July 5, 1966 E. H. SCHIMKAT 3,259,152

APPARATUS FOR FILLING AND SHAKING A CAN

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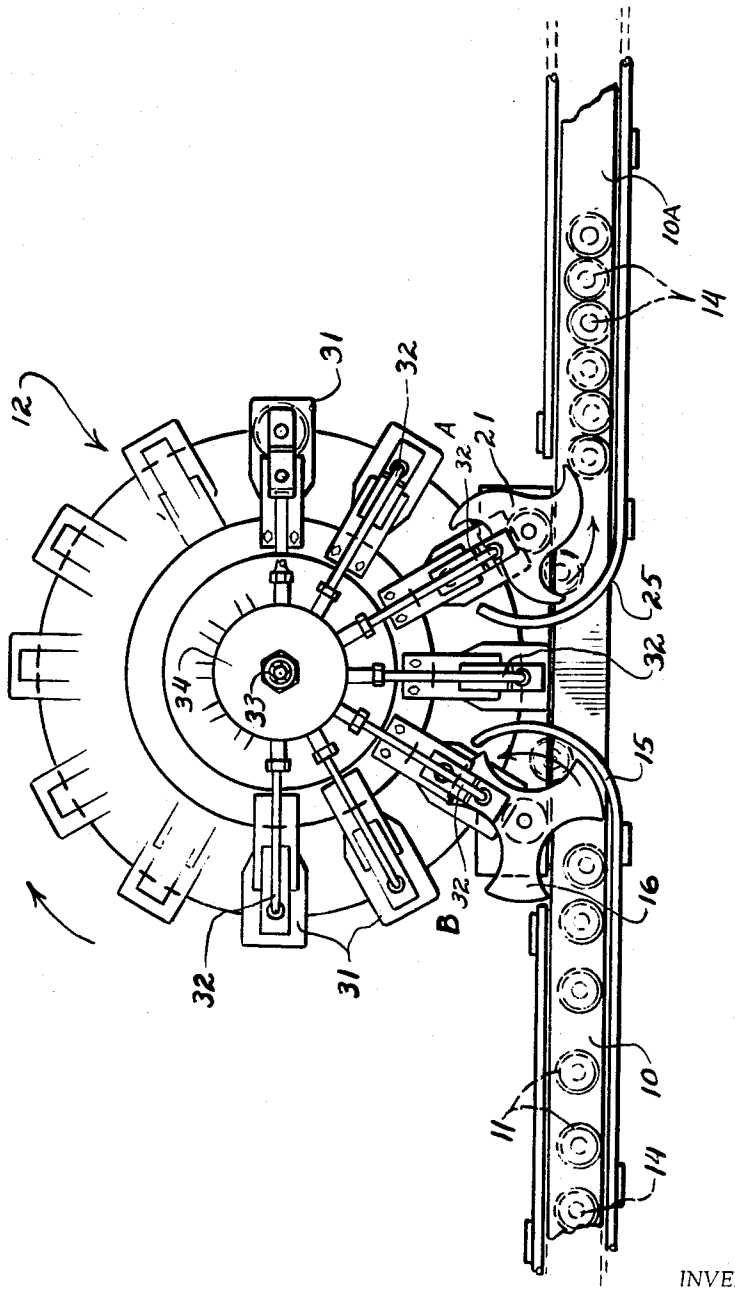


