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54 **Improvements to machines for cone-shaping and flanging of aerosol cans and similar.**

57 A machine (2) for the cone-shaping of cans (16), of aerosol type, or similar, presents improvements in its basic parts. In particular, in it the rotator (38) holding the pliers (39) and the plate (53) holding dies (45) and spindles (65) are rapidly interchangeable, and all operations of replacement of the drums (11) of loading and (71) of discharge and the regulating shims (10) and filling of the feed lung are also rapid. The same machine, equipped with means of control and safety, is ready to be interfaced with an electronic line processor. To said machine are preferably coupled pliers (39) in which a pushing means (104) is equipped with a calibrated force sufficient to keep permanently in contact the ejector piston (106) with the bottom (108) of an object or can (16), fixed in position in a special seat (102). In said position the object (16) is held by peripheral pliers (107). Said calibrated force of the pusher (104) keeps the extractor piston (106) in contact with the bottom (108) also when the object (16) must undergo undesired displacements, in which case a proximity sensor (109) is capable of detecting the corresponding alignment displacement of a reference (118), integral to the same piston (106) and intervening on the stopping means of the operating machines.

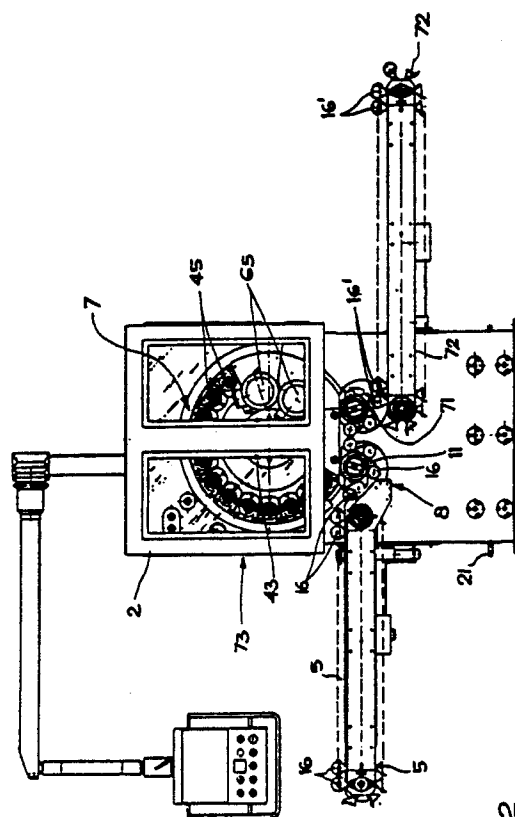


Fig. 2

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IMPROVEMENTS TO MACHINES FOR CONE-SHAPING AND FLANGING OF AEROSOL CANS AND SIMILAR

The invention concerns improvements to machines for cone-shaping and flanging of aerosol cans and similar, comprising means of vertical movement for conveyor feed belts, in addition to those of lateral movement; double means of control for the so-called feed lungs, one of them independent, of traditional type, the other directly derived from the cone-shaping machine; universal comb with shims calibrated for adjustment of the feed belt-loading drum transfer with cans of different types; loading and discharge drums with coaxial suction means and rapid means of change and safety control sensors; pliers-closing and can-ejecting devices with fast controls, derived directly from the main movement; for complete or partial fast replacement of the rotating pliers-holder and the die and spindle-holder; devices to check the axial position and positioning of the dies and spindles and means of interface for connection of all the controls of the cone-shaping machine and line processors. As noted, the present machines for the cone-shaping of cans like the aerosol type consist in a central body, on which a pliers-holder with intermittent rotation is applied, which is aligned to a plate, with alternate forward and backward movement, on which the dies and tools for processings are applied.

Through a conveyor belt, coupled to a feed lung, the cans to be treated are collected by a drum, which aligns them with a loading station, from which they are pushed on the seats present in each station of the rotating pliers-holder. In each station means are present which bind the cans to keep them in the same position throughout all processing phases, which succeed one another as the rotating holder gradually turns intermittently, aligning itself at each pitch to the cone-shaping dies or to the tools assembled in sequence on the plate with alternate motion.

According to the type of pliers used, the operating machines are fitted with means of control, applied directly on the spindle and/or die-holder.

Said means of control, which mainly consist of proximity sensors, are placed in a position where they detect the exact backward movement of the equipment present on the die-holder, after their active phase.

When the can has covered the entire rotation of the holder it is completely processed, and, from the seat in which it has been fixed, is ejected and collected by a discharge drum which deposits it on a conveyor belt which sends the end product to the deposit or to subsequent processing phases. The cone-shaping machines thus formed, although valid from a functional point of view and guaranteeing an

end product of optimal quality, present some drawbacks which limit their production capacities and cause a considerable waste of time for maintenance and/or machine preparation.

In particular, at present, each time production is varied, i.e. each time there is a switch from processing of one type of can to that of a can with different diameter and/or shape, it is necessary to dismantle all the tools, spindles and fixing means of the rotating holder and the plate with alternate motion, completely stopping both the machine and the auxiliary means, such as the feed lung.

Another problem is that the present means of control and positioning of the various devices are not particularly effective, and it therefore sometimes happens that, due to displacement of a can incorrectly fixed, or imprecise positioning of a spindle or tool during operating phases, part of the production suffers irreparable damage and the machines must be stopped to restore optimal conditions and eliminate the damaged products.

A further problem, with specific illustrative reference to the phases of plastic deformation at the ends of the aerosol cans, in which the deforming action of their front part is more decided and coarse, it may happen that the equipment present on the die-holder drags in its return movement the cans treated.

Said dragging, which may even be moderate or temporary, is presently detected with excessive delay by the abovementioned means of control, and the operation machines therefore continue the workings.

The above dragging movement may be produced by the friction arising between the central guide die and the deformed collar of the cans, or between said die and the possible burrs present on the edges of the collars, which lock together the parts in contact the moment they should separate for the start of the return stroke of the equipment.

In these cases, the friction between the parts may be stronger than the grip of the rear pliers which grip and hold in position the bottoms of the cans.

When this happens, the cans are unthreaded, often only partially, from their rear seats and possibly abandoned or released in incorrect intermediate positions, causing considerable damage both to the cans in processing and the equipment during the rotation phases of the rotators of positioning and alignment to the sequential processing stations.

Besides the distribution of part of the production, the above event causes a considerable waste of time, required for the ordinary maintenance operations necessary to restore standard operating

conditions.

Further problems stem from the fact that the present means of grip of the cans, the closing and expelling devices, the controls of the loading and discharge drums are rather slow and impose fairly limited production rates.

The scope of the present invention is to eliminate the above problems.

The invention, as characterized by the claims, solves the problem through improvements to machines for the cone-shaping and flanging of aerosol cans, and similar, with which the following results are obtained: the conveyor feed belt is capable of lowering itself and rotating, to give access to the machine, without imposing modifications to the surrounding parts, like the feed lungs; the secondary power take-off favours the loading phases of the feed lungs even when the machine is at a standstill to fit the necessary equipment at each new processing cycle; the universal combs favour the feed of the loading drum, according to the type and size of the cans to be treated; the coupling means of the loading and discharge drums, the closing and opening means of the pliers and position control are automatic and regulated by control systems which check their position and stop the machines at each minimum irregularity; the die-holders are simpler as they are without positioning control devices and the relevant position-means; the control means are positioned near the base of the seats in which the objects to be processed are positioned; their intervention is simultaneous and directly derived from the grip action of the fixing pliers; the rotating pliers-holder and die and spindle-holder plate as a whole or in sectors are interchangeable.

