DETECTING DEVICE FOR MAGNETIZABLE MEMBERS

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Application May 19, 1950, Serial No. 163,071

13 Claims. (Cl. 177—311)

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This invention relates generally to detecting devices and more particularly to means for automatically detecting the absence of a magnetic cap or crown from a bottle or other non-magnetic container.

Devices of this character, made in accordance with the teachings of the prior art, have utilized different forms of feelers to complete a circuit to actuate an alarm or energize a light. Mechanical detectors have been a possible source of contamination to the contents of the bottle or container without a cap thereon. Electronic detectors are expensive to manufacture and the average maintenance man in a shop cannot repair them and keep them in running order. Furthermore, these electronic detectors require frequent adjustments.

Beverage bottles and other types of beverage and food containers are capped in automatic machinery whereby the bottles or containers pass along a conveyor in aligned positions. Foreign particles, damaged caps, wear on the capping device, mechanical failure of the capping device, and other causes permit bottles or other containers to pass the mechanical capper without being capped. If the absence of a cap can be detected immediately, the machine can be stopped and the failure of the machine to cap the bottles or containers can be adjusted or repaired immediately and they can be run back through the machine without loss of the product. If the uncapped bottle or container is permitted to go to the pasteurizer or out of a sterile atmosphere, the product in the container is lost. This loss may be great since a failure frequently continues until it is manually corrected.

It is, accordingly, an object of my invention to overcome the above and other defects in present detecting devices in general and it is more particularly an object of my invention to provide a detecting device for detecting the absence of a magnetic cap or crown from a bottle or other non-magnetic container which is simple in construction, economical in cost, economical in manufacture, efficient in operation, and easy to install and maintain.

Another object of my invention is to provide a detector for detecting the absence of a magnetizable cap on a container which touches no part of the bottle or container in an area thereof later to be inside thereof or engaged by the cap.

Another object of my invention is to provide a detector for use in conjunction with a bottle capping machine for detecting the absence of a magnetizable bottle cap which requires no adjustment other than the original setting for the size of the bottle or container, which requires no maintenance except the possible replacement of light bulbs, which signals the fact that power is being fed to the detector, and which signals that an uncapped container has passed the detector.

Another object of my invention is to provide a detector for detecting the absence of magnetizable caps on bottles passing thereby which can be readily mounted, removed, or adjusted on a mounting bracket to accommodate different sized bottles or containers, the mounting bracket being readily attached to any conventional capping machine now in use.

Another object of my invention is to provide a detecting device for use in conjunction with a bottle capping machine for detecting the absence of magnetizable bottle caps on bottles mounted on a bracket whereby lights, an audible signal, or any other suitable signal may be actuated thereby, all of said elements being supported on the bracket to provide a complete self-contained unit.

Another object of my invention is to provide a detector for detecting the absence of magnetizable bottle caps on bottles passing thereby which is protected against the entrance of liquids.

Another object of my invention is to provide a detector for detecting the absence of magnetic caps on non-magnetizable containers which utilizes permanent magnets to detect the absence of a bottle cap on a bottle or container.

Other objects of my invention will become evident from the following detailed description, taken in conjunction with the accompanying drawings, in which

Fig. 1 is a side elevational view of my novel detecting device for detecting the absence of a magnetic cap from a non-magnetic bottle or container;

Fig. 2 is a side elevational view of my novel detecting device shown in Fig. 1;

Fig. 3 is a vertical sectional view taken through my novel detecting device;

Fig. 4 is a view taken on the line 4—4 of Fig. 3 with the wiring system shown diagrammatically;

Fig. 5 is a view taken on the line 5—5 of Fig. 1;

Fig. 6 is a fragmentary sectional view of a modified form of my novel detecting device; and

Fig. 7 is a fragmentary sectional view of another modified form of my novel detecting device.

