Dec. 27, 1966 W. T. EVERINGTON 3,294,264

APPARATUS FOR OPENING CLOSED CONTAINERS

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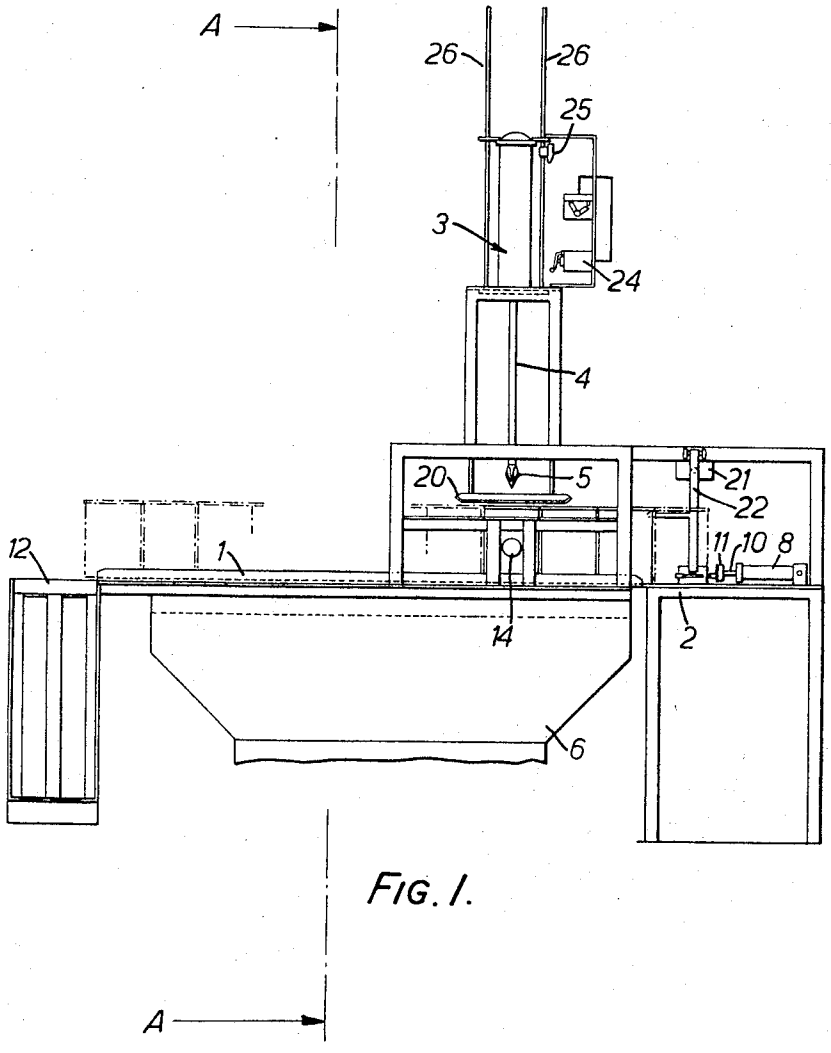


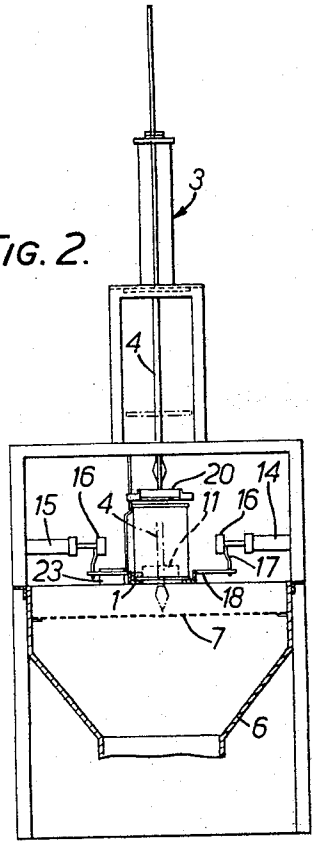
FIG. 1.

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FIG. 2.