The advantages of the present invention mainly consist in the fact that all the means are designed to cut intervention times, to cut the dead times required to set up the necessary equipment at each processing cycle, to eliminate or limit the causes of accidental stopping, to facilitate the feed, loading, discharge, regulation and programming operations involved in the processing cycles of cans of different sizes; the means of control are also of simple, effective construction and operation; their action remains constant throughout the entire processing cycle of each object, guaranteeing a perfect positioning check on the objects in processing and a safe, immediate intervention at each possible displacement, even minimum, of same: the setting up and/or replacement of the equipment (dies and tools) applied to the rotators simpler and faster.

The invention is illustrated in detail below with the aid of the enclosed drawings in which:

- fig. 1 shows a schematic overall view of the machine in the rapid change phase of the complete plate with alternate motion, and a second plate, ready for assembly, viewed from the front,

- fig. 2 shows a front overall view of the same machine,

- fig. 3 shows the detail of the vertical movement control of the conveyor feed belt, seen according to section A-A of figure 2,

- fig. 4 shows the view in plan of the same conveyor belt indicated in figure 1.

- fig. 5 shows the partial lateral view of the end of the same belt as figure 4, equipped with universal comb with calibrated shims,

- fig. 6 shows a cross-section of the control members for motorization of the loading and discharge belts and power take-offs,

- fig. 7 shows the longitudinal overall section of the front part of the loading drum,

- fig. 8 shows the longitudinal overall section of the rear part of the loading drum,

- fig. 9 illustrates the front nozzle of the pneumatic closing device of the pliers of the cans,

- fig. 10 shows the rear end of the control of the closing and opening device of the pliers,

- fig. 11 shows a schematic view of the longitudinal section of the cone-shaping machine with the rotating pliers-holder and plate with alternate motion, die and spindle-holder with tools,

- fig. 12 shows a partial view of the section of the plate with alternate motion carrying dies and spindles, with nonius type regulating device, and

- fig. 14 shows an illustrative example, in cross-section, in particular cone-shaping station for aerosol cans, equipped with means of control and seal.

The drawings show a machine (2) for the cone-shaping and flanging of aerosol cans, or similar, comprising, in sequence, a conveyor belt (5) with which the cans (16) to be processed, which come from a feed lung, not shown, are sent to a loading station, consisting of a rotating loading drum (11). From the drum (11) the cans (16) are loaded, one at a time, in the can pliers (30) applied on the rotating holder (38).

To each intermittent rotating feed of the rotating holder (38) corresponds an identical intermittent rotating feed of the drum (11), so that a can (16) is inserted in each empty set of pliers (39) aligned to the loading station. At each successive intermittent movement; each can (16) gripped in pliers (39) rotates with the pliers-holder (38), is sequentially aligned with all die-holder stations (45) and/or spindle-holder stations (65) present on the plate with alternate motion (53), and is submitted to the corresponding processing phases. At the last station, the pliers (39) open and the finished cans (16') are ejected and sent to a rotating discharge.

drum (71), which collects and deposits them on a discharge conveyor belt (72). A first improvement of the cone-shaping machine consists in a device, shown in figures 3 and 4, composed of a hydraulic or pneumatic piston (1), applied on the side (73) of the cone-shaping machine (2), which supports the bracket (3) on which is supported, in (4), the conveyor belt (5) which feed the cans (16). By means of the piston (1), the conveyor belt (5) is thus capable of making vertical movements in the direction of the arrow (74), besides rotating horizontally round its support (4) in the direction of the arrow (75), pushed by the piston (6). This operation of displacement is necessary to permit free access to the front part (7) of the machine (2) to perform standard maintenance operations, or similar. The possibility of lowering of the belt (5), through the action of the piston (1), and the successive rotation round the support (4), besides facilitating access to the front part of the machine, makes it possible to leave in their position both the cans (16) in arrival from the feed lung, upstream of the belt (5), which remain suspended to the corresponding supporting pins, and those already placed on the belt (5).

Consequently, in the following resumption phase of the cycle, the feed of the cans restarts immediately, without the need for any resetting.

With reference to figure 5, the same belt (5), at its ends (8), has been equipped with a universal comb (9), comprising interchangeable calibrated shims (10) through which it is possible to adjust the position of the cans (16), according to their diameter, in order to facilitate and guarantee their correct insertion on the loading drum (11). The comb (9) is substantially applied on the discharge side (8) of the belt (5), so that, when a can (16) is in arrival, it is conveyed towards one of the housings (12) present on the loading drum (11), according to a trajectory that facilitates correct insertion. For each diameter of the cans (16), the comb is suitably regulated to guarantee the abovementioned trajectory; this is easily obtained, slackening the locking means (13) and replacing the calibrated shims (10) with those corresponding to the required size.

To better manage the machine (2) and reduce the dead times of discharge of the rotating holder for end of shift, and resumption for coupling and/or change of the gauge of the cans (16), a second auxiliary control of the feed lung has been constructed, not shown, derived from a power take-off (21) located on the side of the machine.

As shown in figure 6, the motorization of the auxiliary members of the cone-shaping machine (2) is controlled by a pneumatic coupling unit (14) with different operating positions, located inside the machine.

When the coupling (15) is in position (A), all to

the right as shown in figure 6, the operating conditions are standard, i.e. by the main motorization (17) motion is transmitted to the control (27) of the discharge belt (72), and, through the toothed coupling (18) and the shaft (19), to the control (20) of the loading belt (5) and to the power take-off (21) connected to the feed lung.

When the coupling (15) is placed in position (B), the machine is at a standstill, while the power take-off (20) and the control of the loading belt (5) are moved by a secondary motorization (22).

In this motion, it is possible to recover a good part of the present dead times required to prepare the machine; in fact, while the operators are, for example, carrying out the necessary replacement phases of the plate (53) and rotating holder (38), to change sets of cans (16), the feed lung and loading belt (5) are kept in motion to advance the required load of cans (16), so that, when the machine is ready, also the tank of the cans to be treated is full.

When the coupling (15) is placed in position (C), the machine is in movement, while the power take-off (21) and the control (20) of the loading belt (5) are locked, stopping rotation of the shaft (19) through engagement of the mobile teeth (23) in the teeth (24) of the fixed sleeve (25). Some proximity sensors (26) have the function of checking the alignment of the mobile coupling (15), in its positions. With reference to the coupling obtained in position (A), a basic condition is that the toothed coupling (18) is designed to permit the coupling according to a single position of 360°C. This is obtained by creating the toothed coupling (18) alternated with different pitches to ensure that the coupling can take place according to only one solution. In this way, regardless of the coupling to be made, from position (B) to (A) or position (C) to (A), it always takes place in the same alignment position of the teeth, so that the feed and loading units of the machine (2) are always in phase with the elements downstream.

Together figures 6 and 7 show the means of control of the loading or discharge drum (11). In them, apart from the rotating control devices (36), substantially of traditional type, the coupling suction of the cans (16) takes place by means of slits (27) made in the hollow of the seats (12), which are connected to the suction mouth (28) of the vacuum pump, through the tubular chamber (29) and the coaxial pipe (30), with spans (31) coaxial to the same drum. To guarantee perfect operation and prevent creating critical situations, which weaken the overall movement of the machine and damage or destroy at least part of the product being processed, it is equipped with a torque limiter (32) with the possibility of a movement in axial direction, under force, of some millimetres.

