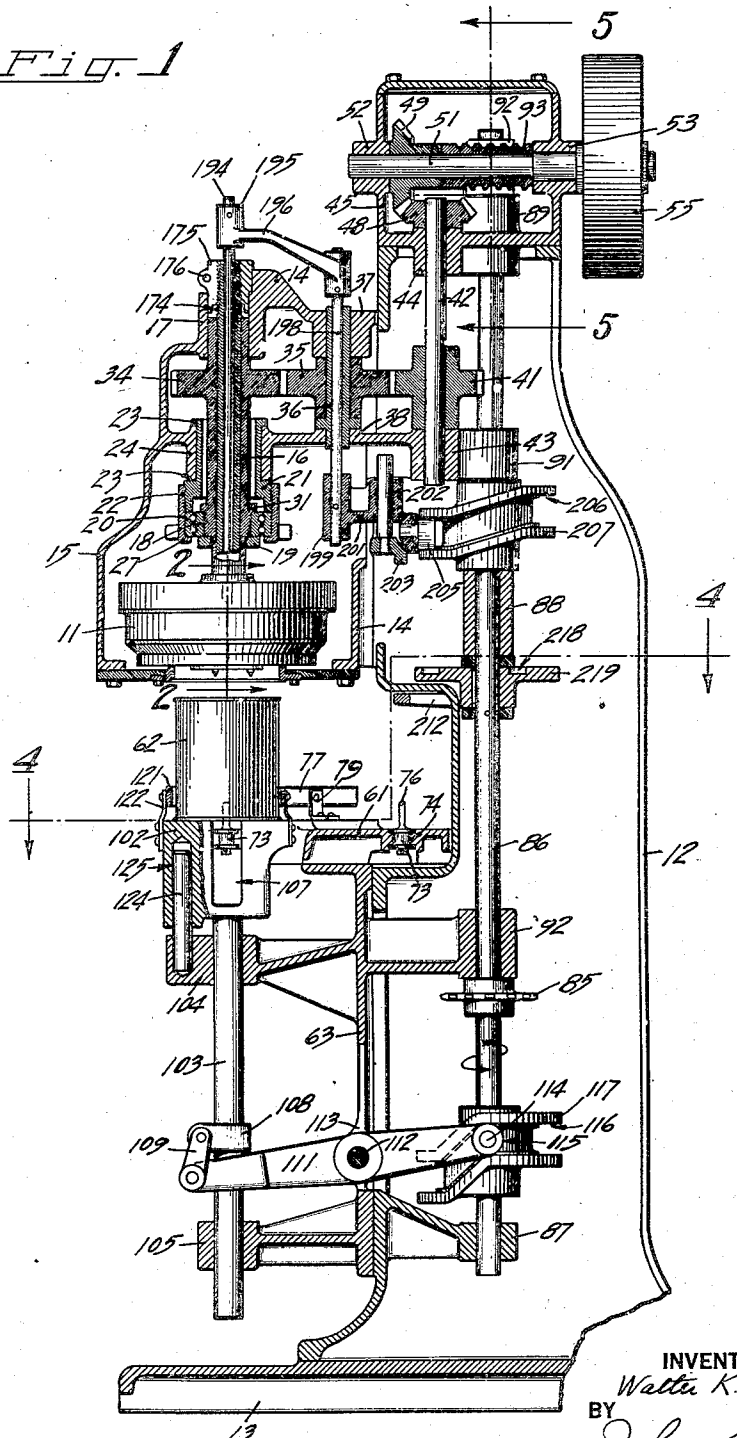
Sept. 3, 1935. W. K. CABOT 2,012,955

CAN OPENING MACHINE

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Fig. 1




