Aug. 12, 1941. W. PECHY 2,251,949

CAN TESTER ELEVATOR

Filed July 19, 1938 4 Sheets-Sheet 1

Fig 1

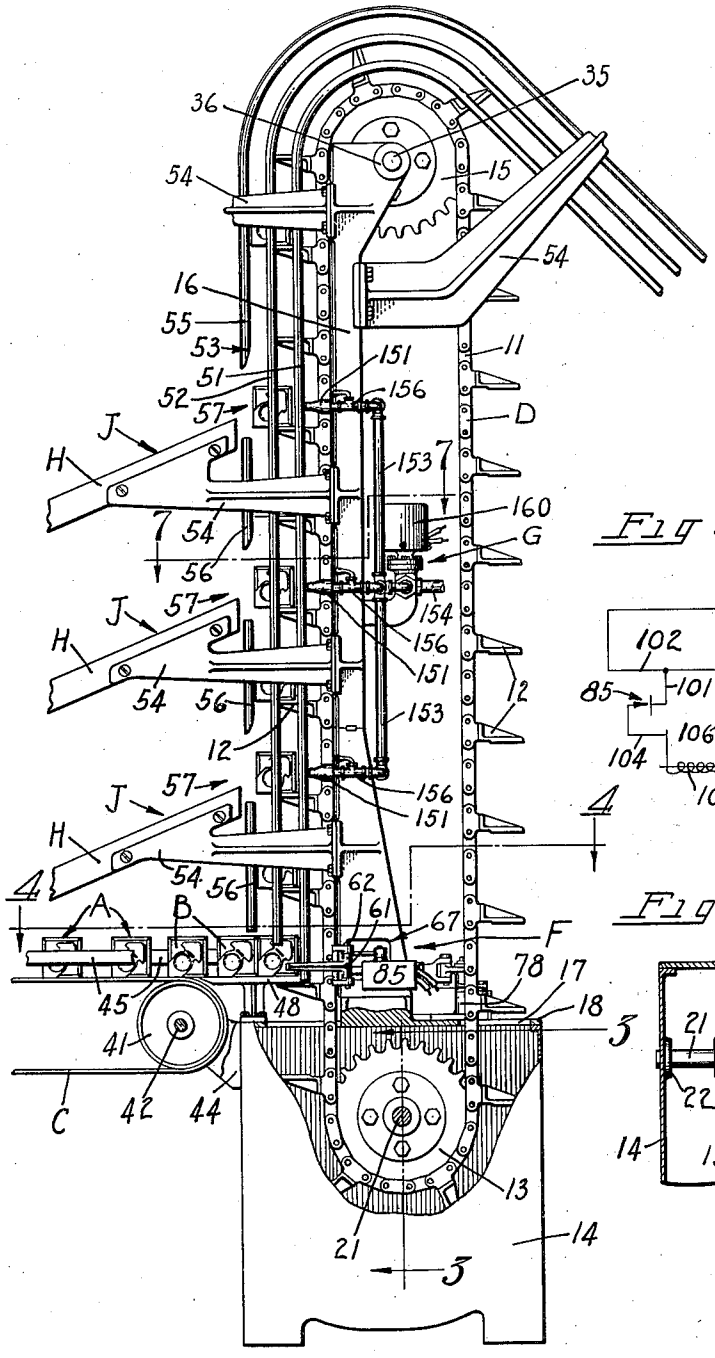


Fig 2

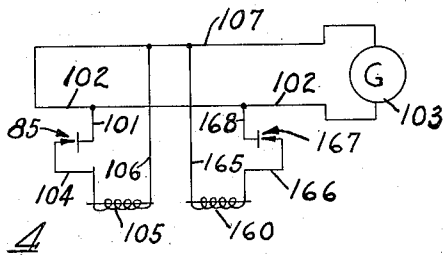
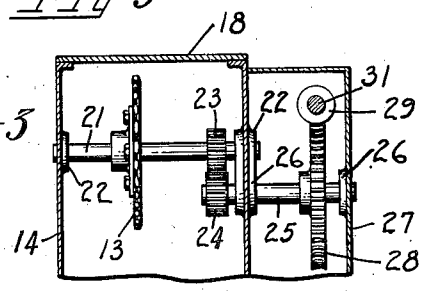


