June 22, 1965 E. L. HEFFLEY ETAL 3,190,258

AUTOMATIC GASKET COMPOUND APPLYING MACHINE

Filed Sept. 29, 1960 6 Sheets-Sheet 1

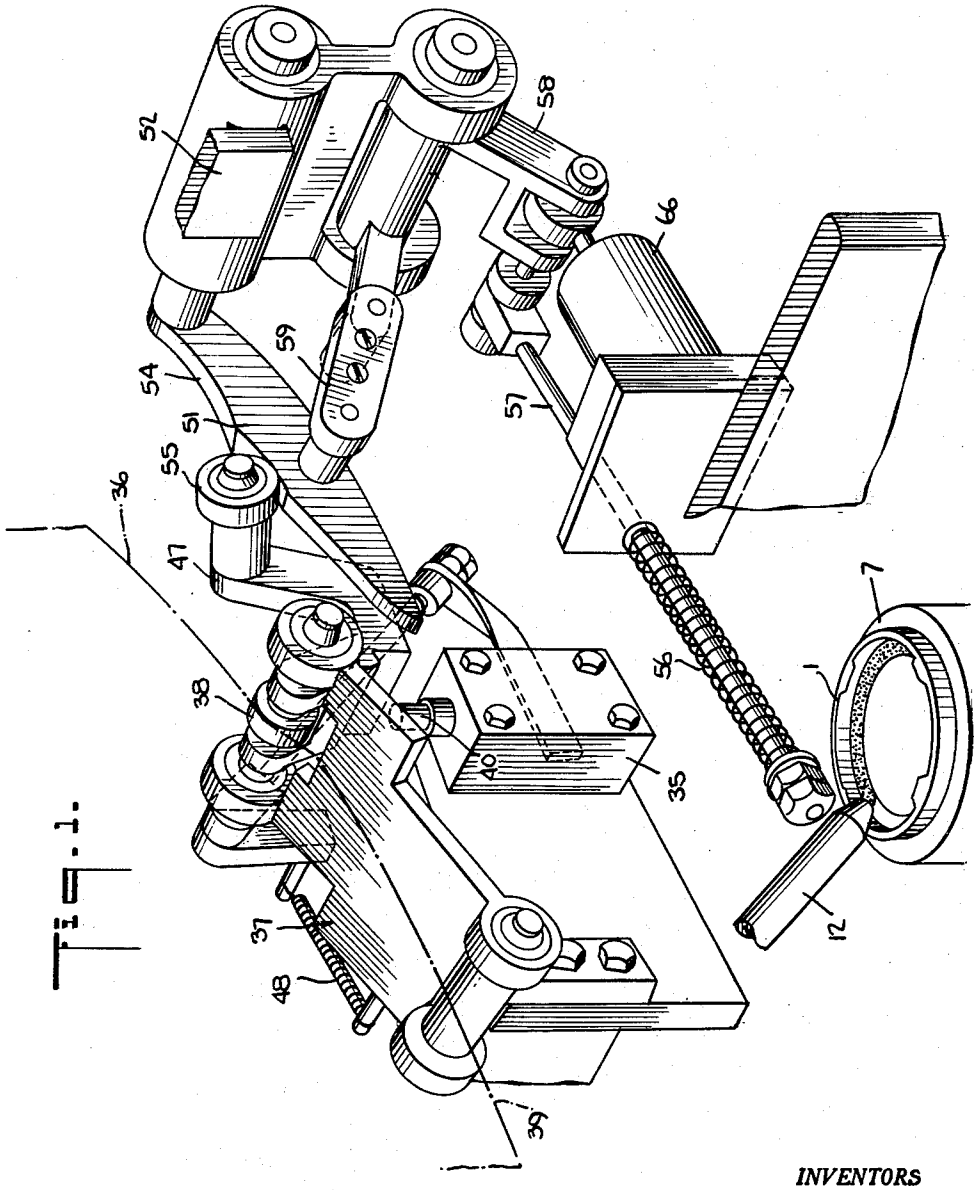


Fig. 1.

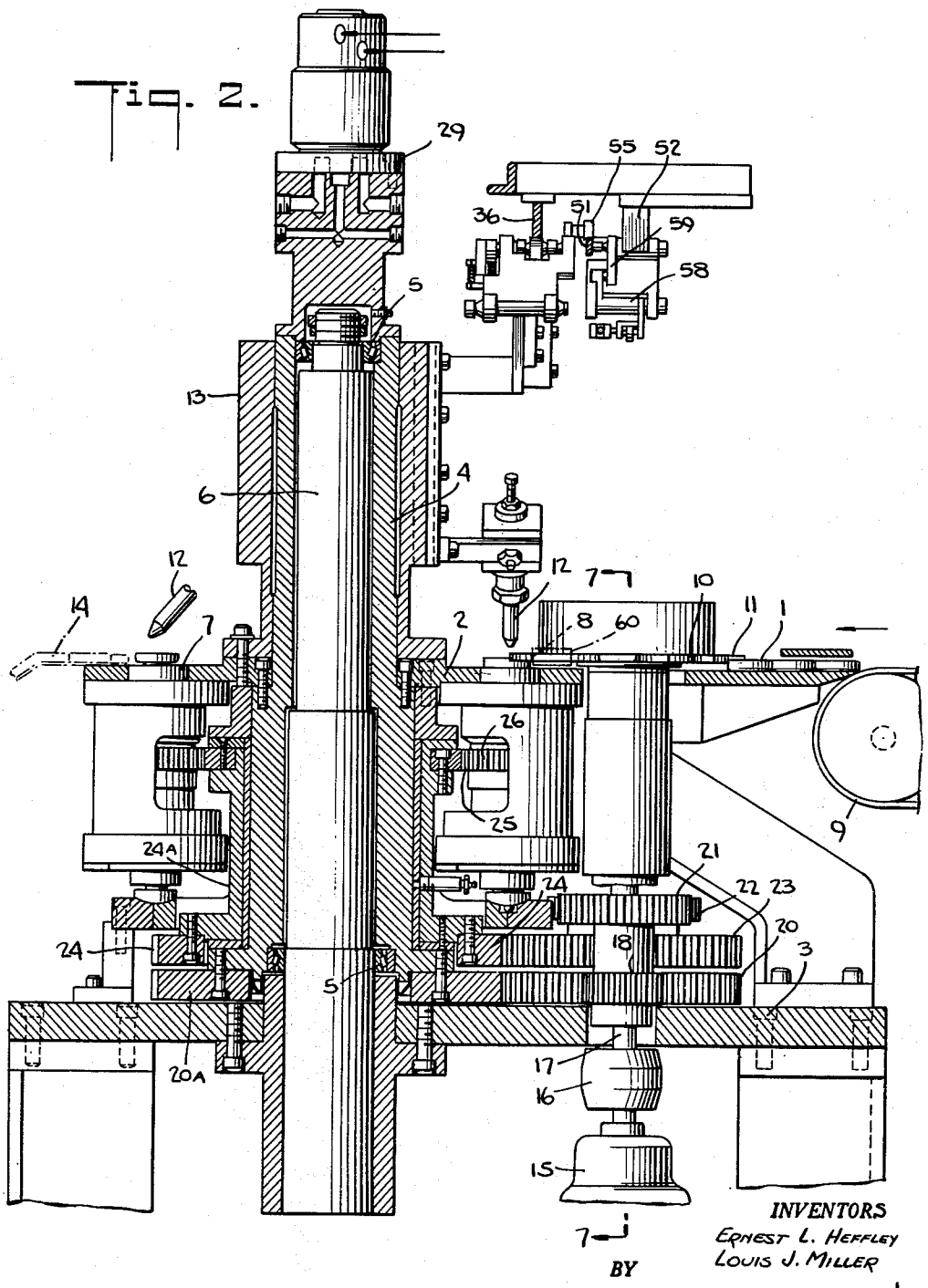
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AUTOMATIC GASKET COMPOUND APPLYING MACHINE