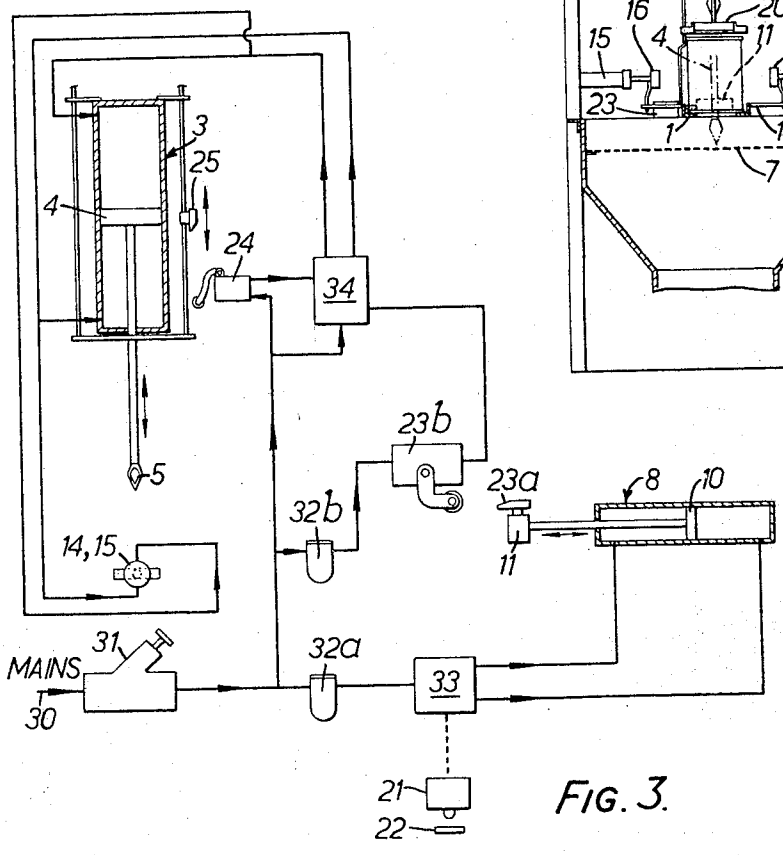


FIG. 3.

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APPARATUS FOR OPENING CLOSED CONTAINERS

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4 Claims. (Cl. 214—305)

The invention relates to apparatus for opening closed containers, and is particularly applicable to apparatus for opening sealed containers, such as cans, having liquid contents.

In establishments where large numbers of cans have to be opened, it has been found to be immensely time consuming and inconvenient to open the cans using a hand tool. Machines have been devised for opening containers, but such machines have in the past tended to be expensive and elaborate; furthermore, although expensive, the machines have not been noted for their efficiency.

It is an object of the invention to provide apparatus suitable for opening closed containers, such as cans having liquid contents, which is simple and quick in operation and inexpensive to manufacture.

It is a further object of the invention to provide a simple, quick, and inexpensive method of opening comparatively large numbers of containers having liquid contents.

One aspect of the invention provides apparatus for opening closed containers which comprises an elongate rupturive member, and first means adapted initially to urge part of said rupturive member through one of the containers whereby to pierce a hole through each of two opposed walls of the container and also adapted subsequently to withdraw said rupturive member from the container.

Another aspect of the invention provides apparatus for opening closed containers which comprises an elongate rupturive member disposed with its length substantially vertical and guided for movement along its length, and first means adapted initially to urge part of said rupturive member downwards through one of the containers whereby to pierce a hole through each of the top and bottom walls of the container and also adapted subsequently to withdraw said rupturive member from the container.

Yet another aspect of the invention provides apparatus for opening closed containers which incorporates: a loading platform for the containers, a first length of guideway for the containers extending between the loading platform and a container opening position, means including a hydraulically operated piston adapted to pass the containers along said first length of guideway to the opening position, at the opening position an elongate rupturive member guided for vertical movement along its length and provided at its lower end with a double tapered four-sided spike having a cross-section enlarged relative to the remainder of the rupturive member, means including a hydraulically operated piston adapted initially to urge said spike downwards through one of the containers whereby to pierce a hole through each of the top and bottom walls of the container and also adapted subsequently to withdraw said spike from the container, a vessel so disposed below said opening position as to collect fluid pouring down from an opened container, a further length of guideway for the containers disposed above said vessel and extending away from the opening position whereby opened containers may continue to drain into the vessel while a further container is at the opening position, means including a pair of hydraulically operated pistons adapted to clamp the container against lateral movement while said holes are pierced, and control means adapted to control the operation of said pistons.

Still another aspect of the invention provides a method of opening containers having contents of liquid or the like including passing part of an elongate rupturive member through the container thus piercing a hole through each of two opposed walls of the container and subsequently withdrawing the rupturive member from the container.

Further features and advantages of the invention will be apparent from the following description of an embodiment thereof, given by way of example, in conjunction with the accompanying drawings in which:

FIGURE 1 is a side view of apparatus in accordance with the invention for opening cylindrically shaped cans, containing liquid.

FIGURE 2 is a section taken along the line A—A in FIGURE 1, and

FIGURE 3 is a diagrammatic representation of the control system of the apparatus.

The apparatus comprises a guideway along which the cans can be transported to a can-opening location, and a piston and cylinder device disposed at this location, the piston of which bears an elongate rupturive member which has its free end formed as a spike to pierce through the top and bottom of each can to permit its contents to empty into a receiving trough.

Referring to the drawings, the apparatus comprises a horizontal guideway **1**, a loading platform **2** where the cans are placed in line in readiness for feeding along the guideway and a piston and cylinder device **3** vertically disposed intermediate the ends of the guideway; the piston of this arrangement bears an elongate member **4** which has at its free end a four sided spike **5** which, on operation of device **3**, pierces the top and bottom portion of a can disposed immediately below it to allow the enclosed liquid contents to empty into a generally U-shaped receiving trough **6** having a wire mesh screen **7**. To transport the cans along the guideway, a horizontally mounted piston and cylinder device **8** is positioned adjacent the loading platform **2**, the piston **10** of this device having a complementarily shaped member **11** which engages a can on the platform **2** to transport it onto the guideway. In so doing, the row of cans already on the guideway is displaced by the width of one can, and the empty can at the end of the row falls forward onto a further, inclined guideway **12** for removal.