The limiter (32) is stiffly connected to the front

end of the central rod (33), whose rear end is supported by an elastic means (34). To the elastic means (34) is aligned a sensor (35) and therefore, at each action or intervention of the load limiter (32), or at each movement in axial direction of the central rod (33), the sensor intervenes causing the immediate stop of the machine.

The control sensor (35) also has the function of coaxial safety control to permit the change of drums (11) without the need to make electrical connections. Through the front ring nut (37), self-locking, with manual tightening without the aid of any tool, it is also possible to make a rapid replacement of the abovementioned drums (11).

On the rotator (38) are preferably applied can pliers (39) which are closed by an elastic union (40) to which the compressed air feed is connected.

The union (40), figure 9, is coaxially assembled to a tubular pipe (41), connected to a compressed air intake, not shown, and controlled, with alternate motion, by means of a device with connecting rod-crank (42) which receives the command, suitably ratioed, from the central control (43) which causes the alternate forward and backward motion of the holder (44) on which is applied the plate (43) carrying dies (45), and spindles (65).

Each time the union (40) is aligned to the inlet valve (46) of a pliers (39), or at each jerky rotation of the rotator (38), it is pressed against the mouth of said valve and made move forward to lift the piston (47) from its seat, until the pipe (48) is connected with the pipe (49) and the valve (46) opens.

When loading is complete, with the return stroke from the connecting rod-crank control (42), the counterspring (50) recloses the through-seat (51), while the inlet of the valve (46) also closes. A similar connecting rod-crank type control, again derived from the central control (43), is applied to the device which, acting on the rod (52), causes discharge of the valves (46) and ejection of the cans (16) contained in the pliers (39), at the end of the processing cycle.

The mechanical controls (42) described above have the advantage over those presently in use of being derived from the central control (43) and of having a decidedly higher intervention speed than can presently be obtained with servo-assisted means, so high that it reaches, in equal situations, a working time of feed or discharge of air from the pliers (39) almost three times greater, to the advantage of the rise of productivity, or of possible strokes per minute. Figure 14 shows an illustrative example of means of grip and control for the positioning of cans (16), of aerosol type, submitted to multiple sequential processings of cone-shaping and processing of the edges, on operating ma-

chines (2), comprising, for each station of the intermittent rotating holder (38) and at the hole of each seat (102) containing the rear ends of cans (16) to be processed, a rear pushing means (104) which acts on the rear (105) of the ejecting piston (106). The pushing means (104) is preferably, but not limitatively, controlled simultaneously to the peripheral pliers (107) which act circumferentially at the lower end of the cans (16) being processed.

At the first loading station, when the can (16) is pushed into the seat (102) until its bottom (108) is in contact with the base (109) through a valve (46) compressed air is injected in the circuit (111). The injector, the piston (47) of the pipe union (40), pressing on the pin (112) of the valve (46) opens the seat of same and inserts the compressed air, which, through said circuit (111) acts on the upper surface (113) of a small sliding piston (114). Said small piston (114) is thus pushed (from right to left in the drawing) and its slip compresses two or more elastic anular elements (107), aligned by stiff profiles with shaped ends and intermediate (115). In this way, the anular elastic means (107), compressed and guided also to the rear by the small piston (114), can only expand towards the inside of the seat (102), uniting around the lower circumferential peripheral end of the can (16). While the elastic anular means (107) act circumferentially on the end of the can (16), forming the pliers for same, a small part of compressed air passes through the pipes (111') and (111'') and acts on the rear surface (116) of the pushing means (104), pushing it towards the outside. The pressure applied on said rear surface (116) is such, and sufficient, that it overcomes the resistance of the return spring (117) of the ejector piston (106) and pushes same into simple contact with the surface of the bottom (108) of the can (16).

At this point the compressed air injector comes uncoupled, the pin (112) closes the seat of the valve (46) and the circuit (111), (111'), (111''), with the small piston (114) and pusher (104) remain under pressure.

Now the ejector piston (106) resting on the bottom (108) of the can (16), its rear end (118) is perfectly aligned with a proximity sensor (110, composed, for example, of a microswitch. During all processing phases, i.e. during the cone-shaping operations carried out by means of successive plastic deformations of the front end of the cans (16) with die-holder (120) equipped with suitable dies (45) and (45') and during possible final processing phases of the edges, the cans (16) remain in position, locked by the pliers (107).

However, if, for example, the thrust generated in the point of maximum plastic deformation (123), or the force exerted by possible processing burrs, or other causes, were even only momentarily ca-

pable of coming free from the pliers (107), and the can (16) was even only partially extracted from its seat (102) in any phase of processing, the compressed air present in the circuit (111') and (111'') would cause immediate displacement of the pushing means (104), which pushes the ejector piston (106) towards the outside.

Simultaneously, the ejector piston (106) calls back its end to which it is connected by the rod (52), moving it from the alignment position with the proximity sensor (119).

At each displacement of the end (118) of the ejector pistons (106) present in all stations of the intermittent rotating holder (38), the corresponding sensors (119) present in each work station cause the immediate stop of the operating machine (2), signalling also the station in which the faulty condition has been found.

Although preferably constructed with micro-switches, the proximity sensors (119) may be replaced by other similar devices of electromechanical or mechanical type, for example.

The immediate break of the processing cycle and location of the fault consent a fast, immediate intervention by the operator to restore standard operating conditions and eliminate the cause of the break, without even partially damaging production.

At the end of all operations, at the loading station, a pusher acts on the pin (112) of the valve (46), opening its seat and discharging the compressed air contained in it. With this, the pliers (107) slacken their grip and the ejector piston (106) is pushed forward by a second device with connecting rod-crank (42) acting on the rear end (118) of the rod (52) until it takes it to the position (124), indicated in dotted line. The can (16) is thus pushed outside its seat (102) and discharged by the operating machine (2) on the discharge drum (71).

The general operating principle of the means of grip and control remaining valid, and with reference to the preferred constructive shape, shown in figure 4, the conformation of the fixing pliers with two or more independent elastic annular means (107), aligned in sequence by means of the shaped stiff profiles (115), end and intermediate, has been designed to guarantee a regular grip distributed on the entire lower circumferential strip of the cans (16).

This, unlike and to the improvement of the present elastic pliers, mainly composed of a single elastic membrane, against which the compressed air, acting, causes deformation towards the outside, preferably in its center, more yielding, and very limitedly in the end zones in which it is fixed to the supporting structure.

In variant, the pneumatic control of the small piston (114) which compresses the elastic annular

means (107) and the pneumatic control of the pusher (104) and relevant circuits (111), (111') and (111'') may be independent and/or driven with different fluids at equal or different pressures.

The same action of the pusher (104) may also be produced with other suitable means, e.g. opposite electromagnetic fields or electromagnets and similar, and the same pusher (104), constructed as independent element, may be formed in another way, like a circular crown, for example, integral to the upper end of the control rod (52) and adjacent to the rear (105) of the ejector piston (106).