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Fig. 2.



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AUTOMATIC GASKET COMPOUND APPLYING MACHINE

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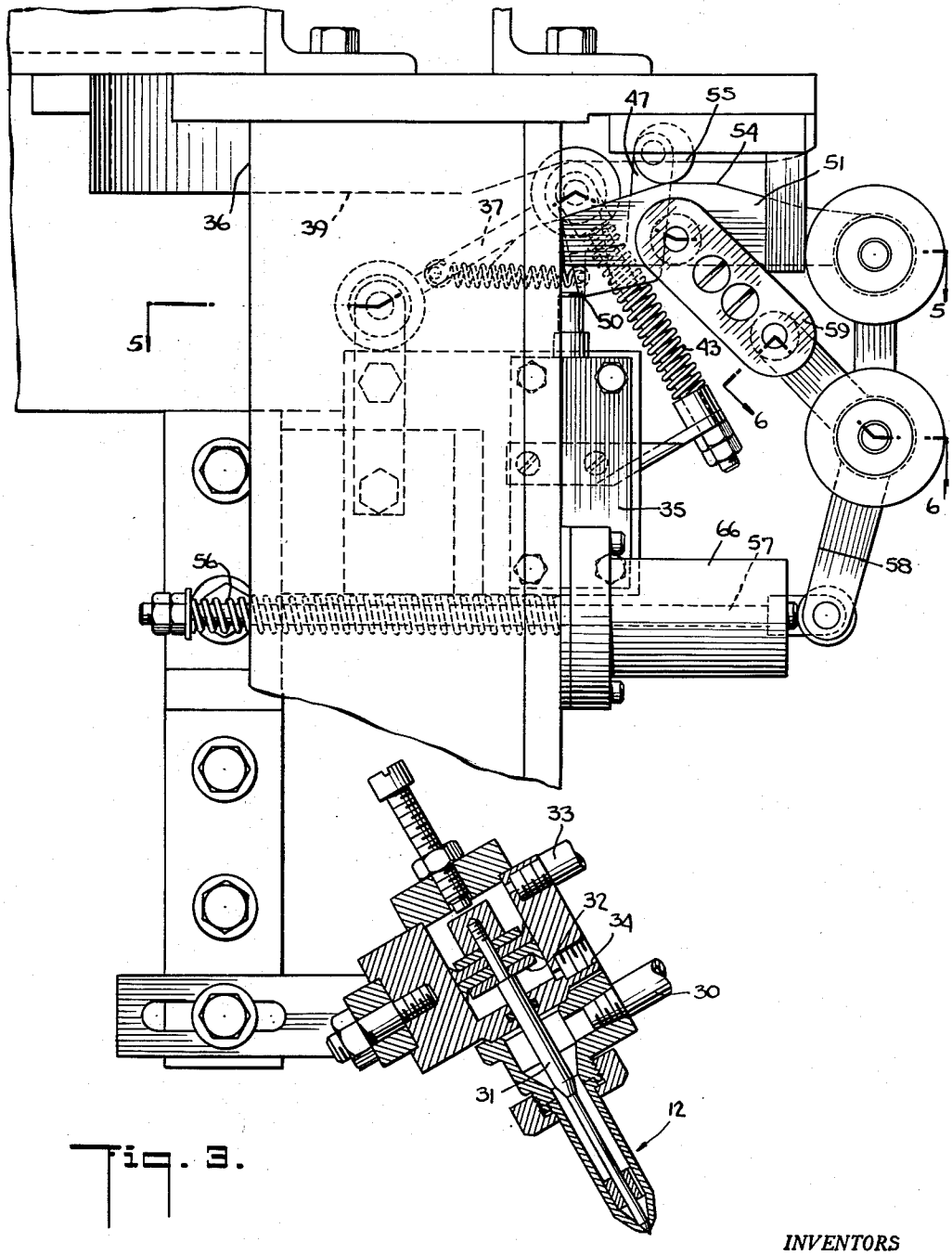


Fig. 3.