To secure each can against movement during the piercing operation, two piston and cylinder devices **14** and **15** are disposed on opposite sides of the guideway and each have an arcuate can-engaging member **16** attached to the piston; member **16** is prevented from rotating by any suitable means for example, by a pin **17** on member **16** engaging parallel guide members **18** attached to the guideway **1**. Vertical movement of the can during withdrawal of the piston **4** is limited by a shoe with a central aperture forming a combined stop and guide member **20** secured to the frame of the apparatus.

The apparatus is made substantially automatic in operation, though it requires an operator to place the unopened cans on the loading platform **2**, and to remove the empty cans from guideway **12**. The automatic control is generally pneumatic and is concerned primarily with the timing of the four piston and cylinder devices **3**, **8**, **14** and **15**; for this purpose there is provided a microswitch **21** and co-operating can-engaging pivoted lever **22** disposed adjacent the loading platform for controlling the operation of device **8**, a lever-bleed valve **23** co-operating with the piston of device **8** at the end of its

stroke for controlling the operation of devices **3**, **14** and **15** during the actual piercing operation, and a further lever bleed valve **24** co-operating with a cam **25** secured to one of the guides **26** of piston **4** to retract the pistons of devices **3**, **14** and **15**, in readiness for the next operation.

The control circuit can be arranged as shown in FIGURE 3. Thus a primary air source **30** passes through an air control valve **31**, oil filter **32***a* and electromagnetic solenoid valve **33** controlled by microswitch **21**, to the piston and cylinder device **8**. Primary air also passes through a further oil filter **32***b* to lever bleed valve **23***b* which, when operated, controls swivel valve **34**. The valve **34** is the main control valve and controls the operation of piston cylinder device **3** and of arrangements **14** and **15** in co-operation with bleed valve **24**.

The operation of the apparatus is as follows: The operator places an unopened can on the loading platform **2**, and in so doing microswitch **21** is actuated, through lever **22**, to apply pressure to the back of piston **10** and cause device **8** to slide the can along the guideway. Towards the end of its stroke, a came **23***a* co-operating with the piston **10** actuates valve **23***b* which, in turn actuates main control valve **34**, causing devices **14** and **15** to clamp in position the can to be opened, and substantially simultaneously, piston **4** to descend. At this time the microswitch **21** has been released and the valve **33** applies pressure to the front of piston **10** returning this piston. At the end of its stroke, piston **4** through cam **25** actuates valve **24** to retract the pistons of devices **3**, **14** and **15**. The operation can now be repeated.

What I claim is:

1. Apparatus for opening closed containers which incorporates: a loading platform for the containers, a first length of guideway for the containers extending between the loading platform and a container opening position, means including a fluid operated piston adapted to pass the containers along said first length of guideway to the opening position, at the opening position an elongate rupturive member guided for vertical movement along its length and provided at its lower end with a double-tapered four sided spike having a cross-section enlarged relative to the remainder of the rupturive member, means including a fluid operated piston adapted initially to urge said spike downwards through one of the containers whereby to pierce a hole through each of the top and bottom walls of the container and also adapted subsequently to withdraw said spike from the container, a vessel so disposed below said opening position as to collect fluid pouring down from an opened container, a further length of guideway for the containers disposed above said vessel and extending away from the opening position whereby opened containers may continue to drain into the vessel while a further container is at the opening position, means including a pair of fluid operated pistons adapted to clamp the container against lateral movement while said holes are pierced, and control means adapted to control the operation of said pistons.

2. Apparatus for opening closed containers containing liquid which incorporates:

a loading platform for the containers, a horizontal guideway for supporting a row of containers of which a first length extends between said loading platform and an opening station and a second length extends away from said opening station,

ram means at said loading platform for engaging the end container of said row and advancing the row along said guideway by a distance substantially equal to the width of a container,

fluid operated piston means at said opening station for clamping the containers against lateral movement during opening,

at the opening station an elongate piercing member disposed above said guideway and guided for vertical movement and actuator means for urging said piercing member downwardly whereby to pierce a hole through each of the top and bottom walls of a container and for subsequently withdrawing said piercing member from the container,

a vessel disposed below said opening station and said second length of guideway to receive fluid from opened containers on the guideway,

and control means for controlling the sequence of a cycle of operations of the apparatus.

3. Apparatus according to claim **2** comprising a switch means connection to said control means and responsive to the positioning of a container on said loading platform to initiate said cycle of operations.

4. Apparatus according to claim **2** wherein said actuator means includes a fluid operated piston disposed above said guideway.

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