Dec. 18, 1951 G. M. STEVENSON 2,579,404

DETECTOR MECHANISM FOR CAPPING MACHINES

Filed Nov. 15, 1948 2 SHEETS—SHEET 1

FIG. 1.

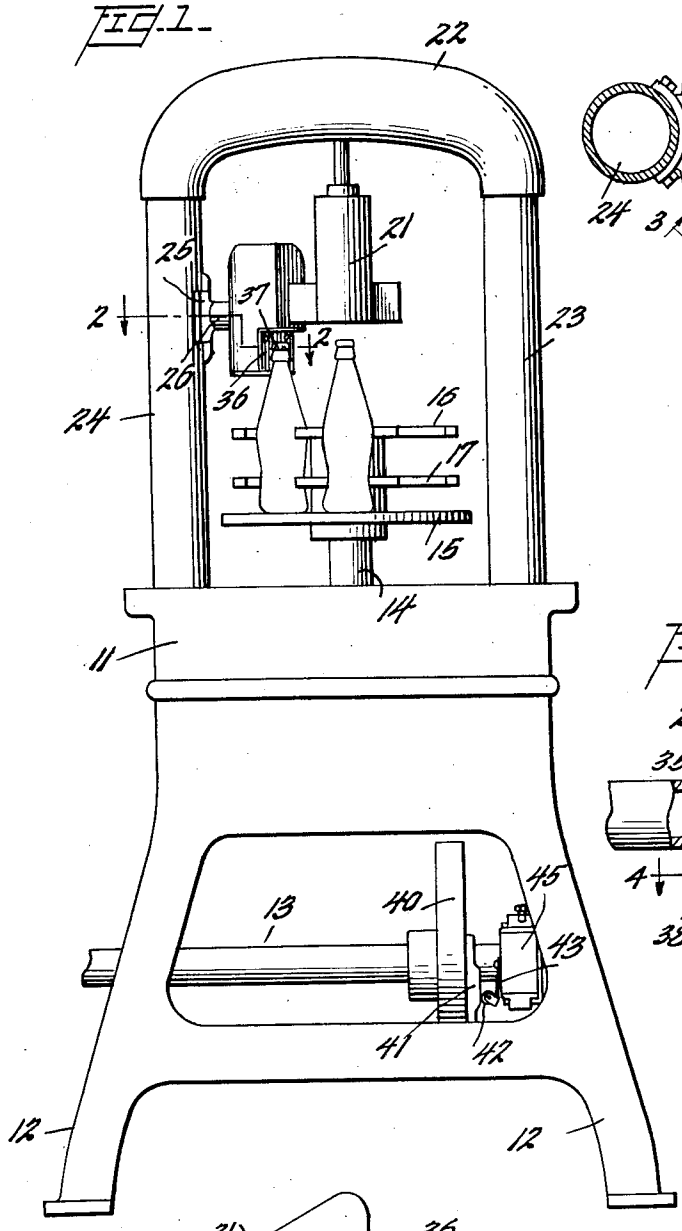


FIG. 2.

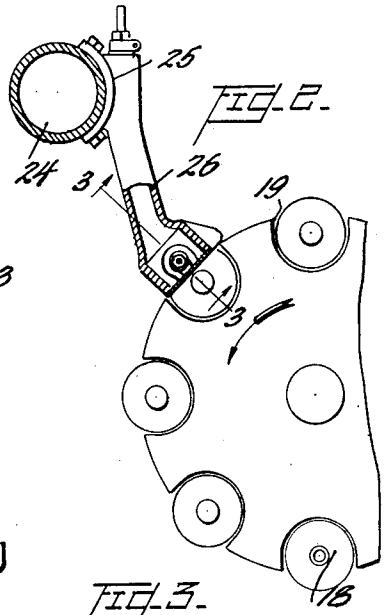


FIG. 3.

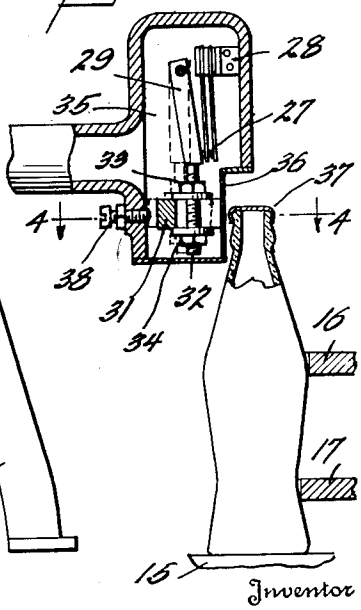
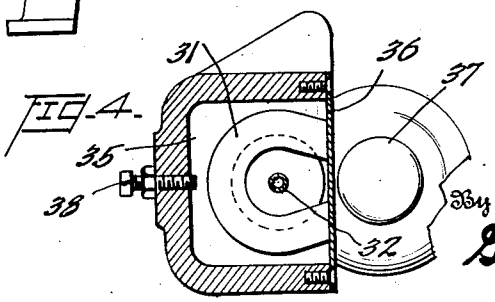


FIG. 4.