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AUTOMATIC GASKET COMPOUND APPLYING MACHINE

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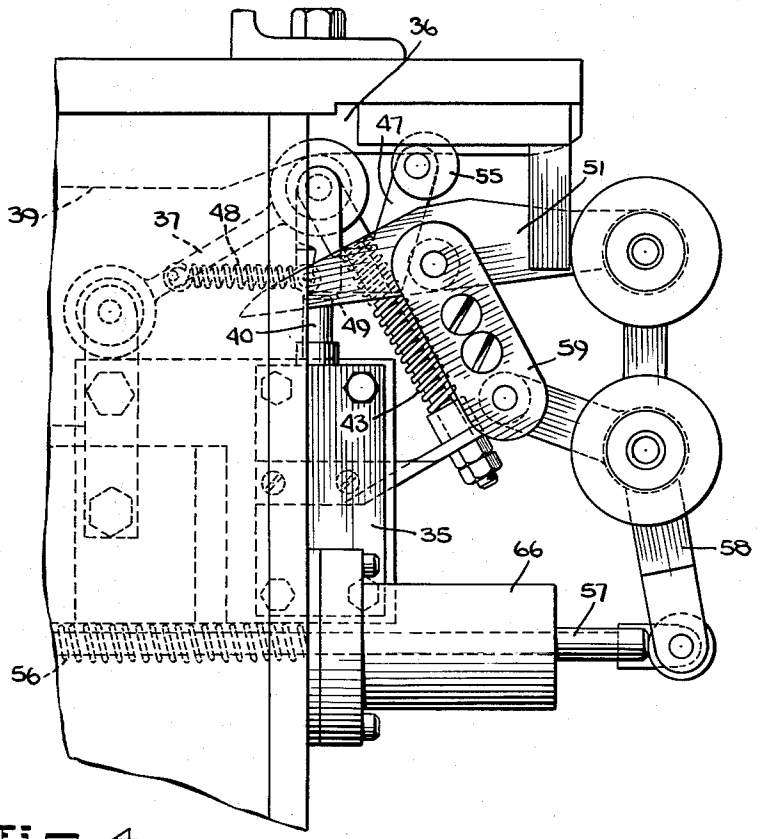


Fig. 4.

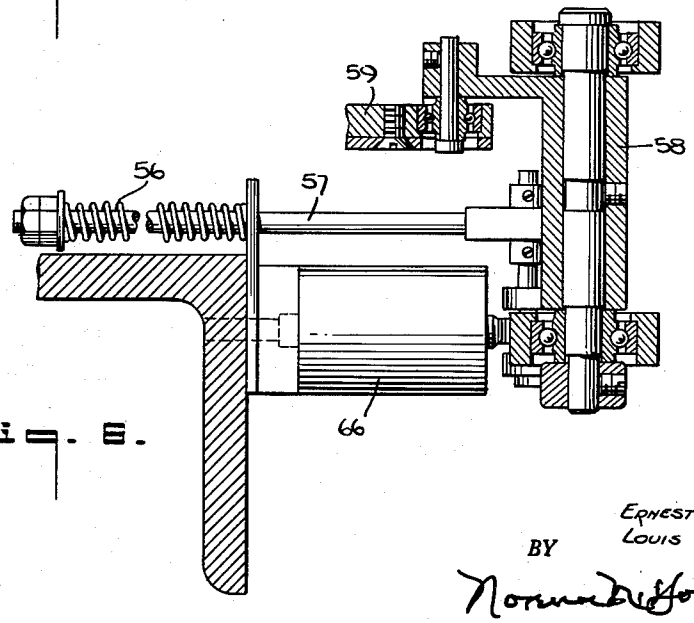


Fig. 5.

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AUTOMATIC GASKET COMPOUND APPLYING MACHINE

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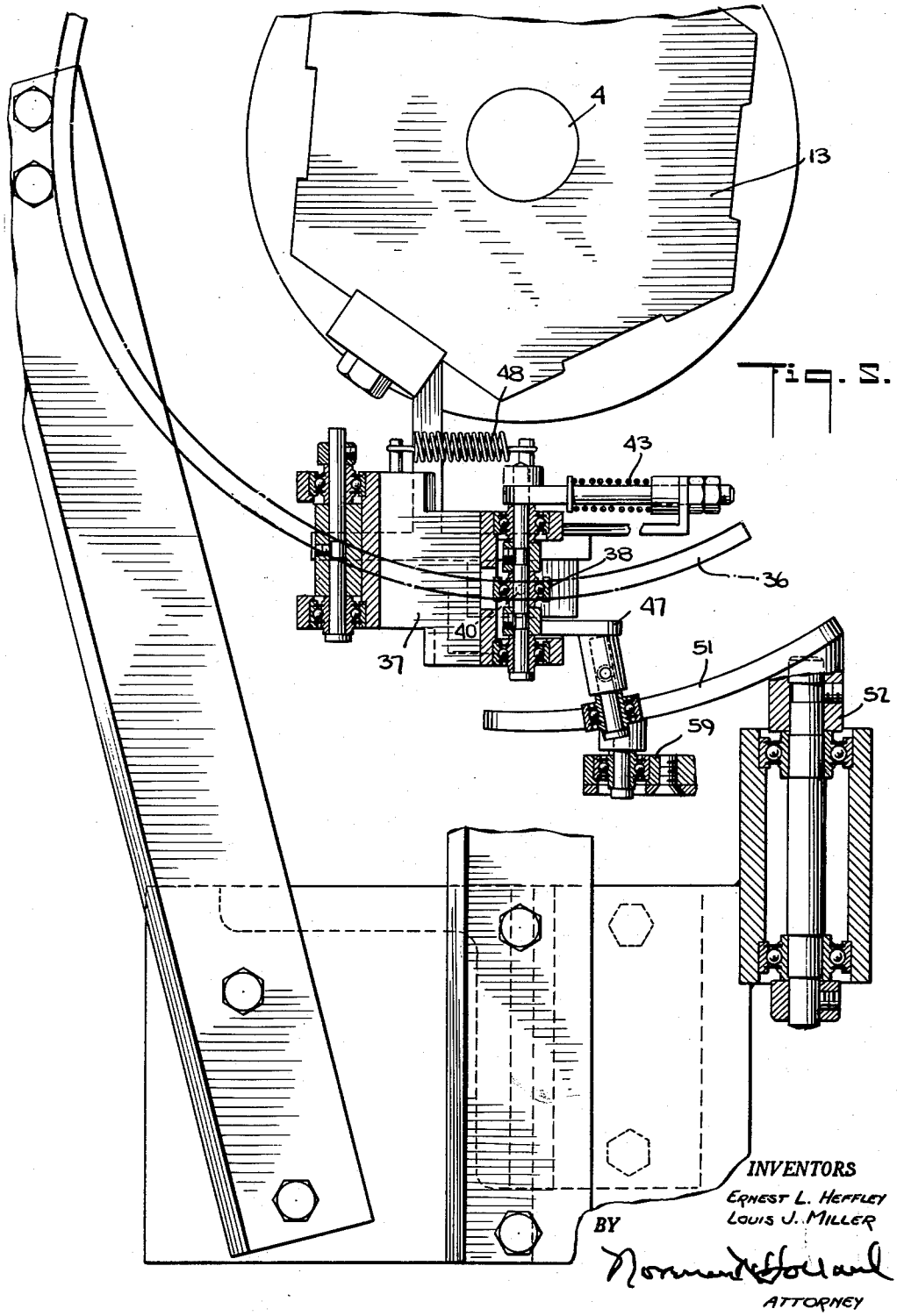