FIG. 1

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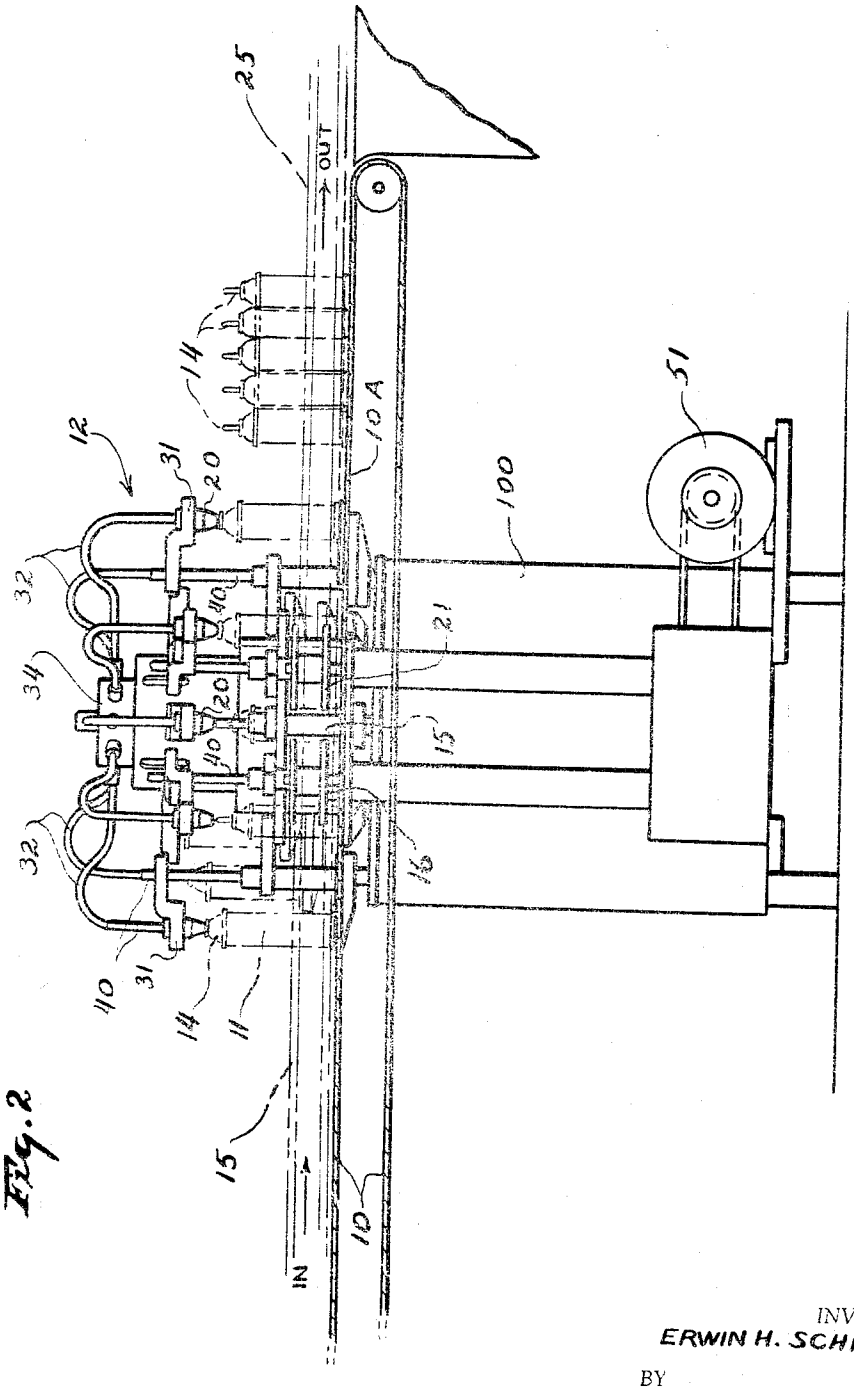


