

Dec. 4, 1962

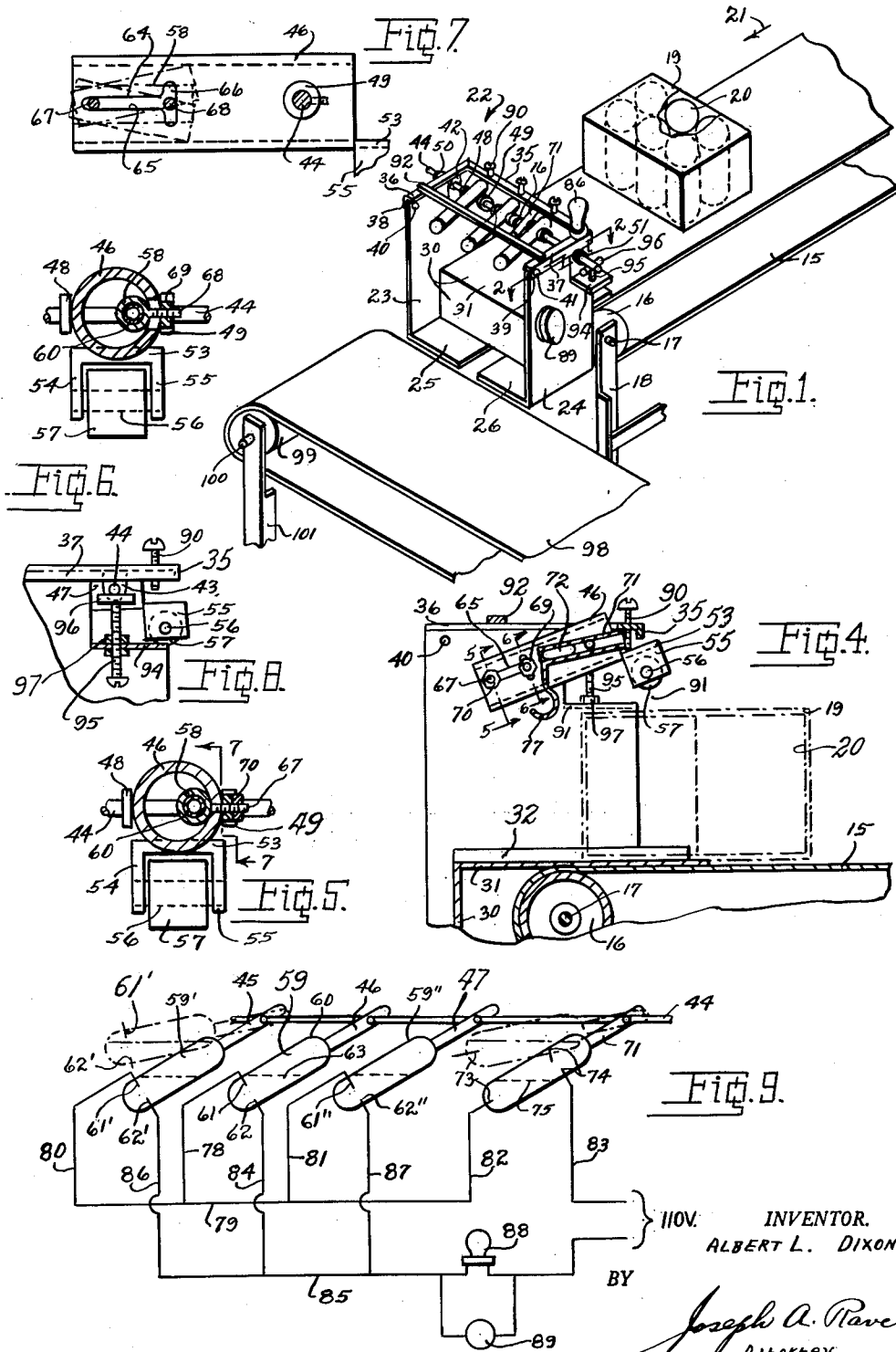
A. L. DIXON

3,067,412

DEVICE FOR DETERMINING THE CONTENTS OF SEALED CONTAINERS

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2 Sheets-Sheet 1



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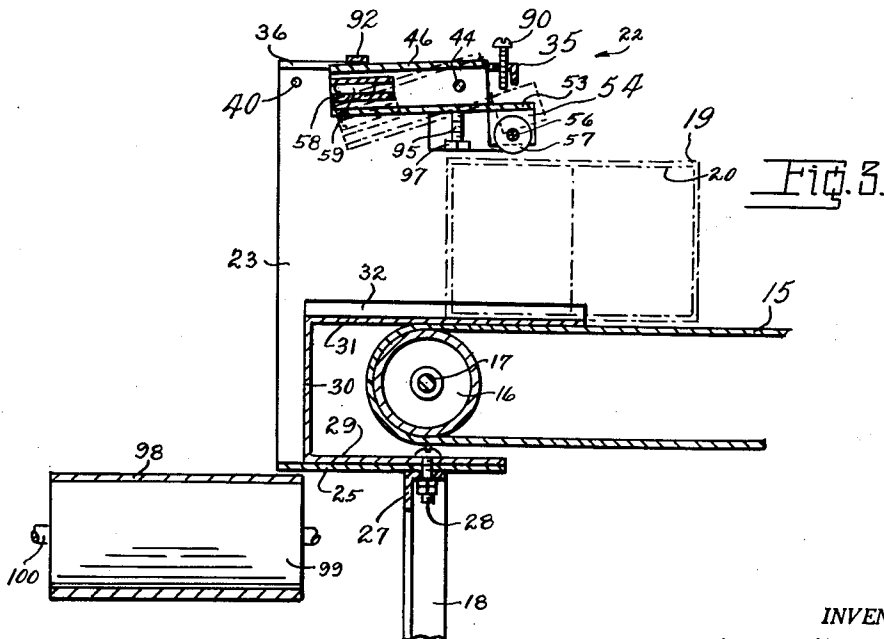
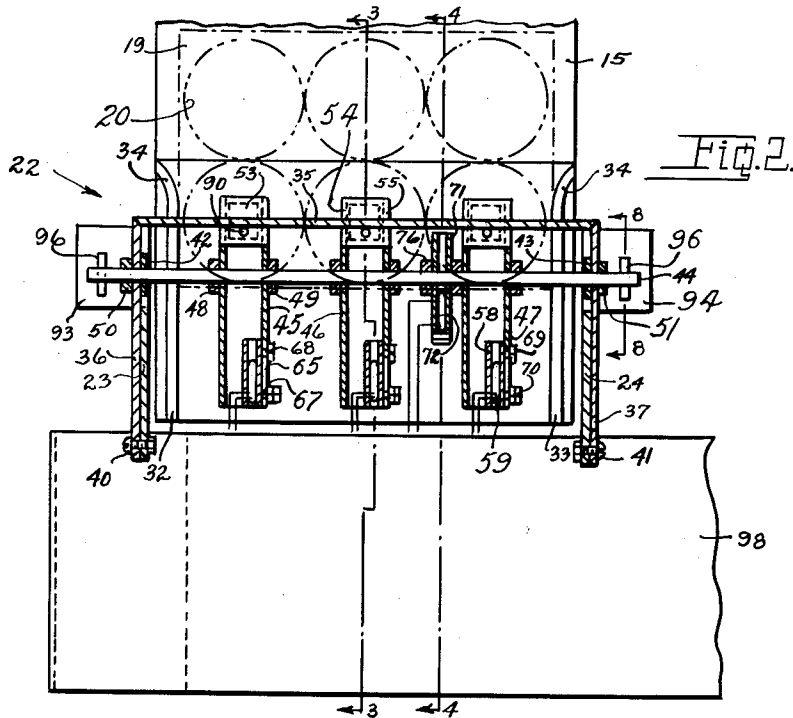
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DEVICE FOR DETERMINING THE CONTENTS OF SEALED CONTAINERS

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2 Sheets-Sheet 2



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3,067,412

DEVICE FOR DETERMINING THE CONTENTS OF SEALED CONTAINERS

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This invention relates to improvements in a device for determining the contents of sealed containers, more particularly a device of the present invention detects the absence of an article inadvertently omitted from a sealed container such as a shipping container, box, or the like.

Canned goods are generally automatically packed a given number of cans to a shipping container, carton, or the like. For example it is the practice to ship beer in cans, such as six cans to a cardboard carton or container, with said cans automatically inserted in said carton and said carton automatically sealed whereupon the carton is delivered by conveyer to a storage or shipping point to be subsequently opened by a user. It occurs with any mechanical means that occasionally a can is short in the desired number yet the carton has been sealed as though it were packed with the desired quantity of cans.

It is the principal object of the present invention to provide a device that inspects the closed container and detects the absence of a can and notifies the attendant.

Another object of this invention is the provision of a device for accomplishing the foregoing object that is relatively simple of construction yet highly efficient in operation.

A further object of this invention is the provision of a device for accomplishing the foregoing objects that may be utilized in connection with an existing conveyer without requiring any particular changes in said conveyer and its operation.