Fig. 5.

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AUTOMATIC GASKET COMPOUND APPLYING MACHINE

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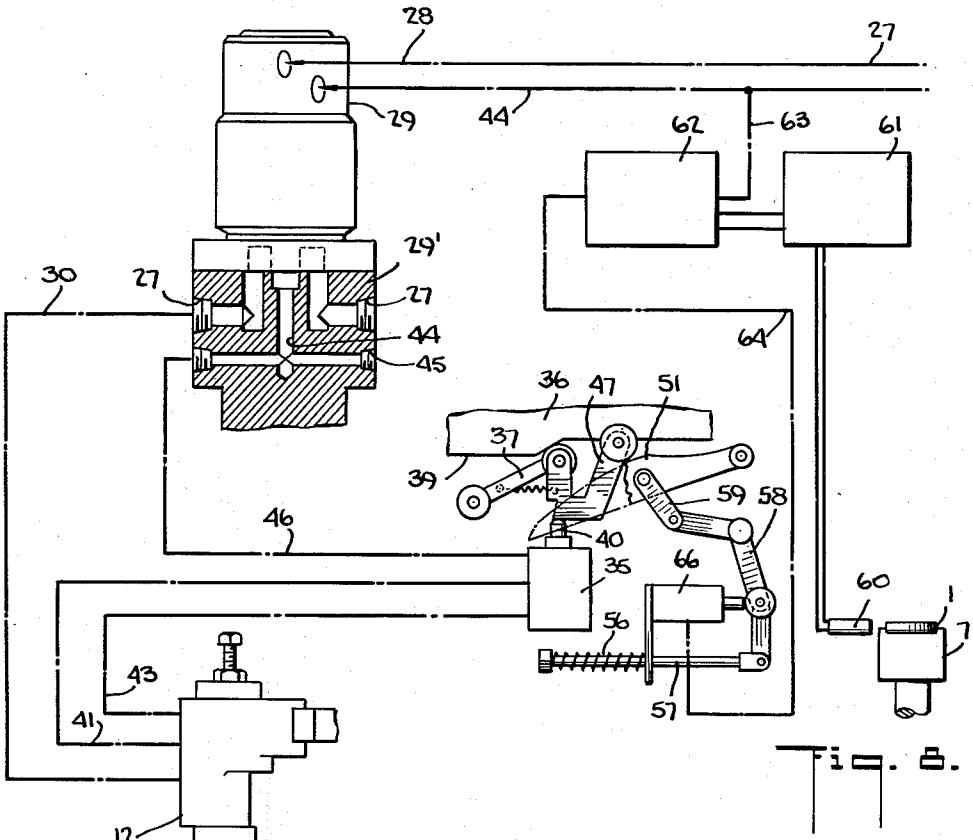


Fig. 8.

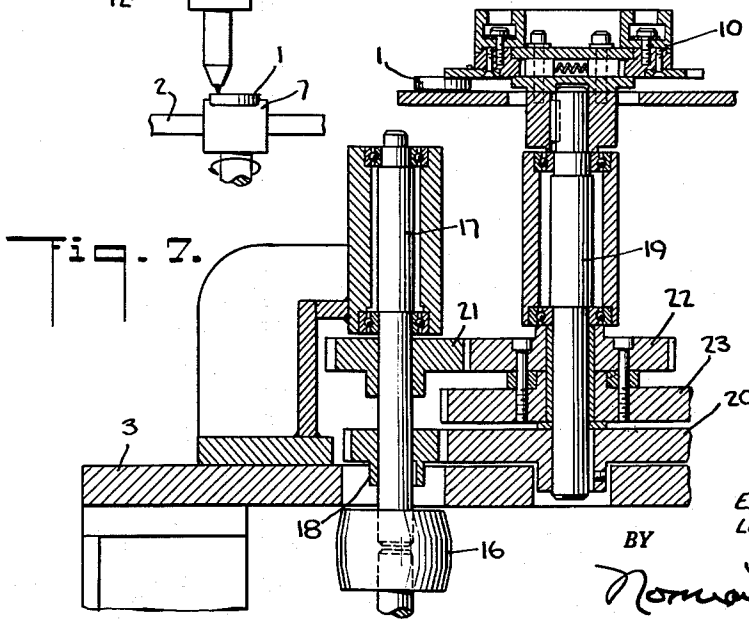


Fig. 7.

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United States Patent Office 3,190,258
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3,190,258

AUTOMATIC GASKET COMPOUND APPLYING MACHINE

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Filed Sept. 29, 1960, Ser. No. 59,264
13 Claims. (Cl. 118—2)

The present invention relates to an automatic machine for applying gasket forming or adhering liquids to closure cap shells and more particularly to an improved automatic machine particularly adapted for applying such liquids in flowed-in rings of predetermined width and thickness.

