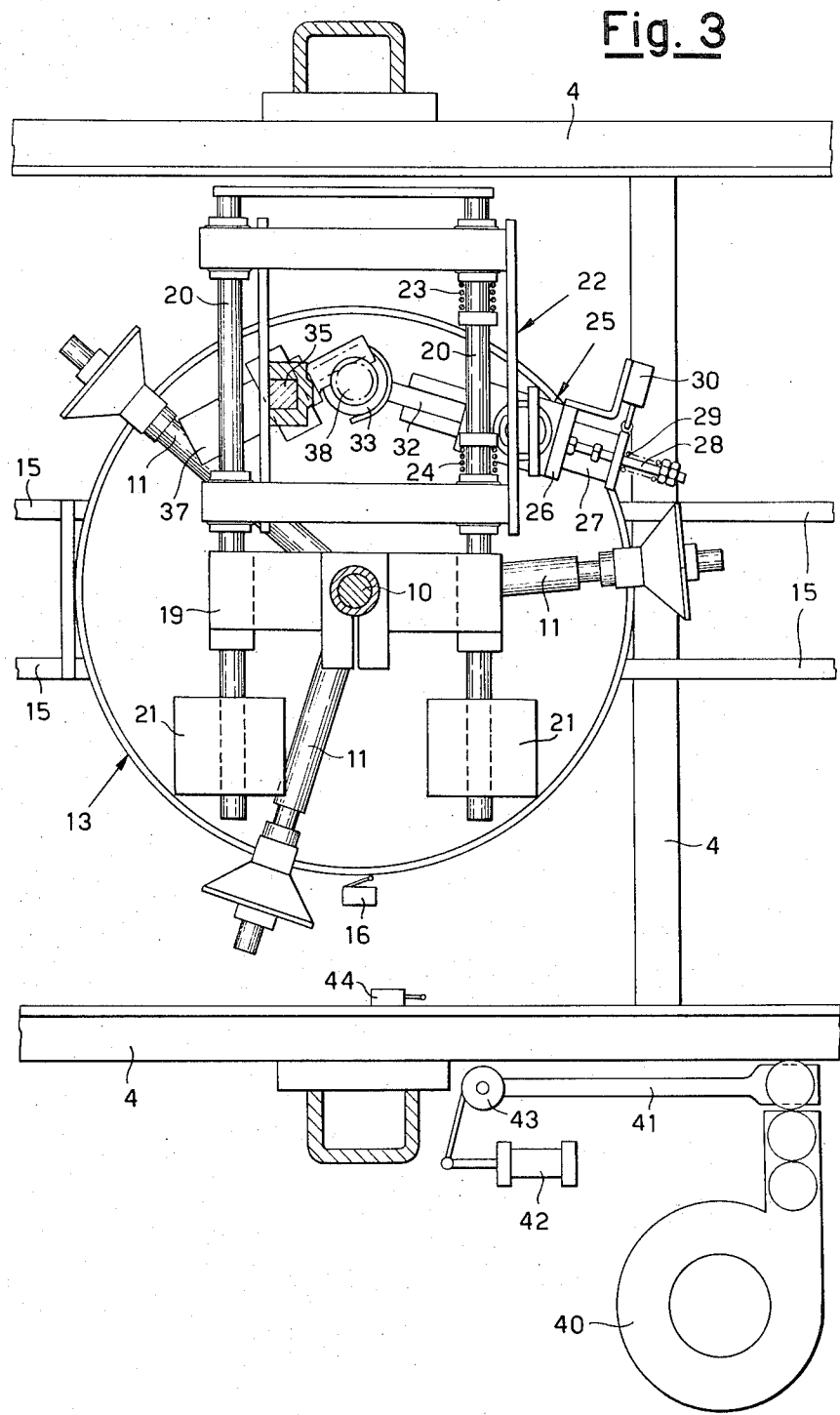


Fig. 4