Fig 3



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CAN TESTER ELEVATOR

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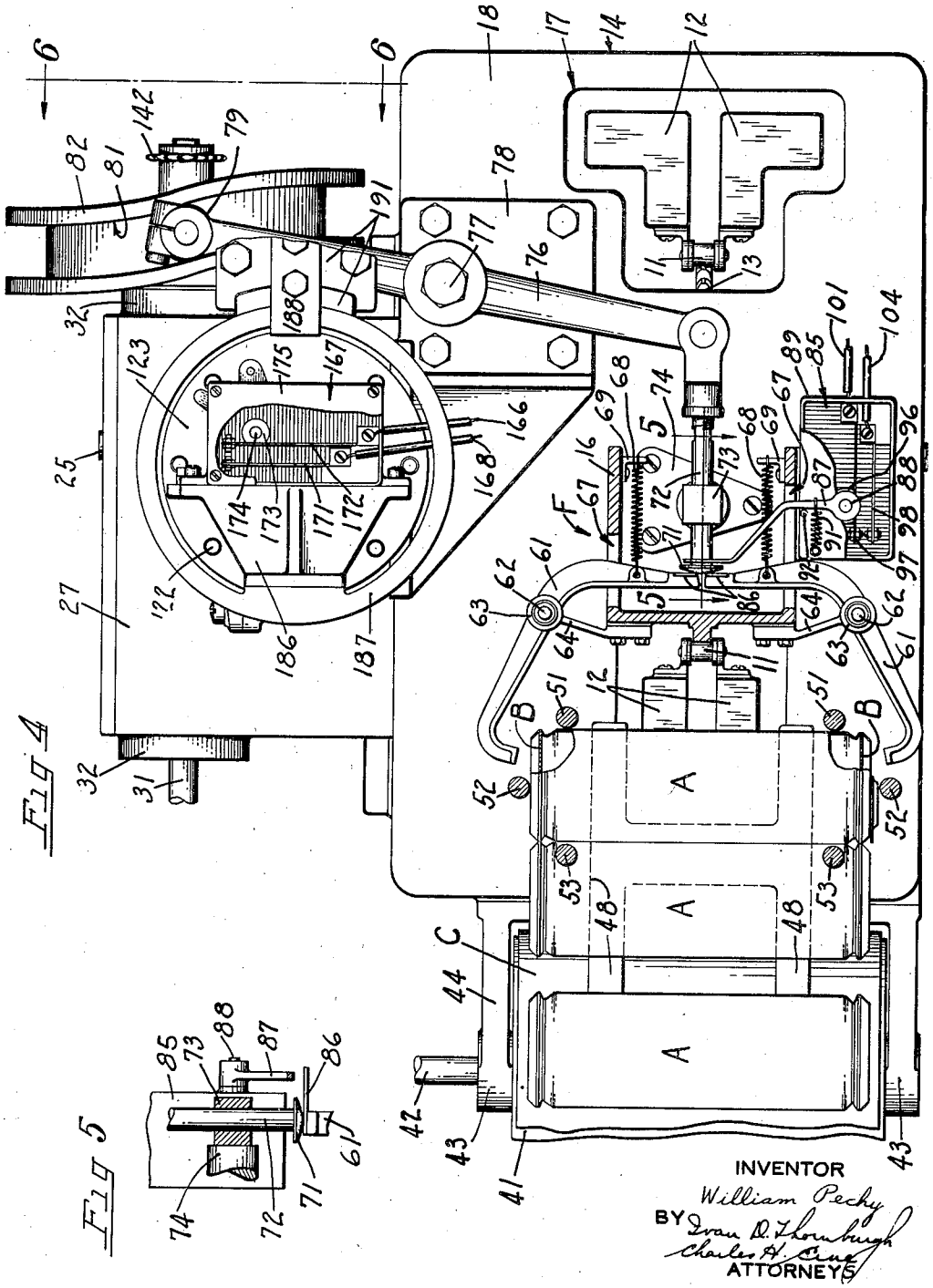