The present application is a continuation in part of our copending application S.N. 806,703 filed April 15, 1959, now U.S. Patent No. 3,053,221. The copending patent application discloses a high speed automatic machine for forming flowed-in gaskets in closure shells. The present application discloses improvements upon the previous machine which adapts it for more efficient insertion of flowed-in ring-like gaskets where the depth and position of the ring must be precisely controlled.

In order to provide for improved control of the gasket applying nozzles, the rotation of the closure shells is synchronized with the over-all machine movement and an improved nozzle control system is provided which permits the simultaneous application of gasket compound to more than one closure shell at a time while providing a safety control and cut-off system for the fluid nozzle related to each closure shell.

Accordingly, an object of the present invention is to provide an improved machine for automatically applying flowed-in gasket compound or adhesive to closure shells.

Another object of the present invention is to provide an improved high speed automatic machine particularly adapted for applying a ring of gasket compound or adhesive of predetermined width and depth.

Another object of the present invention is to provide an automatic flowed-in gasket insertion machine adapted to apply a precisely positioned ring-like gasket.

Another object of the present invention is to provide an automatic flowed-in type gasket applying machine with improved safety controls.

Other and further objects of the invention will be obvious upon an understanding of the illustrative embodiment about to be described or will be indicated in the appended claims, and various advantages not referred to herein will occur to one skilled in the art upon employment of the invention in practice.

A preferred embodiment of the invention has been chosen for purposes of illustration and description and is shown in the accompanying drawings, forming a part of the specification, wherein:

FIG. 1 is a perspective view of the improved gasket fluid control system;

FIG. 2 is a vertical sectional view of the improved gasket fluid control system and the synchronized machine drive applied to a rotary gasket insertion machine;

FIG. 3 is a fragmentary detailed side elevational view of the gasket fluid control system;

FIG. 4 is a fragmentary side elevational view similar to FIG. 3 showing the gasket fluid control system in its normal position;

FIG. 5 is a sectional view taken along line 5—5 of FIG. 3;

FIG. 6 is a sectional view taken along line 6—6 of FIG. 3;

FIG. 7 is a sectional view of the drive coupling taken along line 7—7 of FIG. 2; and,

FIG. 8 is a diagrammatic representation of the fluid control and the safety cut-off system.

The present invention relates to improvements in the rotary gasket compound applying machine described in the above copending patent application. The present description will, therefore, be directed principally to the improved portions of such a compound applying machine and their relationship with the over-all machine operation.

As illustrated in FIGS. 1 and 2 the present improved compound applying mechanism is adapted for use on a turret-type rotary machine which carries a succession of closure shells 1 around an arcuate path while the closure shells 1 are simultaneously rotated and are partially filled with gasket compound in the desired shape and thickness.

Closure shells 1 are carried along the arcuate path by a turret 2 mounted on the machine frame 3 on a hollow shaft 4 rotatably mounted on bearings 5 on a fixed spindle 6. The closure shells 1 are carried by a series of rotatably mounted pedestals 7 evenly spaced around the turret 2 and having a suitable closure shell receiving pocket 8 in their tops. Each of the closure shells 1 is fed onto a pedestal 7 from a feed conveyor 9 by a rotating closure shell feed wheel 10 having spaced pockets 11 whose movement is synchronized with that of turret 2 to apply a closure shell 1 to each of the moving pedestals 7.

As will be more fully described below, a compound applying nozzle 12 is mounted above each of the pedestals 7 on a suitable collar 13 and the collar 13 is attached to and rotated with the turret 2. Each closure shell 1 thus moves along an arcuate path on a pedestal 7 beneath a similarly moving nozzle 12 as the pedestal 7 carries the closure shell 1 from the feed wheel 10 to a closure shell exit chute 14.

In order to apply an even and ring-like coating of gasket compound or adhesive to the under side of each closure shell top, each gasket pedestal 7 is rotated so that the closure shell 1 thereon is spun as it moves along the arcuate path beneath the compound nozzle 12.

The drive means for rotating the turret 2, the feed star whel 10, and the pedestals 7 is illustrated in FIGS. 1 and 7. In order the synchronize the movements of each of these members, a single power source is preferably provided such as the drive motor 15. The drive motor 15 is coupled at 16 to a suitable vertical drive shaft 17 (FIG. 7). Pinion 18 on shaft 17 drives the feed wheel 10 through the intermediation of the vertical wheel mounting shaft 19 and connected pinion 20.

The turret 2 is rotated in synchronization with the feed star wheel 10 at the desired speed by being coupled to the vertical drive shaft 17 through the gears 20 and 20A. The rotatably mounted pedestals 7 are driven through the intermediation of pinion 21 and interconnected pinions 22 and 23 which are rotatably mounted on the wheel mounting shaft 19. The lower pinion 23 engages ring gear 24 on turret 2 which, in turn, is connected to ring gear 25 by sleeve 24A.

Each of the rotatably mounted pedestals 7 are rotated

in synchronism with turret 2 by being driven from ring gear 25 on turret 2 which engages the individual pinions 26 on each of the rotatably mounted pedestals 7. It thus is seen that each of the pedestals 7 will rotate a fixed number of turns as the pedestal 7 moves along the arcuate path between the feed wheel 10 and the exit chute 14 and that this number of rotations will be independent of the operational speed of the machine and of the rotational speed of the turret 2. Gasket compound may thus be applied to each of the closure shells 11 on a pedestal 7 for the fixed portion of the arcuate distance necessary to provide an exact gasket depth with a predetermined overlap at the ends of the gasket ring. The depth and overlap will be independent of the machine speed permitting minor variations to occur or adjustments to be made in the speed of the machine operation without changing the gasket depth and shape.

As indicated above, each of the compound nozzles 12 is mounted to rotate with the turret 2 at a fixed position above a closure shell 1 on a pedestal 7. A nozzle control system governs the application of the compound to the rotating closure shells for the necessary period to regulate the gasket ring depth and overlap. This control system will now be described.