Fig. 2

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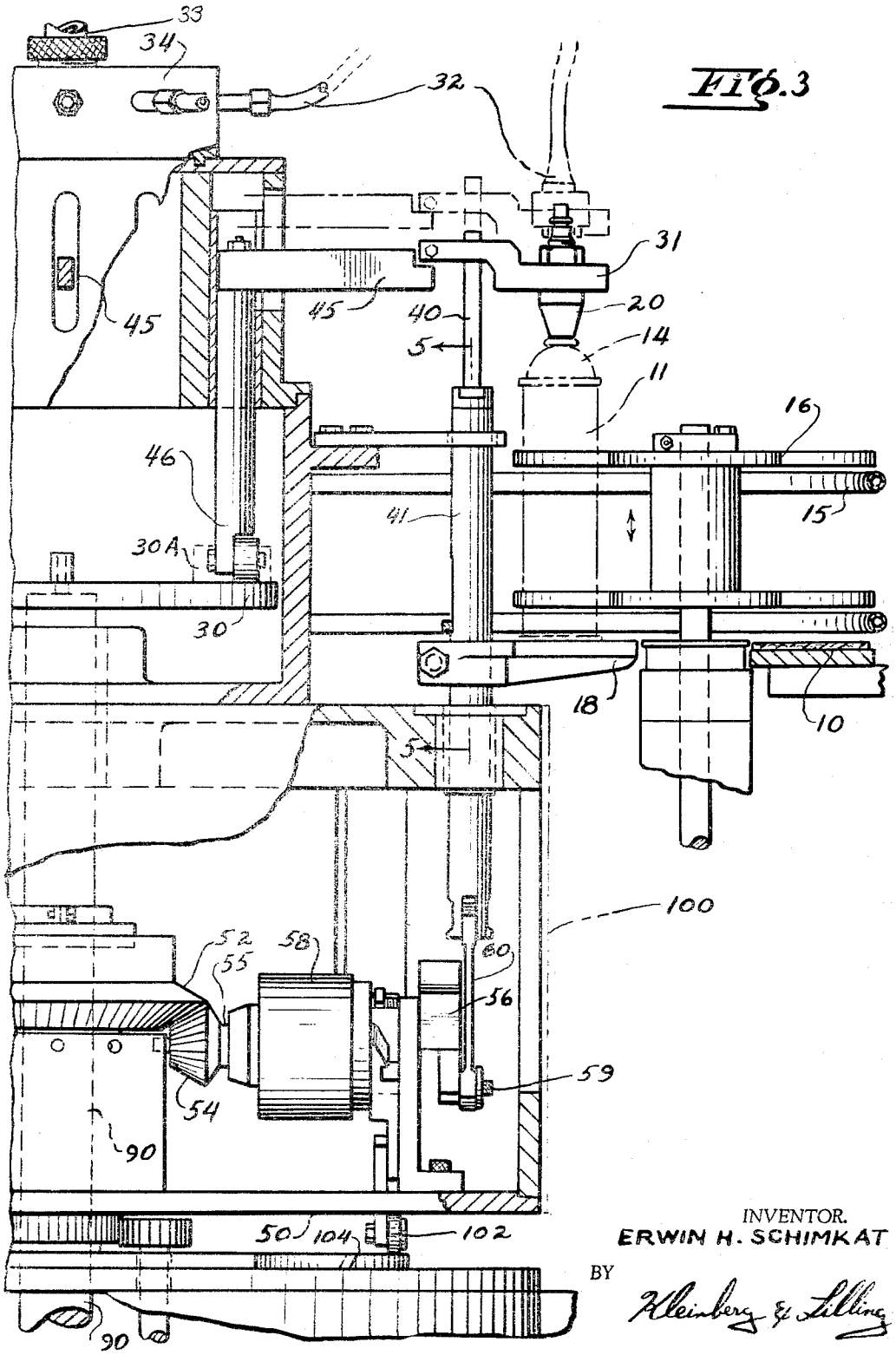
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FIG. 3



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Fig. 4

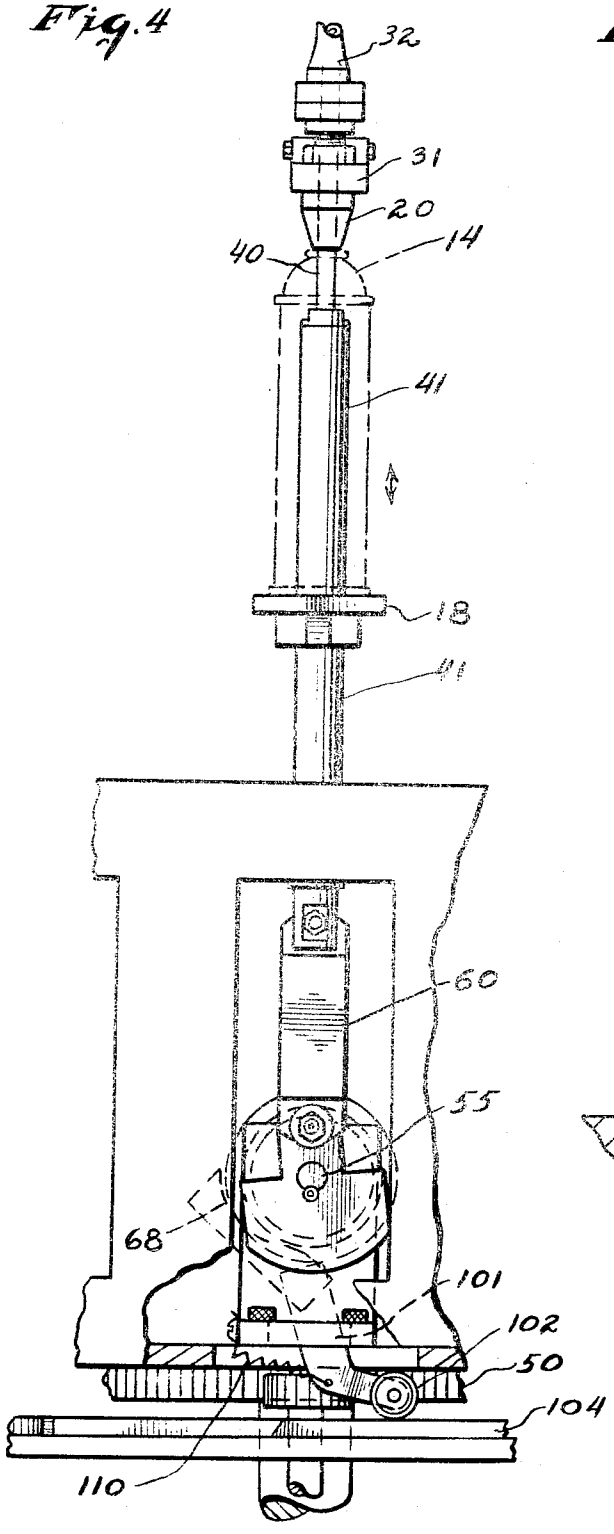
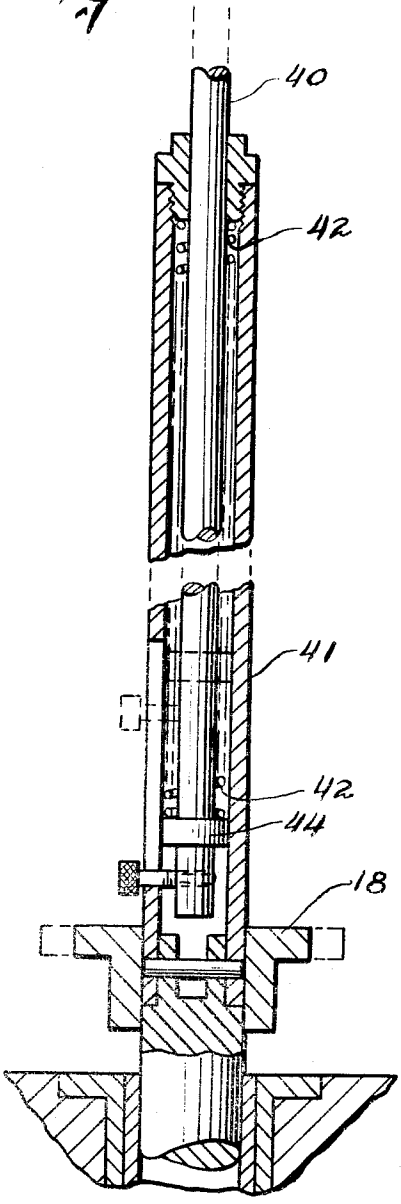