The concept remains fundamental, however, that the positioning of the cans (16) or of the objects to be processed in general, and their permanence in the same state during the operating phases performed in the successive work stations, in front of which they appear at each intermittent rotation of the rotating holder (38) is obtained by means of electrical, electronic and also mechanical proximity detecting devices (119), connected directly to the stop controls of the operating machines (2).

Figure 11 shows a partial cross-section of a cone-shaping machine (2) on which a rotator (38) carrying pliers (39), and a plate (53) carrying dies (45) are applied. The rotating holder (38) is put into intermittent rotation by the members (54) of substantially traditional type, on which it is applied, while the plate (53) is applied to a support (44), suitably connected to the central body (43) of control of the alternate forward and backward movement.

According to the new concept of the present invention, both the holder (38) and plate (53) are mounted on the corresponding supporting structures to simplify their dismantling and replacement. For this, the rotating holder (38) is substantially fixed to the rotation members (54) by an annular pressure-body (55), which is held in position by a handle (56) which presses on the same annular body (55) a metal element with low module of elasticity (63), like copper. Similarly, the plate (53) is held in position on the support (44) by means of an annular pressure-body (57), held in position by a handle (58), also pressing another metal element (64) with low module of elasticity. To replace the rotating holder (38) and plate (53), once supported with pulley blocks (66) through means of support applied to the extractable eyebolts (59), it is sufficient to slacken the handles (56) and (58), and, turning the knobs (60) and (61), make the annular pressure-bodies (55) and (57) partially rotate, until some suitable notches present on them are aligned with the corresponding windows present on the rotating holder (38) and plate (53). At this point, with an axial movement, both the rotating holder

(38) and plate (53) are unthreaded from the respective means of support centering.

The rotating holder (38) and plate (53) can thus be unthreaded simply and extremely quickly to be replaced with another completely identical holder or plate, but on which a different type of pliers (39), dies and/or spindles are applied, for processing of cans (16) of different type and gauge.

Figure 1 clearly shows the way in which a plate (53) with all its dies (45) and its motorized or unmotorized spindles (65) can be removed and replaced with another complete plate (53'). With the plate (53) dismantled and before its replacement, it is possible, in similar way, to replace the rotating holder (38). To facilitate this operation, the machine (2) is preferably fitted with a small upper pulley block (66).

Consequently, it is possible to carry out not only the replacements of the abovementioned plates (53) and rotating holders (38), but also total or partial pre-assembly, with the positioning and calibration of each tool, e.g. dies (45), pliers (39), tool spindles (65).

Furthermore, and according to similar solutions, said plates (53) and said rotating holders (38) can also be constructed with modular sectors, which, through suitable means of connection and separation, may be interchangeable with corresponding means.

In this way, using sets of rotating holders (38) and plates (53) or sets of pre-assembled interchangeable sectors with the relevant pliers (39), dies (45) and/or spindles (65), it is possible to organize sequential processing cycles of different products, cutting the dead times of machine preparation to a minimum.

Through the above stratagems, the total time of preparation of a machine for a completely new process is reduced to about 15 minutes, time in which the loading and discharge drums (11 and 71), and the shims (10) of transfer from the belt to said drums (11) are replaced, and the feed lung of the machine is filled.

Through proximity sensors and elastic devices it is possible to obtain a safe, perfect system of axial control of approach of the dies (45) and the finishing spindles to the relevant locking pliers (39), excluding the risk of interference during the operating phases.

This is achieved by means of a microswitch (67) substantially in contact, during standard operation, with the thrust bearing (68) integral to the central control (43). Each time that, for any reason, between the pliers (39) and dies (45) or spindles (65), there is some interference or obstacle to travel, the support (44) tends to move away from its position with respect to the control (43). In this way also the microswitch (67) comes away from

the abovementioned thrust bearing (68), causing the immediate stop of the machine, safeguarding its components and the production in course.

Figures 12 and 13 show, finally, some nonion type regulating means (69) and (70) applied, respectively, to the support (44) of the plates with alternate movement (53) and directly to the dies (45) and spindles (65).

The regulating means (69) consents a general positioning of all dies (45) and spindles (65) with respect to the corresponding pliers (39) applied on the rotating holder (38); the regulating means (70) has the function of regulating the positioning of each die and each single tool for the processings of the edges of the cans (16), and for compensation of their wear.

The positioning device of the pressing plate (53) holding the equipment, which approaches the pliers (39) during cone-shaping, may be constructed by hand, as mentioned, and by motorization, like the part of regulation of the position of the dies and tool spindles applied in the last stations of the plate (53) for the finishing processes of the edges of the cans (16), or of the mouth, after cone-shaping.

All automatic controls of the machine (2) for cone-shaping of the cans (16) are ready to be interfaced with an electronic line processor through which it is possible to make statistical analyses of the data to optimize and program the processing cycles.

Claims

1. Improvements to machines (2) for the cone-shaping and flanging of cans (16), substantially composed of a conveyor belt (5) which feeds a loading drum (11), with intermittent feed, a rotating holder (38) for pliers (39) with intermittent movement, which is aligned to said drum (11); a plate (53), with alternate forward and backward movement on which are applied the dies (54) and spindles (46) of processing, which is aligned to said rotating holder (38); a discharge drum (71) to collect finished cans (16'), which is aligned to said rotating holder (38); a discharge conveyor belt (72) to collect the cans (16) released by the discharge drum (72), characterized by the fact that they comprise means of vertical movement (1) for the conveyor feed belt (5); double means of control for the feed lungs, one of them consisting of a power take-off (21) derived from the motorization (22) of the cone-shaping machine (2); a universal comb (9) with calibrated shims (10) for adaptation of the transfer of the feed belt (5); loading and discharge drums (11 and 71) with coaxial means of suction (28), (29), (30), (31) and means of rapid change

(37) and control sensors (35); pliers (39) with automatic closure; closing control devices (40) for pliers (39) and ejection of the cans (16) with controls (42) derived directly from the main movement control; means (55) and (57) of rapid replacement of rotating holders (38), interchangeable complete or in sectors, die-holder (45) and spindle-holder (65); control and positioning devices of the members and means of interface and connection of all controls to line processors.

2. Improvements according to claim 1, characterized by the fact that the vertical movement of the conveyor feed belt (5) is formed by a pneumatic or oleodynamic piston (1), substantially applied to the supporting bracket (3) on which is supported in (4) the same conveyor belt (5) for its rotation in horizontal direction.

3. Improvements according to claim 1, characterized by the fact that the feed belt (5) is fitted, at its discharge end (8) with a universal comb (9) positioned with calibrated interchangeable shims (10, aligned to a loading drum (11), on the basis of the gauge of the cans (16) conveyed and discharged.

4. Improvements according to claim 1 in which the motorization of the auxiliary members of the cone-shaping machine (2) is controlled by a pneumatic or hydraulic coupling unit (14) comprising:

a) a position (A) of simultaneous control of the discharge belt (72), the loading belt (5) and the power take-off (21) connected to the feed lung, derived from the main motorization,

b) a lock position (C) of the power take-off (21) and loading belt (5), with the main motorization (27) in operation, characterized by the fact of comprising a further operating position (B) and control position of the power take-off (21) and loading belt (5), moved by a secondary motorization (22) with cone-shaping operation at a standstill.

5. Improvements according to claims 1 and 4 characterized by the fact that the toothed coupling (18) for the position of control (A) presents a single coupling position of 360°.