I will describe my invention, for the purposes of illustration, as applied to bottle caps although it may be applied to any other use in which it has an application.
Referring now to the drawings, I show in Figs. 1 to 5 inclusive an inverted U-shaped support bracket 1 having outwardly flanged feet 2 for attachment to a flanged base 3 as shown in Fig. 4. The flanged base 3 has upwardly extending sides 4. An indexing member 6 extends through an aperture 7 in the base 3 and it has an intermediate offset portion 5 and a finger 8 extending laterally outwardly from the bottom end thereof for engaging the side of a bottle or container. The upper end of the indexing member 6 is attached to the underside of the top of the inverted bracket 1, the member 6 being elastic and laterally yielding. An arm 11 extends transversely of the base 3 and it is attached to the upwardly extending side 4 of the base 3 by a hinge member 12. The end of the member 11 opposite to the hinged end thereof is flanged upwardly at 13 and a magnet 14 is disposed thereagainst. A vertically extending limiting member 15 has a right angled upper end 15 with an armature 17 attached thereto for attraction of the magnet 14 carried on the end of the arm 11. A spring 21 urges the magnet 14 on the arm 11 toward the armature 17. The arm 11 also has a right angled bracket 16 disposed intermediate the upper side thereof carrying an inclined support platform 19 for supporting a magnet 25 thereon. A magnet 22 is secured to the underside of the arm 11 intermediate thereof, the magnet 22 being influenced by magnetic bottle or other container caps passing the finger 8 of the indexing member 6. A spring 25 urges the offset portion 5 of the indexing member 6 into locking engagement with the arm 11.

A bracket 23 is secured to the upper side 8 of the bracket 1 and it has opposed yieldable escutcheon support fingers 24 for detachably carrying in an inclined position a magnetic mercury switch 25 spaced a predetermined distance above the magnet 25 when the magnet 25 is in an inoperative position as in Fig. 4 and being parallel thereto. The mercury switch 25 is conventional and has a fixed contact 27 and a movable contact 27a adapted to be bridged by a mass of mercury or other electrically conducting fluid material 28 movable in a non-conductive container 29. The contact 27 of the mercury switch 25 connects with wire 31 leading to wire 32 and an incandescent lamp 33. The incandescent lamp 33 is connected to the plug 40 by wires 34, 35, and 36. A horn 37 is connected by wires 38 and 39 to wires 31 and 33, respectively. The incandescent lamp 33 and the horn 37 are energized when the contacts 27 and 27a of the switch 25 are bridged by the mercury 26. The movable contact 27a is connected to the plug 40 by wires 42 and 43. A second incandescent lamp 44 is connected by wires 45 and 46 to the wires 42 and 43 respectively and to the plug 40 which may be plugged in any conventional socket to provide electric power for the energization of my novel detecting device. A reset cam 50 is fixed to and extends radially outwardly from one end of a shaft 51 journalined in apertures in a bracket 52 and one side of the bracket 1, respectively. A stop 53 is mounted on one side of the bracket 1 to limit the upward movement of an arm 54 secured to and extending radially outwardly from the shaft 51. A spring 55 urges the arm 54 upwardly against the stop 53. The cam 50 is adapted to engage the arm 11 to set it in a position shown in Figs. 3 and 4 whereby the lamp 33 and horn 37 are de-energized. A handle 56 is disposed on the outer end of the shaft 51.

All parts of my novel detecting device other than the magnets are preferably non-magnetic.

The lamps 33 and 44 are shown diagrammatically in Fig. 4 but in Figs. 1, 2, and 5, lenses 60 on sleeves 61 are shown disposed in apertures 62 in the front portion of a housing 63 which is attached to the upwardly extending sides 4 of the base 3 by screws 64. The lamps 33 and 44 are disposed behind the lenses 60 in apertures 65. The lenses 60 may be of any desired color. The housing 63 has an upwardly extending supporting bracket 65 mounted on the upper side thereof and attached thereto with an aperture 67 for receiving an arm 66 mounted on a vertically adjustable bracket 68 movable vertically on a standard 70. The bracket 65 is locked in any predetermined position by a locking screw 71. The bracket 66 is movable along the arm 68 and is secured in any desired position by a locking screw 72. The vertical shaft or standard 70 may be secured to any suitable portion of a capping machine or any other suitable support means. As shown in the drawings for the purposes of illustration to show one type of support which may be used with my novel detecting device although it will be evident that any suitable form of support means may be utilized. Guide rails 73 are provided in conjunction with a guiding member 74 to guide the bottles or other containers into the magnetic path of my novel detecting device.