As illustrated in FIGS. 3 and 8, nozzles 12 are coupled to a source of gasket compound or adhesive by conduit 28, rotatable fluid coupling 29 and conduits 30. Each of the compound nozzles 12 is coupled by a separate conduit 30 to an outlet 27 in the rotating portion 29' of rotatable coupling 29.

A supply of gasket compound under pressure, therefore, is continuously available in each of the nozzles 12. As illustrated in FIG. 3, the flow of the compound out of the nozzles 12 is controlled by valve stem 31. Valve stem is a piston controlled valve stem which is moved between its opened and its closed positions by the piston 32 at its upper end. Air is admitted under pressure into either the upper port 33 or the lower port 34, to close or open each of the nozzles 12. The admission of the air to the nozzles 12 is controlled by a two-way air valve 35 one of which is connected to each of the nozzles 12. The two-way air valve 35 is operated to apply gasket compound to each of the rotating closure shells 1 at the appropriate portion of their arcuate movement on rotating turret 2 by the arcuate cam 36 fixedly mounted above the path of the moving nozzles 12 and pedestals 7.

As best illustrated in FIGS. 1, 4 and 8, a cam follower 37 is pivotally mounted on the rotating collar 13 with a cam roller 38 urged against the lower surface of the arcuate cam 36 by spring 43. The downwardly positioned portion 39 of the cam 36 swings the cam follower 37 downwardly during the compound applying interval causing the cam follower 37 to engage and to lower plunger 40 of an air switch 35 so that air pressure is released from the top and is applied to the under side of the piston 32 by conduit 41. This raises the valve stem 31 permitting the gasket compound to flow under pressure from the nozzles 12 into the rotating closure shells 1 therebelow. When the cam follower 37 passes beyond the downwardly positioned portion 39 of the cam 36 it returns upwardly to its normal position permitting plunger 40 to rise and causing the air switch 35 to release the air pressure from the lower side of the piston 32 and to apply air pressure to the upper side through line 42. This closes the nozzle 12 to cut off the supply of gasket compound. Air under pressure is supplied to each of the two-way air switches 35 from a supply conduit 44 through the rotating coupling 29 which has a plurality of output ports 45 each of which is coupled by line 46 to an air switch 35 for one of the nozzles 12.

In order to provide a high output of closure shells while keeping the rotational speeds of the closure shells as low as possible to minimize the centrifugal forces, it is desirable to have two or more nozzles 12 operating simultaneously. This is done by a suitable spacing of the nozzles 12 and a proportioning of the cam 36 so that two or more of the cam followers 37 are simultaneously in engagement with the lower portion 39 of control cam 36. At the same time it is also desirable to retain individual control of each of the nozzles 12 so that the flow of gasket compound from any one of the nozzles may be cut off at any time in the event that no closure shell 1 is present in the pedestal 7 corresponding to that nozzle. This is done by the following safety control system.

As illustrated in FIGS. 1, 3 and 4, the cam follower 37 has a latch member 47 pivotally mounted thereon adjacent to the cam roller 38. This latch member 47 is normally held in a lowered position as illustrated in FIG. 4 by the spring 48 so that an abutment portion 49 on the latch member 47 engages and lowers the plunger 40 each time that the cam 36 moves the cam follower 37 downwardly to inject gasket compound into a closure shell 1.

When it is necessary to inactivate any one of the individual nozzles 12 to prevent the flow of gasket compound due to the absence of a closure shell 1 on a pedestal 7, the latch member 47 is rotated about its pivotal attachment on the cam follower 37 in a counterclockwise direction, as illustrated in FIG. 3, so that the cut out portion 49 on the latch member is moved above the plunger 40. When the latch member 47 is in this position, the latch member 47 does not contact plunger 40 as cam 36 lowers follower 37 so that the two-way air switch 35 is not operated and no compound flows from the interconnected nozzle 12.

The mechanism which moves the latch member 47 from its normal operative position to its inoperative position is illustrated in FIGS. 3 and 4. The latch 47 is swung to its inoperative position by cam 51 which is pivotally mounted on a suitable stationary support 52. Cam 51 in its inoperative position is swung downwardly clear of the latch member 47 so that it has no effect on the machine operation. When the no-closure shell sensing device, which will be described below, senses the absence of a closure shell 1 on a pedestal 7, the cam 51 is swung upwardly to its upward position as illustrated in FIG. 3. In this position its upper surface 54 engages the cam roller 55 on the latch member 47 to swing latch member 47 in a counterclockwise direction so that it clears the plunger 40 during downward movement of the cam follower 37 by cam 36. The cam 51 is held in its downward or inoperative position by air piston 66 which urges the cam 51 downwardly about its pivot 52' through the intermediation of crank 58 and connecting link 59 against the force of compressed spring 56 on rod 57. The air piston 66 is controlled by a no-closure shell sensing system in the following manner.

The no-closure shell sensing system which raises cam 51 to its operative position to cut off the flow of gasket compound is illustrated in FIG. 8. This system includes a proximity detector 60 mounted adjacent to the path of the pedestals 7 just beyond the point where the closure shells 1 are fed to the pedestals 7 by the feed wheel 10. Proximity detector 60 is coupled to a conventional proximity signal amplifier 61 having the usual time delay circuit. When a steady succession of closure shells 1 are fed to the pedestals 7, the proximity detector 60 will detect the presence of these closure shells 1 causing the amplifier 61 to remain operative with a continuous output signal. The time delay circuit in the amplifier 61 is set so that an output signal is maintained for each closure shell sensing for a time interval corresponding to that between the passage of closure shells 1 past the proximity detector 60 when a closure shell 1 is present on each pedestal 7. When no closure shell 1 is fed to a particular pedestal 7, the amplifier 61 will receive no signal to continue its output signal and its output signal will cut off. The output signal of amplifier 61 is coupled to an air control valve 62 coupled to air supply conduit 44 by line 63. During nor-

mal operation the continuous output signal from the amplifier 61 keeps the valve 62 open supplying air under pressure through conduit 64 to the air piston 66 (FIG. 3). This air under pressure keeps the air piston 66 at its extended position against the force of the spring 56 so that cam 51 is lowered to its inoperative position. When the output signal of the amplifier 61 is cut off due to the absence of a closure shell 1, valve 62 is closed and spring 56 moves rod 57 to the left raising cam 51. As described above, cam 51 in its raised position engages cam roller 55 and swings the latch member 47 upwardly to prevent the contact between the plunger 40 and the cam follower 37 on the normal downward nozzle opening movement of the cam follower 37 by cam 36.