6) Improvements according to claim 1, characterized by the fact the drums (11) of loading (71) and discharge are fitted with coaxial suction means composed of coaxial pipes (30) placed in communication with the tubular chambers (29) and the housings (12) for the cans (16), by means of spans (31) and slits (27).

7) Improvements according to claims 1 and 6, characterized by the fact that each drum (11 and 71) is fitted with a torque limiter (32) connected to a coaxial rod (33) terminating with an elastic means (34) aligned to a position sensor (35), and is also fitted with front self-locking ring nut (37) with manual tightening for replacement of said drums.

8) Improvements according to claim 1, characterized by the fact that on the rotating holders or on the sectors of interchangeable rotating holders (38) are mounted pliers (39) with pneumatic closing control, whose feed consists of a union (40) with mobile piston (47) directly applicable on the inlet valves (46) of each pliers (39); said union (40) being driven with alternate motion, in connection and disconnection of said valves (46), by means of a control with connecting rod-crank (42), directly derived from the central control (43) to which is fixed the support (44) which carries the plate (43) to support the dies (45) and spindles (65).

9) Improvements according to claims 1 and 8, characterized by the fact that a control with connecting rod-crank (42) is applied also to the discharge device of the valves (46) and to the discharge of the cans from the pliers (39).

10) Improvements according to claim 1 characterized by the fact that the cone-shaping machines (2) is fitted with rotating holders (38) and plates (53) of interchangeable type, integral or in sectors, and their respective application on the members of intermittent rotation (54) and on the support with alternate motion (44) uses annular pressure-bodies (55) and (57), locked in place by means of metal elements with low module of elasticity (63) and (64) tightened by handles (56) and (58).

11) Improvements according to claims 1 and 10 characterized by the fact that the annular bodies (55) and (57) may be locked or opened by means of manual rotation with grip on the knobs (60) and (61).

12) Improvements according to claims 1, 10 and 11, characterized by the fact that the annular bodies (55) and (57), rotating, present notches which are aligned to corresponding windows present on the rotating holders (38) and plates (53); in said alignment position both the rotating holder (38) and plates (53) are removable and replaceable.

13) Improvements according to claims 1 and 10-12, characterized by the fact that each cone-shaping machine (2) is fitted with a set of rotating holders (38) and plates (53), interchangeable and integral or in sectors, pre-assembled with the pliers (39), dies (45) and spindles (65) conforming to the different types of gauges of cans (16) to be processed, combinable according to the needs and scopes of the processings.

14) Improvements according to claims 1 and 10-13, characterized by the fact that the pliers (39), dies (45) and spindles (65) with relevant tools present means of regulation, outside and/or in the machine, according to the type of processing required for each can.

15) Improvement according to claims 1 and 10-14, characterized by the fact that the support (44) of the plates with alternate movement (53) is equipped with a nonion type axial position regulator (69).

16) Improvements according to claims 1 and 10-15, characterized by the fact that the die-holders and dies (45) and/or spindles (65) are equipped with nonion type axial position regulators (70).

17) Improvements according to claim 1, characterized by the fact that the cone-shaping machine (2) is equipped with safety devices such as proximity sensors and similar, devices to control and regulate approach between the parts during operation, and manual or motorized positioning devices for the moving parts and tool spindles.

18) Improvements according to claims 1-17, characterized by the fact that all controls of the machine are ready to be interfaced with an electronic line processor.

19) Improvements to machines (2) for the cone-shaping and flanging of cans (16) with relevant means of grip and control for said cans and/or objects submitted to general, multiple and sequential processings, which can be carried out on operating machines (2) according to claims 1 and 8, characterized by the fact of comprising a pushing means (104) equipped with a calibrated force sufficient to keep the ejector piston (106) in permanent contact with the bottom (108) of an object (16) fixed in position in a special seat (102) and held there by means of peripheral pliers (107); said calibrated force of the pusher (104) keeping the ejector piston (106) in contact with the bottom (108) even when the object (16) undergoes unrequired displacements, in which case any proximity sensor (119) is capable of detecting the corresponding alignment displacement of a reference (118), integral to said ejector piston (106), and intervening on the controls of the operating machines.

20) Means of grip and control according to claims 1, 8 and 18, characterized by the fact of being applied at each station of a mobile intermittent rotating table (35) for operating machines (2) with multiple processing stations.

21) Means of grip and control according to claims 1, 8, 18 and 19, characterized by the fact of having a single, simultaneous control composed of a valve (46), with pin (112), through which compressed air is inserted in circuits (111), (111') and (111''), which exerts its action on the upper plane (113) of the small piston (114) and on the rear surface (116) of the pusher (104).

22) Means of grip and control according to claims 1, 8, 18 and 19, characterized by the fact that the respective controls are joint or independent, and driven with equal or different fluids at

equal or different pressure, or also by means of electric members like electromagnets or other means with similar functions.

23) Means of grip according to claims 1, 8 and 18-21, characterized by the fact of consisting of a plurality of elastic annular elements (107) aligned to one another and guided by stiff shaped profiles (115), end and intermediate.

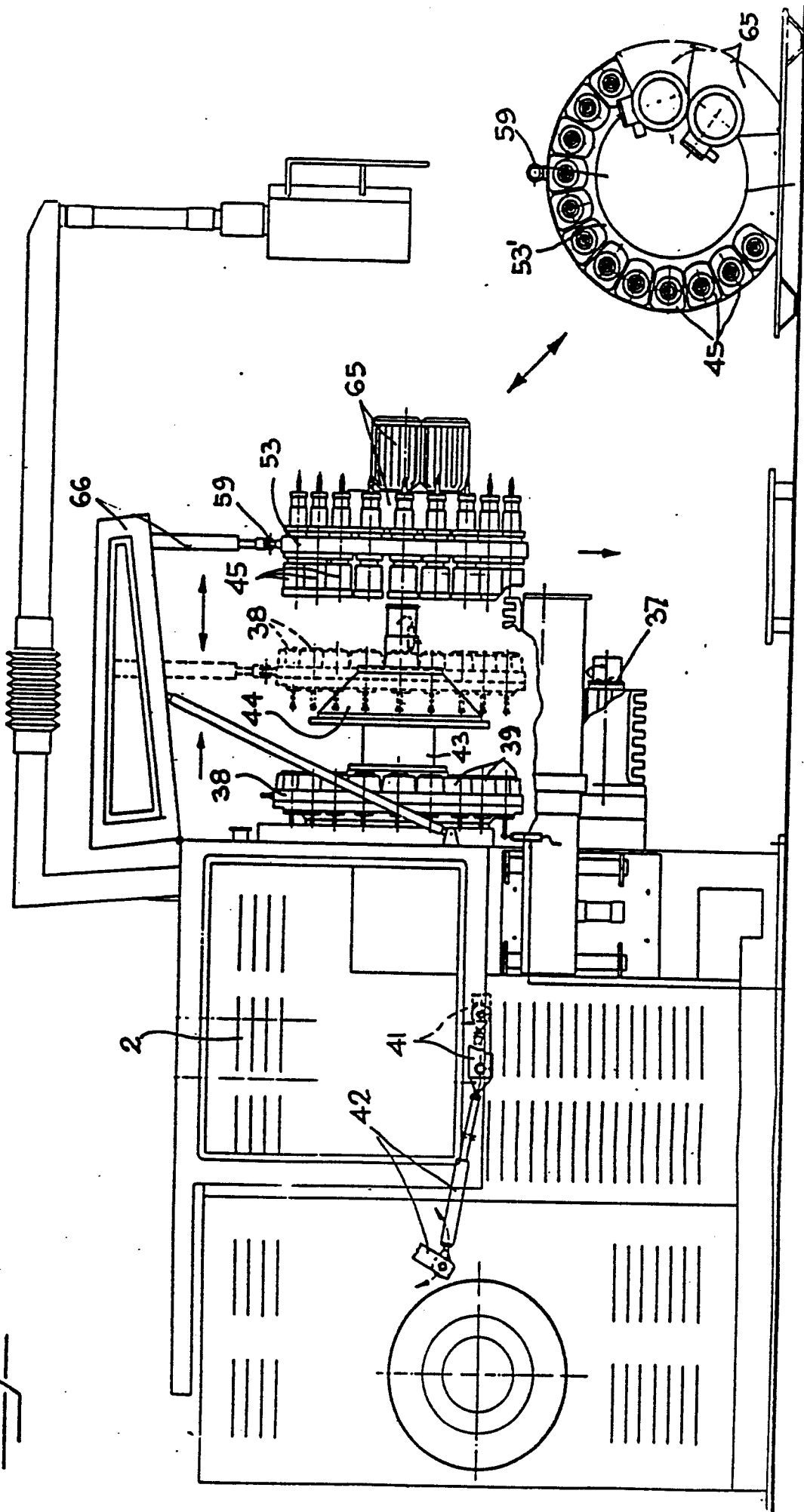
24) Means of grip according to claims 1, 8 and 18-22, characterized by the fact that the elastic annular elements (107) are kept in position and submitted to the grip action by means of the same small piston (114).