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Fig. 2

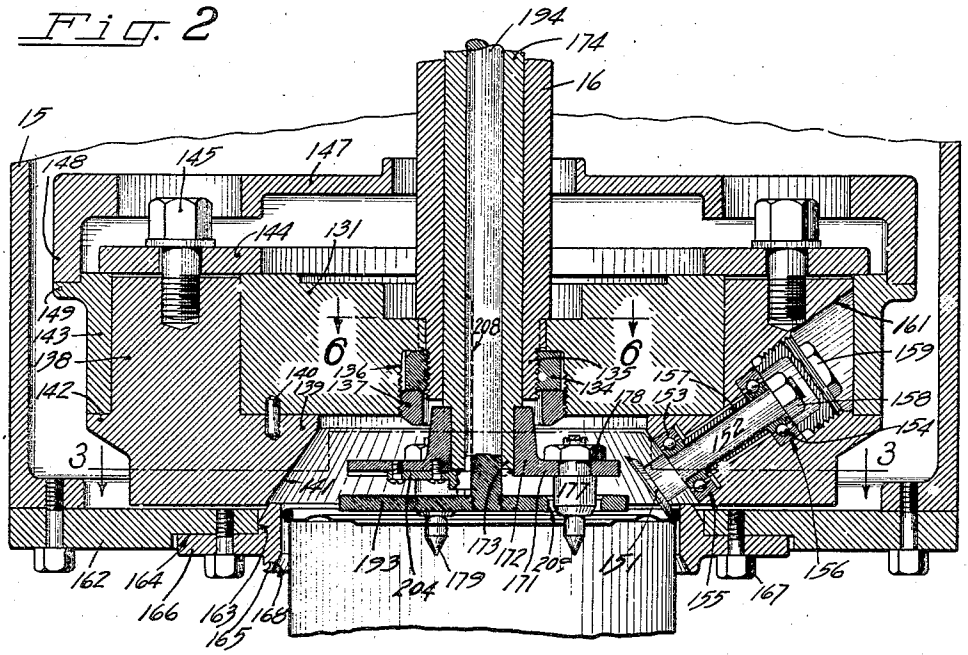
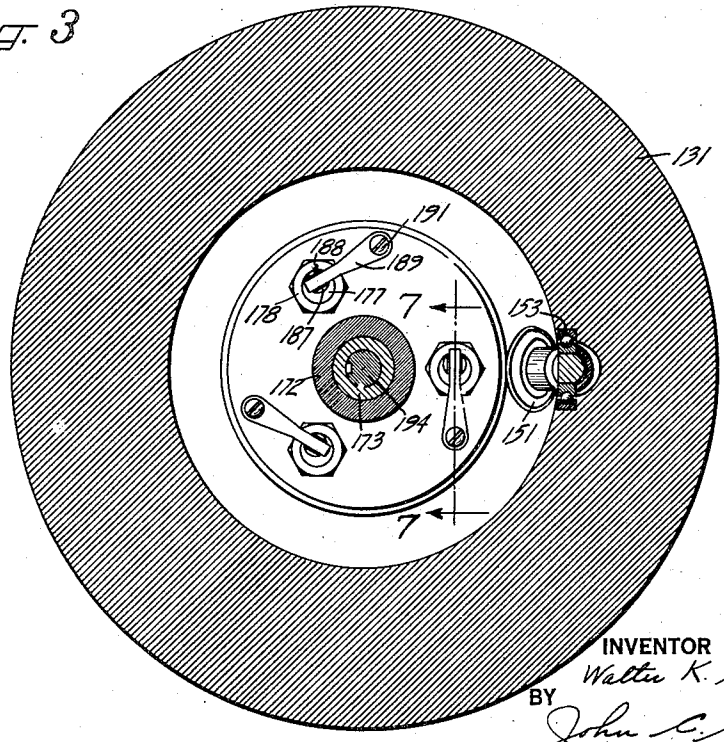