Fig 4

Fig 5

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CAN TESTER ELEVATOR

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Fig 6

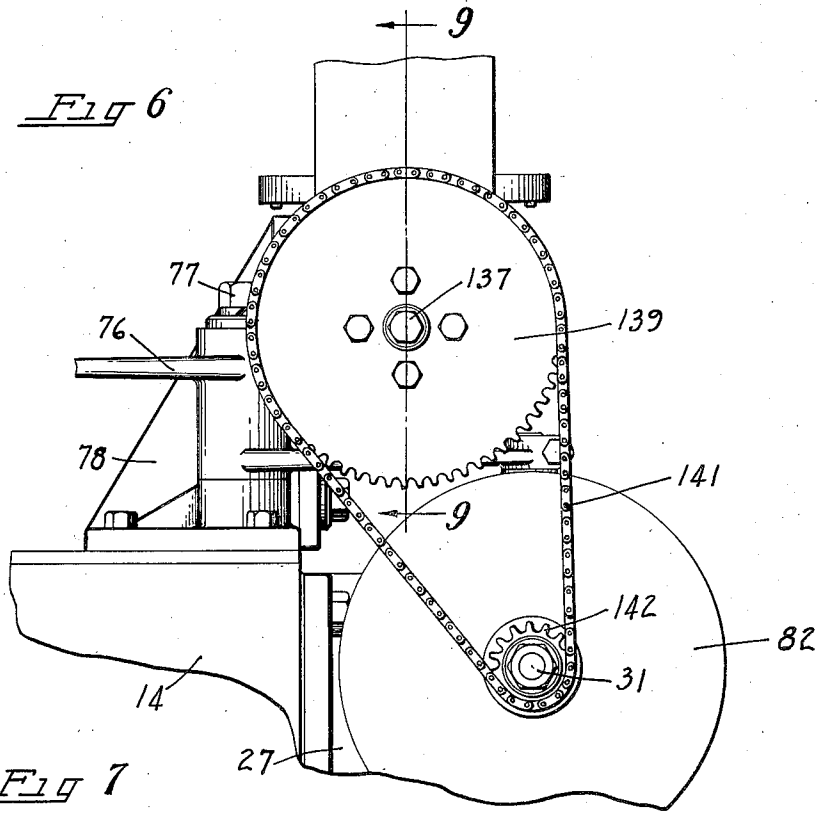


Fig 7

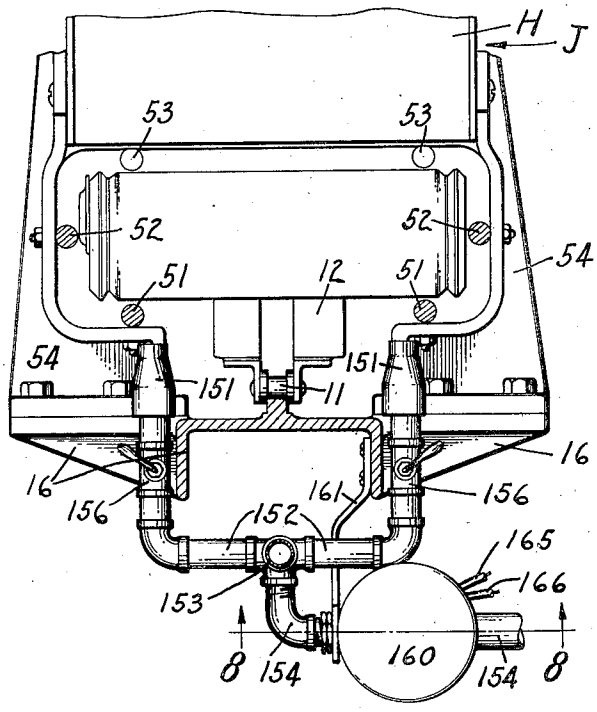
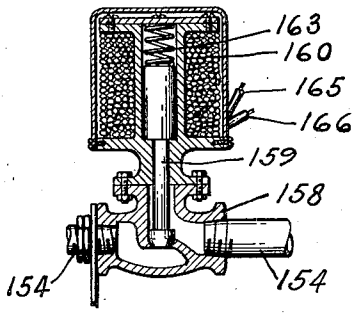


Fig 8



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CAN TESTER ELEVATOR

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Fig 9

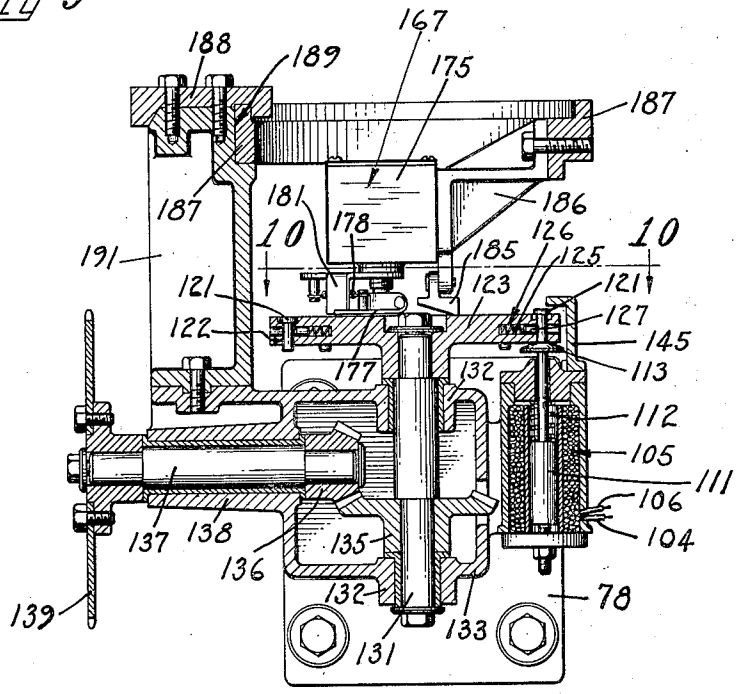
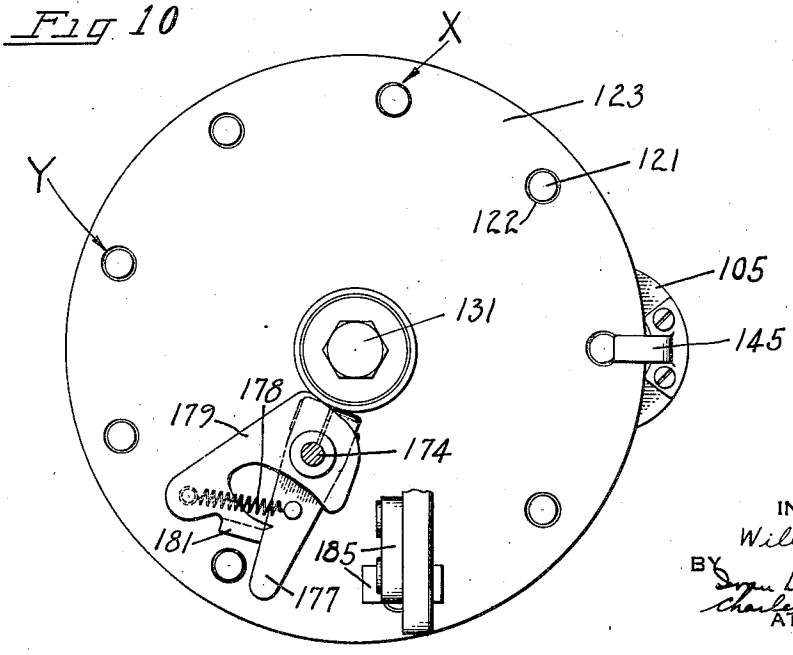