Fig. 5



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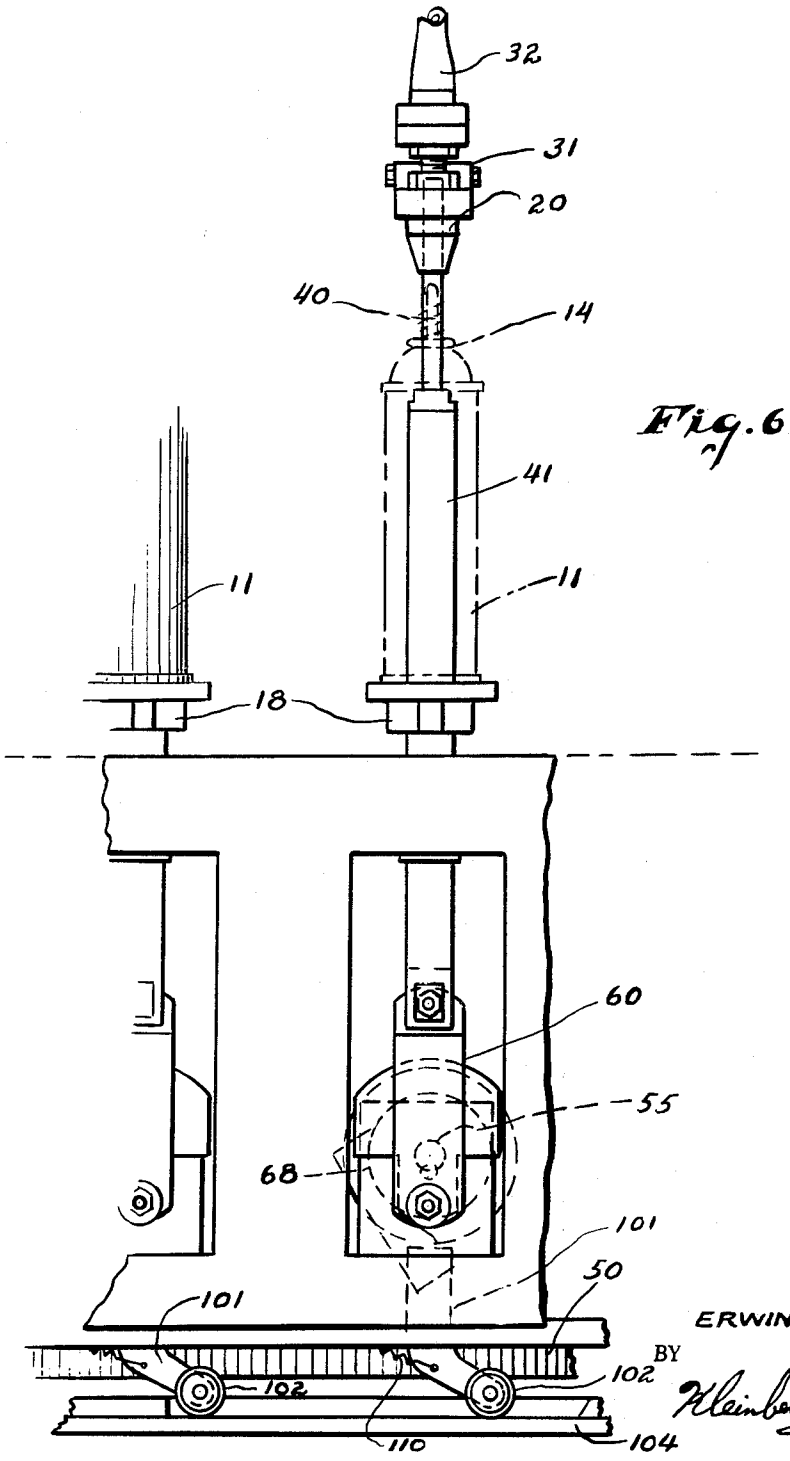