Fig. 3




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Fig. 4

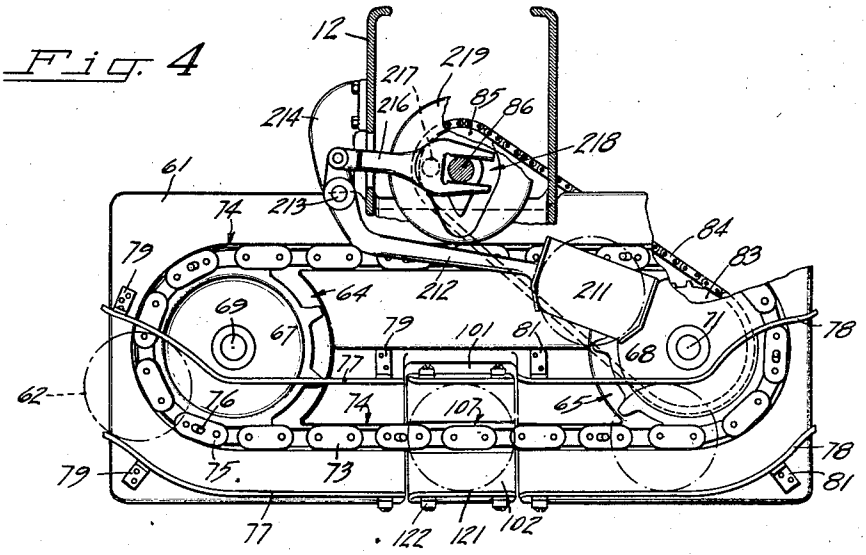



Fig. 5

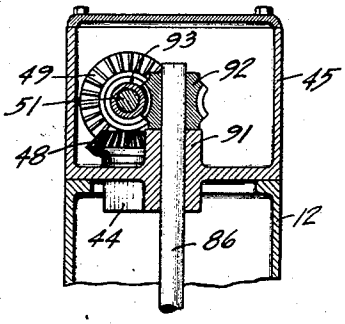



Fig. 7

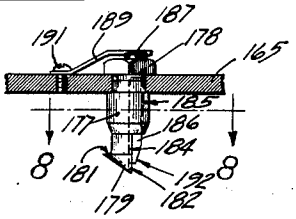



Fig. 6

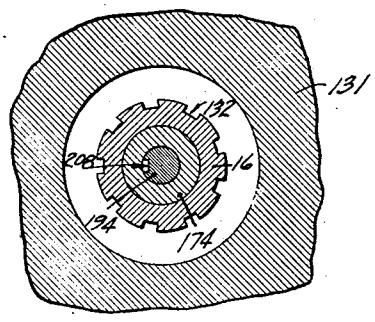
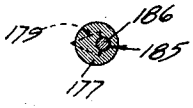



Fig. 8




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# UNITED STATES PATENT OFFICE

2,012,955

## CAN OPENING MACHINE

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Application June 15, 1931, Serial No. 544,351

13 Claims. (Cl. 30—3)

The present invention relates to a container opening machine and has more particular reference to a machine for automatically presenting sealed containers to opening devices which sever a top or other part therefrom.

The opening of containers, particularly metallic containers such as the ordinary tin can, has been accomplished by can openers depending for the most part upon manual operation. Even with more elaborate openers of the bench and table type considerable hand control has been necessary. While such can opening methods have been adequate for opening relatively small numbers of cans, their use is costly in the opening of the large numbers of cans required in certain industries. As an example of the need of opening cans in a large way the present practices of certain canners and manufacturers of tomato catsup may be mentioned.

In the tomato catsup industry all of the principal fruit (tomatoes) ripens at about the same time and must be handled quickly to prevent spoilage. It is a common practice in this industry to temporarily seal the ripened fruit in tin cans for temporary storage. These cans are subsequently opened, as the manufacturing needs require, and this necessitates the opening of a vast number of cans. The present invention is directed to the provision of a container opening machine capable of rapidly and efficiently opening a large quantity of cans in a relatively short time and with the minimum of hand labor.

The principal object of the present invention is the provision of a machine for automatically opening closed containers by automatically presenting them for opening, automatically opening them, and automatically removing the same after they have been opened.

An important object of the invention is the provision of an automatic container opening head for an opening machine, having rotatable cutting elements and provision for holding the container in position during the opening operation.

A further important object of the invention is the provision of an opening machine for containers which conveys the sealed container into opening position, removes a part from the container in opening it and which retains control of both the container and the part severed while independently removing the same from the machine.

An important object of the invention is the provision of a container opening head for severing a part from a sealed container, wherein the container is automatically brought into proper position, is properly presented to cutting elements carried by the head, and is held in such presented position during the severing operation.