Fig 10



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Patented Aug. 12, 1941 2,251,949

UNITED STATES PATENT OFFICE

2,251,949

CAN TESTER ELEVATOR

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Application July 19, 1938, Serial No. 220,152

5 Claims. (Cl. 209—88)

The present invention relates to a container or can tester elevator and has particular reference to an elevator which includes devices for detecting and eliminating imperfect cans from the procession of cans passing through the elevator.

The invention contemplates a can tester elevator which is adapted to be interposed in a line of automatic can making machines and which transfers from one machine to another partially completed cans normally having two end closure members in place.

An object of the invention is the provision of a can tester elevator of the character contemplated wherein each can as it is received in the elevator is tested at its ends to ascertain if the closure members are in proper place and to detect such cans which lack one or both closure members so that only perfect cans or cans having both end closure members in proper place, will be carried on to a succeeding machine in the line for the performance of a subsequent operation thereon.

Another object is the provision of such a can tester elevator wherein cans detected as being imperfect regarding their end closure members are eliminated, at a predetermined station, from the line of cans passing through the elevator so that such cans will not interfere with the good cans while undergoing subsequent operation.

Numerous other objects and advantages of the invention will be apparent as it is better understood from the following description, which, taken in connection with the accompanying drawings, discloses a preferred embodiment thereof.

Referring to the drawings:

Figure 1 is a side elevation of a can tester elevator embodying the instant invention, parts being broken away;

Fig. 2 is a wiring diagram of the electric apparatus used in connection with the elevator;

Fig. 3 is a transverse section through the lower portion of the elevator the view being taken substantially along the line 3—3 in Fig. 1;

Fig. 4 is an enlarged horizontal or plan section taken substantially along the line 4—4 in Fig. 1, with parts broken away;

Fig. 5 is a sectional detail view taken substantially along the line 5—5 in Fig. 4;

Fig. 6 is a fragmentary side elevation as viewed substantially along a plane indicated by the line 6—6 in Fig. 4;

Fig. 7 is an enlarged horizontal section taken substantially along the broken line 7—7 in Fig. 1, the view being rotated through ninety degrees relative to its position in Fig. 1;

Fig. 8 is a sectional detail view taken substantially along the line 8—8 in Fig. 7;

Fig. 9 is a sectional view taken substantially along the line 9—9 in Fig. 6; and

Fig. 10 is an enlarged horizontal section taken substantially along the line 10—10 in Fig. 9.

In the machine shown in the drawings as a preferred embodiment of the invention cans A having end closure members B loosely assembled therewith enter the elevator by way of an endless belt carrier C (Figs. 1 and 4). The cans are received by a vertically disposed conveyor D and at a station adjacent an end detector device F. Each can as it is received in the conveyor D is tested by the detecting device and cans having only one or no ends in proper place are immediately detected as being imperfect.

Detection of a can which lacks one or both end members sets in motion a time delay and can discharge mechanism G which discharges the imperfect can from the elevator as it is being carried up to a higher level. Discharge of the can is effected by a blast of air issuing from nozzles which are located adjacent the path of travel of the cans. Provision is made for selecting one of several positions of discharge and therefore there are a plurality of sets of these nozzles arranged along one side of the elevator. Each set is disposed adjacent a can discharge chute H, this arrangement constituting predetermined stations J at any one of which the imperfect can may be eliminated from the elevator as desired. A corresponding setting of the time delay mechanism G makes this selection possible.

Referring now to the details of the elevator it will be observed that the conveyor D comprises a vertically disposed endless chain 11 (Fig. 1) provided with flights 12 which are secured to the chain at spaced intervals along its length. The chain takes over a lower or driven sprocket 13 which is located in a base housing 14 and over an upper or idler sprocket 15 which is supported in the upper end of a vertical frame 16 mounted on the base housing. Openings 17 in a top wall section 18 of the base housing permit the passage of the chain and its flights therethrough.