Fig. 6

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United States Patent Office

3,259,152

Patented July 5, 1966

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APPARATUS FOR FILLING AND SHAKING A CAN

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Filed Jan. 31, 1963, Ser. No. 255,374
5 Claims. (Cl. 141—20)

This invention is concerned with the art of producing charged dispensing containers, and more particularly describes a machine for the simultaneous injection of a propellant within a container and the shaking thereof whereby the said propellant and the other contents of the container will be mixed.

Pressurized cans dispensing products for home and industry use are well known today. Generally such a can will have a valve assembly wherein a product contained therein may be ejected under the pressure of the propellant within the said can. Ordinarily a production line for such devices commences with open cans which are filled with a predetermined quantity of the material desired to be later dispensed. The valve assembly is then inserted and generally crimped at the top of the can. Means may then be provided to fill the can with a propellant through the valve assembly. It is desirable, however, to simultaneously shake the can along its longitudinal axis as the propellant is being inserted so that the material to be dispensed and the propellant may be uniformly mixed. This effect is desirable with almost all products so packaged but may be especially important with certain dairy products such as cream, or the like, and water based formulations.

It is a cardinal object of this invention, therefore, to provide a fully automatic machine for pressure packaging a can while longitudinally shaking the same.

Another primary object of the invention set forth herein is to present a device as above-described that will operate on a continuous rotary basis, as is most desirable for mass-production line techniques.

A still further object and accomplishment hereof is the provision of a device that will simultaneously pressure package and shake a can, or be utilized for either of the immediately above functions independently.

Another principal object and accomplishment of this device is to provide a machine as mentioned above that will be not only efficient, but safe and economical.

The above and other objects are accomplished by providing a fully automatic, rotary, continuous motion machine. The said machine has a positive start-stop shaking action for each of its individual shaker stations. Each station is adjustable for various size containers and valves, and is adjustable for various lengths of shaking strokes. Each container is handled separately and independantly and proper filling is not dependant upon other containers.

With these objects in view, the invention consists of the novel features of construction and arrangement of parts which will appear in the following specification and recited in the appended claims, reference being had to the accompanying drawings wherein the same reference numerals indicate the same parts throughout the various figures and in which:

FIG. 1 is a plan view of the overall machine in operation.

FIG. 2 is a front elevational view of the overall machine in operation.

FIG. 3 is a side elevational view of one station of the machine described herein.

FIG. 4 is a front view corresponding to FIG. 3.

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

FIG. 6 is a view corresponding to FIG. 2 but showing another position of the station wherein a can ready for pressure packaging and shaking is about to be inserted thereon.

Referring to the drawings, which illustrate what may be for some purposes a preferred embodiment of the invention, and especially to FIGS. 1 and 2, there is shown an endless conveyor **10** accommodating a continuous flow of cans **11** to and from the machine designated generally as **12**. The said cans **11** which advance to the machine **12** on the endless conveyor **10** will each have a valve assembly **14** thereon and a predetermined quantity of the material to be dispensed, such as cream, therewithin.

The machine **12** will, as explained in detail hereinafter, receive each can **11**, inject a propellant through the valve assembly **14**, and shake the can, thereby mixing the contents and the propellant. The machine **12** will then return each can **11** to the exit portion **10***a* of the conveyor **10** for subsequent operations such as inspection, capping, labelling, packaging, or the like.