Numerous other objects 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 longitudinal sectional view of a machine embodying the present invention.

Fig. 2 is an enlarged central sectional view of the opening head, taken substantially along the line 2—2 of Fig. 1;

Fig. 3 is a sectional plan view of the head, taken substantially along the broken line 3—3 in Fig. 2;

Fig. 4 is a sectional plan view of the machine, taken substantially along the broken line 4—4 in Fig. 1, parts being broken away;

Fig. 5 is a fragmentary sectional view, taken substantially along the line 5—5 in Fig. 1;

Fig. 6 is a fragmentary sectional plan view, taken substantially along the line 6—6 in Fig. 2;

Fig. 7 is a fragmentary sectional view, taken substantially along the line 7—7 in Fig. 3; and

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

An apparatus embodying the present invention is illustrated in the drawings and comprises an opening head suitably mounted for rotation in a frame. A conveyor is provided for bringing the cans into alignment with the head from which position they are successively lifted and presented to a stationary chuck supported centrally of the rotating head.

During this transfer of a can into chucked position it is properly aligned relative to the head and its cover is impaled upon spring held spikes or sharpened pins carried in the chuck. A rotable cutting roller is angularly mounted in the rotating head and is carried around and inside of the cover seam. This rotative action completely cuts the cover from the rest of the container, a backing up ring disposed on the outside of the can seam assisting in the severing operation.

The opened can is then lowered and replaced on to the conveyor which discharges it from the machine. The severed can part, the cover, still impaled upon the spikes in the chuck, is then forced downwardly by a knockout device and falls into a catcher device. The catcher device

comprises a plate carried on one end of a horizontally movable arm. This arm and plate during the can opening operation are out of alignment with the opening head but after the opened can has been lowered the plate swings beneath the head and above the opened can, in time to catch the severed cover as it is knocked off the chuck. As the arm swings out of the way of the next succeeding can being brought into its opening position, the severed cover in the catcher is thrown out of the catcher plate and is thereby ejected from the machine.

An opening head 11 (Fig. 1) is rotatably mounted in the supporting frame of the machine which comprises an upright column section 12 mounted on a base 13. A housing 14 is bolted on the front face of the frame 12 and partially encloses the opening head, a housing cover 15 bolted to the housing completing the inclosure.

The rotating parts of the head 11 are carried on the lower end of a sleeve 16 extending vertically through connecting sections of the housing 14 and its cover 15. The upper end of the sleeve 16 is journaled in a bearing 17 formed in the housing and cover. Adjacent the head 11, the sleeve is enlarged to provide a support for a rotatable element 18 of a ball bearing unit, this element being clamped on the sleeve by a lock nut 19. The stationary element of the bearing unit comprises a ball race 20 held in stationary position, against the lower end of a tubular member 21, by a lock nut 22 threadedly secured over the tubular member.

The tubular member 21 is shouldered at 23 to provide locking support within a clamp bearing 24 formed at the junction between the housing 14 and the cover 15 and is located beneath the bearing 17. The head 11 and its sleeve 16 is thus held against vertical movement but is freely rotatable within the bearing 17 and within the bearing unit.

The cutter head 11 is rotated within its supporting bearings through movement imparted by way of its sleeve 16 and for this purpose the sleeve is enlarged intermediate its bearings 17 and 24 to provide a gear section 34. Gear 34 meshes with an idler gear 35 rotatably mounted on an elongated bushing 36 secured in bearings 37 and 38 formed in housing 14. The gear 35 also meshes with a driving gear 41 keyed to a vertical shaft 42 journaled for rotation at its lowermost end in a bearing 43 formed in an extension of the housing 14 and at its upper end in a bearing 44 formed in a gear casing 45 mounted on the top of the column frame 12.

A bevel gear 48 is keyed to the shaft 42 at its upper end and is located within the gear casing adjacent the bearing 44. This gear 48 meshes with a corresponding bevel gear 49 mounted on and keyed to a horizontal drive shaft 51 journaled in bearings 52, 53 formed in the gear casing 45. Driving power is imparted to the drive shaft in any suitable manner as by means of a pulley 55 secured to one end of the shaft exteriorly of the gear casing.