As soon as a pedestal 7 passes the proximity detector 60 with a closure shell 1 correctly positioned thereon, amplifier 60 will be reactivated and its output signal will open valve 62 causing air piston 66 to lower the cam 51 so that the compound applying system returns to its normal position under control of cam 36.

Operation

The operation of the above described machine will now be summarized.

As the pedestals 7 and nozzles 12 continuously rotate about the vertical spindle 4, a succession of closure shells 1 are fed by the feed wheel 10 onto the turret 2 so that one closure shell 1 lies in an inverted position on each of the pedestals 7. These closure shells 1 are moved along an arcuate path beneath a similarly moving nozzle 12 from the feed wheel 10 to an exit conveyor 14 and during this movement each closure shell 1 is rotated at a predetermined speed by the drive pedestals 7 which are rotated in synchronization with the moving turret 2. Each nozzle 12 is aimed to inject a supply of gasket compound or adhesive in a ring-like configuration on the under side of the closure shell top and the injection period is precisely timed so that the gasket compound or adhesive is applied for a predetermined number of turns of the closure shells 1. The timing period is set to provide only a predetermined amount of overlap between the beginning and the end portions of the compound ring so that the change in gasket thickness due to overlapping is minimized and is held within prescribed limits such as for example within thousandths of an inch variation in total gasket thickness.

As more fully described above, the pedestal 7 rotation and the turret 2 rotation are exactly synchronized by a positive gear drive system so that the number of turns made by each closure shell 1 on a pedestal 7 between the entrance and exit positions will be constant and independent of the machine speed. This will permit the gasket overlap and depth controls to be maintained independently of variations and adjustments in the machine speed.

Application of the gasket compound to the closure shells 1 is controlled by a cam operated air valve system as illustrated in FIGS. 3 and 8. An arcuate cam 36 is provided having a downwardly positioned portion 39 which opens the air control nozzles 12 through the intermediation of cam followers 37 and air switches 35 which control valve stems 31 in the compound nozzles 12. Cam followers 37 depress the air switch 35 plungers 40 during the compound applying period to admit air to the under side of the control pistons 32 to open the nozzles 12 and release the plungers 40 during the remaining time which causes the air switches 35 to apply air to the upper sides of the pistons 32 to close the compound nozzles 12.

A safety system is provided for each of the compound applying nozzles 12 which prevents compound injection when there is no closure shell 1 on a pedestal 7. This system is illustrated in FIG. 8 and it operates through the provision of a pivoted latch 47 on the nozzle control cam follower 37. The normal position for the latch 47 is illustrated in FIG. 8 wherein the downward movement of the cam follower 37 operates the plunger 40 so that air switch 35 opens the nozzles 12. In this normal operation position a control cam 51 for the latches 47 remains in a downwardly pivoted position as illustrated in FIG. 8 out of contact with the latches 47. The cam 51 is held in its inoperative position by air piston 66. The air piston 66 is held in its extended position by air supplied through air conduit 44, valve 62 and conduit 64. In this position crank 58 and connecting link 59 are turned to draw the cam 51 downwardly.

During normal operation the steady passage of closure shells 1 past the proximity detector 60 causes a steady signal on the output of the proximity detector amplifier 61. This signal is connected to air valve 62 so that it remains open causing piston 66 to remain in its extended position and cam 51 to remain in its lowered position. If there is an interruption in the supply so that one or more pedestals 7 have no closure shells 1 thereon the output signal 61 will be interrupted causing valve 62 to close. This permits spring 56 to move rod 57 to the left swinging the cam 51 upwardly to its operating position. Now when the latch 47 reaches the normal nozzle opening position for the air switch 35, it is swung in a counterclockwise direction by cam 51 so that it fails to engage plunger 40 when the cam follower 37 is swung downwardly by cam 36. The nozzles 12 thus remain closed as no air is admitted to the under side of the piston 32. When closure shells 1 reappear on the pedestals 7, the proximity detector amplifier 61 will again provide an output signal opening the valve 62 so that air piston 66 lowers cam 51 permitting normal operation of the cam follower 37 so that it again operates plunger 40 of air switch 35.

It will be seen that an improved automatic gasket compound or adhesive applying machine has been provided with more accurate control for gasket depth and positioning to permit the high speed formation of accurately positioned and dimensioned flowed-in-type gaskets or gasket anchoring adhesive rings. An improved safety control and compound cut off system has also been disclosed which permits individual safety control of compound nozzles even where two or more nozzles are in operation simultaneously.

As various changes may be made in the form, construction and arrangement of the parts herein without departing from the spirit and scope of the invention and without sacrificing any of its advantages, it is to beunderstood that all matter herein is to be interpreted as illustrative and not in a limiting sense.

Having thus described our invention, we claim:

1. In an automatic machine for forming flowed-in rings in closure shells having a means to rotate and to move a plurality of the closure shells along an arcuate path and having a gasket fluid application nozzle mounted for motion above each of the closure shells, the improvement which comprises the combination of cam means comprising a cam and cam follower means to cause the simultaneous operation of a plurality of the nozzles to apply fluid to a plurality of closure shells therebelow, an air piston in each fluid nozzle, and an air switch operatively coupled to said air piston and to said cam follower to operate the nozzle under the control of said cam, means comprising a proximity detector adjacent said arcuate path adapted to detect the absence of a closure shell below one of the nozzles, latch means to deactivate said one nozzle, and a coupling between said latch and said detection means comprising a movably mounted second cam, an air cylinder operatively coupled to said second cam, a valve to control said air cylinder, and an amplifier electrically coupling said detector to said valve.

2. The machine as claimed in claim 1 in which said amplifier includes a signal time delay circuit whereby an input signal provides a delayed output signal.