As each can **11** reaches the machine **12**, it will be guided to one of the shaking units or stations of the machine **12** as by guide rails **15** and a rotating infeed rounded starwheel **16**. The said rotating infeed starwheel **16** will urge each can **11** onto one of the machine shaker platforms **18** which will be at the proper elevation to receive the said can **11**. The infeed starwheel **16** will be timed to synchronize each can **11** on each platform **18** to insure proper operation of the unit.

As will be further described in detail hereinafter, the machine propellant nozzle **20** will then descend upon the can **11** causing the injection of a quantity of propellant within each can **11**. The propellant nozzle **20** will commence injection of the propellant prior to the commencement of the shaking, and further, serve to clamp the can **11** on the platform **18** during the shaking thereof.

The machine **12** will then rotate with each can **11** and will commence the shaking of each can. Each shaker station and can thereon will rotate with the said machine **12** and positively shake each can **11** along its longitudinal axis. The injection of the propellant will continue during the rotary motion of the machine as will the shaking and mixing action. As each can **11** reaches the discharge starwheel **21**, the platform **18** will be stopped at the proper elevation, thereby terminating the shaking and mixing action. The machine propellant nozzle **20** will be removed from the can valve assembly **14** permitting the discharge of each can **11** to the portion **10***a* of the conveyor. This discharge may be assisted by a stationary stripper guide **25**.

Thus, the overall operation of the device will be apparent. The machine **12** will discharge cans **11** filled with the material to be dispensed and with a propellant uniformly mixed therewithin.

The propellant nozzle assembly

Located above each can **11** as the said can is inserted on the shaker platform **18** will be a propellant nozzle assembly. Each nozzle assembly will include a nozzle bracket **31** and a propellant nozzle **20**. Each machine propellant nozzle **20** will include a normally pressure biased closed member which may be opened only upon the said machine nozzle **20** descending upon the can valve assembly **14**. Thus, as each machine nozzle **20** is urged open by each of the can valve assemblies **14**, communication will be established between the flexible line **32** feeding the machine nozzle **20** and the interior of the can **11**. The gas propellant being fed under pressure to the flexible line **32** will be urged into each can **11**. The discharge passage through each machine nozzle **20** may be adjusted to meter the flow of propellant into each can **11** at a desired rate.

As seen in FIGS. 1 and 2, each flexible line **32** will be connected to a manifold **34** which will rotate with the

machine, thus providing the necessary propellant to each of the flexible lines **32** at the required predetermined pressure. The manifold **34** will be fed with the propellant from a central feed line **33**.

Referring to FIG. 3, the position of a nozzle assembly is shown in solid in contact and in operative position with a can **11**. Correspondingly, a nozzle assembly is shown in phantom when in position to receive or discharge a can **11**.

Each nozzle assembly will be adjustably fastened on a nozzle support rod **40** guided within the platform support rod **41** (see FIG. 5). The said platform support rod **41** will be substantially hollow and will contain a compression spring **42** which will rest upon an annular extending portion **44** of the said nozzle support rod **40**. Thus, the spring **42** will urge the said rod **40** to one position which will correspond to the position shown in solid in FIG. 3 wherein the nozzle **20** is operatively interconnected with the can **11**.

When each shaking unit or station is in the area or region wherein a can will either be received or discharged, a cam controlled actuator **45** (FIG. 3) will lift each nozzle assembly above the normal position of the can **11** thus disconnecting the nozzle **20** from the valve assembly **14** of the can **11**. The actuator **45** will normally be in non-engaging position with the nozzle support **31** except in the receiving and discharge areas of the machine **12**, where it will be raised to the desired elevation, thereby raising the nozzle assembly by means of the stationary cam portion **30***a* shown in phantom in FIG. 3. The actuator **45** will rotate relative to the cam **30** along with the remainder of the machine **12**.

Thus, it will be apparent that the portion of the device above will effect interconnection between the propellant manifold **34** and the interior of each can **11** throughout the rotation of the machine **12**, except in that area of the machine wherein each can **11** will be received or discharged. In that area, the raised cam portion **30***a* will raise actuators **45** through rollers and lifters **46**.

In that each of the machine nozzles **20** are normally closed and can be opened only upon contact with a can **11**, it will be apparent that should a can fail to reach the station of the machine, the said machine nozzle **20** will be inoperative and no gas propellant will be discharged, allowing continued proper operation of the machine.

The machine nozzles **20** serve an additional important function. It is necessary to clamp each can **11** on each platform **18** in order to insure proper contact thereto. As seen in FIGS. 3 and 4, the machine nozzles **20** provided herein will fit securely about the crimped valves **14** of each can **11**. In that each nozzle **20** is tightly urged against each can **11** by spring **42**, the nozzles **20** will clamp each can **11** against each platform **18** and prevent inadvertent movement thereof.