The conveyor chain 11 is actuated in a clockwise direction (as viewed in Fig. 1) by the rotation of the lower sprocket 13. For this purpose the sprocket 13 is mounted on a cross shaft 21 (Figs. 1 and 3) which is journaled in bearings 22 formed in the base housing 14. Shaft 21 is driven through a gear 23 which is carried on the

shaft and which meshes with a driving gear 24 mounted on a parallel cross shaft 25.

Shaft 25 is journaled in a pair of bearings 26 one of which is formed in the base housing 14 and the other in a casing 27 bolted to a side of the base housing. The shaft 25 also carries a worm wheel 28 which is disposed in the casing and which meshes with a worm 29 carried on a main driving shaft 31 (see also Fig. 4) journaled in bearings 32 formed in the casing. The main driving shaft 31 is the power shaft for the entire elevator and its movable parts and may be rotated by any suitable means.

The upper or idler sprocket 15 is mounted on a cross shaft 35 (Fig. 1). This shaft is journaled in bearings 36 which are formed in the upper end of the vertical frame 16.

The carrier C, which brings the cans A into the elevator, is located adjacent the bottom of the elevator and it carries the cans horizontally or at right angles to the path of travel of the conveyor flights 12 as they move vertically. The carrier at the machine end takes over a pulley 41 (Figs. 1 and 4) which is mounted on a shaft 42 carried in bearings 43 formed in a bracket 44 secured to the base housing 14. The cans are retained in carrying position on the carrier by side guide bars 45.

The cans A therefore enter the elevator in a horizontal position and are received on a platform 48 which is disposed adjacent the discharge end of the carrier C and which is bolted to the base housing 14. The platform extends in front and along each side of the path of travel of the conveyor flights 12 being cut away for clearance at this position.

A can A after being received on the platform 48 is pushed along by following incoming cans in the carrier C and it moves over the platform and into the path of travel of the conveyor flights. As the next flight just below comes up adjacent the platform it engages under the aligned can A and carries it vertically toward the top of the elevator.

During this upward travel of the picked-off cans A they are guided by cooperating pairs of inner rails 51, end rails 52 and outer rails 53 (Figs. 1 and 4) which are secured in brackets 54 bolted to the vertical frame 16. At the top of the elevator these guide rails curve around the upper sprocket 15 and thence project off at a tangent to any suitable place of discharge for the elevated cans.

The inner rails 51 at their lower ends extend down adjacent the can receiving platform 48 and thus serve as stops to properly locate the incoming cans so that each will be in proper picking-off position when the rising conveyor flight 12 engage thereunder. The end rails 52 locate and maintain the cans in proper endwise position within the elevator.

The outer guide rails 53 are adjacent the outer side wall of each can as it moves upwardly along and around its path of travel. Each outer guide rail preferably comprises a long upper section 55 which curves around the sprocket 15 and a plurality of short sections 56 which are in alignment but spaced apart, thereby leaving can discharge openings 57 adjacent the discharge chutes H hereinbefore mentioned. These chutes are secured to extensions of certain of the rail brackets 54.

As hereinbefore mentioned each can A as it enters the elevator is tested by the end detector device F to ascertain if the can end members are in proper place. This testing is done after an entering can on the platform 48 passes into its momentary position under the guide rails 51, 52, 53 and just prior to being engaged and lifted by one of the conveyor flights 12. Thus the detector device F is located at the bottom of the elevator adjacent the entrance platform 48.

The detector device F includes a pair of curved and horizontally movable detector fingers 61 (Figs. 1 and 4) which are mounted on vertical pivot pins 62 carried in bearings 63 of brackets 64 secured to the vertical frame 16 and on opposite sides thereof. The outer ends of the fingers curve inwardly toward the path of travel of an entering can and are normally disposed adjacent and between the guide rails 51, 52. In this normal position (Fig. 4) the outer ends of the fingers are adjacent the ends of a can in its testing position and are in vertical alignment with the can guide rails.

The inner ends of the detector fingers 61, on the opposite side of the pivot pins 62, extend through openings 67 formed in the sides of the vertical frame 16 where they are inside the frame and in almost abutting position with each other, as shown in Fig. 4. These inner ends of the fingers are held under spring tension by a pair of springs 68. One end of each spring is connected with the inner end of its finger while the opposite end of the spring is hooked over a lug 69 secured to the vertical frame 16.

The tension springs 68 hold the inner ends of the detector fingers 61 against a rounded head 71 of a plunger 72 carried in a swivel block 73 which is pivotally secured in a plate 74 mounted on the base housing 14. The tail end of the plunger 72 is connected with the inner end of a cam arm 76. Intermediate its length the cam arm is mounted on a pivot stud 77 secured in a bracket 78 carried on the base housing 14. The outer end of the cam arm carries a cam roller 79 which operates in a groove 81 of a detector cam 82 mounted on and rotated by the main drive shaft 31 of the apparatus.