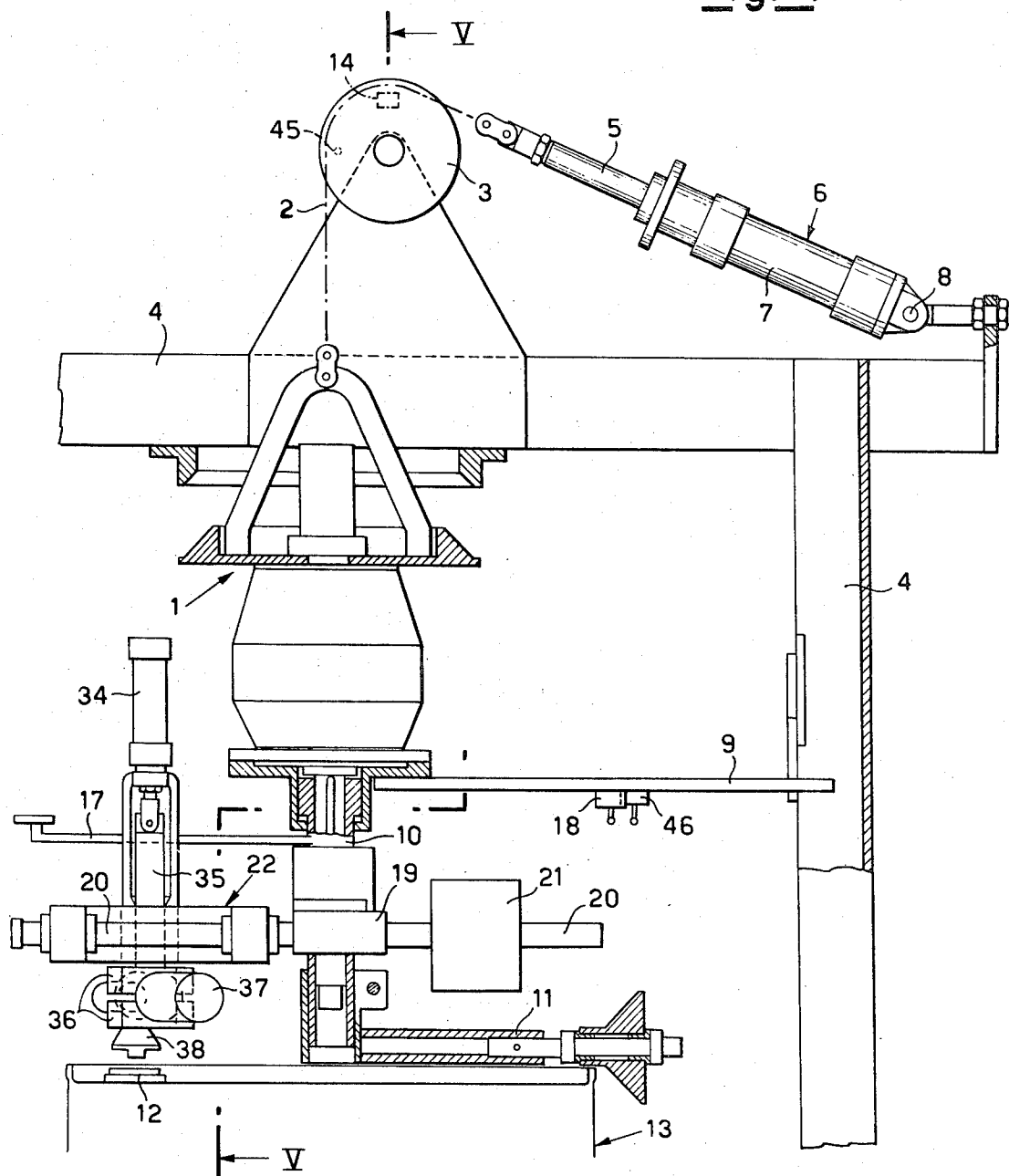
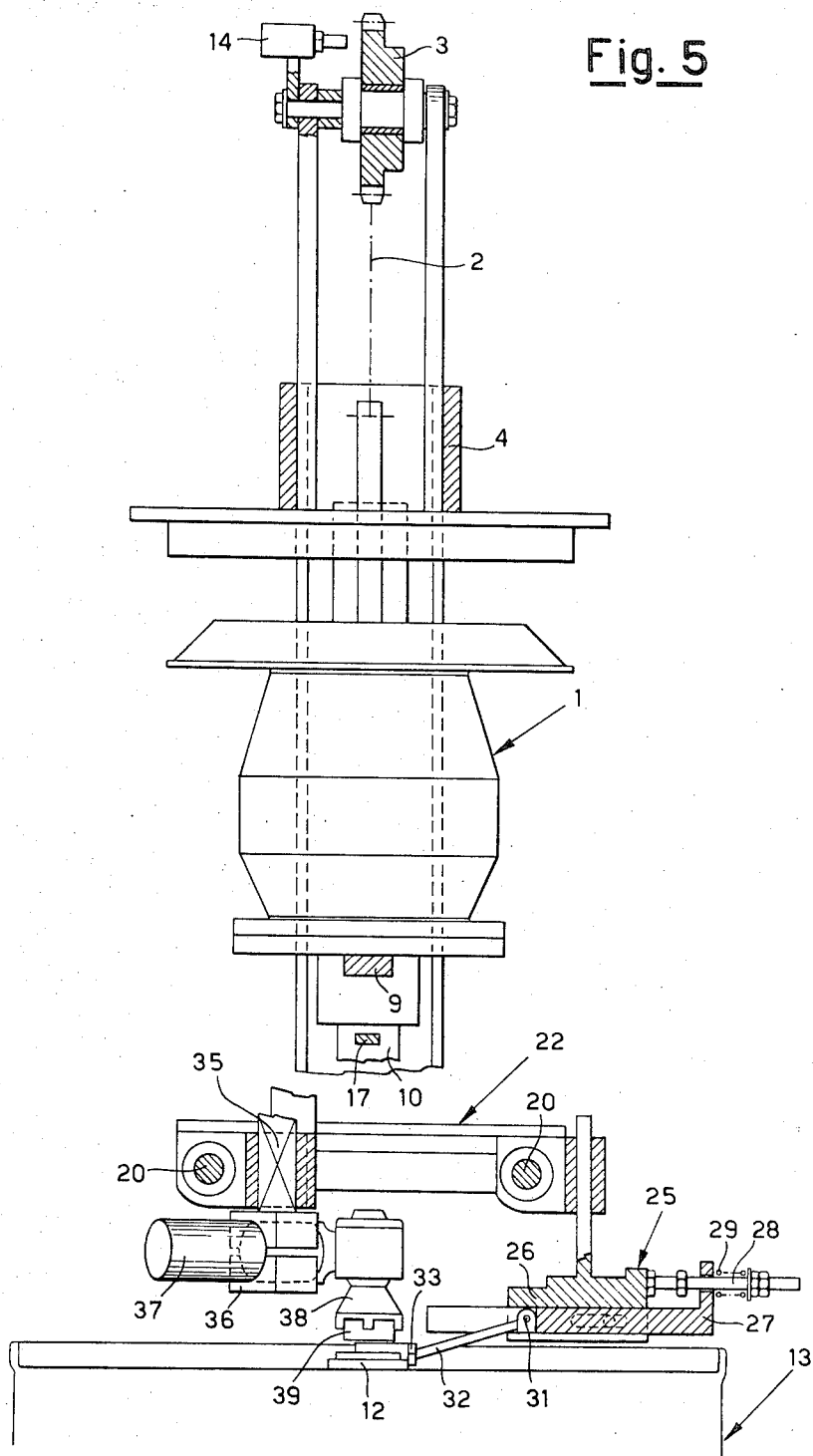