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Dec. 18, 1951 G. M. STEVENSON 2,579,404

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Filed Nov. 15, 1948 2 SHEETS—SHEET 2

FIG. 5.

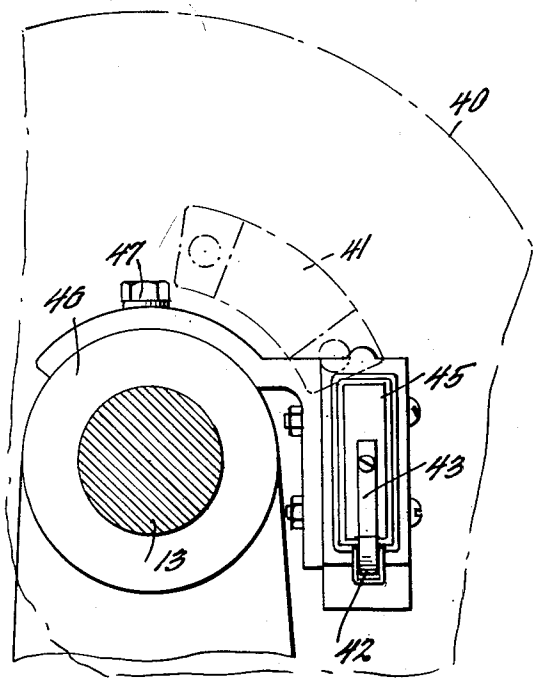


FIG. 6.

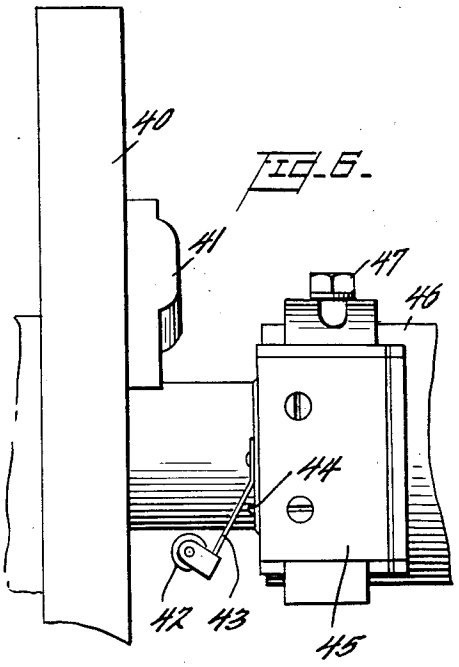
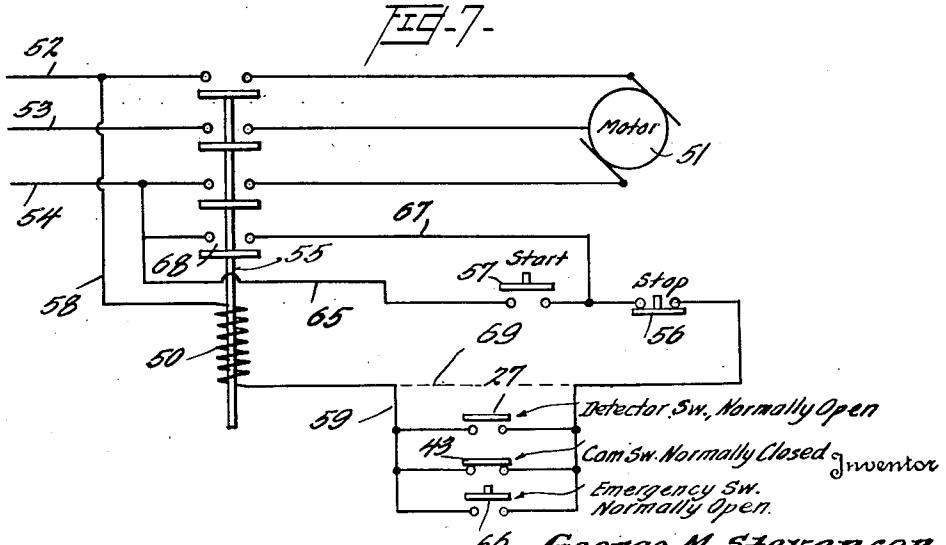


FIG. 7.