In operation, my novel detecting device is set up on a bottle capping machine at some point on the conveyor line beyond the capper. I have shown a form of support which may be secured to conventional bottle capping machines, many of which have tapped holes for securing the standard 70 thereto. The guiding member 74 and finger 8 on the indexing member 6 are set in a predetermined relationship to the cap on the bottles moving on the conveyor by moving the bracket 66 along the horizontal arm 68 and securing it at a predetermined position by the locking screw 72 and moving the bracket 68 on the standard 70. The arm 11 is then set in a horizontal position as shown in Figs. 3 and 4 by rotation of the handle 56 on the end thereof, the cam 50 on the shaft 51 engaging the arm 11 to move it to a position as shown in Figs. 3 and 4. The spring 55 urges the arm 54 upwardly. The detecting device is set up over the conveying line so that the top of a cap on a bottle on the conveyor is a predetermined distance from the magnet 25 whereby the magnetic attraction of the caps will hold the arm 11 in a horizontal position against the force of the spring 21. The force of the spring 21 is comparatively light so that the magnetic force between a bottle cap and magnet 22 is slightly greater than the force of the spring 21. The plug 40 is plugged in any suitable socket so that the lamp 44 is energized to indicate that the detecting device is energized.

As bottles move along the conveying line beneath my detecting device, the finger 8 on the index insert 10 is progressively engaged by the tops of the bottles thereby moving the offset portion 5 thereof against the force of the spring 55 out of the upwardly swelling path of the arm 11 so that the magnet 25 may move adjacent the bulb 29 of the switch 25 to actuate the switch 25 when there is no cap on a bottle to attract the magnet 22. As long as bottles passing along the conveyor line and beneath the detector have magnetic caps thereon, the magnet 22 will be at-
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tracted to the caps thereby preventing the rise of the arm 11 to which the magnet 22 is attached to energize the switch 25 and the horn 37 and the lamp 33 in circuit therewith. When a bottle passes the detector without a cap, the indexing arm 14 is also forced to draw the arm 88 out of the upwardly swinging path of the arm 11 the same as when engaged by a capped bottle; however, there is no cap to attract the magnet 22 and the spring 21 pushes one end of the arm 11 upwardly, the attraction of the magnet 14 to the armature 17 is therefore that the upper side thereof in engagement with a bent arm 88 fixed to a transversely extending shaft 89 in a housing 90. Also fixed to the shaft 89 is an arm 91 extending outwardly of the housing 90 with an enlarged head 92 on the outer end thereof. In operation, the arm 82 with the bracket 87 moves upwardly when the magnet (not shown) carried on the underside thereof is not attracted by the magnet 88 thereby raising the arm 88 which rotates the shaft 89 and the arm 91 carrying the enlarged head 92. An operator will notice that the enlarged head 92 is extending upwardly from the housing 90 as shown in dotted lines which is a signal that a bottle has passed the detecting device without a cap. The enlarged head 92 may also be used as a knocker for striking a bell (not shown). The bell may be disposed on the upper side of the housing 90 thereby providing a visual signal as well as an audible signal. It will be evident from the foregoing description that I have provided a novel detecting device for automatically detecting the absence of a magnetic cap or crown from a bottle or other non-magnetic container passing within a predetermined distance below the detecting device in an aligned position, in which no part thereof touches the bottle or container in an area later to be inside of or contacted by the cap, which may be adjusted horizontally or vertically, which requires practically no maintenance, one in which visual means or audible means indicate that power is being fed to the detector and one in which any other suitable signalling means or any other switching means may be actuated when a cap is absent from a container, which may be readily adapted for use on any conventional bottle-capping machine now in use, which is protected against the entrance of liquids, and which is very economical in cost and manufacture and efficient in operation.