Fig. 5



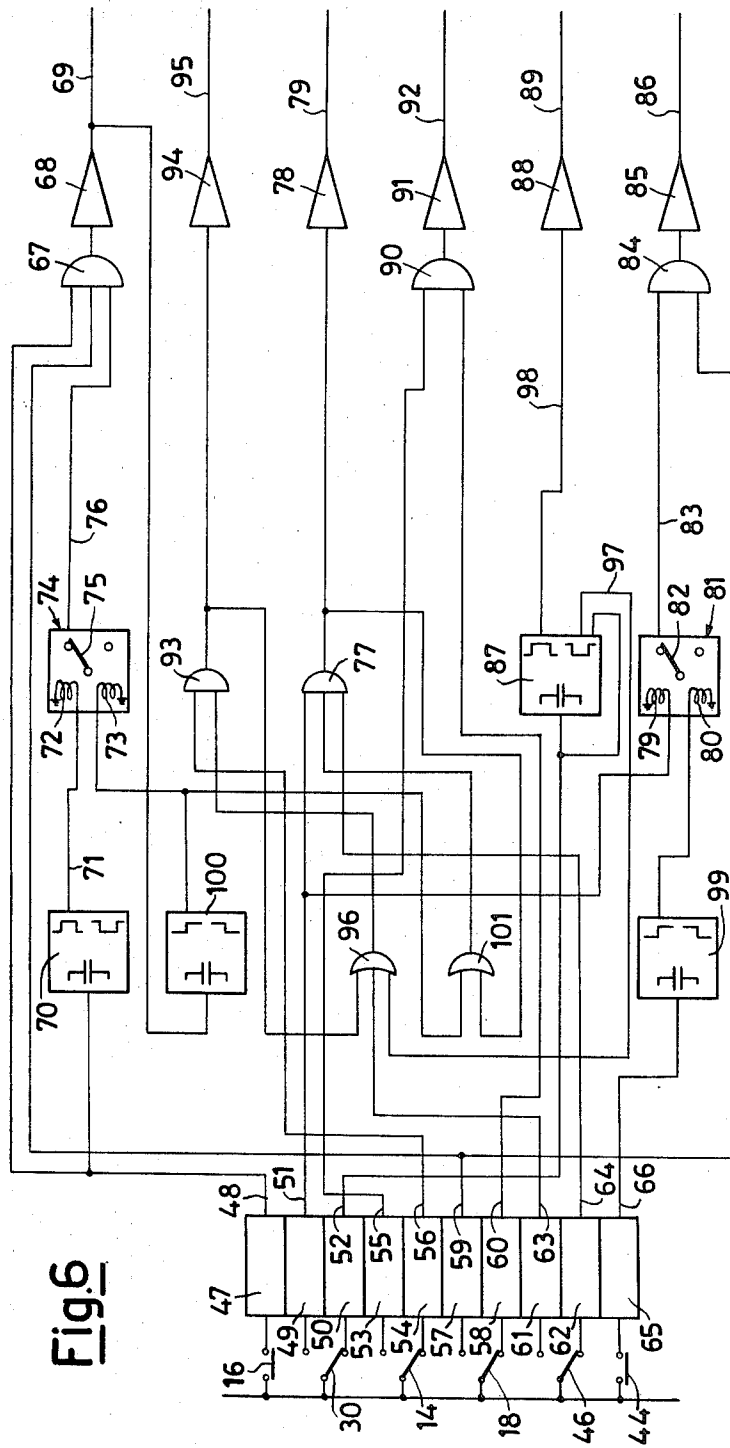


Fig. 7

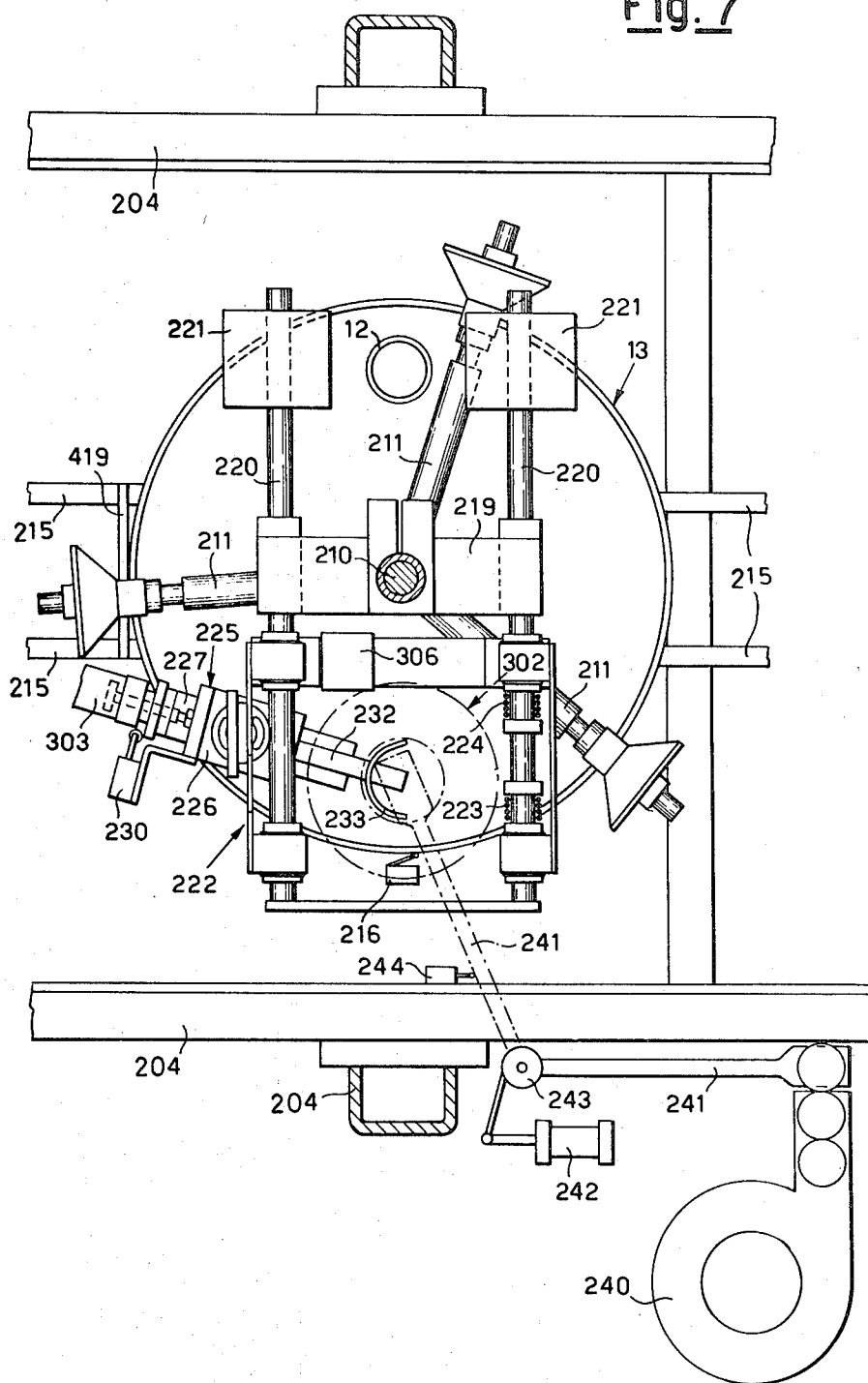


Fig. 8

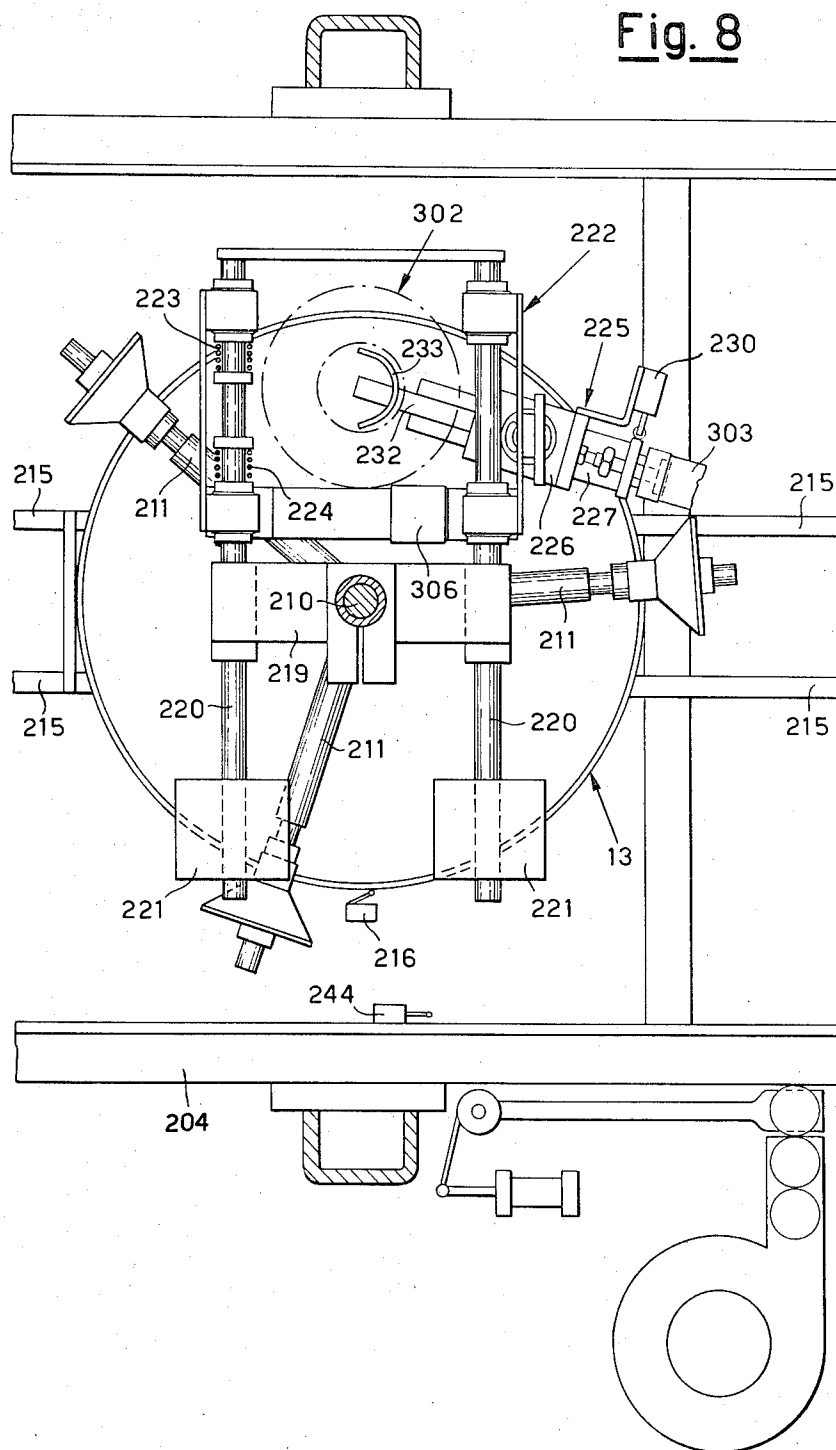


Fig. 9

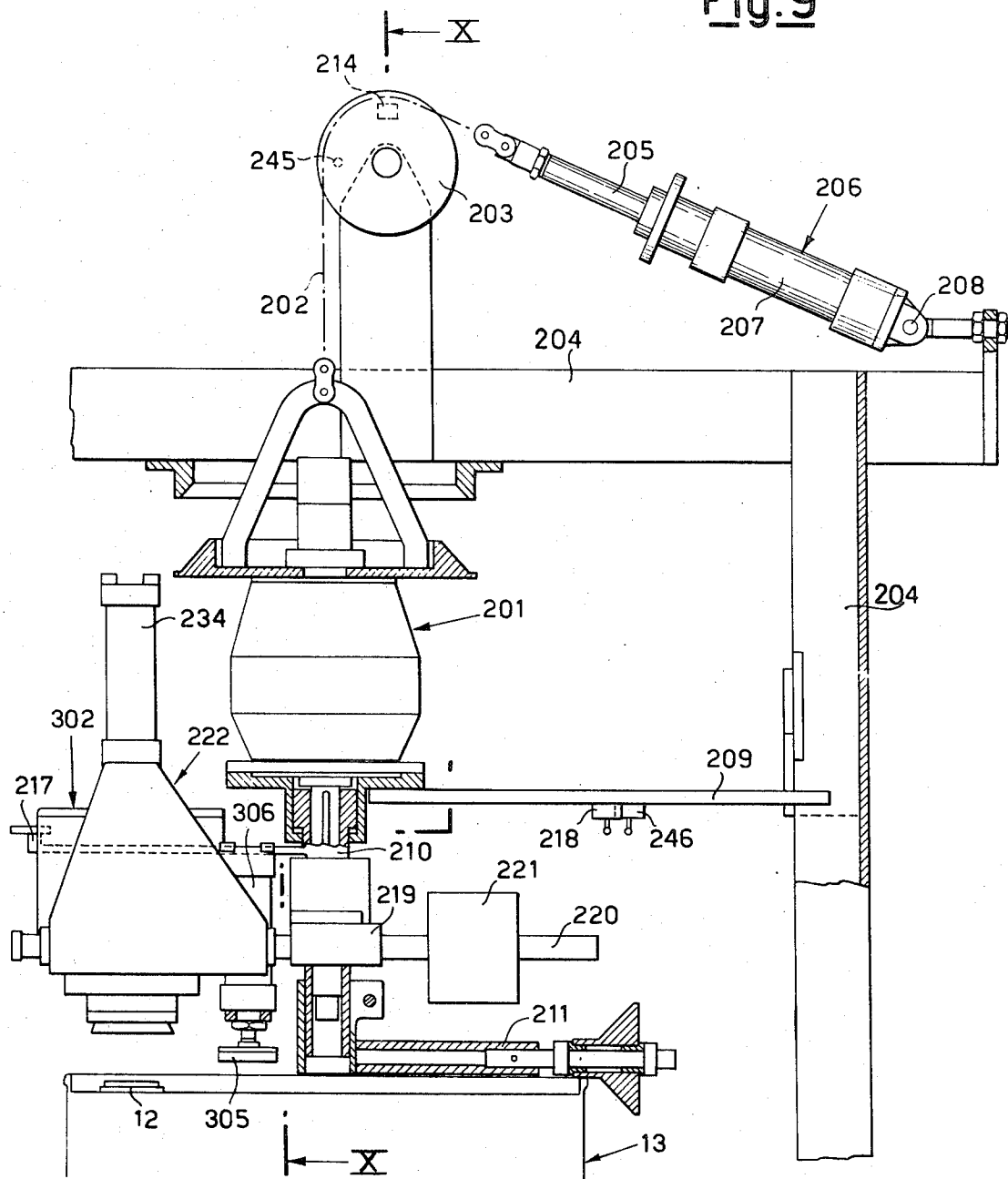
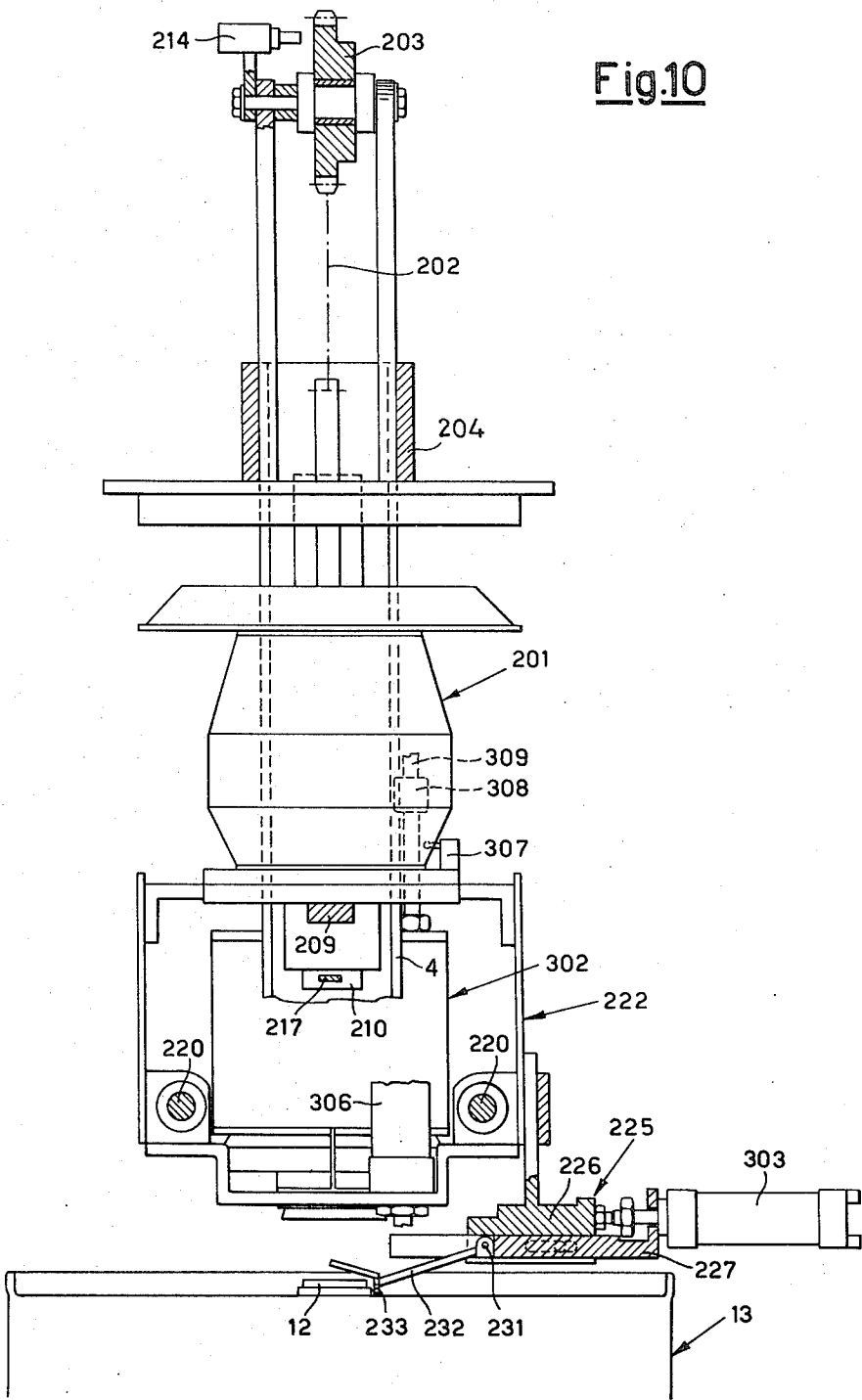


Fig.10



DEVICE FOR SEALING CONTAINERS HAVING AN ECCENTRICALLY LOCATED POURING SPOUT

This invention relates to a device for sealing containers having an eccentrically located pouring spout.

As is known, one of the outstanding difficulties in making devices for sealing containers having eccentric pouring spouts, is bound to scanning the spout position, since the spout can be positioned at any point of a circumference whose center is in the axis of the container and whose radius equals the distance between the axis of the spout and that of the container. This difficulty has prevented hitherto the provision of a completely automatic device, thus imposing the use of slow manual or semi-automatic machines.

The principal object of the present invention is thus to provide a device for sealing containers having eccentric spouts, in which the scan of the spout position is entrusted to means which may facilitate and speed up such a scan and, more particularly, to means which make it possible completely to automatize the whole working cycle of the device.

Another object, which directly stems from the first one, of the present invention, is to provide a device capable of automatically carrying out, in an orderly sequence, all the several operations inherent in sealing a container having an eccentric spout.

Now, having these objects in view, the device according to the invention has been provided, whose principal feature is the fact that it comprises a prime mover unit which can be shifted between an at rest position and a working position wherein centering means supported by the unit engage the periphery of the container lid wall which is equipped with an eccentric spout, so as to position and to maintain in a position coaxial with said container a rotatable output shaft of said prime mover unit, a sensing device eccentrically punted on said shaft and displaceable integrally therewith along a circumference whose center is on the container's axis and whose radius equals the distance between the spout's axis and the container's axis up to a position in which the spout is engaged, and a stoppering head eccentrically carried by said shaft in a position coaxial with said sensing device and displaceable along its own axis between an idle position and a position in which the spout is engaged.