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DETECTOR MECHANISM FOR CAPPING MACHINES

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9 Claims. (Cl. 226—84)

1

This invention relates to detector mechanism for capping machines, and more particularly to mechanism for automatically stopping a container-capping machine in the absence of a cap or in the case of a broken or improperly capped container.

Detecting machines of the prior art have been unduly complicated and generally limited to indicating either the absence of a cap or the clogging of a feed chute without functioning to stop the machine should a broken bottle be present on the bottle-carrying conveyor or turret.

The main object of the present invention is, therefore, to provide a simple unitary mechanism for stopping the machine either when a container reaching the detector station has no cap, or when a broken or improperly capped container passes the detector station.

Another object of the invention is to provide a simple mechanism for performing both of these functions, and to incorporate it in a standard machine with a minimum of expense and alteration of that machine.

Numerous other objects and advantages of the mechanism will be apparent from the following description when it is read in connection with the accompanying drawings, in which:

Figure 1 is a front elevation showing the essential features of a known type of bottle-capping machine having an embodiment of the present invention applied thereto.

Figure 2 is a horizontal sectional view of the detector mechanism, substantially on line 2—2 of Figure 1, showing its relation to the bottle-carrying turret.

Figure 3 is a vertical sectional view on line 3—3 of Figure 2, showing the details of a portion of the detector mechanism, and its operative relation to a bottle carried on the capping-machine.

Figure 4 is a horizontal section on the line 4—4 of Figure 3.

Figure 5 is a sectional view through a rotating shaft of the machine, showing the relation between the parts of a cam actuated circuit-controlling mechanism used in connection with the invention.

Figure 6 is a side elevation of the arrangement of Figure 5 looking from right to left in that figure, and

Figure 7 is a circuit diagram of the invention, as applied to a machine of the type shown in Figure 1.

Referring to the drawings, reference character 11 designates the frame of a well-known type of container capping-machine, such as is used in capping bottles containing non-alcoholic beverages. This particular type of machine is shown by way of example but without intention to limit the application of the invention to machines of this type alone. The details of the machine are

2

omitted except to show such parts as are essential to the operativeness of the invention.

As shown, the frame, designated 11, mounted on legs 12, includes suitable means to support a rotating shaft 13 carrying a cam-operated circuit-controlling mechanism, later to be described. The frame includes posts 23 and 24 bridged by an arch 22, adapted to carry the capping mechanism. An electric motor suitably mounted on this frame (shown in Figure 7), is adapted to drive both the shaft 13 and a vertical shaft 14 which carries a turret 15. This turret includes means such as the notched plates 16 and 17 for supporting a plurality of bottles to be filled and capped, as the turret rotates in the direction indicated by the arrow in Figure 2. As the turret rotates, a bottle is placed in the position indicated 18 in Figure 2, and passes a filling mechanism (not shown) until it reaches the capping station 19 where it may be supplied with a cap by means of a known type of capping mechanism indicated 21, and supported by the arch 22.

The parts so far described are standard and are described merely to indicate how the present invention is applied. The modification required to make use of the present invention is to provide two circuit controllers, one associated with the shaft 13 or other equivalent moving part of the machine, and the other with the turret, and to arrange them in the circuits, as described below.

The circuit controller for the turret is attached to post 24 and comprises a bracket 25 terminating in a hollow arm 26, which supports within its outer end a magnetic circuit-controlling means, arranged to close an electric circuit through contacts 27 each time that a properly capped bottle passes it. For convenience, this will be referred to as the detector station. Should an uncapped bottle or an improperly capped or broken bottle pass this station, the contacts 27 would not be closed. The clearances between the detector and the bottles may be arranged to give as precise control as is desired.

Described in detail the circuit-controlling mechanism carried by the arm 26 comprises not only the contacts 27, supported by spring arms attached to the support at 28, but a pivoted arm 29 supported at its upper end and carrying magnetic means, here shown as a horse-shoe permanent magnet 31 at its lower end. This magnet could assume any equivalent form to that shown, e. g. it could be an electromagnet. The magnet is adjustably clamped to the stud 32 by nuts 33 and 34 which permit variation in the magnet position. The magnet is preferably of some such highly coercive material as "Alnico." It and the arm and the contacts are all housed within a chamber 35. The face of said chamber adjacent to the turret is closed by a thin non-

magnetic plate 36 which may, for example, be of aluminum. This plate contacts the ends of the magnet, as indicated in Figure 4, when a capped bottle is at the station. The positioning of the arm 26 is such that the capped bottle passes the plate with very slight clearance during proper operation of the machine. This clearance is so slight that the presence of the bottle cap 37 will cause the magnet 31 to move toward it and swing the arm 29 to the right sufficiently to close the contacts 27. In the absence of the cap 37 the magnet will remain swung to the left against the stop screw 38, as indicated in dotted lines, leaving the contacts 27 open. The actuation of contacts 27, is therefore, dependent upon the presence of a properly capped bottle passing the detector station. An uncapped bottle or a bottle broken so that the cap is not properly positioned with respect to the magnet in passing will not actuate the magnet. The stop screw 38 may be adjusted to vary the clearance between the magnet and plate 36.