As the main drive shaft 31 rotates, the cam 82 in one position acts on the roller 79 to shift the cam arm 76 toward the right as viewed in Fig. 4 and thus tends to pull the plunger 72 away from the inner ends of the detector fingers 61. Since the detector fingers are held under the tension of the springs 68 they remain in engagement with the plunger head 71 and rock on their pivot pins during the receding movement of the plunger. This rocking of the fingers moves their outer ends toward the ends of the can A then in the testing position.

If both end closure members B of the can are in proper place the outer ends of the moving detector fingers 61 engage them and thereby further rocking movement of the fingers is arrested. The plunger head 71 continues back however and draws away from the fingers. This set of conditions prevails for a good can and nothing further happens here until the plunger head is moved back when the fingers are again engaged and the can is released this being at about the time the conveyor flight 12 picks up the can. Such a good can continues along its upward path of travel through the elevator, up over the upper sprocket 15 and is discharged to any suitable place of deposit for the desired subsequent operation.

If one or both of the end closure members B are missing from the can being tested another set of conditions are present. The outer end

of the detector finger, where there is a missing or open end in the can, instead of being stopped in its detecting movement, continues on further passing into the inside of the can. This extra movement of either or both fingers actuates an electric switch 85 (Figs. 1 and 4) which in turn sets in motion other electrical and mechanical devices which result subsequently in discharge of the can from the elevator.

Actuation of the switch 85 is effected by engagement of one or both of a pair of plates 86 (see Figs. 4 and 5) one plate being secured to the inner end of each detector finger 61. These plates extend above the plunger head 71 and when a finger is rocked the extra distance described above, its plate engages against and moves a switch arm 87 mounted on a pivot pin 88 carried in a box 89 which houses the switch 85. This arm is retained under tension of a spring 91 which normally holds the arm against a stop pin 92 secured in the switch box.

Movement of the switch arm 87 rocks a flat side cam 96 carried on the pivot pin 88 and located inside the switch box. The cam presses against a yieldable contact 97 and moves it into engagement with a stationary contact 98 disposed in the switch box and thereby closes the switch.

Referring now to the wiring diagram in Fig. 2 it will be seen that the yieldable contact 97 of the switch 85 is connected by a shunt wire 101 to a main lead wire 102 transmitting electrical energy from a suitable source of power such as a generator 103. The other or stationary contact 98 of the switch is connected by a shunt wire 104 to a solenoid 105 (see also Fig. 9) which in turn is connected by a wire 106 to the opposite or return main lead wire 107 of the generator. Thus when the switch 85 is closed the shunt circuit is completed and electric energy from the generator 103 passes along and energizes the solenoid 105.

The solenoid 105 is associated with the time delay and can discharge mechanism G and when energized sets this mechanism so that the can will be discharged from the elevator by way of a predetermined discharge chute H. For this purpose the solenoid 105 is provided with a movable core 111 (Fig. 9) retained under normal pressure of a compression spring 112 disposed within the solenoid. The core extends outside of the solenoid and is formed with a head 113.

The solenoid core head 113 is located adjacent the path of travel of a plurality of timing pins 121 (Figs. 9 and 10) which are carried in spaced, peripheral, vertical holes 122 formed in a horizontal timing disc 123. The pins are adapted to be shifted vertically in the holes by the solenoid head 113 and when shifted to remain in position until positively returned. The normal position of a pin 121 is that shown at the left of the disc, as viewed in Fig. 9, the top of the pin being seated in a counterbore and flush with the top of the disc. The lower end of the pin is then depending from the bottom of the disc.

Retaining of the pins in either of their two positions is effected by a compression spring 125 which is located inwardly of each pin in a radially disposed horizontal bore 126 formed in the disc 123. A spring button 127 is backed up by the spring and presses against the side of the timing pin holding it frictionally in place until positively moved.

The timing disc 123 is rotated in time with the upward passage of cans through the elevator. It is secured to the upper end of a vertical shaft 131 (Fig. 9) which is journaled in bearings 132 in a gear housing 133 formed as a part of the bracket 78 (see also Figs. 1, 4 and 6). Within the gear housing the shaft 131 carries a bevel gear 135 which meshes with a bevel pinion 136 mounted on the inner end of a horizontal stub shaft 137 journaled in a bearing 138 formed in the housing. The outer end of the stub shaft carries a sprocket 139 driven by a chain 141 which also takes over a driving sprocket 142 mounted adjacent the cam 82 on the main driving shaft 31.

As the main driving shaft 31 actuates the conveyor chain 11 and its flights 12 in time with the other moving parts of the elevator it also rotates the timing disc 123 in the same time therewith and in a counter-clockwise direction as viewed in Fig. 10. Thus when a conveyor flight 12 moves past the can testing station, a timing pin 121 carried around by the rotating timing disc 123 is passing over the head 113 of the solenoid core 111.

When a can picked up by a conveyor flight at the testing station has been detected as one lacking one or both end members, the core head 113 of the energized solenoid 105 extends up into the path of travel of the approaching timing pin 121. As the lower end of the pin engages the raised solenoid core head 113 the pin is shifted upwardly into its raised position. An inverted L-shaped lug 145 secured to the solenoid and extending over the top of the timing disc prevents the timing pin from being raised too far when it is shifted upwardly.