A table 61, (Figs. 1 and 4) is provided to assist in the presentation of sealed containers 62 to the opening head and for the removal of the same. Table 61 is mounted on a bracket 63 secured to the front of the column frame 12, the bracket extending forwardly of the frame and beneath the opening head.

Pockets or depressions 64, 65 are formed in the top of the table 61 and accommodate horizontally disposed sprockets 67, 68 mounted on the upper ends of shafts 69, 71 respectively, journaled in bearings formed integrally of the table 61. A can conveyor is provided, comprising an endless chain 73, which operates over the sprockets 67, 68, the forward run of the chain passing beneath the opening head 11. The upper surface of the chain 73 is flush with or slightly below the surface of the table, guideways or grooves 74 formed in the table accommodating the chain in its passage between sprockets.

Chain 73 preferably embodies special links 75 at spaced regular intervals which carry vertically extending fingers 76 which project above the table surface and engage behind the sealed containers as they are conveyed over the table. Parallel spaced guide bars 77, 78 direct this path of travel of the containers to and from the opening head, these bars being supported on the table and at a slight distance above its upper surface by brackets 79, 81 respectively secured thereto.

Shaft 71 at its lower end carries a sprocket 83 (Fig. 4) over which operates a chain 84 also moving over a sprocket 85 mounted on a vertical shaft 86 (see also Fig. 1) journaled for rotation in bearings 87, 88, formed in the frame 12, in a bearing 89 formed in the gear casing 45, in a bearing 91 provided in the housing 14 adjacent the bearing 43 and also in a bearing 92 formed in an inward extension of the bracket 63. At its uppermost end the shaft 86 carries a worm gear 92 (Fig. 5) which meshes with a worm 93 secured to the drive shaft 51. This gear, shaft, and chain and sprocket connections provide continuous driving power for the conveyor chain 73.

The table 61 directly beneath the opening head is cut away or recessed at 101 and as the sealed containers 62 are brought to this position beneath the opening head 11 by the conveyor chain 73 they move on to the upper surface of a movable platform or can lifter 102 (Figs. 1 and 4). This platform 102 is mounted on the upper end of a vertically movable, vertically disposed shaft 103 journaled in bearings 104, 105 projecting forwardly from the bracket 63.

The platform 102 is slotted at 107 to allow for passage of the conveyor chain 73, the slot being of the same width as the table slot 74 and therefore permitting unobstructed passage of the chain. The slot 107 is deep enough to permit lifting of the platform 102 with the rising shaft 103 without interference with the continuous movement of the conveyor chain. This raising of the platform takes place as a container 62 is moving into position on the platform and under the opening head and the container is lifted clear of the chain lug 76 at such time.

To effect this lifting action a collar 108 is secured to the shaft 103 intermediate the bearings 104, 105 and is pivotally connected by a link 109 with the forward end of a lever 111 pivoted on a stub shaft 112 supported in bosses 113 formed in the bracket 63. The rear end of lever 111 carries a stud 114 on which a cam roller 115 is rotatably mounted. This cam roller operates within a cam groove 116 formed in a cam 117 secured to the lower end of the shaft 86.

Lifting of the platform 102 in the manner described removes its superimposed container 62 from the influence of the conveyor chain 73 and brings its upper end into the opening head 11. Parallel spaced guide rails 121 (Figs. 1 and 4) are supported at the front and rear sides of the platform 102 and are held above the platform surface by brackets 122 secured to the platform walls. These rails form continuations of the

guide rails 77 and hold the can 62 in proper position. A pilot pin 124 is mounted on the bearing 104 and extends upwardly and into sliding connection with a vertical bore 125 formed in the platform. This construction holds the platform against turning but permits its vertical movement with the shaft 103.