It is apparent that with the device according to the invention the operation for scanning the position of the eccentric spout of the container takes place in a very simple and quick manner (shifting the prime mover unit to its working position and subsequent displacement of the sensing device and the stoppering head to the position of engagement of the sensing member with the spout), which lends itself completely to a thorough automation of the device.

Such a complete automation is just provided for in a preferred embodiment of the device according to the invention, wherein, in addition to the basis component parts enumerated above, means are provided which are responsive to the prime mover unit reaching the working position and control the actuation of said prime mover unit for causing its output shaft to be rotated, means responsive to the contact between the sensing device and the container's spout, which control the stoppage of the prime mover unit, the shift of the stoppering head towards its working position and the actuation of the stoppering head as such for applying the

stopper to the container's spout and means responsive to the completion of the stopper application which control the stoppage of the stoppering head and the return of the head, the sensing device and the prime mover unit to their respective inoperative positions.

The presence of the means cited above apparently enables the device to carry out automatically all the operations comprised in a whole stoppering cycle.

The device according to the invention can apparently be embodied in a number of different versions, even though they may be conceptually similar, especially as a function of the type of stoppering head which is used from time to time. For example, the accompanying drawings show, and will be described hereinafter two versions in which, as the stoppering head, there are used a screwing machine and a sealing machine, respectively, but it will be obvious that the scope of the invention should be considered as being extended to any other kind of stoppering head.

In the drawings:

FIG. 1 is a plan view which shows, in the idle position, a device according to the invention which is capable of carrying out in a completely automatic manner the screwing of a closure stopper in the inside of the pouring spout of a container in which the pouring spout is eccentrically mounted.

FIG. 2 is an elevational view which shows, still in the inoperative position, the device of FIG. 1.

FIG. 3 is a plan view which shows, in the working position, the device of FIGS. 1 and 2.

FIG. 4 is an elevational view which shows, in the operative position, the device of FIGS. 1, 2 and 3.

FIG. 5 is a cross-sectional view taken along the line V—V of FIG. 4.

FIG. 6 is a diagrammatical showing, in block form, of the control assembly which wholly automatizes the sequential order of all the several steps of an operative cycle of the device of FIGS. 1 to 5 inclusive.

FIG. 7 is a plan view which shows, in the idle position, an alternative embodiment of the device according to the invention, which is capable of carrying out in a wholly automatic manner the application of a sealing capsule around the pouring spout of a container having an eccentric spout.

FIG. 8 is a plan view which shows, in the working position, the device of FIG. 7.

FIG. 9 is an elevational view which shows, in the working position, the device of FIGS. 7 and 8.

FIG. 10 is a cross-sectional view taken along the line X—X of FIG. 9.

The device shown in FIGS. 1 to 5 inclusive, comprises, above all, a motive unit 1 which is hung to the end of a chain 2, the latter being engaged with an idly mounted gear 3, which is borne by a fixed frame 4 and has its other end fastened to the stem 5 of the piston of a hydraulic jack 6, whose cylinder 7 is pivoted at 8 to the fixed frame 4. To the outer casing of the motive unit 1 is fastened a rod 9, which engages a window of an upright of the fixed frame 4 so as to allow for axial movements (vertical) but not for the rotation of the motive unit. Of the latter, only an output shaft 10 can be rotated, to the bottom end of which there are affixed three transversal arms 11, spaced angularly 120° apart from each other, which have the function of engaging the periphery of the lid wall, equipped with an eccentric spout 12, of a container 13 so as to carry out the centering of the shaft 10 with respect to the container

when, as will be better appreciated hereinafter, the jack 6 controls the descent of the motive unit 1 from the at rest position of FIG. 2 (as defined by the engagement of a pin 45 protruding from the gear 3, with an end of stroke microswitch 14) to the operative position of FIG. 4, after that a conveyor 15 has fed in the container 13 in an appropriate position of work as defined by the engagement of the container 13 with an end of stroke microswitch 16 (FIGS. 1 and 3).

To the shaft 10, whose angular at rest position is defined by the engagement of a stirrup 17 solid with the shaft 10 with an end of stroke switch 18 fastened to the rod 9 (FIG. 2) and the angular position of which as to the maximum distance apart from said idle position is defined by the engagement of the stirrup 17 with an end of stroke microswitch 46 affixed to the rod 9, is also affixed a parallelepipedal body 19, which supports parallel transversal bars 20, which on the one side, support respective counterweights 21 and, on the other side, support a small frame 22, which can slide over the bars 20 against the bias of two counteracting springs 23 and 24 and overhangingly supports a unit 25 having the task of scanning the position of the spout 12 of the container 13 to the ends of a correct angular positioning of the device relative to the container.

The scanning and positioning unit (or sensing unit) 25 is composed by a fixed supporting member 26 and a slider 27, which are slidably connected to one another by a tiny bar 28, around which a spring 29 is wound which urges the slider 27 towards a position in which it is disengaged from an end of stroke microswitch 30 (FIG. 1). On the slider 27 there is, pivoted at 31, an arm 32 which is terminated by a half ring 33 which, sliding over the top wall of the container 13, is always kept at a distance from the shaft 10 which is equal to the distance between the axes of the spout 12 and the container 13 when the shaft 10 is rotated about its own axis by the motive unit 1 after that the latter has attained the working position of FIG. 4. As will become better apparent hereinafter, keeping said distance by the half ring 33 will enable the latter to meet the spout 12 during its movement as controlled by the shaft 10, that which causes the shift of the slider 27 towards the position of engagement with the microswitch 30 (FIG. 3).

The small frame 22 supports, in addition, the hydraulic jack 34, to the stem of whose piston is fastened a slidable rod 35, which supports by means of a pair of jaws 36 a screwing device 37 (of any conventional kind as available on the market) equipped with a rotatable head 38 having disengageable means (not shown) for supporting a stopper 39 to be screwed into the interior of the spout 12. The rotary head 38 is always kept coaxial with the half ring 33 (FIGS. 1 and 3).

The device shown in FIGS. 1 to 5, lastly, is completed by a stopper-feeding unit 39 to the head 38 of the screwing device 37, said unit comprising a feeder 40 (of any conventional type) and a grasping rod 41 (for example of a magnetic material) driven to rotation by a hydraulic jack 42 about an axis 43 between the taking up position as indicated in solid lines in FIGS. 1 and 3 and the dispensing position as indicated in dotted lines in FIG. 1. The latter position is defined by the engagement of the rod 41 with an end of stroke microswitch 44.