The circuit-controlling mechanism actuated by the shaft 13 comprises a cam 40 having an enlargement at 41 cooperating with a roller 42 carried by a spring arm 43. The spring arm is adapted, when moved to the right in Figure 6, to engage electrical contact button 44 carried by the housing 45, this housing being secured to a fixed bearing 46 by screws 47. The arrangement is such that the enlargement 41 will actuate the circuit-controller once during each revolution of the shaft 13. Rotation of the shaft 13 is timed so that the circuit is opened by the arm 43 each time that a container reaches the detector station and it is, therefore, essential that there be a particular timed correlation between the action of the circuit controller at the detecting station, and the circuit controller associated with shaft 13. This relation will be clear from consideration of the circuit diagram of Figure 7.

Referring now to Figure 7 the reference character 51 designates a driving motor of known type shown, in this instance, as a three-phase motor supplied with current from line wires 52, 53 and 54 over a main electro-magnetic starting switch 55.

As is usual in machines of this type, a starting switch 57 of the push button type is provided and, likewise, a similar stop switch 56. These switches are included in a circuit extending from line wire 52 over wire 58, winding 50 of starter switch 55, wire 59 through either of switches 27 or 43 to line wire 64, stop switch 56, start switch 57 and wire 65 to line wire 54.

When cam switch 43 is closed, the closing of start switch 57 will complete the motor circuit through the main switch 55. In the event that the machine has stopped at a point where cam switch 43 is open, and detector switch 27 is also open, it would be impossible to complete the motor circuit to start the machine. Consequently, a manually operable switch 66 is provided in parallel with the switches 27 and 43 in order to energize the motor and drive the machine far enough to close the cam switch 43 and initiate normal operation.

The start switch 57 opens after it has established a holding circuit over line 67 and contacts 68 of switch 55. This places the control under the two parallel-connected switches 27 and 43. The arrangement is such that during proper operation of the machine one of these parallel-connected switches is always closed. Each time that a properly-capped bottle passes the detector station, the switch 27 is closed to maintain the motor circuit closed when the cam switch 43 is subjectd to its periodic opening. It will be seen, therefore, that so long as properly-capped bottles pass the detector station in sequence, the switches 27 and 43 open and close at regularly recurrent intervals staggered with respect to each other to secure continuous operation of the motor 51. The motor is stopped, therefore, through the action of the detector only when the switch 27 remains open at the time that the cam switch 43 opens.

It will be understood that the application of the present invention to a standard capping-machine involves merely the placing of the detector switch 27 at a convenient position on the frame of the machine, the attachment of the cam switch 43 in a position to be opened cyclically in timed operation with the switch 27 and placing of the emergency switch 66. These three switches are then merely wired in parallel and cut into the normal circuit of the machine at a point such as that indicated in dotted lines at 69. In other words, the only alteration necessary in attaching the mechanism of the present invention to a machine of the type of that described, is to break the machine circuit at 69 and to connect the parallel-connected switches 27, 43 and 66 across the break.

It should be pointed out that even though the circuit in Figure 7 indicates that switch 27 is normally open and switch 43 normally closed, this specific arrangement is not necessary provided the two switches are arranged so that one is always closed during the normal functioning of the machine. In other words, it is possible to so arrange these switches that 43 is normally open and 27 normally closed, without altering the principle of operation of the machine. The invention has been described in connection with a bottle-capping machine employing a rotating turret, but it will be obvious to those skilled in the art that it is by no means limited to the specific type of machine shown but may be applied to other machines employing a conveyor which is not a turret, or to the capping of containers other than a bottle like that illustrated. It is essential that the container have a closure of magnetic material and that the body of the container be of non-magnetic material so that it will only actuate the circuit controller when a cap is missing, or the container is defective and incapable of holding the magnetic cap in proper relation to the detector. Otherwise, the type of conveyor mechanism and the size or shape of the container is not important, and may be varied within wide limits.