The upper end of the raised pin 121 now projects above the top surface of the timing disc being held frictionally by its spring button 127. After such a setting of the timing pin for its corresponding imperfect can, the time required for such a pin to reach a given position provides for the time delay necessary before the can reaches a desired discharge chute H in its upward travel through the elevator.

The air blast which is used for the discharge of the imperfect can from the elevator issues from a series of pairs of spaced nozzles 151 (Figs. 1 and 7) which are located adjacent each of the discharge chutes H at the discharge stations J. These nozzles are all connected as by cross pipes 152 and vertical pipes 153 which in turn join with a main supply pipe 154 leading from a suitable source of supply of compressed air. Each nozzle 151 is fitted with a manual shut-off valve 156 so that all nozzles may be closed excepting those located at the particular station from which it is desired to discharge detected cans.

The main supply pipe 154 includes a main air valve 158 (Fig. 8) having a valve stem 159 the upper end of which constitutes a core of a valve actuating solenoid 160 bolted onto the valve. The solenoid is also held by a bracket strap 161 which is secured to the vertical frame 16. A compression spring 163 housed within the solenoid normally presses the core stem 159 into the valve seat and keeps the valve closed as long as good cans are passing through the elevator. It is only when the solenoid is energized that the valve is opened, and this energizing of the solenoid takes place only when an imperfect can reaches a position of discharge.

Again referring to the wiring diagram in Fig. 2 it will be seen that one side of the valve actuating solenoid 160 is connected by a shunt wire 165 to the main return lead wire 107 of the gen-

erator circuit. The other side of the solenoid is connected by a shunt wire 166 to a discharge switch 167 and this switch is joined by a wire 168 to the main lead wire 102 of the generator circuit. With switch 167 closed, electric energy from the generator passes along the shunt circuit to energize the valve actuating solenoid 160.

Discharge switch 167 (Figs. 4 and 9) is normally open and is provided with a stationary contact 171 and a yieldable contact 172. Yieldable contact 172 is in engagement with a flat side cam 173 mounted on a vertical pivot shaft 174 carried in suitable bearings formed in a switch box 175 which houses the switch parts.

Outside of the box the pivot shaft 174 carries a horizontal switch arm 177 (see also Fig. 10) which is disposed parallel with and close to the top surface of the timing disc 123. A tension spring 178 is connected at one end to the arm and at its opposite end to a stationary plate 179. Plate 179 is loosely bored for the shaft 174 and is secured to the bottom of the switch box 175. Spring 178 normally holds the arm 177 stationary against a stop lug 181 formed on the plate and in such position the switch contacts 171, 172 are held apart.

The outer end of the switch arm 177 extends into the path of travel of the upper end of a raised timing pin 121 as it is moved around in the counterclockwise (Fig. 10) rotation of the disc 123. Since under normal conditions the tops of the pins are flush with the top of the disc ordinarily the pins will pass under the switch arm without interference. A raised pin engages against the outer end of the switch arm and shifts it toward the right, as viewed in Fig. 10. This engagement takes place at the precise moment when the imperfect can has reached its position of discharge.

Shifting of the switch arm 177 rocks its pivot shaft 174 and switch cam 173 and thereby closes the switch 167. This energizes the valve actuating solenoid 160 which quickly opens the main air valve 158. This action is only momentary, the valve being open only until the moving timing pin rides off the end of the switch arm 177. This momentary opening of the main air valve is sufficient, however, for a blast of air to pass from the main air pipe 154 into the pipes 152, 153 and to issue from the open nozzles 151. The air blast impinging against the side of the can blows it off its conveyor flight 12 and into the selected chute H where it is directed to any suitable place of deposit.

The raised timing pin 121 after leaving the switch arm 177 is depressed back into its normal position by its top riding under an inclined stationary cam shoe or reset cam 185 (Figs. 9 and 10).

Mention has already been made of selective setting of the time delay mechanism G to determine the exact place of discharge of imperfect cans. The reset cam 185 and the discharge switch 167 together with their associated parts are adapted to be manually shifted around the path of travel of the timing pins 121 for this purpose. The switch and the reset cam are both carried on a bracket 186 (Figs. 4 and 9) which is bolted to a ring 187 concentrically disposed over the timing disc 123. The ring is retained by a clamp plate 188 in a recess 189 formed in a bracket 191 bolted to the top of the gear housing 133. By loosening the clamp plate 188 the ring 187 may be slid around in its recess to any desired position.

Thus when it is desired to discharge cans from the upper chute H (Fig. 1) the position of the switch and the reset cam should be that illustrated, by way of example, in the drawings (Figs. 9 and 10). The distance of the can movement by the elevator, when the can is discharged at the upper chute H is equal to six flight spaces from the testing station and for such a setting the position of the discharge switch 167 will be six timing pin spaces from the solenoid 105 (Fig. 10).