The can reciprocating mechanism

As was mentioned heretofore, it is necessary to reciprocate each can **11** longitudinally as the said can is being filled with the propellant to insure the mixing of the propellant. In the prior art, such attempts to mix have generally provided structures wherein the can will be moved along at least a portion of an arc and generally the longitudinal movement of the can has been restricted. Due to the elongated configuration of most such cans **11**, such an apparatus not only has been proven expensive and troublesome, but further, has not properly mixed the contents of the can **11**. For example, it has been found that too small a movement in the elongated direction of the can at the required high cycle rate will allow the contents of the can **11** to remain relatively stationary in space except for the upper and lowermost portions thereof. This invention, therefore, provides movement of each can **11** only along its elongated axis and further, provides the same over an easily adjustable distance. Thus, the proper mixing of the contents of each can **11** may be easily assured. The reciprocation of each can **11** as it rotates with the machine **12** and is filled with the propellant may be adjusted to any desired amount, which is a principal object of this invention.

In the drawings, and especially in FIGS. 3 and 6, the accomplishment of this operation is described. It will, of course, be realized that in FIGS. 3 to 6 there is shown primarily one station of the machine. The other stations of the machine will operate in similar fashion.

The entire mechanism of each station of the machine will be affixed to a frame **50** connected to a drive **51** for uniform and even rotation. A central gear **52** will be mounted on a center post **90** for rotation. Each station of the machine will have a bevel gear **54** (FIG. 3) with teeth mating with the central gear **52**.

Therefore, as each bevel gear **54** rides about the device **12**, it will be caused to rotate at a uniform speed. The shaft **55** of the bevel gear **54** will be connected to a rotating cam arm **56** through a clutch **58**. Located off center of the rotating cam arm **56** will be a pin **59** rotatably connecting the said rotating cam arm **56** to an oscillating connecting member **60**. The oscillating connecting member **60** in turn is pivotally connected to the lower portion of the platform support rod **41**. Thus, rotation of the cam arm **56** will cause the oscillating member **60**, and in turn the platform support rod **41**, to vertically rise and descend. In that the platform support rod **41** will be guided (FIG. 5) only vertical movement may be transmitted to the said platform support rod **41**.

Thus, so long as the rotating arm **56** is operatively connected to the bevel gear **54** and so long as the device **12** is caused to rotate, each platform **18** will alternately rise and descend in quick successive movements along with the rod **41**. Thus, as the can **11** is filled with the propellant, the can **11** will be rapidly agitated along its elongated axis according to a predetermined cycle thus causing the desired material within the can **11** and the propellant being injected to be uniformly mixed.

The stroke of the support rod **41** and the platform **18** will be easily adjusted merely by replacing the pin **59** position of the rotating cam arms **56**.

As mentioned heretofore, however, in the area of the machine wherein the cans are received and discharged, it will be desirable to maintain the platform **18** in a fixed position and stationary to receive and discharge the said cans **11**. This may be accomplished by clutch means **58**. When each of the stations reach the discharge area, a bar **68** will contact the said clutch **58** disengaging the said clutch **58** so that the rotation of the bevel gear **54** will not cause corresponding rotation of the rotating cam arm **56**. Thus, the arm **56** will now be stationary and will not allow movement of the can supporting platform **18**. The bar **68** will be caused to deactivate the said clutch **58** when the said can supporting platform **18** is in a predetermined position. This will be the position wherein the cans may be conveniently inserted upon or removed from each of the platforms **18** and will be approximately from position A to position B as shown in FIG. 1.

Each bar **68** is secured at its lower end to an arm **101** carrying a cam roller **102** which will ride on a cam **104**. The cam **104** is level except for the region from A to B wherein it is lowered (compare FIGS. 4 and 6). The clutch **58** will normally engage the bevel gear **54** and the arm **56** except when contacted by the bar **68**. The bar **68** will contact the clutch **58** as shown in FIG. 6 only when the cam roller **102** is depressed by spring **110** into the lower portion of cam **104**.

It will thus be realized that the machine provided herein will accomplish all of the objects previously set forth. The cans **11** will be uniformly received, will be filled with a propellant, and will be reciprocated to obtain a predetermined desired result. It is important that the can **11** be agitated along its elongated axis in a uniform manner.

The entire device, together with the cans **11**, may be rotated 90 degrees wherein the elongated axis of each of the cans **11** will be horizontal as will be the agitation of the machine.