The opening head 11 (Figs. 1, 2, and 3) into which the container is inserted, comprises a connecting collar 131 which secures the body of the head to the lower end of the sleeve 16. A special spline connection 132 (Fig. 6) is used between sleeve and collar to prevent movement therebetween. Collar 131 is further clamped in place by a nut 134 threadedly engaged to a reduced part 135 of the sleeve. This nut 134 rests within a recess 136 which also accommodates a lock nut 137 threadedly engaging the collar.

The body of the opening head comprises a ring member 138 (Fig. 2) mounted upon the collar 131 and having an inwardly projecting shoulder 139 engaging the under side of the body and held in registration by dowel pins 140. This shouldered part of the ring member encloses a central conical walled chamber 141. An annular peripheral shoulder 142 is formed in the ring member 138 and supports an outer ring 143. The upper surfaces of this outer ring 143 and the collar 131 are in the same horizontal plane which is slightly above the top surface of the ring 138 and a clamping plate 144 engages the outer ring and collar and is held in clamping position by bolts 145 passing through the plate and threadedly secured to the ring body 138. A cover disc 147 is also provided for the head, its outer annular wall designated by the numeral 148, being frictionally fitted upon a flange 149 projecting outwardly from and at the top of the ring 143.

A rotatable cutter disc 151 (Fig. 2) provides the active cutting element for the opening head, being preferably formed as an integral part of a spindle 152 mounted in ball bearing units 153, 154 seated in recesses 155, 156 formed in the ring member 138. The spindle 152 is disposed at an angle of about thirty degrees to the horizontal and this positions the cutter disc 151 at an abrupt cutting angle as will be more fully explained. This disc 151 is located entirely within the chamber 141.

For easy assembly of the cutter parts the spindle ball race elements of the bearing units 153, 154 are clamped against an interposed spacing sleeve 157 and these members are held on the spindle 152 and against the cutter by a lock nut 158 threadedly secured to its upper end. The outer or stationary ball race element of the bearing unit 154 is clamped in its recess 156 by a nut 159 threadedly secured within a connecting recess 161 formed in the ring member 138. The outer or stationary ball race element of the bearing unit 153 is allowed to float in its recess 155.

A circular plate 162 is used to partially enclose the opening head (Fig. 2) and is secured to the bottom edges of the housing 14 and the cover 15. Plate 162 is centrally apertured at 163 and its lower face is counterbored adjacent at 164. A ring 165 is disposed within the aperture 163 and its flange 166 is secured within the counterbore 164 by bolts 167. The ring 165 at its lower edge is formed with a tapered throat 168 which acts as a guide in centering the container as it is lifted into the opening head by the rising platform 102 as previously described. In its raised and inserted position, the container has a snug fit on the inside of the ring 165 and is thus securely held in cutting position.

A chuck organization (Fig. 2) is provided in the head 11 for engaging and holding the top or cover end of the inserted container 62 so that it is held stationary during the cutting operation. This chuck device is located centrally of the chamber 141 and embodies a flanged disc 171 having a hub 172 which is secured to a reduced lower end 173 of a vertically disposed sleeve 174 (see also Fig. 1) which extends through the sleeve 16.

The sleeve 174 is held stationary within the bearing 17, the upper end of the sleeve being threadedly connected with a clamp collar 175 securely held in the bearing. This clamp collar may be split along one side and a screw 176 may be used to tightly hold the collar against the threads of the sleeve.

The chuck organization also includes a plurality of vertically disposed shouldered spikes or pins 177 (Figs. 2, 3, 7, and 8) carried in the disc 171 and extending downwardly below its lower face. These pins extend through the disc flange and are held in fixed position by nuts 178, three such pins being illustrated. Each pin 177 terminates at its lower extremity in a triangular pointed head 179 above which there is formed a ledge 181, the head and a portion of the pin above the ledge being cut back substantially half of its thickness leaving a flat side 182.

A vertically extending semi-circular groove 184 is cut into this flat side and extends upwardly through the body of the pin as a circular bore 185. A pin 186, having an enlarged head 187 is slidingly mounted in the bore 185 and groove 184. The upper surface of the head 187 is slotted at 188 (Figs. 2 and 3) to accommodate the free end of a flat spring 189 secured to the disc 171, at its opposite end, by screws 191. This construction yieldingly holds the pin 186 in downward position (Fig. 7) with its head 187 against the upper end of the pin 177, the fitting of the spring within the slot 188 preventing turning of the pin.