3. A machine for forming flowed-in ring like gaskets in closure shells comprising means to move closure shells

in a path, a plurality of gasket flow nozzles adapted to move in timed relation with said closure shells, a plurality of means for controlling gasket flow through said nozzles, a cam element adapted to actuate said control means, a device adapted to selectively engage and inactivate each of said control means, and detection means adapted to sense the absence of closure shells from said path without touching said shells, and said detection means being further adapted to actuate said device upon detecting the absence of closure shells from said path.

4. A machine for forming flowed-in ring like gaskets in closure shells comprising means to move closure shells in a path, a plurality of gasket flow nozzles adapted to move with said closure shells, a plurality of means for controlling gasket flow through said nozzles, a cam element adapted to actuate said control means, a second cam adapted to selectively engage and inactivate each of said control means, drive means adapted to move said second cam into engagement with said control means whereby the control means is inactivated, detection means adapted to sense the absence of closure shells from said path without touching said shells, and said detection means being further adapted to actuate said drive means upon detecting the absence of closure shells from said path.

5. A machine for forming flowed-in ring like gaskets in closure shells comprising, means to move closure shells in a path, a plurality of gasket flow nozzles adapted to move in timed relation with said closure shells, a plurality of means for controlling gasket flow through said nozzles, a cam element adapted to actuate said control means, a device adapted to selectively engage and inactivate each of said control means, a proximity detector adapted to sense the absence of closure shells from said path without touching said shells, and means cooperating with said detector being adapted to actuate said device upon detecting the absence of closure shells from said path.

6. A machine for forming flowed-in ring like gaskets in closure shells comprising means to move closure shells in a path, a plurality of gasket flow nozzles adapted to move in timed relation with said closure shells, an air piston within each of said nozzles for metering gasket flow through the nozzles, a plurality of air switches controlling air flow to said pistons, a cam element, a plurality of cam followers each cooperating with said cam for actuating a corresponding one of said switches, a device adapted to selectively engage and prevent each of said cam followers from actuating its corresponding switch, and detection means adapted to sense the absence of a closure shell from said path without touching said shells, and being further adapted to actuate said device upon detecting the absence of a closure shell from said path.

7. In a machine for forming flowed-in ring like gaskets in closure shells having a means to rotate and to move a plurality of the closure shells along an arcuate path and having a gasket fluid application nozzle mounted for motion above each of the closure shells, the improvement which comprises the combination of a plurality of means to control the operation of a plurality of the nozzles to apply fluid to a plurality of the rotating closure shells therebelow, a device adapted to selectively inactivate each of said control means having a first position wherein said device has no effect on said plurality of control means and a second position wherein said device selectively inactivates the control means, and means responsive to the absence of closure shells from said path for moving said device from the first position to the second position whereby said device prevents gasket flow through any nozzle not having a closure shell thereunder.

8. In a machine for forming flowed-in ring like gaskets in closure shells having a means to rotate and to move a plurality of closure shells and having a gasket fluid application nozzle mounted for motion above each of the closure shells, the improvement which comprises the combination of a cam, a plurality of followers cooperating with said cam, a plurality of switches being actuated by said followers to cause the operation of a plurality of the nozzles to apply fluid to a plurality of the rotating closure shells therebelow, a device adapted to selectively inactivate individual followers having a first position wherein said device has no effect on said followers and a second position wherein said device inactivates one or more individual followers, and means responsive to the absence of closure shells from said path for moving said device from the first position to the second position.

9. In a machine for applying flowed-in gaskets to closure shells, the combination of means to move closure shells in a predetermined path through the machine, means to rotate said shells, elements adapted to apply gasket material to said shells being positioned to move in a path adjacent the path of said shells, each of said elements including a nozzle and a control switch, a device adapted to engage a plurality of said switches whereby said nozzles apply flowed-in gaskets to said shells, and a mechanism fixed adjacent the path of said shells and adapted to sense the absence of a shell from said path and further adapted to inactivate one of said elements upon sensing the absence of a shell adjacent the nozzle of said one element.

10. The machine as claimed in claim 9 in which said sensing mechanism means comprises an electrical proximity detector adjacent said arcuate path adapted to sense the absence of a closure shell on said means to rotate the closure shells.

11. In a machine for applying flowed-in gaskets to closure shells, the combination of means to move closure shells in a predetermined path through the machine, means to rotate said shells, elements adapted to apply gasket material to said shells being positioned to move in a path adjacent the path of said shells, each of said elements including a nozzle and a control switch, a cam adapted to engage a plurality of said switches whereby said nozzles apply flowed-in gaskets to said shells, a proximity detector fixed adjacent the path of said shells and adapted to sense the absence of a shell from said path, a second cam fixed adjacent the path of said switches and adapted to selectively inactivate said elements, and means responsive to said detector and cooperating with the second cam whereby one of said elements is inactivated upon the detection of the absence of a closure shell adjacent the nozzle of said one element.

12. A machine for forming flowed-in ring like gaskets in closure shells comprising means to move closure shells in a path, means for rotating said closure shells moving in said path, a plurality of gasket flow nozzles adapted to move with said closure shells, a plurality of means for controlling gasket flow through said nozzles, a cam element adapted to actuate each of said control means, a second cam adapted to engage and inactivate each of said control means, drive means adapted to selectively move said second cam into engagement with each of said control means whereby the control means is inactivated, and detection means operative without touching said shells adapted to sense the absence of a closure shell from said path, said detection means being further adapted to actuate said drive means upon detecting the absence of a closure shell from said path.

13. A machine for forming flowed-in ring like gaskets in closure shells comprising means to move closure shells in a path, means for rotating said closure shells which are moving in said path, a plurality of gasket flow nozzles

adapted to move in time relation with said closure shells, an air piston within each of said nozzles for metering gasket flow through the nozzles, a pulrality of air switches controlling air flow to said pistons, a cam element, a plurality of cam followers each cooperating with said cam for actuating a corresponding one of said switches, a device adapted to selectively engage and prevent each of said cam followers from actuating its corresponding switch, and detection means adapted to sense the absence of a closure shell from said path without touching said shells, and being further adapted to actuate said device upon detecting the absence of a closure shell from said path.

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