Other objects and advantages of the present invention should be readily apparent by reference to the following specification considered in conjunction with the accompanying drawings forming a part thereof and it is to be understood that any modifications may be made in the exact structural details there shown and described, within the scope of the appended claims, without departing from or exceeding the spirit of the invention.

In the drawings;

FIG. 1 is a perspective view of a device embodying the principles of the present invention.

FIG. 2 is an enlarged horizontal sectional or plan view of the device as seen from line 2-2 on FIG. 1.

FIG. 3 is a vertical sectional view of the device of the present invention as seen from line 3-3 on FIG. 2.

FIG. 4 is a view similar to FIG. 3 taken through a plane to the right of that of FIG. 3 on line 4-4 on FIG. 2.

FIG. 5 is a transverse sectional view through an element of the device as seen from line 5-5 on FIG. 4.

FIG. 6 is a view similar to FIG. 5 through a plane to the right of that of said FIG. 5 as seen from line 6-6 on FIG. 4.

FIG. 7 is a fragmentary view partly in section and partly in elevation of the elements of FIG. 5 as seen from line 7-7 on said FIG. 5.

FIG. 8 is a view partly in section and partly in elevation of a portion of FIG. 2 as seen from line 8-8 on said FIG. 2.

FIG. 9 is a diagrammatic view of the electrical circuit employed in the device of present invention.

Throughout the several views of the drawings similar reference characters are employed to denote the same or similar parts.

As was noted above this invention pertains to a device for determining the absence of an article in a sealed

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container and particularly for use with containers non-metallic in themselves but housing metallic articles such as metal cans. As is well known said cans are automatically inserted in a container while the said container is moving on a conveyer and which container after receiving its charge has its open end automatically sealed while still moving on said conveyer. Said sealed container is then delivered to a storage or shipping point.

As illustrated in the drawings the numeral 15 indicates an endless conveyer, power driven (not shown), which extends about a drum or pulley 16 suitably rotatably mounted through a shaft 17 carried by suitable supports or a frame 18. Neither the conveyer nor any of its supporting and actuating mechanism, per se, form a part of the present invention.

As illustrated in the drawings the container 19, such as a cardboard box or carton, having enclosed therein six metal cans 20 is being moved by the conveyer 15 in the direction of the arrow 21 to the detection device of the present invention indicated in its entirety by the reference numeral 22. While the device of the present invention is illustrated in connection with a container containing six metal cans it is to be understood that any number of cans may be disposed within the container with only minor changes necessary in the detecting device.

The detecting device, per se, comprises a pair of side plates 23 and 24 each of which has its lower end inwardly turned as, respectively, at 25 and 26 to underly the conveyer and form a means whereby said detecting device may be mounted in operative relation to the conveyer 15, shown in the drawings as in operative relation to the discharge end of the conveyer 15. As seen in FIG. 3 the conveyer frame 18 conveniently includes a transverse support 27 through which the side plates 23 and 24 have their lower ends 25 and 26 operatively secured by bolts 28.

As further illustrated, particularly in FIGS. 1 to 3, the end of the conveyer 15 and including its drum or pulley 16 is sheathed by an enclosing housing substantially U shaped in cross-section and including a mounting base 29, an upstanding end member 30 and a platform 31. The mounting base 29 may be conveniently secured to the conveyer supporting frame 18 through the bolts 28 to have the platform 31 resting on the upper surface of the upper reach of the said conveyer 15. The platform unyieldingly supports the container and to insure the container 19 properly passing through the detector 22 the platform 31 receives said container 19 from the conveyer and is provided on opposite sides thereof with guide rails 32 and 33 each of which has its outer end outwardly curved, as at 34, to act as guides and centralizing means for the container 19 as it passes through the said detector 22.

The sides plates 23 and 24 have their upper ends spaced from one another by a frame including a front portion 35 and side portion 36 and 37 each of angle construction and with each of said side frame portions 36 and 37 having one of its legs 38 and 39 depending exteriorly, respectively, of side plates 23 and 24 and with said parts secured to one another by screws 40 and 41 in axial alignment and respectively acting as pivots for the angle frame for a purpose subsequently to be made clear.

Each of the frame side portions 36 and 37 has inwardly of its end remote from its pivot screw 40 or 41 and depending from its leg 38 and 39 an ear 42 and 43 in which is mounted a bar or rod 44.