25) Means of control according to claims 1, 8 and 18-21, characterized by the fact that the pusher (104) is independent from the ejector piston (106) and its action is exerted on the back (105) of said piston.

26) Means of control according to claims 1, 8 and 18-21, characterized by the fact that the pusher (104) is integral to the control shank (52) supporting the ejector piston (106).

27) Means of grip and control according to claims 1, 8 and 18-25, characterized by the fact that the proximity sensors (119) are of electrical, electromechanical or mechanical type.

Fig. 1



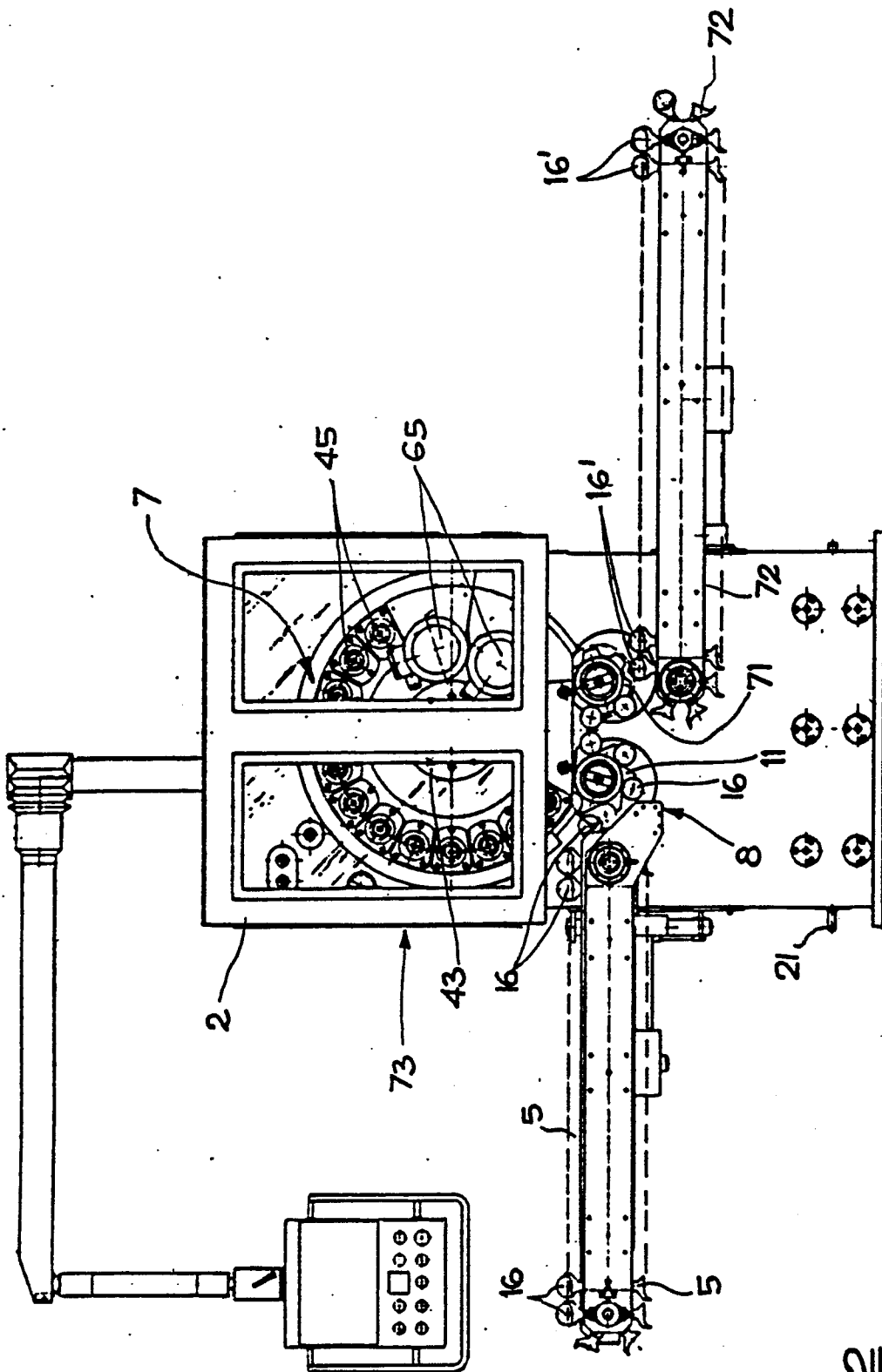
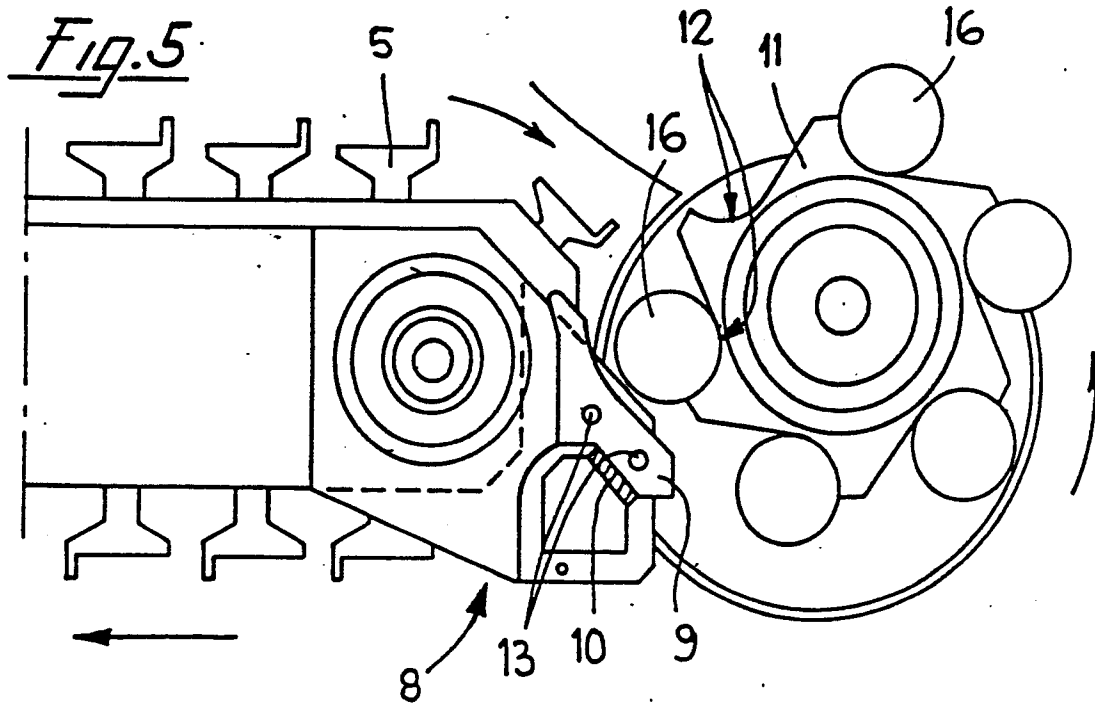
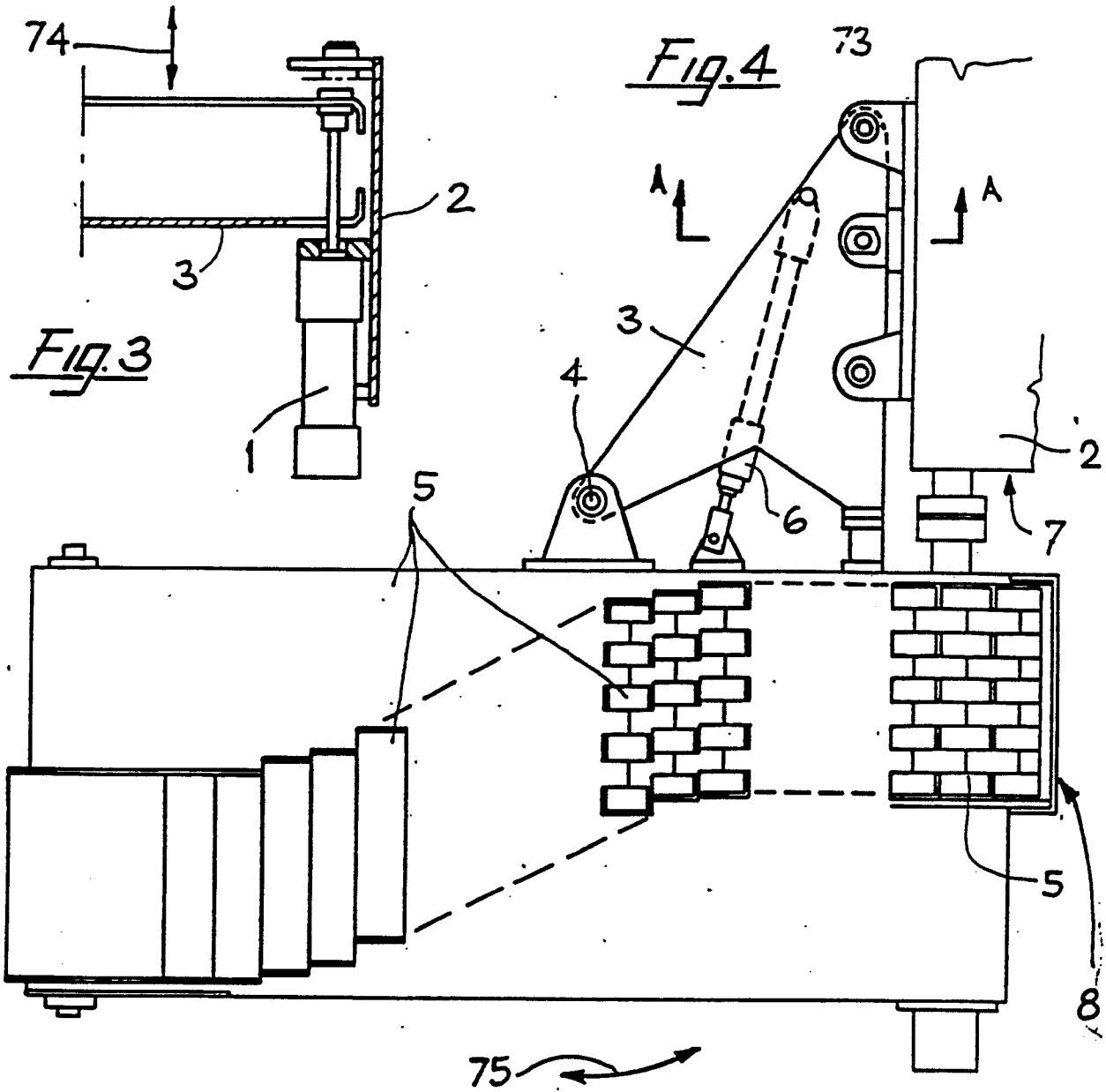


Fig. 2



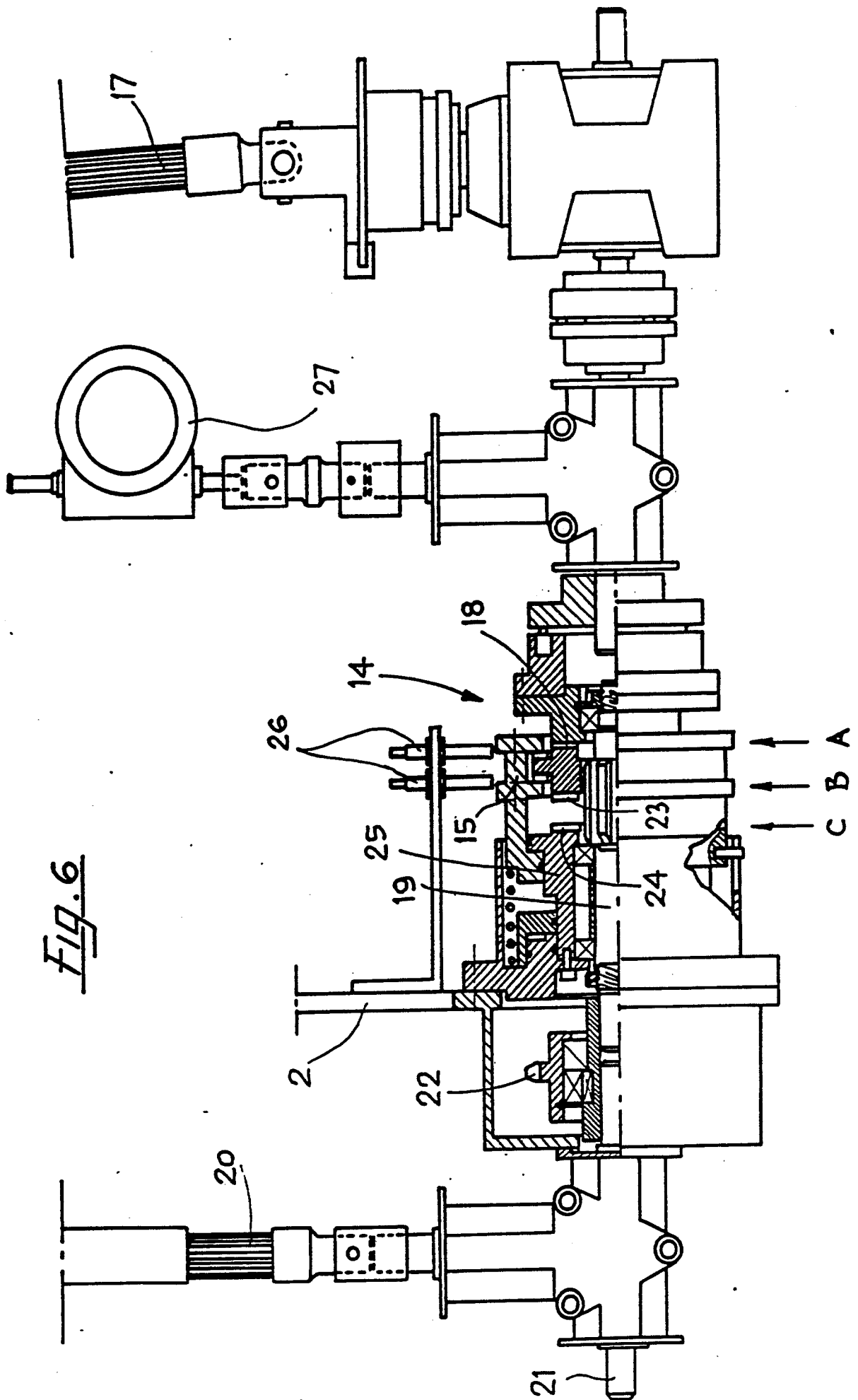


Fig. 7

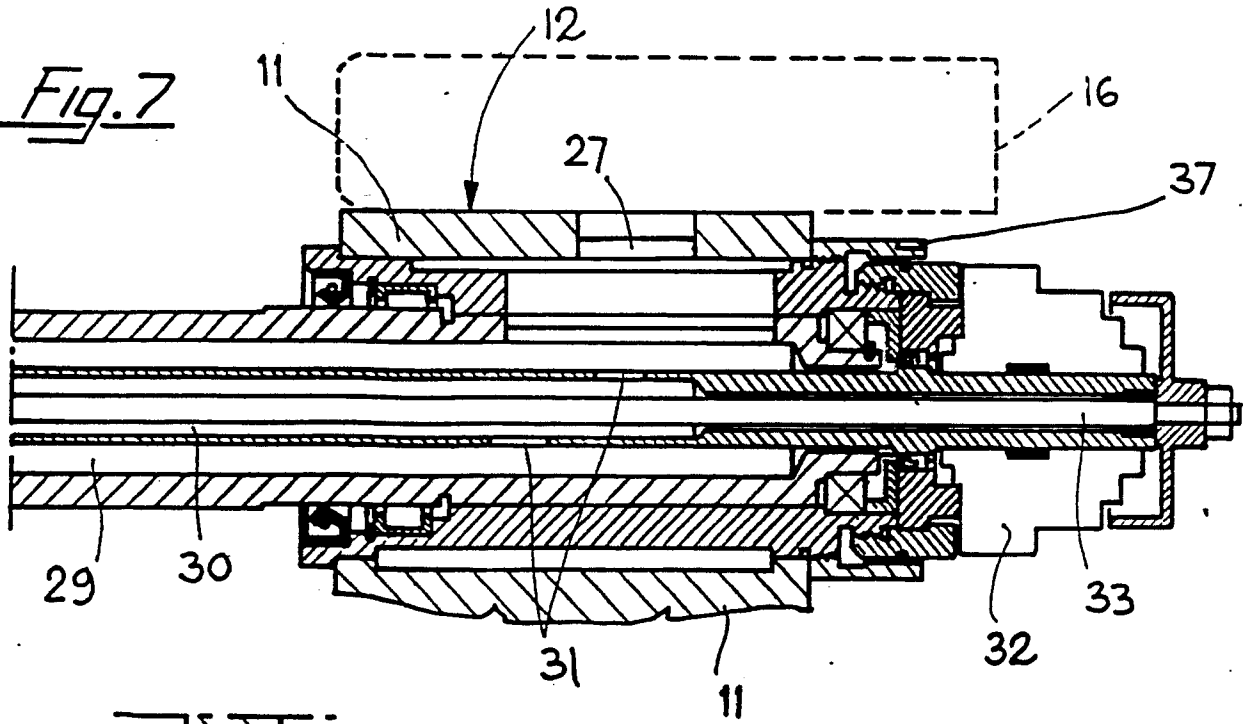


Fig. 8

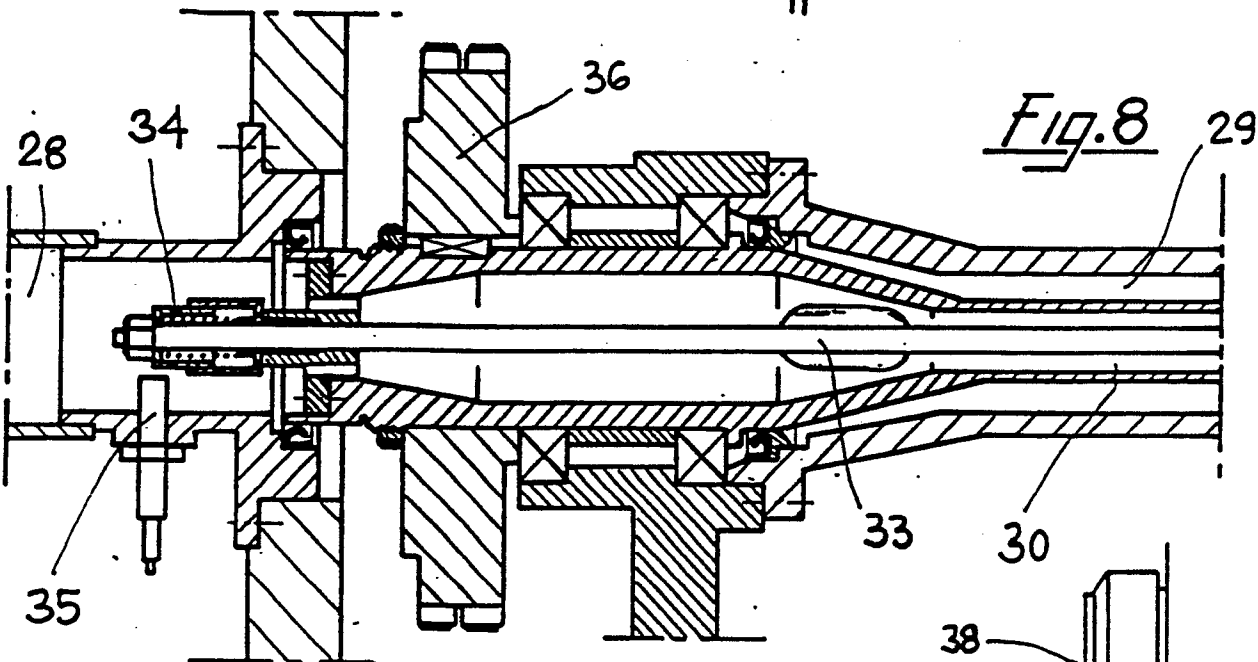


Fig. 9