To the device shown in FIGS. 1 to 5 there is associated an electronic control unit, which has the task of

exploiting the information supplied by the microswitches 14, 16, 18, 30, 44 and 46 so as completely to automatize the operation of the device. In an example of a control unit which is diagrammatically shown in block form in FIG. 6, the microswitch 16 controls a signal generator 47 so as to cause same to emit a signal 48 whenever the microswitch in question is engaged (closed) by a container 13, the microswitch 30 controls two signal generators 49 and 50 in such a way as to produce the delivery of the respective signals 51 and 52 whenever the microswitch is either disengaged (shifted upwards with respect to FIG. 6) or engaged (position of FIG. 6) from the slider 27 of the sensing unit 25, the microswitch 14 controls two signal generators 53 and 54 so as to produce the emission of respective signals 55 and 56 whenever the microswitch is engaged (shifted upwards with respect to FIG. 6) or disengaged (position of FIG. 6) from the pin 45 projecting from the gear 3, the microswitch 18 controls two signal generators 57 and 58 so that the emission is caused to occur of respective signals 59 and 60 every time that the microswitch in question is either engaged (shifted upwards with respect to FIG. 6) or disengaged (position of FIG. 6) from the stirrup 17, the microswitch 46 controls two signal generators 62 and 62 so as to cause the emission of the respective signals 63 and 64 whenever the microswitch 46 is either engaged (shifted upwards with respect to FIG. 6) or disengaged (position of FIG. 6) from the stirrup 17, and the microswitch 44 controls, lastly, a signal generator 65 so as to cause it to emit a signal 66 every time that the microswitch in question is engaged (closed) by the rotatable rod 41.

The signal 48 is applied to an input of an AND logical circuit 67, at whose output there is a power amplifier 68, which produces a signal 69 adapted to cause the actuation of the jack 6 for the descent of the motive unit 1 and the other component parts (feeler 25, screwing device 37) associated therewith. The signal 48 is also applied to the input of a timing circuit 70, which supplies a timed signal 71 acting upon either of two coils 72 and 73 of a bistable circuit 74 so as to displace a movable contact 75 towards a position (FIG. 6) where a signal 76 is produced, which is applied to another input to the AND circuit 67. The signal 51 is applied to an input of a logical AND circuit 77 at whose output there is arranged a power amplifier 78, which produces a signal 79 adapted to cause the actuation of the motive unit 1 for the scanning rotation of the position of the spout 12. The signal 51 is also applied to either coil 79 and 80 of a bistable circuit 81 so as to shift a movable contact 82 towards a position (FIG. 6) where a signal 83 is produced, which is applied to an AND logical circuit 84, at whose output there is a power amplifier 85, which produces a signal 86 adapted to cause the actuation of the jack 42 for shifting the rod 41 from the take-up position to the dispensing position of the stoppers 39. The signal 52 is applied to the input of a feedback timer 87 to whose output a power amplifier 88 is applied, which produces a signal 89 adapted to cause the actuation of the jack 34 for the descent of the screwing device 37, as well as the actuation of the same screwing device 37 for screwing the stopper 39 into the spout 12. The signal 55 is applied to the input of an AND circuit 90, at whose output there is a power amplifier 91, which produces a signal 92 adapted to cause the actuation of the motive unit 1 for the return (with reverse rotation) of the unit associ-

ated therewith towards the inoperative position of FIG. 2. The signal 56 is applied to an input of an AND circuit 93, at whose output is applied a power amplifier 94 which produces a signal 95 adapted to cause the actuation of the jack 6 for lifting the motive unit 1 again along with the assembly associated therewith towards the idle position of FIG. 2. The signal 59 is applied to another input of the AND circuit 67 as well as to another input of the AND circuit 84. The signal 60 is applied to another input of the AND circuit 90. The signal 63 is applied to an input of the logical OR circuit 96, to two further inputs of which there are applied the output signal of the AND circuit 93 and the output signal 97 of the timer 87 which has an inverted sign with respect to that (98) as applied to the input of the power amplifier 88. The signal 64 is applied to another input of the AND circuit 77. The signal 66 is applied to the input of a timer 99 to one output of which there is applied the coil 80 of the bistable circuit 81. The assembly of FIG. 6, lastly, comprises a timer 100, which receives at its input the signal 69 coming out of the amplifier 68. To one output of said amplifier there are connected the coil 73 of the bistable circuit 74 and an input of an OR logical circuit 101, another input of which is connected to the output of the AND circuit 77. The output of the OR circuit 101 is connected to another input of the AND circuit 77.

The structure as described above of the device shown in FIGS. 1 to 5 and the control unit of FIG. 6 associated therewith operate in the following manner.

The arrival of a container 13 to the working position of FIGS. 1 and 3 causes the microswitch 16 to be closed, so that the generator 47 emits a signal 48 which, in combination with the signal 59 as produced by the generator 57 due to the effect of the engagement existing between the stirrup 17 and the microswitch 18 (FIG. 2) and the signal 76 as produced by the timer 71 and the bistable circuit 74 under the command of the signal 48, drives the AND circuit 67 to emit a signal to be converted by the amplifier 68 into a signal 69 which causes the actuation of the jack 6 for the descent of the entire assembly hung to the chain 2. The signal 69 is also applied to the input of the timer 100, which, after a time which is calculated in such a way as it is sufficient for the descent of the motive unit 1 down to the position where the centering arms 11 enter engagement with the container 13 (FIG. 4), emits a signal which, on the one side, causes the energization of the coil 73 of the bistable circuit 74 for dropping the signals 76 and 69 and the consequent stoppage of the descent controlled by the jack 6 and, on the other side, it causes, via the OR circuit 101, the AND circuit 77 (the microswitches 30 and 46 being both disengaged), and the amplifier 78, the production of a signal 79 which controls the actuation of the motive unit 1 and the ensuing rotation of the shaft 10 and other component parts connected therewith. The rotation is completed as the half ring 33 of the feeler unit 25 meets the spout 12 (if, per chance, it does not meet the spout, the rotation is anyhow stopped at the end of a complete revolution by the engagement of the stirrup 17 with the microswitch 46, an engagement which causes the signal 64 to drop and thus, through the AND circuit 77, the drop of the signal 79). Such an abutment (FIGS. 3 and 4) causes, in fact, the back shift of the slider 27, which, by being engaged with the microswitch 30, causes the drop of the signal 51 and thus, through the AND circuit 77, the drop of