Disposed on said rod between the side plates 23 and 24 are a plurality of detector units, per se, each including a tube 45, 46 and 47. Each tube is mounted on the rod 44 so as to oscillate thereon and is retained against axial movement through a pair of collars 48 and 49, one located on each side of each of said tubes 45, 46 and 47. The

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said tubes are positioned to have the cans 20 in the container 19 to pass therebeneath and since said cans are arranged in rows of three cans each the said three detector units or their tubes 45, 46 and 47 has a can of each row therebeneath at the same time.

The rod 44 is held against axial shifting in the frame side portions ears or supporting brackets 42 and 43 to retain the tubes in their adjusted positions by means of collars 50 and 51 on the rod 44 exteriorly respectively, of said frame side portions ears or supporting brackets 42 and 43.

Since each of the detector units, per se, is substantially identical and includes a tube 45, 46 or 47 which, in turn, is substantially identical in construction, it is believed that a description of one of them will suffice for all. Tube 46, since it is illustrated in FIGS. 2, 3, and 4, for example, has projecting from its forward end a bracket which comprises a base 53 and since it may be formed from the tube itself is integral therewith, although this bracket may be formed separately and secured to the tube in any suitable manner. The base 53 has depending sides 54 and 55 which together constitute or form an inverted U-shaped bracket having journaled in said sides 54 and 55 a shaft 56 to which is secured a roller 57 which is a permanent magnet.

Disposed in the rear end of the tube 46 is a carrier 58 in form of a sleeve in which is secured in any suitable or desirable manner a switch 59. The said switch 59 is what is commonly known as a "mercury" switch and as illustrated diagrammatically in FIG. 9 comprises a glass container 60 into which projects switch contact points 61 and 62 adapted to be bridged, electrically connected, by means of mercury 63. It is believed that the operation of a mercury switch is well known, briefly, it is mounted so that the glass tube 60 may be oscillated, or tilted, on a fixed point and when in one position of oscillation, or tilt, the mercury electrically connects the switch contact points 61 and 62 while in the second position of oscillation, or tilt, separates the said switch points, or electric lines therebetween, and at which time there is no current flowing through said switch.

The mercury switch carrier or sleeve 58 is adapted to have its axis and that of the switch angularly adjusted within its tube 46, wherefore said tube 46, at the side thereof against which the carrier or sleeve lies, is provided with a slot 64 which includes a stem 65 and a transverse arm 66. The carrier or sleeve 58 has outwardly projecting therefrom a pair of securing screws or bolts 67 and 68 with the screw or bolt 67 extending through the stem 65 of the slot 64 while the bolt 68 extends through the arm 66 of said slot 64. By this construction the said mercury switch carrier or sleeve 58 may be adjusted to various axial angular positions with respect to the axis of its tube and which extreme positions of adjustment are illustrated in phantom lines in FIG. 7 and whereby the point of operation of the mercury switch may be adjusted as will be subsequently made clear.

The said switch carrier or sleeve 58 is secured in its angular positions of adjustment by means of a nut 69 on the screw or bolt 68 and by a pair of nuts 70 on the screw or bolt 67. It is to be noted that a single nut may be employed instead of the pair of nuts 70, but, in the particular embodiment illustrated in the drawings the said pair of nuts 70 add an additional amount of counterbalance to the tube 46 in actuating it to one of its operative positions as will presently be made clear.

Disposed for independent oscillation on the bar or rod 44 is a further tube 71 containing a mercury switch 72 similar in all respects to the mercury switch 59 except that the switch contact points 73 and 74, see FIG. 9, of said switch 72 are positioned with respect to one another that with said switch in its normal position the mercury 75 thereof maintains the said switch in an open condition while each of the switches 59 in their normal position

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are rendered in a closed condition, all of which will be further described.

Said tube 71 is retained against axial movement on the rod 44 by a collar 76 which cooperates, either, with a second and similar collar on the other side of said tube 71 or, as conveniently illustrated in the drawings, cooperates with the positioning collar 48 of the tube 47. The tube 71, as seen more clearly in FIG. 4, has depending from its rear end a finger 77 and through which it is operated as will presently be made clear.

As illustrated in FIG. 9 the mercury switch 59 of the detector unit of tube 46 has its switch contact 61 connected through a wire 78 with a wire 79 which, for convenience in description, may be considered the hot wire of the electric system. The similar switch contact 61' of mercury switch 59' of detector unit of the tube 45 has connected therewith a wire 80 terminating in the hot wire 79, while the switch 59'' of the detector unit of the tube 47 likewise has its switch contact point 61'' connected through a wire 81 with the hot wire 79. The said hot wire 79 terminates at, or is connected through, a wire 82 with the switch contact point 73 of the mercury switch 72 of the tube 71 with said mercury switch 72 having its second switch contact 74 connected through a wire 83 to a source of electrical current, preferably of 110 volts. It should be noted that this connection may be effected through the usual pronged or male member of an electrical connector.