In like manner, if cans are to be discharged from the lower chute H (two flight spaces from the testing station) the switch will be set at X (Fig. 10—two timing pin spaces from the solenoid 105). If the discharging is to be done by way of the intermediate chute H (four flights up) the switch should be set at Y (Fig. 10—four timing pin spaces from solenoid 105). If more than three chutes are to be used the number of timing pins may be accordingly increased.

It is thought that the invention and many of its attendant advantages will be understood from the foregoing description, and it will be apparent that various changes may be made in the form, construction and arrangement of the parts without departing from the spirit and scope of the invention or sacrificing all of its material advantages, the form hereinbefore described being merely a preferred embodiment thereof.

I claim:

1. In a can elevator, the combination of a conveyor for carrying cans having end members applied thereto from one level to another level, a plurality of vertically spaced can discharge chutes disposed adjacent the path of travel of the cans through the elevator, a can end testing device including detector fingers disposed at the entrance of said conveyor and simultaneously movable into engagement with the opposite ends of the cans in time with their passage into said conveyor for detecting imperfect cans which lack end members, a detector solenoid operable by said detector fingers when a can lacking its end members is detected, a time delay mechanism including a rotatable disc rotating in time with said conveyor and having shiftable timing pins which are moved into operative position by said detector solenoid, an air nozzle disposed in line with each of said can discharge chutes, a pipe line connecting with said nozzle and leading to a suitable source of compressed air, and a solenoid actuated valve in said pipe line and operable by a positioned timing pin of said time delay mechanism for issuing a blast of compressed air through said nozzle so that the detected can will be discharged from the elevator by way of said chute at a predetermined time.

2. In a can testing elevator, the combination of a vertically disposed conveyor for carrying cans having end members applied thereto from one level to another level, a can discharge chute disposed adjacent the path of travel of the cans through the elevator, a can end testing device including pivotally mounted detector fingers simultaneously movable into engagement with the opposite ends of the cans, means for actuating said detector fingers in time with the passage of the cans through the elevator for detecting cans which lack both end members, a detector solenoid operable by said detector fingers when a can lacking an end member is detected, a time delay mechanism including a rotatable disc rotating in time with said conveyor and having shiftable timing pins which are moved into operative position by said detector solenoid, an air nozzle dis-

posed in line with said can discharge chute, a pipe line connecting with said nozzle and leading to a suitable source of compressed air, a solenoid actuated valve in said pipe line and operable by a positioned timing pin of said time delay mechanism for issuing a blast of compressed air through said nozzle so that the detected can will be discharged from the elevator by way of said chute, and means for resetting said timing pins for subsequent operation.

3. In a can elevator, the combination of a conveyor for carrying cans having end members applied thereto from one level to another level, a can discharge chute disposed adjacent the path of travel of the cans through the elevator, a compressed air nozzle located in line with said discharge chute and disposed adjacent the path of travel of said cans, a normally closed valve for controlling the passage of air through said nozzle, and means for detecting imperfect cans which lack both end members and including devices for momentarily opening said valve to issue a blast of air from said nozzle to remove the detected can from the elevator by way of said discharge chute, said can detecting means further including a pair of oppositely disposed detector fingers pivotally movable toward and away from the opposite ends of the cans to detect the presence or absence of a said end member, and means for actuating said detector fingers in synchronism with the movement of the cans into the conveyor.

4. In a can elevator, the combination of a conveyor for carrying cans having end members applied thereto from one level to another level, a plurality of spaced discharge chutes located adjacent the path of travel of the cans through the elevator, a can discharge nozzle located in line with each of said discharge chutes and disposed adjacent the path of travel of the cans, said nozzles having connection with a source of supply of compressed air, a manually operable stop-cock adjacent each nozzle to selectively render a particular nozzle effective, a valve for controlling the passage of air from said air source to said effective nozzles, and means for detecting cans which lack end members, said means including devices operating to momentarily open said valve after a can without an end member has been detected so that a blast of air will be issued from said effective nozzle and the detected can thereby removed from the elevator by way of the discharge chute associated with said selected nozzle, said can detecting means further including a pair of cam actuated detector fingers disposed at the inlet end of said conveyor and pivotally movable toward and away from the opposite ends of the cans and engageable therewith when an end member is present on the can.

5. In a device of the character described, the combination of a conveyor for carrying cans having end members applied thereto, a can discharge chute disposed adjacent the path of travel of the cans on said conveyor, can ejecting means located in line with said discharge chute and disposed adjacent the path of travel of said cans, and means for detecting imperfect cans which lack an end member and including devices for actuating said can ejecting means to remove the detected can from the conveyor by way of said discharge chute, said can detecting means further including a pair of oppositely disposed detector fingers pivotally movable toward and away from the opposite ends of the cans to detect the presence or absence of a said end member, each of said detecting fingers having means for operating said ejecting means upon detecting the absence of a can end, and means for actuating said detector fingers in synchronism with the movement of the cans into the conveyor.

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