Various changes may be made in the specific embodiment of my invention without departing from the spirit thereof or from the scope of the appended claims.

What I claim is:

1. A device for detecting the absence of magnetizable members from conveyed magnetizable and non-magnetizable members comprising a magnet disposed a predetermined distance from a passing conveyed member and arranged to attract thereby, means for yieldingly supporting said magnet, a control member actuated upon the movement of said support member away from said conveyed members upon the absence of magnetizable members, and means for normally holding said support member and magnet in a predetermined position relative to said conveyed members, said holding means being releasable from said support member upon actuation thereof by passing conveyed magnetizable and non-magnetizable members being conveyed thereby.

2. A device as set forth in claim 1 wherein said control member has a signalling member which is actuated thereby.

3. A device as set forth in claim 1 wherein said device includes an inclined mercury switch connected to signalling means and a second magnet is supported by said yieldable support member movable adjacent to said mercury switch upon release of said support member to actuate said switch.

4. A device as set forth in claim 1 wherein said support member carries a second magnet engageable with an armature a predetermined distance therefrom for limiting the movement of said support away from said conveyed members and for accelerating and positively securing said support
4. In combination with a capping machine, a detecting device for detecting the absence of magnetizable caps on conveyed non-magnetic containers comprising a magnet spaced a predetermined distance above the tops of the containers for attraction thereby, yieldable support means for said magnet, a switch, means for urging said support means towards said switch, signalling means electrically connected to said switch, a source of electrical power connected to said switch for energizing said signalling means upon the actuation of said switch, means movable with said support means for actuating said switch when said magnet is not attracted by the caps on the containers passing thereby, and means normally restraining the movement of said support means progressively actuated by conveyed containers to free the path of said support means whereby said switch may be actuated.

7. In combination with a capping machine, a detecting device as set forth in claim 5 wherein a reset member is provided for moving said switch actuating means away from said switch to de-energize same.

9. In combination with a capping machine for containers, a detecting device for detecting the absence of a magnetizable cap on a non-magnetizable container conveyed from said capping machine comprising a support member, means for urging said support member away from said conveyed containers, a magnet carried by said support member adapted to be attracted by the caps on containers passing thereby a predetermined distance therefrom, a switch, a source of power connected to said switch, means carried by said supporting member for energizing said switch, signalling means connected to said switch, and support member holding means progressively actuated by said containers for progressively freeing said support member whereby it may move toward said switch.

10. In combination with a capping machine for containers, a detecting device as set forth in claim 9 wherein said switch is a switch with a movable liquid electrical conducting mass therein with a fixed and a movable contact member and a second magnet is carried on top of said support member adapted to attract said movable contact member and move it into said electrical conducting mass to actuate said switch when a cap is absent from a container and said support member moves toward said switch.

11. In combination with a capping machine for containers, a detecting device as set forth in claim 9 wherein guiding means guide the tops of containers in a predetermined magnetic path in passing said detecting device.

12. A device for detecting the absence of members from conveyed magnetizable and non-magnetizable members comprising a housing, a hinged support member in said housing, a magnet carried on the underside of said support member adapted to be disposed a predetermined distance from said conveyed members, means for urging said support member away from said conveyed magnetizable members, a second magnet on the upper side of said support member, a mercury switch, electrical power means connected to said mercury switch, signalling means connected to said mercury switch, said second magnet actuating said mercury switch upon upward movement of said support means in the absence of magnetizable members passing said device, and an indexing member normally in the path of movement of said support member engageable by the conveyed members passing said detecting member for moving said indexing member from the path of movement of said support member.

13. A device for detecting the absence of magnetizable members from conveyed magnetizable and non-magnetizable members comprising a magnet disposed a predetermined distance from the passing conveyed members for attraction thereby, means for yieldingly supporting said magnet, a control member actuated by the movement of said support member and magnet away from said conveyed members upon the absence of a conveyed magnetizable member, and means for normally holding said support member in a predetermined position relative to said conveyed magnetizable member, said holding means being released upon the movement of conveyed members.

RONALD C. HOFF.

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The following references are on record in the file of this patent:

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