The second switch contact 62 of the mercury switch 58 has connected therewith a wire 84 that terminates in a wire 85 which, again, for the purpose of description, may be termed the ground wire.

The second switch contact 62' of the mercury switch 58' has connected therewith one end of a wire 86 that terminates in the ground wire 85 while the second switch contact 62'' of the switch 58'' likewise has connected therewith one end of a wire 87 terminating in the ground wire 85 which terminates at the source of commercial voltage similar to the hot wire 83 above. The ground wire 85 has mounted or connected in parallel therewith a visible signal such as an electric lamp 88 and in addition has connected in parallel therewith an audible signal such as an electric bell or buzzer 89.

The visible signal or electric lamp 88 may conveniently be mounted on the angle frame of the detector device 22, as for example, at the corner of the front portion 35 and side portion 37, while the audible signal or buzzer or bell 89 may be attached to the outer surface of the detector side plate 24, all as illustrated in FIG. 1.

In normal operation the tubes 45, 46, 47, and 69 each have the positions illustrated in FIGS. 1 and 4 and wherein their respective mercury switches are in the condition as illustrated in FIG. 9, namely, with the mercury switches 59, 59' and 59'' respectively connecting their switch contacts while the mercury switch 72 has its switch contacts disconnected and since this switch 72 has each of the other switches independently wired in series therewith the electrical circuit is broken with neither the visible or audible signal actuating. The tubes 45, 46 and 47, which may be designated as the detector tubes, are in positions that each pair of cans 20 in the container 19 pass therebeneath as the said container 19 is moved to the discharge end of the conveyer 15. As said conveyer moves the container 19 and its cans pass beneath the magnet rollers 57 of the several tubes and the said magnet is attracted to the container for thereby moving the tubes from the position illustrated for tube 46, in FIG. 4, to the position illustrated therefore in FIG. 3. This movement oscillates the mercury switches from the solid line positions illustrated in FIG. 9 to the phantom line illustrated position of switch 59' in said FIG. 9, for thereby breaking the electrical circuit through said switches. Since, at this time, the switch 72 also has its circuit broken there is no change in the said circuit and particularly no current flow. Continued movement of the container 19 picks up the finger 77 of the tube 71 for oscillating it in a clock-wise direction, as

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seen in FIG. 4, for positioning its switch 72 in the phantom line position thereof illustrated in FIG. 9 and thereby connecting the switch contacts 73 and 74 thereof through the mercury 73. Again, since each of the switches 59, 59' and 59'' are open, there is no current flow through the circuit and the signals 88 and 89 continue to be turned off.

If at the time the container 19 picked up the finger 77 and closed the switch 72 a can 20 in the forward row of the container 9, for example, the middle can 20 of said forward row, were missing, the center tube 46 would not have been attracted to the said container 19 and its switch 59 would have therefore remained closed as illustrated in FIG. 9 and upon the closing of the switch 72 through the actuation of the finger 77 by the container 19, a circuit would have been completed for operating both the visible and audible signals. Said circuit in this instance would be from the commercial current source through wire 83 to switch contact 74 and successively through mercury 75, switch contact 73, wire 82, wire 79, wire 78, switch contact 61, mercury 63, switch contact 62, wire 84, wire 85, signals 88 and 89 and back to the source of the current.

The absence of either end can of said first and forward row in the container would have likewise completed the electric circuit either through switch 59' or switch 59''. Assuming now that said forward row of cans is complete but that one of the cans in the rear row is missing and upon said space appearing beneath its magnetic roller 57 the attraction therefore would be cut off whereupon the tube thereof, 45, 46, 47, would swing back from the position thereof illustrated in FIG. 3 to the position thereof in FIG. 4 and whereupon a circuit would be complete through the mercury switch thereof since the switch 72 is closed, physically, so long as the container 19 is located therebeneath.

The effective normal position of each of the tubes 45, 46, 47 is regulated and controlled, in one instance by the adjusting screw 90 extending through the horizontal leg of the frame front portion 35 and which screw abuts on the upper surface of the base 53 of the magnetic roller bracket. This positioning of the said parts is to control the height or clearance 91 which it is desirable to maintain between the said magnetic rollers and the upper surface of the container 19, more particularly to maintain or control the said space as respects the upper surface of the can closure end. It should be here noted that the magnetic rollers have a pull of sixteen pounds and while said space or clearance is not critical it is limited. The other position of the said tubes, and to prevent actual physical contact of the magnetic rollers and container 19, is provided through a tie-bar 92 connecting the side portions 36 and 37 of the angle frame and with such tie-bar 92 located in such a position that the said tubes 45, 46, and 47 engage therewith at points inwardly of rear ends.

The tube 71 has its normal or inoperative position determined by engaging its forward end with the horizontal leg of the forward portion 35 of the angle frame.

The entire control mechanism may be further adjusted as a unitary structure and for which purpose each of the side plates 23 and 24 has its upper forward corner severed on a vertical line and with said severed portions outwardly bent as shelves 93 and 94 through each of which, as particularly illustrated in FIG. 8 for shelf 94, an adjusting screw 95 is threaded with said adjusting screw at its free end being provided with a cross bar 96 on which the ends of the bar or rod 44 rest. The said adjusting screws are secured in adjusted positions by suitable lock nuts 97 located above and below the shelves 93 and 94.

It is obvious that by axially adjusting the screws 95 the said bar or rod 44, which is carried by the angle frame side portions 36 and 37, is similarly adjusted as is the said frame along with the mechanisms carried thereby, or are raised and lowered on the pivot screws 40 and 41.

As noted above the said detector mechanism of the

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present invention may be conveniently located at the discharge end of the conveyer 15 and from which point the containers 19 are sent to either a storage or a delivery station. As illustrated in FIG. 1 the conveyer 15 discharges onto a second conveyer 98 illustrated as extending at right angles to the said conveyer 15 and said conveyer 98 may be similar in all respects to the conveyer 15 including a drum or pulley 99 having a shaft 100 suitably journaled in a supporting frame 101.

From the foregoing it is believed obvious that there has been provided a device or mechanism which will automatically detect the absence of an article from an alleged full container which has been sealed after allegedly receiving a full charge. As noted above the invention is illustrated in connection with a container having six metallic cans therein but it is believed obvious that the device will operate so long as there are three containers transversely thereof and with said containers properly spaced below the operating magnets and it is further believed obvious that the device can have one or more of its detector units removed or additional detector units added so long as the containers to be inspected have cans of equal number as the detector units and are being simultaneously moved relative thereto.

What is claimed is:

1. In a device of the class described the combination with a conveyer adapted to convey a closed container enclosing magnetic responsive metallic topped articles with said articles disposed transversely of the conveyer in a row and with said container being followed in succession by other containers each including similar rows of magnetic responsive metallic topped articles and with said articles in successive containers in longitudinal alignment, of a plurality of detectors one for each longitudinal line of articles and relative to each of which a longitudinal line of articles passes and each detector comprising a pivotally mounted tube-like carrying member adapted to be gravity oscillated in one direction about its pivotal mounting to normal position, an electric switch carried by each of said carrying members adapted to be closed when the member is in its gravity effected normal position, an electric control switch normally open in separate electrical series with each of said detector switches for rendering same inoperative, magnetically operated means for oscillating said tube-like carrying members upon conveyance relative thereto of the container and its articles, and means operated by said container for actuating said control switch for rendering the detector switches operable.

2. In a device of the class described the combination with a conveyer adapted to convey a closed container enclosing magnetic responsive metallic topped articles with said articles disposed transversely of the conveyer in a row and with said container being followed in succession by other containers each including similar rows of magnetic responsive metallic topped articles and with said articles in successive containers in longitudinal alignment, of a plurality of detectors one for each longitudinal line of articles and relative to each of which a longitudinal line of articles passes and each detector comprising a pivotally mounted tube-like carrying member adapted to be gravity oscillated in one direction about its pivotal mounting to its normal position, an electrical switch carried by each of said carrying members adapted to be closed when the member is in its gravity effected normal position, an electric control switch normally open in separate electrical series with each of said detector switches for rendering same inoperative, magnetically operated means for oscillating said tube-like carrying members upon conveyance relative thereto of the container and its articles, means operated by said container for actuating said control switch for rendering the detector switches operable, and means establishing the position of each of the tube-like carriers when in its gravity actuated position.

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3. In a device of the class described the combination with a conveyer adapted to convey a closed container enclosing magnetic responsive metallic topped articles with said articles disposed transversely of the conveyer in a row and with said container being followed in succession by other containers each including similar rows of magnetic responsive metallic topped articles and with said articles in successive containers in longitudinal alignment, of a plurality of detectors one for each longitudinal line of articles and relative to each of which a longitudinal line of articles passes and each detector comprising a pivotally mounted tube-like carrying member adapted to be gravity oscillated in one direction about its pivotal mounting to its normal position, an electric switch carried by each of said carrying members adapted to be closed when the member is in its gravity effected normal position, an electric control switch normally open in separate electrical series with each of said detector switches for rendering same inoperative, magnetically operated means for oscillating said tube-like carrying members upon conveyance relative thereto of the container and its articles, means actuated by said containers for actuating said control switch for rendering the detector switches operable, a frame for supporting each of the detector tube-like members, and means for positioning the frame relative to the conveyer and the detectors relative to the container on the conveyer.

4. In a device of the class described the combination with a conveyer adapted to convey a closed container enclosing magnetic responsive metallic topped articles with said articles disposed transversely of the conveyer in a row and with said container being followed in succession by other containers each including similar rows of magnetic responsive metallic topped articles and with said articles in successive containers in longitudinal alignment, of a plurality of detectors one for each longitudinal line of articles and relative to each of which a longitudinal line of articles passes and each detector comprising a pivotally mounted tube-like carrying member adapted to be gravity oscillated in one direction about its pivotal mounting to its normal position, an electric switch carried by each of said carrying members adapted to be closed when the member is in its gravity effected normal position, an electric control switch normally open in separate electrical series with each of said detector switches for rendering same inoperative, magnetically operated means for oscillating said tube-like carrying members upon conveyance relative thereto of the container and its articles, means actuated by said containers for actuating said control switch for rendering the detector switches operable, a frame for supporting each of the detector tube-like carrying members, means for positioning the frame relative to the conveyer and the detectors relative to the container on the conveyer, and a visible signal electrically connected in series with the control switch and each of the detector switches.

5. In a device in the class described comprising a pair of spaced side plates, a pivotally mounted frame at the upper ends of said side plates, a rod carried by said frame spanning the distance between said side plates, a plurality of similar tube-like carrying members pivotally mounted on said rod between said side plates in spaced relation to one another, means defining and limiting the ends of the pivotal movement of said tube-like carrying members, a detector mercury switch carried by each tube-like carrying member closed when its tube-like carrying member is at one end of its pivotal movement, a control mercury switch pivotally mounted on said rod including a tube-like carrying member, means limiting the pivotal movement of said control switch tube-like carrying member in one direction to close the same, said detector mercury switches being each individually electrically connected in series with said control mercury switch, mechanical means for pivotally actuating said control mercury switch tube-like carrying member to a second and

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open position, and a magnet carried by each detector switch tube-like carrying member for actuating it to the second position of its pivotal movement.

6. In a device of the class described comprising a pair of spaced side plates, a pivotally mounted frame at the upper ends of said side plates, a rod carried by said frame spanning the distance between said side plates, a plurality of similar tube-like carrying members pivotally mounted on said rod between said side plates in spaced relation to one another, means defining and limiting the ends of the pivotal movement of said tube-like carrying members, a detector mercury switch carried by each tube-like carrying member closed when its tube-like carrying member is at one end of its pivotal movement, a control mercury switch pivotally mounted on said rod including a tube-like carrying member, means limiting the pivotal movement of said control switch tube-like carrying member in one direction to close the same, said detector mercury switches being each individually electrically connected in series with said control mercury switch, mechanical means for pivotally actuating said control mercury switch tube-like carrying member to a second and open position, a magnet carried by each detector switch tube-like carrying member for actuating it to the second position of its pivotal movement, and an audible signal means carried by one of said side plates electrically connected in series with said control and detector switches.

7. In a device in the class described comprising a pair of spaced side plates, a pivotally mounted frame at the upper ends of said side plates, a rod carried by said frame spanning the distance between said side plates, a plurality of similar tube-like carrying members pivotally mounted on said rod between said side plates in spaced relation to one another, means defining and limiting the ends of the pivotal movement of said tube-like carrying members, a detector mercury switch carried by each tube-like carrying member closed when its tube-like carrying member is at one end of its pivotal movement, a control mercury switch pivotally mounted on said rod including a tube-like carrying member, means limiting the pivotal movement of said control switch tube-like carrying member in one direction to close the same, said detector mercury switches being individually electrically connected in series with said control mercury switch, mechanical means for pivotally actuating said control mercury switch tube-like carrying member to a second and open position, a magnet carried by each detector switch tube-like carrying member for actuating it to the second position of its pivotal movement, and means carried by said side plates for adjusting the pivotally mounted frame about its pivot with respect to said side plates.