As the sealed container is being raised into engagement with the head 11, as previously described, its top or cover first strikes against the pointed heads 179 of the pins 177 and then continued upward movement of the container against the fixed pins causes the latter to pierce through the cover, impaling it upon the pins at a position above the shouldered ledges 181. During this movement the container cover has engaged the lower ends of the pins 186 and lifted them against yielding action of their springs 189.

As the container cover comes into its raised position and passes over the shoulders 181 it shifts laterally a sufficient distance to permit partial insertion of pointed and wedge shaped bottom ends 192, of the spring held pins 186, within the holes formed by the pointed pins 177. This shifting causes the ledges 181 to catch under the cover and to hold it during severing of the cover from the container which now follows.

In this inserted position of the container its cover has been brought up against the cutting disc 151 being continually carried around with the rotating head. This cutter now circumscribes the top adjacent to and inside of the double seam joint and cuts out the top cover as the cutting edge rotates against its wall, the ring 165 backing up the engaged can part adjacent the cutter at such a time.

As the container cover is cut loose from the container body so that it can be further shifted, the springs 189 slide the pins 186 downwardly and move their tapered lower walls along the edges of the pierced holes in the cover. This further moves the now detached cover into secure shouldered engagement with the pins 177 where it remains during lowering of the opened container 62 back to the conveyer chain 73 with the lowering platform. The opened container is thereupon reengaged by an approaching chain pin 76 and discharged from the machine. It will be understood that alternate pins 76 are used for conveying containers to the platform 102 while those intermediate are for discharging engagement.

During the interim between lowering of an opened container and insertion of the next succeeding closed container into the opening head, the severed cover impaled upon the spikes 177 is knocked off by a knockout device and is caught and thrown out of the machine by a discharge device working in close cooperation. The knockout device comprises a stripper disc 193 (Figs. 1 and 2) secured to the lower end of a vertically extending knockout rod 194. This rod is located centrally of the sleeve 174 and projects both above and below its ends.

The upper end of the rod 194 is pinned to a boss 195 formed in an arm 196 which is secured to the upper end of a vertically disposed rod 198 slidingly mounted in the tubular shaft 36. The lower end of the rod 198 is secured to a boss 199 formed in a vertically movable block 201 which is held by and which slides upon a pilot pin 202 mounted in a bracket 203, projecting between side walls of the column frame 12. A cam roller 205 is rotatably mounted on the block 201 and operates within a groove 206 of a barrel cam 207 mounted on the vertical shaft 86.

Rotation of the shaft 86 through the described cam parts raises and lowers the block 201, rod 198, arm 196, rod 194, and disc 193 to strip the container top from the holding pins 177. A feather 204 (Fig. 2) is secured by screws to the under side of the disc 171 and one end projects into a featherway 208 cut in the lower end of the rod 194. This holds the disc 193 against rotation while permitting its vertical movement. Clearance openings 209 cut through the disc 193 allow for clearance of the pins 177.

The discharge mechanism for catching the severed container top comprises a pan 211 (Fig. 4) carried on the free end of a lever 212 pivoted at 213 to a bracket 214 secured to the side of the column frame 12. The opposite end of the lever 212 is pivotally connected to one end of a bifurcated cam yoke 216 which straddles the vertical shaft 86 and which carries a cam roller 217 operating within a cam groove 218 formed in a face cam 219 secured to the shaft 86. This cam oscillates the lever 212 and positions its catcher pan 211 beneath the head 11 as the severed container cover is knocked off and then swings out of the way of the next succeeding closed container being raised into opening position. This lateral movement of the pan 211 is sufficiently jerky to cause a throwing out or ejection of the cover when the lever 212 comes to an abrupt stop. The severed cover is thus ejected from the machine.

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. An opening machine for containers comprising in combination, a rotatable head having a cutting element adapted to sever a part of the container in the opening operation, a continuously moving conveyor for bringing the container into position adjacent said head prior to opening and for discharging it from said position after opening, and a movable platform combined with said conveyor and located in alignment with said head for transferring the container from said conveyor into engagement with said head for the opening operation and for returning the opened container back to said conveyor.

2. An opening machine for containers comprising in combination, a head having a cutting element adapted to sever a part of the container in the opening operation, a chuck combined with said head for holding the container in position for opening, means associated with the chuck for holding the severed part of the container after opening, and a stripper device for releasing the said severed part from said holding means.

3. An opening machine for containers comprising in combination, a head having a cutting element adapted to sever a part of the container in the opening operation, a chuck combined with said head for holding the container in position for opening, means combined with the chuck for holding the severed part of the container after opening, a stripper device for releasing the said severed part from said holding means, and discharging means for removing the said severed container part from the machine.

4. An opening machine for containers comprising in combination, a rotatable head having a cutting element adapted to sever a part of the container in the opening operation, a conveyor for bringing the container into position adjacent said head prior to opening, means combined with said conveyor for transferring the container therefrom into engagement with said head, and means combined with said head for guiding the container into exact cutting position within the said head.

5. An opening machine for containers comprising in combination, a rotatable head having a rotatable cutting element adapted to sever a part of the container in the opening operation, a stationary chuck combined with said head for holding the container in stationary position for opening said chuck having depending spikes for piercing the said container part and means combined with said spikes for shifting the severed container part into holding position.

6. An opening machine for containers comprising in combination, a rotatable head having a cutting element adapted to sever a part of the container in the opening operation, a stationary chuck combined with said head for holding the container in stationary position for opening, means associated with said chuck for piercing and holding the container part to be severed, and yielding means also combined with said chuck for shifting the container part into holding position during severance.

7. An opening machine for containers comprising in combination, a rotatable head having a cutting element adapted to sever a part of the container during a rotation of the head, a conveyor for bringing the container into position ad-

jacent said head and for discharging it therefrom, means for transferring the closed container from said conveyor into engagement with said head and for returning it after opening back to said conveyor, means for holding the severed container part during removal of the opened container from said head, a stripper device for releasing the said severed part from said holding means, and discharging means operating after removal of said opened container from said head to catch said stripped and severed container part and eject it from the machine.

8. In a can-opening machine, the combination of a rotatable head, a rotary cutter journaled in said head, a conveyor for depositing filled cans successively beneath said head, a can lifter for placing said cans with their upper ends within said head, and mechanism for operating the described elements in timed relation.

9. An opening machine for containers comprising in combination, a head having a cutting element operating downwardly on the container end and adapted to sever a part of the container in the opening operation, and a conveyor for bringing the container into said head for opening and for discharging it therefrom after opening, means movable relative to said conveyor for discharging the said severed part away from the line of said head and container, and mechanism operating said elements in timed relation.

10. An opening machine for containers comprising in combination, a head having a cutting element adapted to sever a part of the container in the opening operation, a conveyor for bringing the container into position adjacent said head and for discharging it therefrom after opening, and means combined with said conveyor for moving the container from said position and into said head for opening, and devices movable to and from the cutting element for discharging the severed part of the container laterally from said head.

11. An opening machine for containers comprising in combination, a head having a cutting element adapted to sever a part of the container in the opening operation, a chuck combined with said head for holding the container in position for opening, and means for bringing the container into said head for opening and for discharging it therefrom after opening, and devices movable to and from the cutting element for discharging the severed part of the container laterally from said head and chuck.

12. An opening machine for containers comprising in combination, a rotary head having a cutting element and means for piercing and supporting a cut-off part of the container, means for changing the vertical distance between said head and the container, means for moving the container to a position under said head and away therefrom, means for rotating the head, means for stripping the removed container top from the said piercing means, and means for removing said top from under said stripping means and head.

13. An opening machine for containers having in combination, chuck and holding elements for elevating and holding a container, a head and knife disc rotary on its own axis and around the axis of a container so held for severing the top part of the container, relatively fixed means for holding the severed part while the container is removed, and conveying means for feeding containers to said chuck and holding elements.

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