The machine described above has many inherent advantages other than as outlined heretofore. For example, it receives only one can at a time and its rate is, therefore, adjustable. Should a can fail to reach a station of the machine at a proper time, the station will continue to rotate without the can and without any malfunction. No propellant will be lost in that the flow of the propellant can only be commenced by the interaction of the can valve and the machine valve. Should a can not be in position, the machine valve will not open and no propellant will be dispensed.

It will be noted that all the portions of the machine disclosed herein are positive and there is no room for machine error. The shaking action, the filling, the rotation, the stopping of each platform at the desired elevation to receive or discharge a can, are all positive.

Additionally, the machine disclosed herein lends itself to a safe, as well as efficient operation. Automatic safety devices may be installed as well as stop devices to stop the machine should an unusual pressure be applied at any point thereof.

Of further importance is the even flow of propellant. In many of the prior art devices, a series or bank of cans are filled simultaneously, thus yielding an intermittent flow of the propellant. Either a no-flow condition or a large-flow condition will exist at any time in such devices. In this instant machine, however, wherein cans are successively and individually filled, there is a continuous and uniform flow of the propellant.

There may be separate drive mechanisms, one for rotation of the entire machine, and a second for the controlling of the reciprocating up-down motion of the individual shaker stations. This is to provide maximum adjustability for different product and propellant and mixtures thereof.

It is to be noted that throughout the course of this specification, the terms container and can were utilized. It is to be emphasized, however, that the instant invention will be usable in conjunction with an enclosure such as a glass or plastic bottle or can or any sort of container.

While there are above disclosed but a limited number of embodiments of the structure and product of the invention herein presented, it is possible to produce still other embodiments without departing from the inventive concept herein disclosed, and it is desired, therefore, that only such limitations be imposed on the appended claims as are stated therein, or required by the prior art.

Having thus described my invention and illustrated its use, what I claim as new and desire to secure by Letters Patent is:

1. A machine for simultaneously injecting pressurized propellant into and shaking cans, said machine comprising: a rotary frame, frame drive means connected to said frame for effecting rotation thereof, a plurality of rods carried by said frame in parallelism with and circumferentially spaced about the axis of frame rotation, said rods being mounted on said frame for rotation therewith and longitudinal reciprocatory movement relative to said frame, a plurality of can-receiving platforms respectively carried by said rods for rotative movement therewith about a closed path through a loading and unloading region, a plurality of rotary eccentric drives on said frame and each connected to a respective rod for effecting longitudinal vibratory reciprocation thereof during rotation with said frame, eccentric-drive actuating means operatively connected to said eccentric drives to disable each eccentric drive during movement of its associated platform through said loading and unloading region, a plurality of injection nozzles each located adjacent to a respective platform and carried by the associated rod for rotation and reciprocation with the adjacent platform to inject propellant into a can on the adjacent platform during its rotative and reciprocatory movement, and a plurality of nozzle-spacing means carried by said frame each operatively connected to a respective nozzle to space the latter from its adjacent platform during platform movement through said loading and unloading region.

2. A machine according to claim **1**, in combination with means for selectively varying the eccentricity of each of said eccentric drives, to vary the vibratory reciprocation of any selected rod.

3. A machine according to claim **1**, said nozzles each being resiliently biased toward its adjacent can-receiving platform, and said nozzle-spacing means comprising cam-actuated means operative to move said nozzles against said resilient biasing action.

4. A machine according to claim **1**, said eccentric-drive actuating means each comprising a rotary motion-transmitting clutch, and a clutch-operating arm engageable with the clutch to disengage the latter when the associated can-receiving platform reciprocates to a predetermined position and moves into said loading and unloading region.

5. In a machine for simultaneously injecting pressurized propellant into and shaking cans, the combination comprising: a rotary frame, frame drive means connected to said frame for effecting rotation thereof, a plurality of can-receiving platforms arranged circumferentially about said frame, a plurality of platform-mounting means on said frame each mounting one of said platforms for rotative movement with said frame and independent vibratory reciprocation relative to said frame, a plurality of vibratory drive means carried by said frame and each connected to a respective platform-mounting means for effecting vibratory reciprocation of the associated platform, actuating means operatively connected to said vibratory drive means to disable the latter upon platform rotation through a can-loading and -unloading region, a plurality of injection nozzles each located adjacent to a respective platform and carried by the associated platform-mounting means for rotation and reciprocation with the adjacent platform to inject propellant into a can on the adjacent platform during its rotative and reciprocatory movement, and a plurality of nozzle-spacing means carried by said frame each operatively connected to a respective nozzle to space the latter from its adjacent platform during platform movement through said loading and unloading region.

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