8. In a device in the class described comprising a pair of spaced side plates, a pivotally mounted frame at the upper ends of said side plates, a rod carried by said frame spanning the distance between said side plates, a plurality of similar tube-like carrying members pivotally mounted on said rod between said side plates in spaced relation to one another, means defining and limiting the ends of the pivotal movement of said tube-like carrying members, a detector mercury switch carried by each tube-like carrying member closed when its tube-like carrying member is at one end of its pivotal movement, a control mercury switch pivotally mounted on said rod including a tube-like carrying member, means limiting the pivotal movement of said control switch tube-like carrying member in one direction to close the same, said detector mercury switches being individually electrically connected in series with said control mercury switch, mechanical means for pivotally actuating said control mercury switch tube-like carrying member to a second and open position, a magnet carried by each detector switch tube-like carrying member for actuating it to the second position of its pivotal movement, and means carried by said side plates for adjusting the pivotally mounted frame about its pivot with respect to said side plates including outwardly projecting

brackets on each side plate, and a jack-screw carried by each side plate bracket for engaging the rod for raising and lowering the same and the supporting frame.

9. In a device in the class described comprising a pair of spaced side plates, a pivotally mounted frame at the upper ends of said side plates, a rod carried by said frame spanning the distance between said side plates, a plurality of similar tube-like carrying members pivotally mounted on said rod between said side plates in spaced relation to one another, means defining and limiting the ends of the pivotal movement of said tube-like carrying members, a detector mercury switch carried by each tube-like carrying member closed when its tube-like carrying member is at one end of its pivotal movement, a control mercury switch pivotally mounted on said rod including a tube-like carrying member, means limiting the pivotal movement of said control switch tube-like carrying member in one direction to close the same, said detector mercury switches being each individually electrically connected in series with said control mercury switch, mechanical means for pivotally actuating said control mercury switch tube-like carrying member to a second and open position, and means carried by each detector switch tube-like carrying member for actuating it to the second position of its pivotal movement including an inverted U-shaped bracket having a base and depending arms at opposite sides thereof, and a magnetically charged roller between the U-shaped bracket arms.

10. In a device in the class described comprising a pair of spaced side plates, a pivotally mounted frame at the upper ends of said side plates, a rod carried by said frame spanning the distance between said side plates, a plurality of similar tube-like carrying members pivotally mounted on said rod between said side plates in spaced relation to one another, means defining and limiting the ends of the pivotal movement of said tube-like carrying members, said pivotal movement of the tube-like carrying members being effected in one direction by gravity, a detector mercury switch carried by each tube-like carrying member closed when its tube-like carrying member is at said gravity effected position, a control mercury switch pivotally mounted on said rod including a tube-like carrying member, said pivotal movement of the control switch tube-like carrying member being effected in one direction by gravity to open the same, means limiting the pivotal movement of said control switch tube-like carrying member to close the same when in said gravity effected position, said detector mercury switches being each individually electrically connected in series with said control mercury switch, mechanical means for pivotally actuating said control mercury switch tube-like carrying member to a second and open position, means carried by each detector switch tube-like carrying member for ac-

tuating it to the second position of its pivotal movement including an inverted U-shaped bracket having a base and depending arms at opposite sides thereof, a magnetically charged roller between the U-shaped bracket arms, and means carried by the frame engaging the detector switch tube-like member bracket for determining the gravity effected pivotal position of each detector switch tube-like member.

11. In a device in the class described comprising a pair of spaced side plates, a pivotally mounted frame at the upper ends of said side plates, a rod carried by said frame spanning the distance between said side plates, a plurality of similar tube-like carrying members pivotally mounted on said rod between said side plates in spaced relation to one another, means defining and limiting the ends of the pivotal movement of said tube-like carrying members, said pivotal movement of the tube-like carrying members being effected in one direction by gravity, a detector mercury switch carried by each tube-like carrying member closed when its tube-like carrying member is at said gravity effected position, a control mercury switch pivotally mounted on said rod including a tube-like carrying member, said pivotal movement of the control switch tube-like carrying member being effected in one direction by gravity to open the same, means limiting the pivotal movement of said control switch tube-like carrying member to close the same when in said gravity effected position, said detector mercury switches being each individually electrically connected in series with said control mercury switch, mechanical means for pivotally actuating said control mercury switch tube-like carrying member to a second and open position, a magnet carried by each detector switch tube-like carrying member for actuating it to the second position of its pivotal movement, and means for adjusting and securing each mercury switch to its tube-like carrying member to determine the axial relationship of each mercury switch and its carrier tube-like carrying member when in said gravity effected position.

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