Having thus described my invention, what is claimed is:

1. In a detecting mechanism for capping machines of the type in which containers are capped on a traveling conveyor and the machine includes a traveling conveyor, a capping station adjacent to said conveyor for capping containers passing the same, and a detector station, the combination comprising cam means rotating in timed relation with movement of said conveyor, electric means for driving said conveyor and said cam means, two parallel-connected switches in circuit with said electric means, one switch being normally open and the other normally closed, means controlled by said cam means for opening the normally closed siwtch each time a container reaches the detector station, and means brought into action

by only a properly capped container for closing the normally open switch each time a capped container reaches the detector station.

2. In a cap-detecting mechanism for container capping machines of the type having a traveling conveyor for carrying containers to be capped, a capping station, a detector station, and means for capping containers passing said capping station, the combination comprising electric means for driving said conveyor, a circuit for supplying current to said electric means, means actuated in timed relation with the movement of the conveyor for opening said circuit each time a container reaches the detector station, and means brought into action by a properly capped container for closing said circuit each time said first-mentioned means approaches the circuit-opening position.

3. In a flaw detector for bottle capping machines of the type comprising a rotating turret for bottles to be capped, a capping station including means for capping bottles as they pass said station, a detector station, and electric motor means for driving said turret, the combination comprising a pair of parallel-connected switches in circuit with said motor, means for causing one or the other of said switches to be closed at all times when a series of properly capped bottles are passing said detector station in sequence, cam means operating in timed relation with the rotation of the turret for actuating one of said switches each time a bottle reaches the detector station, and means including a pivoted magnet arranged adjacent the path of travel of bottles on said turret for actuating the other of said switches each time a capped bottle reaches the detector station.

4. In a detecting mechanism for capping machines of the type having a bottle-carrying turret, a capping station and a detector station adjacent to said turret, the combination comprising electric motor means for driving said turret, a pair of parallel-connected switches in said motor circuit, means for causing at least one of said switches to be closed at all times when properly capped bottles are passing the detector station in succession, a permanent magnet pivoted adjacent the path of travel of said bottles at said detector station and arranged to be attracted by the bottle caps as they pass the detector station in sequence, said magnet being arranged to actuate one of said parallel-connected switches, and means moving in timed relation with the movement of said turret for actuating the other of said parallel-connected switches.

5. In an automatic stop mechanism for bottle capping machines of the type having a bottle carrying turret, an electric motor for driving said turret, means for capping bottles as they move with said turret, and a detecting station past which the bottles travel after leaving the capping means, the combination comprising a pair of parallel-connected switches in circuit with said motor, means driven by said motor for opening one of said parallel-connected switches each time a bottle passes the detector station, and magnetic means adapted to be moved by a properly positioned bottle cap at the detector station for closing the other of said switches to maintain the motor energized when said motor driven switch is opened.

6. A detector mechanism for container capping machines, comprising a traveling conveyor for containers, electric motor means for driving said conveyor, said means including a motor circuit, a magnetically operated switch in the motor circuit and disposed adjacent to the path of travel of containers on said conveyor and arranged to be actuated only by a properly capped container, and a cam actuated switch connected in parallel with the magnetically operated switch, driven by said motor and arranged to be actuated each time a container passes the magnetically operated switch.

7. In a cap-detecting mechanism for container capping machines of the type having a traveling conveyor for carrying containers to be capped, a capping station, a detector station, and means for capping containers passing said capping station, the combination comprising electric means for driving said conveyor, a circuit for supplying current to said electric means, means actuated in timed relation with the movement of the conveyor for opening said circuit each time a container reaches the detector station, means brought into action by a properly capped container for closing said circuit each time said first-mentioned means approaches the circuit-opening position and manually operable means for closing said circuit when both said circuit-opening and said circuit-closing means are positioned to open said circuit.

8. A detector mechanism for detecting the presence or absence of a metal cap on a non-metallic receptacle, comprising a support, a permanent magnet pivoted on said support and arranged to be attracted by the cap of a container passing the magnet, a pair of electric contacts positioned to be closed by said magnet in one position of the magnet, and to be opened in another position of the same, electric motor driven means for moving containers past said detector, and circuit controlling means for the motor, a switch in said motor circuit, and means for actuating said switch each time a container passes said detector.

9. A detector unit for detecting the presence or absence of a metal cap on a non-metallic receptacle comprising a bracket having a chamber in an extreme portion thereof, a flat non-magnetic face on said bracket, a magnet pivoted in said chamber and arranged to swing against said plate or away from it, and an electric switch in the path of travel of said magnet and arranged to be actuated by movement of said magnet against said plate.

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