the signal 79. At the same time, the engagement of the microswitch 30 causes the emission of a signal 52, which, converted into a signal 89, causes the actuation of the jack 34 (to approach the screwing device 37 to the spout 12) and of the screwing device 37 (for screwing the stopper 39 into the spout 12) during a time which is determined by the timer 87. As soon as the timer 87 controls the drop of the signal 89, at the other of its output a signal 97 appears which, through the OR circuit 96 and the AND circuit 93 (the microswitch 14 is disengaged), controls the emission of a signal 95 which controls the jack 6 to lift the assembly hung to the chain 2 again. As the pin 45 engages the microswitch 14, the signal 56 is dropped, causing the AND circuit 93 to control the drop of the signal 95 and thus the stoppage of the jack 6, whereas a signal 55 is emitted which, by being combined with the signal 60 (the microswitch 18 is disengaged) at the input of the AND circuit 90, controls the emission of a signal 92 which actuates in the reverse direction the motive unit 1 for rotating in the reverse direction the shaft 10 and to restore the entire assembly to the at rest position of FIGS. 1 and 2 (the signal 92 drops as the stirrup 17 engages the microswitch 18). At this stage the signals 51 (through the bistable circuit 81) and 59 control the circuit AND 84 to deliver the signal 86, which, by actuating the jack 42, controls the rod 41 to take a new stopper from the feeder 40 and to bring it in registry with the head 38 of the screwing device 37, where the stopper is taken by means of any kind, for example magnetically. The arrival of the rod 41 to the stopper dispensing position causes the engagement of the microswitch 44 (FIG. 1), so that the generator 65 emits a signal 66 which, after a time determined by the timer 99, controls the drop of the signal 83 and thus that of the signal 86. Appropriate means not shown in the drawing will provide to restore the rod 41 to the takeup position which is indicated in solid lines in FIG. 1. The sealing cycle of the container 13 is now completed and the device is in readiness for a new cycle (preferably means will also be provided which, sensing the end of a cycle, provide to actuate the conveyor 15 for dumping the sealed container and feeding in a new container to be sealed).

The device shown in FIGS. 7 to 10 is substantially similar to that of FIGS. 1 to 5 (corresponding component parts are indicated by reference numerals which are obtained by adding 200 to the numerals as used for FIGS. 1 to 5); the only exceptions being the replacement of the screwing device 37 by a sealing device 302 (of any conventional type available on the market), the replacement of the spring 29 by a hydraulic jack 303 (whose stem is the equivalent of the rod 28) adapted to cause a further back shift of the slider 227 after the abutment of the half ring 233 with the container's spout (for both the spout and the container the same reference numerals as in FIGS. 1-5 have been used), so as to permit the application of a capsule about the spout 12, by the provision of a plug 305, actuated by a pneumatic jack 306, which has the task of holding the container 13 stationary after that the half ring 233 has been withdrawn, by the provision of an end of stroke microswitch 307 (FIG. 10) which, as it is engaged by an enlargement 308 of an arbor 309 integral with the sealing device 302, has the function of stopping the descent of the sealing device and of controlling, conversely, the actuation for clinching the capsule or the seal to the

spout 12, and by appropriate and simple changes in the control unit (neither illustrated herein nor described in detail since the modifications involved are wholly obvious and well within the purview of anyone skilled in the art).

The structural changes enumerated above involve corresponding modifications in the operation, which consists in that the engagement of the microswitch 230 as caused by the abutment of the half ring 233 with the spout 12 causes, in a preselected time sequence, at the outset the descent of the plug 305 until abutting the container 13, then the backward shift of the slider 227, then the descent of the sealing unit 302 again until engaging the microswitch 307, then the actuation of the sealing unit 302 for clinching the seal to the spout 12 and, lastly, the discontinuation of the actuation of the seaming unit 302 and the lift of the whole unit again until engaging the microswitch 214, whereupon all the operation described above for the final part of the working cycle of the device of FIGS. 1 to 5 are repeated.

As can be seen, these modifications are negligible to the effect of the basic idea of the invention and thus they are entirely encompassed by the spirit and scope of the present invention.

What is claimed is:

1. A device for sealing containers equipped with an eccentric spout, characterized in that a motive unit which can be shifted between an idle position and a working position in which centering means supported thereby are engaged with the periphery of the lid wall of the container which has an eccentric spout in such a way as to position and maintain in a position coaxial with the container a rotatable output shaft of said motive unit, a feeler member carried eccentrically by said shaft and shiftable integrally therewith along a circumference having its center on the axis of the container and a radius equal to the distance between the axis of the spout and the axis of the container up to a position of engagement with the spout, and a sealing head carried eccentrically by said shaft in a position coaxial with said sensing member and displaceable along its own axis between an at rest position and an operative position in which there is the engagement with said

spout.

2. A device according to claim 1, characterized in that it comprises means responsive to the arrival of the motive unit to the working position, which control the actuation of said motive unit for the rotation of its output shaft, means sensitive to the contact between the sensing member and the container spout which control the stoppage of the motive unit, the displacement of the sealing head towards the working position and the actuation of said sealing head for applying the stopper to the container spout, and means sensitive to the completion of the application of the stopper, which control the stoppage of said actuation of the sealing head and the return of the sealing head, of the sensing member and of the motive unit to their respective inoperative positions.

3. A device according to claim 1, characterized in that it comprises a holding member for the container which can be shifted between an at rest position and a working position where there is the engagement with the container and means for withdrawing the sensing member from the container spout irrespective of the actuation of the motive unit.

4. A device according to claim 3, characterized in that it comprises means sensitive to the arrival of the motive unit to the working position, which control the actuation of said motive unit for rotating its output shaft, means sensitive to the contact between the sensing member and the container spout, which control the stoppage of the motive unit, the displacement of the holding member towards the working position, the actuation of said withdrawing means of the sensing member and the displacement of the sealing head towards the working position, means sensitive to the arrival of the sealing head to the working position, which control the stoppage of the displacement of said sealing head and the actuation of said sealing head for applying the stopper to the container spout, and means sensitive to the completion of the application of the stopper, which control the stoppage of said actuation of the sealing head, and the return of said sealing head, of the holding member and of the motive unit to their respective inoperative positions.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,765,146

Dated October 16, 1973

Inventor(s) Aldo Ghiretti

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Title page, line [73] should read:

--[73] Assignee: OCME Officina Costruzioni Meccaniche
Emiliana S.r.l., Parma, Italy--

Signed and sealed this 2nd day of July 1974.

(SEAL)
Attest:

EDWARD M. FLETCHER, JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents