March 5, 1963 H. CAREW ET AL 3,080,078

METHOD OF AND APPARATUS FOR DISPENSING HOT FOODS

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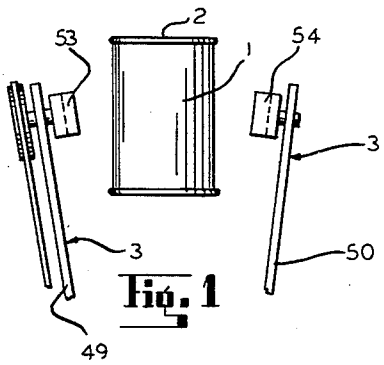


Fig. 1

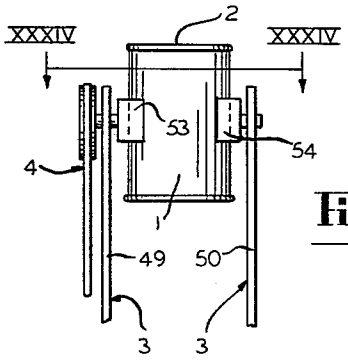


Fig. 2

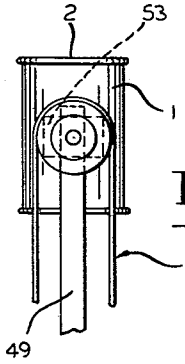


Fig. 3

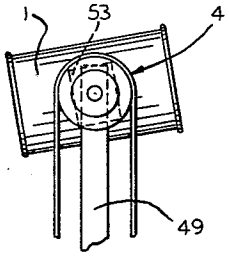
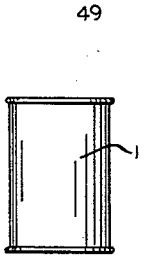


Fig. 4



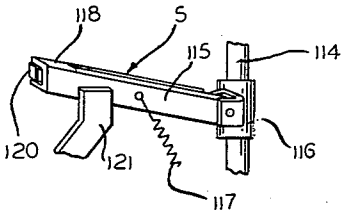




Fig. 5

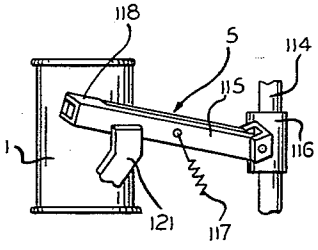




Fig. 7

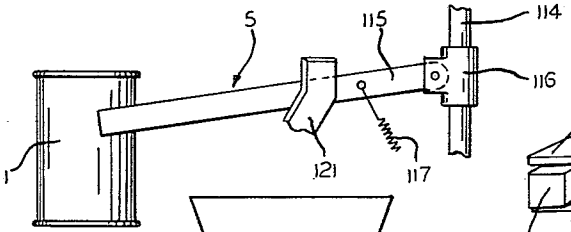




Fig. 6

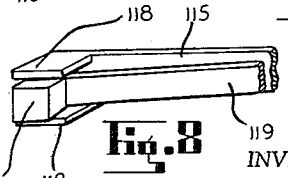


Fig. 8

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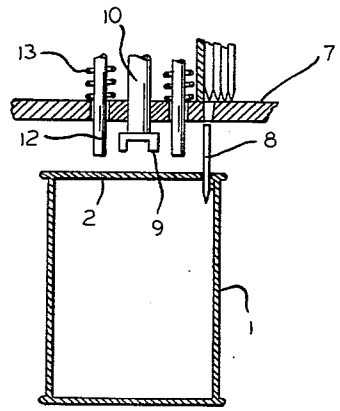


Fig. 9

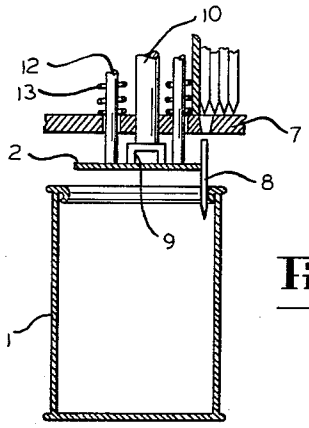


Fig. 10

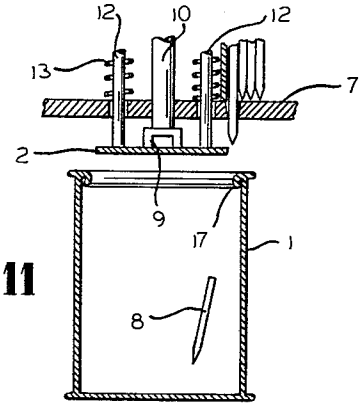


Fig. 11

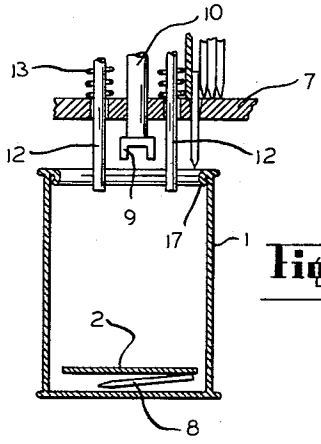


Fig. 12

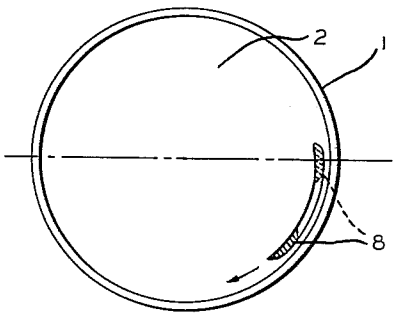


Fig. 13

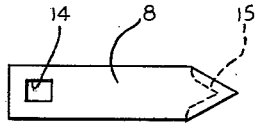


Fig. 14

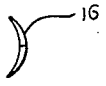


Fig. 15

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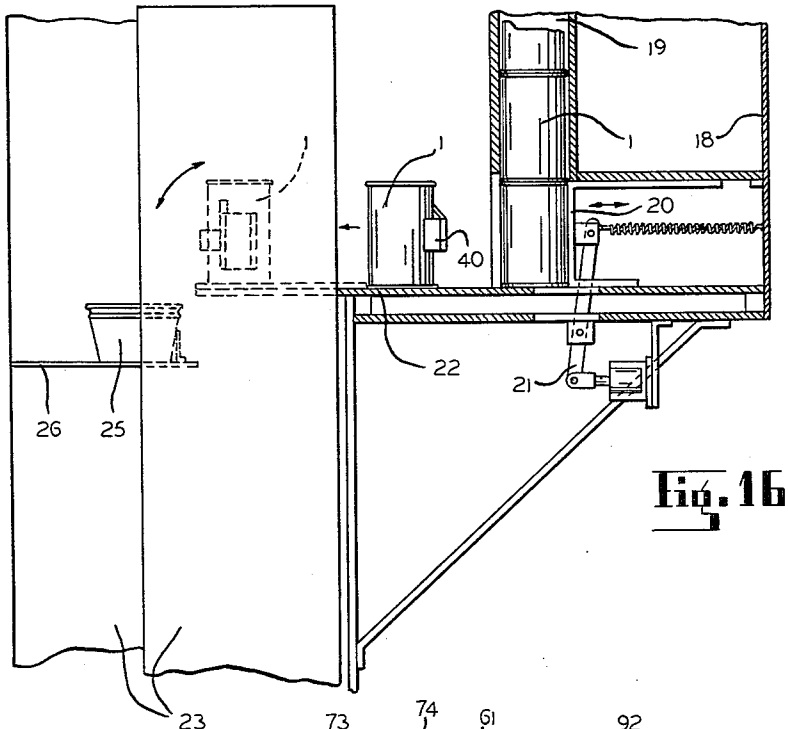


Fig. 16

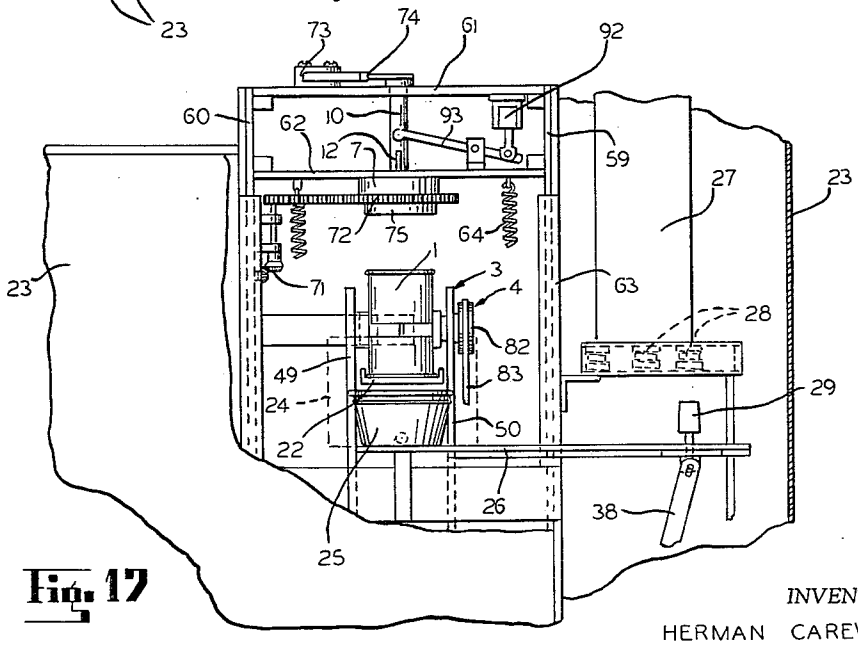


Fig. 17

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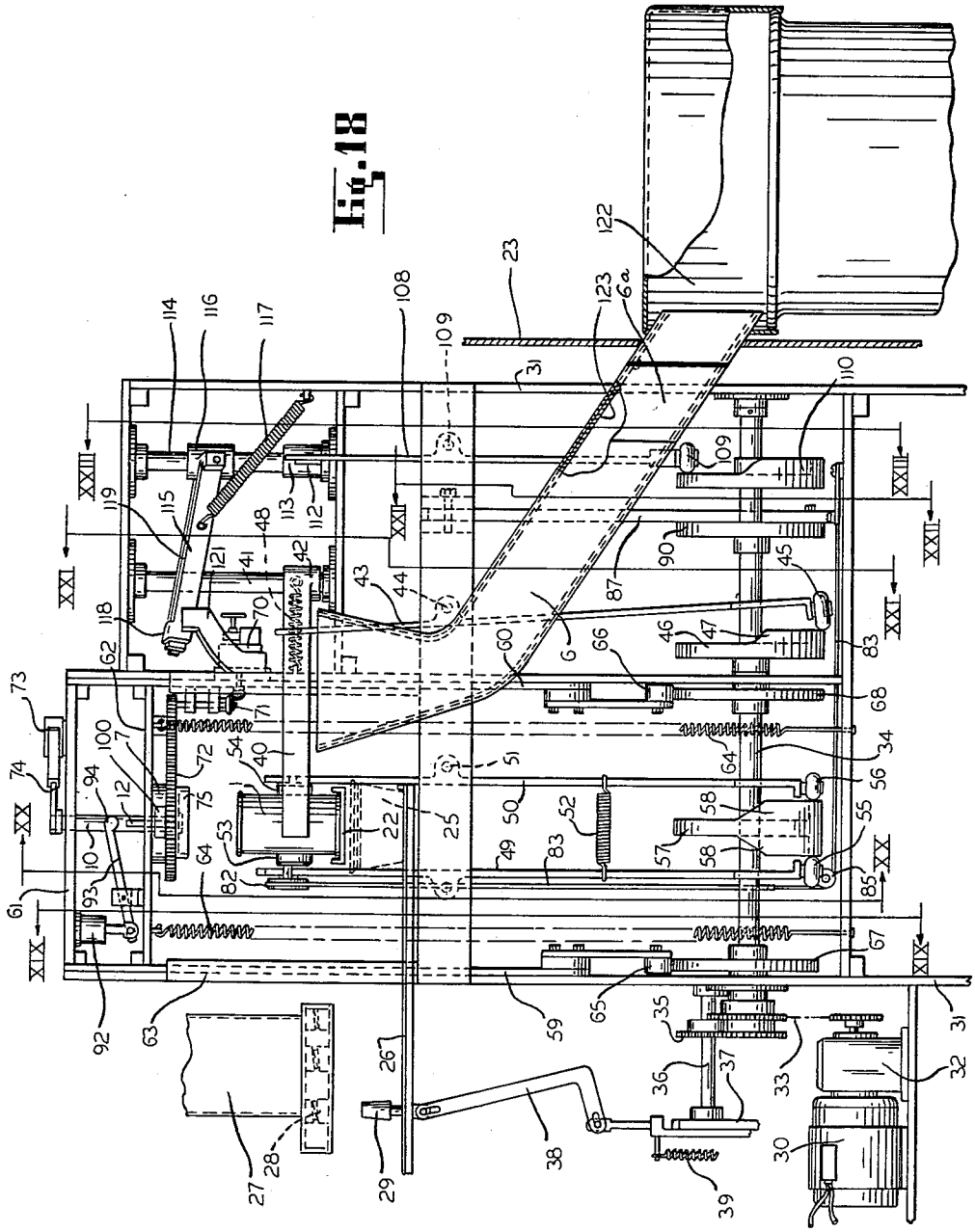
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METHOD OF AND APPARATUS FOR DISPENSING HOT FOODS

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Fig. 18



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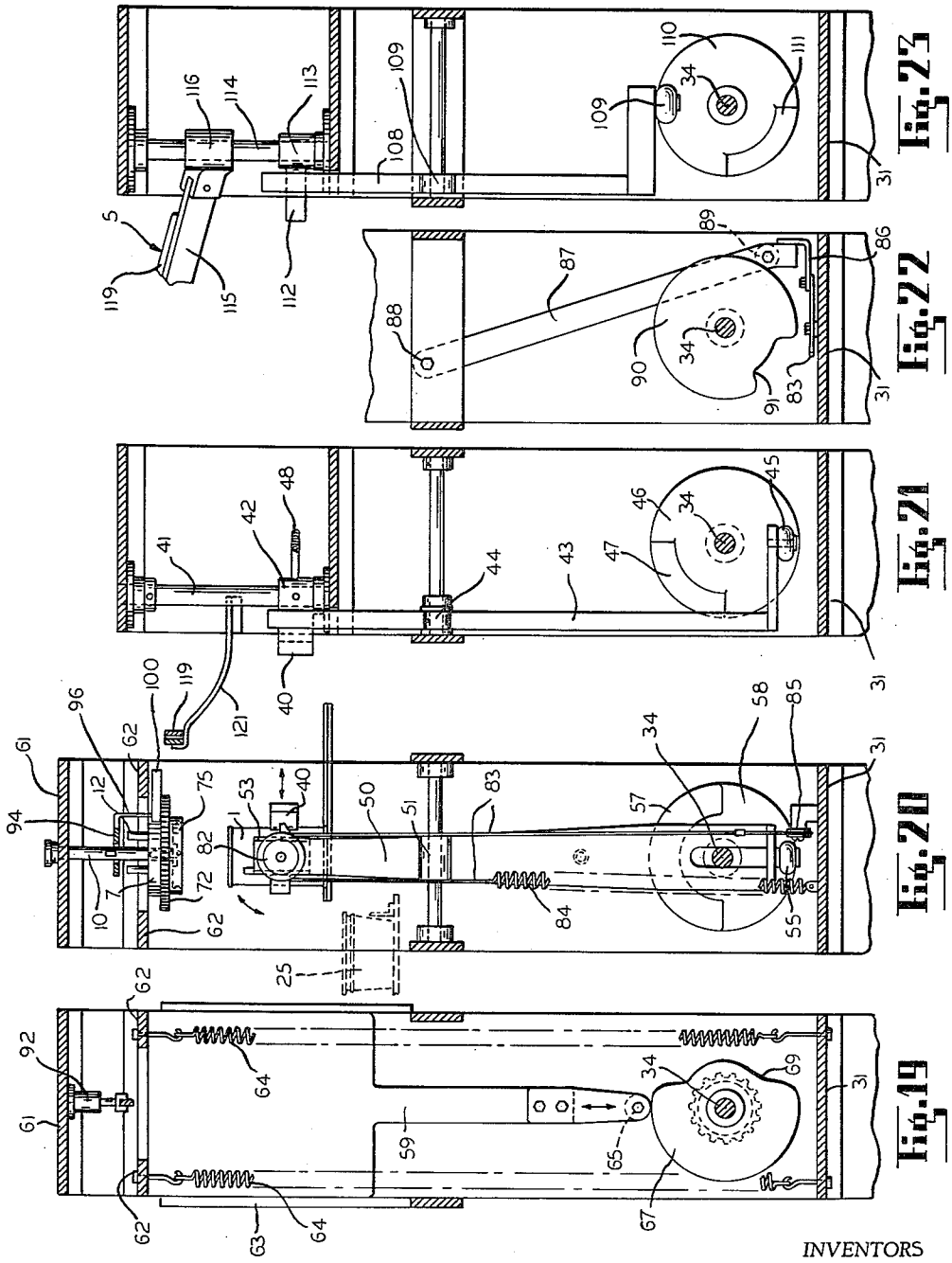


Fig. 23

Fig. 22

Fig. 21

Fig. 20

Fig. 19

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March 5, 1963 H. CAREW ET AL 3,080,078

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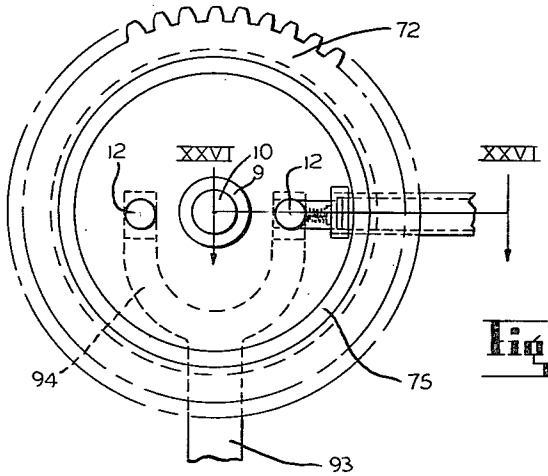


Fig. 24

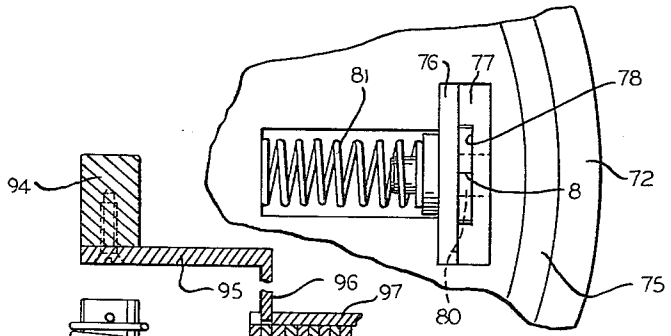


Fig. 25

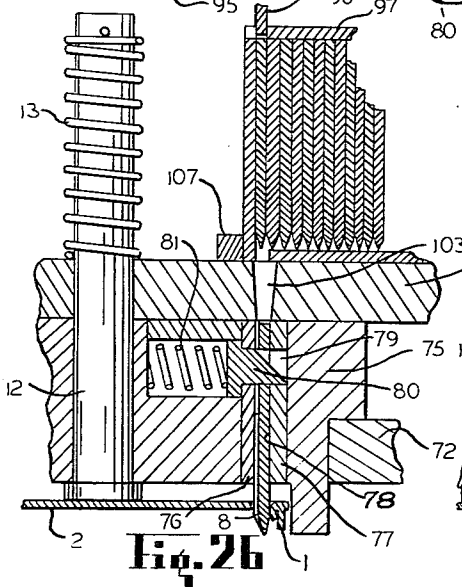


Fig. 26

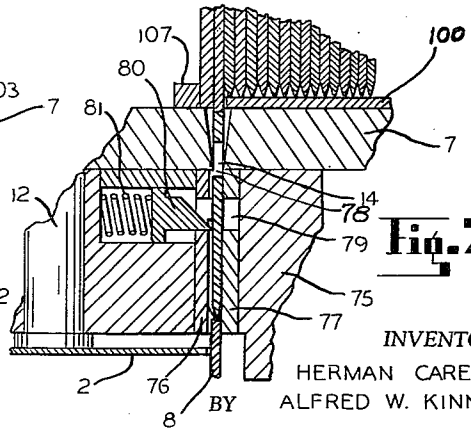


Fig. 27

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METHOD OF AND APPARATUS FOR DISPENSING HOT FOODS

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Fig. 28

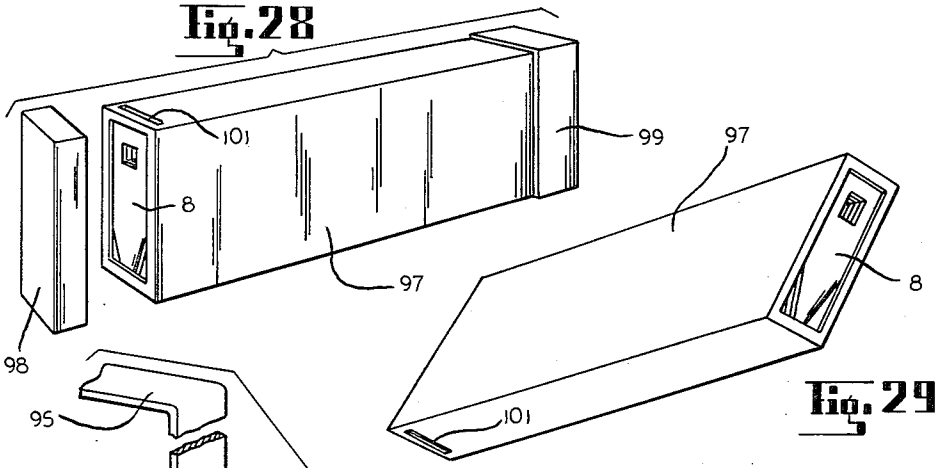


Fig. 29

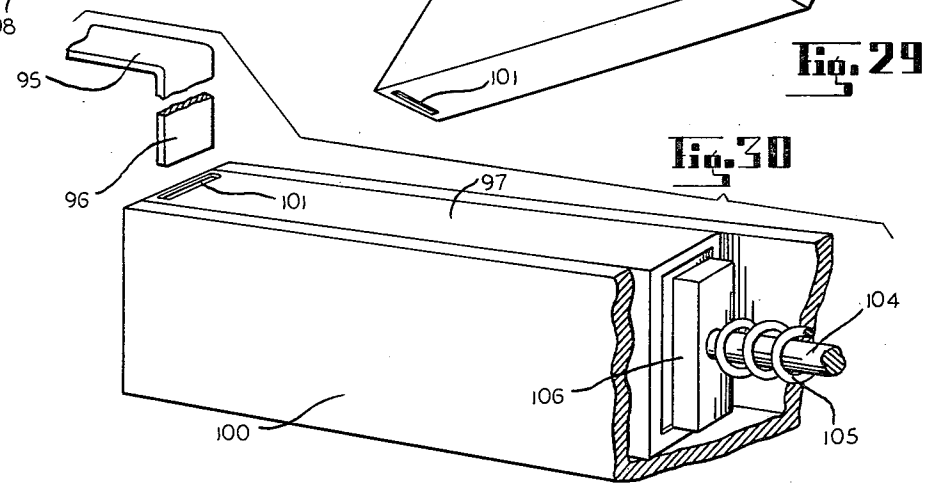


Fig. 30

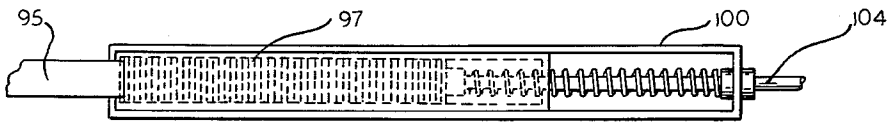


Fig. 31

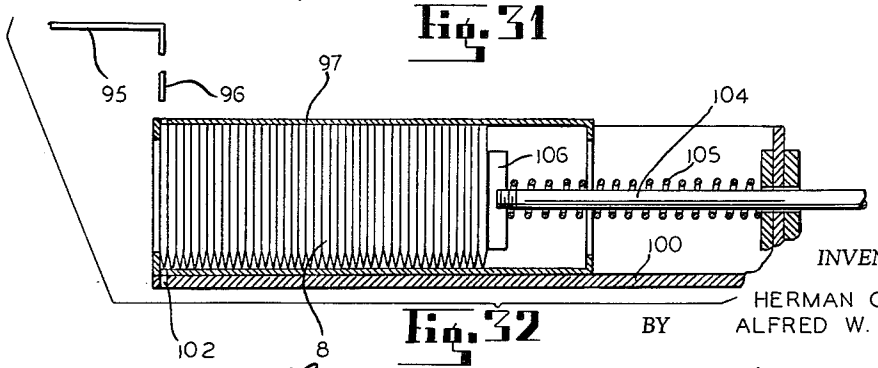


Fig. 32

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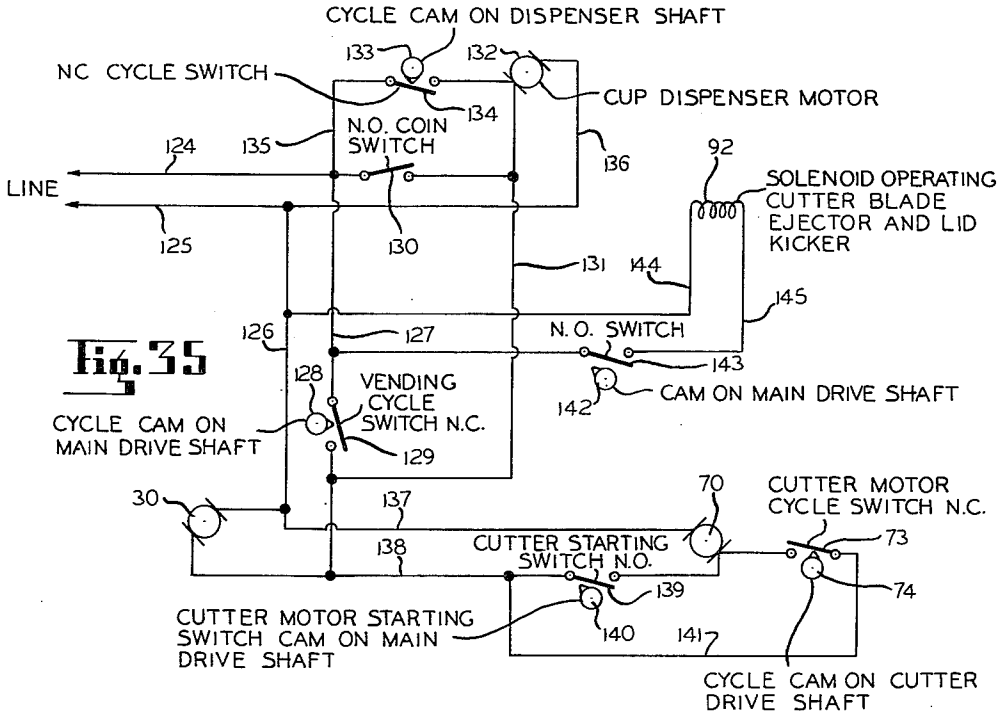


Fig. 35

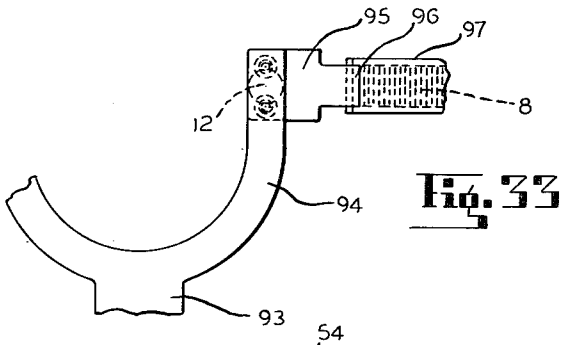


Fig. 33

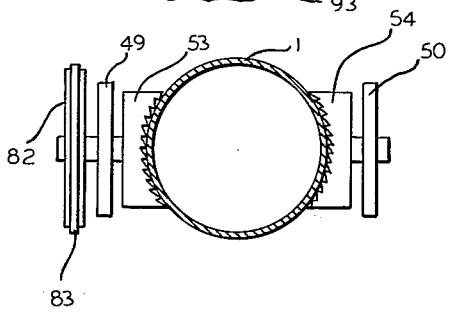


Fig. 34

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United States Patent Office

3,080,078

Patented Mar. 5, 1963

3,080,078

METHOD OF AND APPARATUS FOR DISPENSING HOT FOODS

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Filed Mar. 3, 1958, Ser. No. 718,683
13 Claims. (Cl. 214—305)

This invention relates to improvements in a method of and apparatus for dispensing hot foods, the invention being highly desirable for use for the automatic dispensing of hot edibles from containers such as tin cans and the equivalent in a completely sanitary manner, although the invention may have other uses and purposes as will be apparent to one skilled in the art.

More specifically, the instant invention relates to apparatus for automatically opening a selected container of edible material such as a tin can or the equivalent, emptying the contents thereof into a temporary container on the order of a paper cup or dish, and disposing of the empty can. The instant invention might well be incorporated in apparatus that may be coin controlled in the manner of vending machines, such apparatus enabling the customer to select a can or container of a particular type of edible from a number of them, and the apparatus will remove the selected can, and complete the above-mentioned routine automatically. The instant invention might also be incorporated with apparatus of many and various types for the dispensing of canned edibles in an automatic and entirely sanitary manner, whether or not the cans are preselective and whether or not the particular mechanism housing the cans or the instant invention functions in response to the deposition of a coin, or is actuated in any other manner. Obviously the instant invention functions equally as well for the dispensing of hot or cold edible liquids or other foods, and any desired can housing mechanism and any means for maintaining it at the required temperatures may be utilized. While many structural features of the instant invention might be incorporated with the type of dispensing mechanism wherein the contents of cans are periodically emptied into a larger vat or reservoir tank from which measured amounts are ultimately dispensed, the invention is highly suitable and desirable for the individual dispensing of the complete contents of a can directly into a suitable container for immediate consumption by the customer.

In the past, many and various types of machines and mechanisms for dispensing canned edibles have been developed. In certain instances, the complete unopened can was dispensed and when the customer had selected a hot food, the customer found himself with a relatively hot can in his hands, and then had to seek some means of opening that can and emptying it himself. The difficulty of such procedure is at once apparent when it is realized that the Sanitary Code requires canned edibles to be maintained under 50° F. for cold products, and over 150° F. for hot products. Obviously, a can, such as the commonly known tin can, over 150° F. in temperature is too hot to be handled comfortably in the bare hands.

In other instances with heretofore known apparatus of this general character, the mechanism was only capable of dispensing a relatively thin liquid from a can, the opening being by way of a puncturing of the can top, but solid and semisolid commodities such as thick soups, baked beans, and the like were incapable of being dispensed from a can by the apparatus.

It should also be noted that mechanisms heretofore developed for the dispensing of hot or cold food products from tin cans and the like, even though operative in the

manner intended, were unfit for use by virtue of failing to satisfy the relatively strict sanitary codes and laws. For example, in some cases the cutting implement by which the can was automatically opened was allegedly dipped into a sterilizing solution, and then used on successive cans. In view of the fact that there is no adequate way of telling whether or not the sterilizing solution is effective, whether there is sufficient of it at any one time, when and how it is replaced, etc., unsanitary conditions would likely result and therefore the Code requires that anything contacting the contents of a can only be used once. In other instances, the mechanisms heretofore known did not dispose of the opened and emptied can outside of the housing enclosing the can handling and opening mechanism, whereby it was possible for bacteria to breed and come in contact with the contents of a freshly opened can. Consequently, the Sanitary Code prohibited the use of such mechanism publicly.

It is also to be appreciated that machines for dispensing the contents of tin cans and the like as heretofore known were not capable of performing all the desiderata of such machines; for example, they might dispense the unopened cans only, they might open and empty a can but the customer must provide and properly replace the receptacle into which the can is emptied, they might open and empty a can but not properly dispose of the emptied can, and they might perform one or more of these functions in an unsanitary manner. In short, in no instance of which we are aware was there a machine devised capable of complying fully with all the requirements of dispensing a food product from a can into a receptacle ready for immediate consumption by the customer, and with no operations required on the part of the customer except the actuation of the machine by the deposition of a coin or otherwise, and the removal of the filled receptacle to a place for consumption of its contents.

With the foregoing in mind, it is an important object of the instant invention to provide mechanism for automatically moving a preselected can into proper position, contemporaneously dispensing and placing a receptacle adjacent the can, opening the can, emptying the contents of the can into the receptacle, and removing the emptied can to a waste container outside the housing of the mechanism.

Also an object of this invention is the provision of mechanism for automatically taking a preselected can, severing the top from the can, holding the top while the can is emptied into a dispensed receptacle, re-righting the can, dropping the cutter by which the can was opened into the can, dropping the removed can cover into the can over the cutter, and disposing of the emptied can and its new contents by delivering it to a location outside the housing of the mechanism.

Also an object of this invention is the provision of apparatus for opening and emptying a can of an edible, either liquid, semi-solid or solid, and removing the emptied can, all in a completely sanitary manner.

It is also a feature of this invention to provide mechanism for automatically dispensing the contents of a tin can or the like, including cutting means for opening the can, the apparatus being such that a separate cutting blade is utilized for each can.

A further feature of the invention resides in the provision of mechanism for automatically opening, emptying, and disposing of an emptied can in a completely sanitary manner, a new cutting blade being automatically moved into position for each succeeding can, while the cutting blade already used is disposed of along with the can it opens.

Still a further object of the instant invention resides in the provision of mechanism for automatically opening

and emptying tin cans and similar containers, which mechanism embodies a new type of rotary cutting mechanism capable of severing a can cover, holding the can cover out of the way while the can is emptied, and then dropping the severed cover into the empty can for disposition in a waste receptacle.

It is also an object of this invention to provide a new and highly efficient, as well as extremely economical cutting blade for use in a mechanism which automatically opens and empties tin cans and similar receptacles.

The instant invention also contemplates the provision of an automatic apparatus embodying can placing means, can holding means, can opening means, can emptying means, knife discharging means, cover dropping means, and can disposition means, all operated or controlled from a single drive shaft.

It is also a desideratum of this invention to provide a mechanism of the character set forth herein which may be used as an individual unit, or used in combination with a machine for chilling or heating a quantity of cans containing different commodities, and capable of delivering a can preselected by a customer.

It is still a further object of the instant invention to provide a new and novel method of automatically dispensing hot or cold edible products from tin cans or the equivalent in a completely sanitary manner.

While some of the more salient features, characteristics and advantages of the instant invention have been above pointed out, others will become apparent from the following disclosures, taken in conjunction with the accompanying drawings, in which

FIGS. 1 to 7 and 9 to 13, inclusive, are fragmentary somewhat diagrammatic views indicating steps of the method embodied in the instant invention, and the operation of salient portions of the apparatus to illustrate successive steps in the process and operation of the machine, as follows:

FIG. 1 indicates the position of the can and can holding apparatus at the start of the operation;

FIG. 2 illustrates the holding apparatus engaged with the can;

FIG. 3 illustrates the structure of FIG. 2, taken from the lefthand side thereof;

FIG. 4 illustrates the tipping of the can to empty the same;

FIG. 5 illustrates the can re-righted after having been emptied;

FIG. 6 illustrates an initial step in the operation of the means for disposing of the empty can;

FIG. 7 illustrates a final step in the disposition of the empty can;

FIG. 8 is a fragmentary elevational view of a portion of the can disposing means;

FIG. 9 illustrates an initial step, namely the start, of the operation of the can opening means which immediately follows the operation of the parts illustrated in FIGS. 2 and 3;

FIG. 10 illustrates the operation of the can opening means after the cover has been severed from the can;

FIG. 11 illustrates the deposition of the used knife blade into the empty can and the partial replacing of the used knife blade with a new one, the operation of this figure following the re-righting of the can as seen in FIG. 5;

FIG. 12 illustrates the dropping of the removed cover of the can into the empty can over the deposited knife blade;

FIG. 13 illustrates the operation of the cutting knife following the showing in FIG. 9;

FIG. 14 is a face view of one of the knife blades;

FIG. 15 is a lower end view of the knife blade taken from the righthand side of FIG. 14;

FIG. 16 is a fragmentary, part sectional, part elevational view illustrating the instant invention associated with a can-containing machine and the manner of delivery of the can to opening position;

FIG. 17 is a fragmentary front view of the instant invention, with a portion of the casing broken away, and parts shown in section;

FIG. 18 is a rear view of the mechanism embodying principles of the instant invention, showing the same with the rear portion of the casing or housing removed, and with parts broken away and shown in section;

FIG. 19 is a fragmentary vertical sectional view taken substantially as indicated by the line XIX—XIX of FIG. 18, looking in the direction of the arrows;

FIG. 20 is a fragmentary vertical sectional view taken substantially as indicated by the line XX—XX of FIG. 18;

FIG. 21 is a fragmentary vertical sectional view, with parts omitted, taken substantially as indicated by the line XXI—XXI of FIG. 18;

FIG. 22 is a fragmentary vertical sectional view taken substantially as indicated by the line XXII—XXII of FIG. 18;

FIG. 23 is a fragmentary vertical sectional view taken substantially as indicated by the line XXIII—XXIII of FIG. 18;

FIG. 24 is a fragmentary bottom plan view of the can cutting or opening mechanism;

FIG. 25 is a fragmentary enlargement of the right central portion of the structure seen in FIG. 24;

FIG. 26 is an enlarged fragmentary vertical sectional view through the can opening mechanism, taken substantially as indicated by the line XXVI—XXVI of FIG. 24;

FIG. 27 is a fragmentary view of the righthand portion of FIG. 26, showing the same in a different stage of operation;

FIG. 28 is a perspective view of a magazine of cutting blades, with the lefthand end cover removed;

FIG. 29 is also a perspective view of the magazine of cutting blades, showing the rear end thereof and with the rear cover removed;

FIG. 30 is a fragmentary perspective view illustrating the disposition of the cutting blade magazine in position on the can opening means;

FIG. 31 is reduced top plan view of the structure seen in FIG. 30;

FIG. 32 is an enlarged fragmentary vertical sectional view through the structure of FIGS. 30 and 31;

FIG. 33 is a fragmentary top plan view of the cutter blade ejecting means;

FIG. 34 is a fragmentary plan sectional view taken substantially as indicated by the section line 34—34 of FIG. 2; and

FIG. 35 is a schematic wiring diagram of the electrical circuit embodied in the instant invention whereby the various operations are performed in proper sequential order.

As shown on the drawings:

For purposes of clarity, the instant invention will be described as operating upon the commonly known form of tin can containing an edible product which may be a liquid, solid, semi-solid, or the like, and the can may be kept at either a low temperature or an elevated temperature, depending upon its contents. With the instant invention, substantially any food commodities that may be dumped or poured from a can may be dispensed, including pure liquids, soups from consommes to relatively thick vegetable soups and purees, baked beans, peas and other vegetables of that character, etc. Obviously, too, the instant invention might be utilized for industrial purposes where it is desired to frequently dispense a can of lubricant or other material that may be dumped or poured.

The instant invention may perhaps better be understood by way of a brief description of the general method of positioning, holding, opening, emptying, and disposing of a can. Diagrammatic illustrations of this process are

found in FIGS. 1 to 7 inclusive, and FIGS. 9 to 13 inclusive.

In FIG. 1, a can 1 having a top or cover 2 is shown in proper position for opening and emptying, the can having been placed in such position by means to be later described. After arriving in this position, the can is engaged in the body portion thereof by can holding means generally indicated by numeral 3 and associated with can tipping means generally indicated by numeral 4, as seen in FIG. 2 and FIG. 3. After the can has been opened while being held as seen in FIGS. 2 and 3, it is then tipped to empty its contents as shown in FIG. 4, after which it is re-righted in an empty condition by the tipping means 4.

The re-righted can is then in position to be engaged by a can disposing means generally indicated by numeral 5, shown in inoperative position in FIG. 5. After the cutting blade and previously removed can top are dropped within the empty can, the disposing means is brought into engagement with the can 1 as seen in FIG. 6, and picks up the can magnetically and transfers it to the position seen in FIG. 7 over a discharge chute 6 which leads to a waste receptacle. When the can is brought into position over the discharge chute, the can disposing means 5 is caused to automatically drop the can by means to be later described.

With reference now to FIGS. 9 to 13 inclusive, the can opening means and their operation are illustrated, it being understood that these means perform their operations in timed sequence interspersed with the operations of the can handling mechanisms diagrammatically shown in FIGS. 1 to 7 inclusive. While the can is firmly held by the holding means 3 against rotation, a head 7 is lowered toward the top 2 of the can, this head 7 carrying a knife blade 8 in position to puncture the can as seen in FIG. 9. Then the entire head 7 including all apparatus carried thereby is rotated relatively to the can, as indicated in FIG. 13 and the top 2 is severed from the can. The severed can cover 2 is immediately drawn up and held by a permanent magnet 9 on the lower end of a vertical shaft 10 to the position seen in FIG. 10. At this point, the head 7 again rises so that the blade 8 is withdrawn from the can, although this particular movement is not illustrated in these figures. The opened can is then tipped as in FIG. 4 in order to empty its contents, and then re-righted to the position of FIG. 5. After the empty can is again disposed in vertical position, and prior to the operation of the can disposing means 5, the used knife blade 8 is automatically expelled into the can as seen in FIG. 11. Immediately thereafter, the can cover is pushed off the magnet 9 by a pair of posts 12—12, each of which is spring biased as indicated at 13, and the cover falls into the can on top of the used knife blade 8 as seen in FIG. 12.

Simultaneously with the expulsion of the knife blade 8, a new knife blade is brought into position to operate upon the succeeding can. When the cover is discharged into the can and the posts or rods 12—12 again rise out of the can, the can disposing mechanism 5 comes into operation and removes the can containing the used knife blade and cover into the discharge chute 6, as above explained.

At this point, it may be best to describe an individual knife blade 8 which is completely disposed of after a single usage for sanitary reasons. Obviously, the blade must be extremely economical to warrant disposition after a single usage. Preferably, a blade is merely an economical metal stamping, since it does not need a hardened and carefully sharpened cutting edge for the mere opening of a single can. The blade is best seen in FIG. 14 and comprises a substantially rectangular body portion having a polygonal aperture 14 adjacent the upper end. It is not necessary that this aperture be square as illustrated, but it can be in substantially any desired shape, as long as it has a flat side at the bottom. The opposite end of the blade is formed into a point and preferably beveled on each angular edge as indicated at 15 to provide a cutting edge. As seen in FIG. 15, the blade is preferably struck to curve at least the cutting end of the blade as indicated at 16, and when the blade is forced through the top of the can, the convex side of the cutting end is preferably toward the outside of the can as seen in FIG. 13. With the blade so positioned, when a cut is made, the remaining marginal portion of the severed cover, adjacent the can chime is turned downwardly against the side wall of the can, as indicated at 17 in FIGS. 11 and 12. This results in providing a smooth margin at the open end of the empty can, and also insures the cutting of the cover at such a size that the cover will always fall within the can when pushed off the magnet 9 after the can has been emptied. Accordingly, at each operation the can will be substantially completely emptied, and there will be no trouble resulting from a misplaced or stuck cover.

With reference now to FIG. 16, it will be seen that the instant invention is preferably associated with any suitable machine capable of maintaining a quantity of cans having different contents at a predetermined temperature, and capable on manipulation of a dial or the like of preselecting a can containing a particular commodity desired by the customer. Such a machine is only fragmentarily illustrated in the drawings, and includes a housing 18 divided into a number of compartments 19 each of which may contain a stack of cans 1. This machine may be provided with a suitable pusher 20 operated by a linkage mechanism 21 connected to a suitable actuator, so that the machine will move out the lowermost can of the stack substantially to the position of the free can seen in FIG. 16, and then return to the position shown ready to move out the next can.

The instant mechanism for opening and emptying cans may be associated with the can selecting machine in any suitable manner, but preferably so that the platform 22 upon which each can is discharged enters into and forms a part of the mechanism. All operating parts, save for entrance and exit ports, are preferably contained within a housing 23 which may be fabricated in any shape suitable for enclosing the mechanism and maintaining the same in a sanitary condition. With reference to FIG. 17, we have indicated by dotted lines a door 24 which may be raised in the front of the housing and through which the customer may remove a container 25 now holding the commodity previously in the selected can. This container 25 may be a paper cup or the like, which rests upon a platform 26 in position to receive the contents of the can 1 when the same is emptied.

Now with reference to FIG. 17, it will be noted that the container 25 was automatically dispensed from a suitable paper container dispenser comprising a magazine 27 for a stack of nested containers, and a bottom housing containing a plurality of dispensing worms 28 operated in a well known manner; and when a container is dispensed, it drops upon the platform 26 in position to be moved over to commodity-receiving position by a pushing element 29.

Referring now particularly to FIGS. 18 to 23 inclusive, it will be seen that the entire mechanism, with the exception of the cutting mechanism, is preferably operated from a single source of power, such as an electrical motor 30 mounted near the bottom of a suitable frame structure 31. It will be understood, of course, that the frame structure 31 has uprights and cross bars wherever needed, and is fabricated in any suitable manner, it not being necessary herein to specifically describe the frame structure, bearing mountings for the various shafts, pivot points, and the like. The motor 30 may be connected through suitable reduction gearing contained in a box 32 and a suitable gear train 33 to actuate a main drive shaft 34, and the various parts of the mechanism are actuated from means connected to the main drive shaft, and the cutting mechanism is controlled in its operation from this shaft.

Looking at the left side of FIG. 18, it will be seen that through suitable gearing 35, the main drive shaft operates a transverse shaft 36 carrying an eccentric 37 thereon, which acts upon a suitable linkage system including a bell crank 38 to cause a transverse reciprocal movement of the container pusher 29, the pusher being restored to original position by a spring 39 connected to any suitable portion of the frame. Each time a cup or container is dropped by the dispensing mechanism 27—28, the pusher moves a cup 25 into position to receive the contents of the can, and immediately returns to the position shown in FIG. 18.

Most of the sub-assemblies in the machine are directly operated by suitable cams on the main drive shaft 34. At the outset, it is necessary for the can positioning mechanism to operate to move the can from the full line position seen in FIG. 16 to the dotted line position along the platform 22. This is accomplished by means of a pusher arm 40 having one end pivoted on a vertical shaft 41 as indicated at 42. An elongated lever 43 pivoted intermediately as at 44 to a part of the frame has its upper end bearing against the arm 40. The lower end of the lever carries a cam rider in the form of a roller 45 which acts against the side surface of a cam 46 keyed to the drive shaft 34. With reference to FIGS. 18 and 21, it will be seen that the cam 46 has a widened arcuate portion 47 thereon of just sufficient length to pivot the lever 43 as seen in FIG. 18, and cause the arm 40 to move the can into position for opening. As the structure is shown in FIG. 21, the rider 45 is off the high part 47 of the can, and the arm 40 has been returned to initial position by way of a spring 48 connected between a pin on the hub 42 of the arm 40 and a part of the frame.

Immediately upon the can 1 reaching proper position, the aforesaid can holding means come into effect, which are best seen in FIGS. 18 and 20. The holding means include a pair of allochiral elongated levers 49 and 50, each of which is pivoted intermediately to a cross shaft as indicated at 51, and below these pivot points the levers are connected by a spring 52 which tends to draw the parts of the levers below the pivot points together to spread the upper ends of the levers apart to the position seen in FIG. 1. These levers 49 and 50 carry can gripping elements at 53 and 54 at their upper ends, the grippers being journaled for rotation on stub shafts in the respective levers. As seen in FIG. 34, each of the gripping elements is serrated on its inner face with the teeth extending in a direction to resist the tendency of the can to rotate when the cover is cut therefrom. At their lower ends, the levers 49 and 50 carry cam riders in the form of rollers 55 and 56 respectively acting on opposed sides of a cam 57 carried on the main drive shaft 34. This cam 57 has an elevation or high portion 58 on each side thereof, these portions being identical in size and, as seen in FIG. 20, extend substantially halfway around the cam. When the high parts of the cam are disposed between the riders 55 and 56, the upper ends of the levers 49 and 50 are forced toward each other to firmly grip the can, against the action of the spring 52, as seen in FIG. 18. By these means, the can 1 is held against rotation during the cutting out of the cover 2 and the emptying of the can's contents.

As soon as the can has been firmly gripped by the holding means, the can top severing means come into play. The can opening or cutting means are also controlled and actuated from the main drive shaft 34. These means embody a slidable frame including vertical side members 59 and 60 connected at the top by a transverse member 61 and a short way below that transverse member by a pair of spaced transverse members 62—62, all as seen in FIGS. 18 and 19. This entire frame structure vertically reciprocates along guides on the main frame as indicated at 63. The frame structure just described is urged downwardly at all times by means of a plurality of springs 64, there being four such springs in the illustrated showing. The upper ends of these springs are connected to the cross members 62—62 of the slidable frame, while the lower ends of the springs are connected to a fixed cross bar of the main frame.

Still with reference to FIGS. 18 and 19, it will be seen that the lower ends of the slidable side members 59 and 60 carry cam riders in the form of rollers 65 and 66 respectively, riding on spaced cams 67 and 68 respectively, secured to the main drive shaft 34. The cams 67 and 68 are identical in shape and relative angular disposition, and as seen in FIG. 19, each includes a drop-off portion 69 that extends partially around the cam and permits the springs 64 to pull the slidable frame downward toward the can resting on the platform 22.

The vertically reciprocal frame carries the can cutting mechanism including not only the aforesaid head 7, and the vertical shaft 10 carrying the magnet 9, but also a drive motor 70 carried on the slidable side member 60, suitable gearing 71 driving a large ring gear 72 fixedly connected to the head 7, as will later appear, and on top of the upper cross member 61 is a cutter motor cycle switch 73 which limits the rotation of the cutting means to a single revolution and a substantially accurate revolution. This cycle switch is actuated by a cam arrangement 74 carried on the upper end of the vertical shaft 10 which extends through the cross member 61 of the slidable frame.

The detailed structure of the cutting mechanism is best seen in FIGS. 24 to 27 inclusive. The head 7 is fixedly connected to rotate with the shaft 10 which carries a magnet 9 on its lower end. Secured to the underside of the head 7 in any suitable manner and also to the shaft 10 is a circular housing 75 provided with an annular notch on its lower outer portion to receive the aforesaid ring gear 72 which is affixed to the housing, as best seen in FIG. 25. Set into a suitable recess in the housing block 75 are the cutting knife holding means which include a pair of adjacent members 76 and 77 provided with a slot-like passage 78 through which the knife blade 8 may extend. These two members 76 and 77 are provided with a lateral aperture 79 to accommodate a detent 80, spring biased as indicated at 81 in an outward direction. This detent 80 is flat on the underside, and has a sloping upper wall. It extends through the polygonal or flat-bottom opening 14 in the knife blade 8, the flat under face of the detent bearing against the flat bottom edge of the opening 14 in the knife blade. With the knife blade positioned as seen in FIG. 26, it will be then apparent that the knife blade cannot move upwardly when the cutting mechanism is brought downwardly, but the knife blade is effectively forced through the cover 2 of the can 1, and the knife blade is held rigid during a revolution of the cutting mechanism while the can cover is being severed.

With reference again to FIG. 13, it will be seen that the knife blade is held so that it enters the can cover 2 in a manner to split a diameter of the cover, and when it returns to the original position after a single revolution of the cutting means, the can cover will by necessity be fully severed, and there is no danger of the cover being stuck to the can body by a metallic thread. Of course, as soon as the can cover 2 is severed, it is immediately pulled upwardly and held by the magnet 9. The cutter drive motor rotates at a faster speed than the main drive shaft 34, because as soon as the cutting operation is completed, the cam riders 65 and 66 strike the high parts of the cams 67 and 68, and the entire slidable frame is elevated to the position seen in FIG. 18 to withdraw the knife blade from the can 1.

At this point, the can tipping or dumping means become effective. These means are best seen in FIGS. 18, 20 and 22. As stated above, the can holding or gripping elements 53 and 54 are journalled for rotation in the upper ends of the tong levers 49 and 50. On the shaft of the gripper 53, outside the lever arm 49 is a pulley 82 and a flexible cable 83 is trained over that pulley. On one side of the pulley, this cable is connected at an end to a spring 84 secured to a lower cross piece of the main

frame 31. The cable also passes over another pulley 85 disposed on an angle member secured to the main frame, and the other end of the cable is connected to an angle member 86 bearing against the lower end of a dog leg lever 87 pivoted at its upper end as indicated at 88 to a part of the main frame, and carrying at its lower end a cam rider roll 89 bearing against the surface of a cam 90 on the main drive shaft 34. When the cam rider 89 drops into a relatively short recess 91 in the circumference of the cam 90, the spring 84 pulls the cable 83 in a manner to cause rotation of the pulley 82, and consequently rotation of the can grippers 53 and 54 sufficient to tip the can to the position seen in FIG. 4, and with sufficient rapidity to expel the contents of the can. The can is then immediately righted by the rider 89 passing out of the recess 91. This action, of course, is relatively rapid and occupies only a small portion of the time during which the drive shaft 34 makes its single revolution.

As soon as the empty can is restored to upright position, as just above explained, the means for discharging the knife blade and dropping the can cover into the can come into operation. These means are best seen in FIGS. 18, 24, 26, and 33. As seen in FIG. 18, there is a solenoid 92 mounted to the underside of the top member 61 of the slidable frame carrying the cutting mechanism, and the armature of this solenoid is connected to an end of an intermediately pivoted lever 39. As seen in FIG. 24, the outer or free end of the lever 93 is bifurcated as indicated at 94, and the ends of the furcations extend over the aforesaid spring biased rods 12, which ultimately push the can cover off the magnet 9 as diagrammed in FIG. 12. Extending sidewise from one of the furcations 94 is a bracket 95 having a depending blade pusher 96 on the outer end thereof, as best seen in FIGS. 26 and 33. This blade pusher removes the just used blade and substitutes a new one therefor in a manner now to be described.

The cutting blades are supplied in a magazine which may be in the form of a cardboard container 97 shown in FIGS. 28 to 32 inclusive. The magazine 97 contains a number of blades 8 in aligned relationship, and this container or magazine is preferably provided with end caps 98 and 99. The blades are preferably sterilized either before or after being packaged in the magazine. When it is desired to place a magazine supply of blades in the machine, it is a simple expedient to remove the end caps 98 and 99, and the hands of the operator need not contact any of the blades. The magazine with the end caps removed is then placed in a trough-like housing 100 carried on the upper face of the head 7 immediately above the blade holding mechanism, as seen in FIG. 26. The magazine 97 is provided with upper and lower slots 101 at one end thereof, and the trough-like housing 100 is slotted as at 102 (FIG. 32) in alignment with the slots in the magazine. Likewise, with reference to FIG. 26, it will be seen that the rotary head 7 is provided with a V-shaped slot 103 also in alignment with the slots in the magazine and the housing. These slots are so sized as to permit the discharge of a single blade at a time.

Now with reference again to FIGS. 30, 31 and 32, it will be seen that the trough-like housing 100 is provided with a plunger 104 spring biased inwardly as at 105, and having a head 106 on its inner end of a size to enter the magazine and force the blades toward the opposite end of the magazine. It is a simple expedient to dispose a magazine of blades in proper position in the housing 103 by merely seating the magazine in the housing and moving it forwardly against a stop element 107, shown in FIGS. 26 and 27.

It will be noted that the pusher 96 on the bracket 95 extends well below the bottom faces of the furcations 94 on the solenoid actuated lever 93. Therefore, as soon as the empty can is restored to upright position, the solenoid is energized to draw in the armature thereof, and cause the bifurcated end of the lever 93 to move downwardly. The pusher 96 first enters the slots 101 in the magazine of blades, and forces down a new blade through the slot 103 in the head 7, driving out the used blade 8 and moving a new blade 8 into position such that the latch type detent 80 springs back through the aperture 14 in the new blade and locks it in position ready for a succeeding can. The blade already used is discharged into the empty can just prior to the ends of the furcations 94 contacting the cover rejecting rods 12—12, and continued downward movement forces the cover off the magnet 9 so that the can cover drops into the empty can on top of the already received cutting blade. This operation is diagrammed in FIGS. 11 and 12. The idea of first dropping the blade into the empty can and then dropping the severed cover over that blade is to discourage any unauthorized recovery of used blades by an unethical proprietor.

Following the dropping of the used knife blade and can cover into the empty can, the final operation of the mechanism ocurs. This is the removal and disposition of the empty can by the aforesaid disposal means generally indicated by numeral 5. These means as to their detailed construction are best seen in FIGS. 8, 18 and 23, with slight reference to FIGS. 5, 6 and 7. With reference to FIGS. 18 and 23. it will be seen that these means are actuated by a lever arm 108 intermediately pivoted as at 109 to the main frame 31. At the lower end thereof, the lever 108 carries a cam rider roll 109 bearing against the side surface of a cam 110 on the main drive shaft 34. This cam is provided with a lateral arcuate elevation 111, which when contacted by the roller 109, forces the upper end of the arm 108 to the left as viewed in FIG. 18. The upper end of the lever 108 bears against a lug 112 projecting outwardly from a collar 113 keyed to a vertical shaft 114 in the upper portion of the main frame 31. A disposal arm 115 has one end thereof secured to a hub 116 also keyed to the shaft 114. This arm 115 is constantly urged toward neutral or inoperative position by means of a spring 117 which, as noted from the showing in FIG. 18, is mounted obliquely, one end of the spring being connected to the main frame at a point much lower than the other end connection with the arm 115. Consequently, when the rider 109 passes over the high spot on the cam 110, the arm is forced by the lever 108 through an arcuate and downward path from the relatively high position seen in FIG. 18 toward the can, as diagrammatically indicated in FIG. 6.

Now as seen best in FIG. 8, the free end of the arm 115 has a pair of spaced inwardly extending lugs 118—118. Secured at one end to the arm 115 is a spring blade 119 having a normal tendency to move away from the arm. The free end of this spring blade carries a permanent magnet 120 thereon, which normally projects outwardly beyond the lugs 118—118 on the arm, as seen in FIG. 8. When the arm reaches the empty can, the magnet 120 first contacts the can and engages the same, the can being entirely supported by that magnet. As the cam rider 109 passes off the high point of the cam 110, the spring 117 forcibly retracts the arm 115 against a fixed stop member 121. This stop member is so located that when the arm contacts the same, the can is immediately above the flared mouth end of the discharge chute 6. The arm 115 strikes the stop member 121 with sufficient force to cause the spring arm 119 to be jarred inwardly against the arm, while the can is brushed off the magnet 120 by the aforesaid lugs 118—118 on the arm. The empty can containing the used knife blade and cover then gravitates into the chute 6 and ultimately into a closed waste receptacle 122 (FIG. 18) which is disposed outside the casing 23 of the machine, for sanitary reasons. Further, and for sanitary reasons, the discharge chute 6 is preferably provided with a removable lining 123, which may be made of glazed or waxed paper, or equivalent material. This lining 123 may be replaced at predetermined intervals through a self-closing trap door indicated diagrammatically at 6a. Obviously, a germicidal lamp may be mount-

ed at a judicious location in chute 6 to fully satisfy sanitary requirements in all locations.

It is therefore apparent that there is extremely little likelihood of any bacteria or offensive odors emanating from the waste receptacle 122 up through the chute 6 into the interior of the housing 23, and there is substantially no possibility of any contamination from such bacteria by way of contact with the contents of a newly opened can.

A satisfactory electrical circuit for the instant invention is diagrammatically illustrated in FIG. 35 of the drawings, This circuit includes line conductors 124 and 125 which are connected by way of conductors 126 and 127 to the main motor 30 which operates the main drive shaft 34. This circuit is normally open, however, by virtue of a cycle cam 128 on the main drive shaft 34 holding open a normally closed vending cycle switch 129. Circuit to the motor 30 is established by way of the deposition of a coin in the case of a vending apparatus, or by way of manually closing a switch 130, which will establish connection to the motor by way of conductor 131 that bypasses the switch 129. Immediately upon the closing of the switch 130, the motor starts and the cam 128 permits the normally closed switch 129 to close and maintain the circuit through the motor until that circuit is again broken by the cam 128 opening the switch.

The closing of the switch 130, also energizes a motor 132 associated with the cup dispenser 27—28, and a cam 133 on the dispenser motor shaft immediately permits the closing of a normally closed cycle switch 134 that maintains the circuit through the dispenser motor by way of conductors 135 and 136 until the switch 134 is again opened by the cam 133 after a dispensing operation. The motor 70 that drives the cutting means is energized through conductors 137 and 138 by way of a normally open starting switch 139 which is closed for a short interval by a cam 140 on the main drive shaft. The starting of the motor 70 operates the cam 74 on the cutter drive shaft to permit the closing of the normally closed cutter motor cycle switch 73, and thereafter the cutter motor 70 remains energized by way of conductor 137 and conductor 141, which bypasses the starting switch 139 until the cycle switch 73 is again forced open by the completion of a revolution by the cam 74. Shortly after the cutter motor stops, another cam 142 on the main drive shaft closes a normally open switch 143 of a short time just sufficient to energize the solenoid 92 by way of conductors 144 and 145, thus operating the cutter blade ejecting means and the lid dropping means.

The wiring, switches, etc. of the electrical circuit may be disposed in any judicious location on the apparatus.

The various operating sub-assemblies of the instant invention have been above described in the order of their operation. Consequently, a brief résumé will be sufficient. It will be noted that a filled can having been delivered by the selecting machine is first moved into position by the arm 40, and then immediately held against rotation by the grippers 53 and 54. Contemporaneously with this operation, a container such as a paper cup 25 has been dispensed and moved into position in front of the can by the pusher 29. As soon as the can is firmly gripped, the slidable frame carrying the cutting means descends forcibly and pushes the knife blade through the cover of the can, whereupon the cutting means rotate and sever the cover from the can, which cover is drawn up and held by the magnet 9. The slidable frame then rises, and the can tipping means empties the can into the container 25, and promptly rights the empty can. Then the blade ejector and cover dropping means come into play and the used blade is dropped into the can and a new blade moved into position to operate on the next can, the removed can cover being dropped into the can over the ejected blade. The arm 115 is then moved so the can is picked up by the spring mounted magnet 120 carried by that arm, and the arm is then brought back forcibly against the stop 121 to drop the can with the ejected blade and cover therein into the discharge chute 6 from which the can drops into the closed waste receptacle 122. The entire sequence of operations requires only an exceedingly short interval of time, since only one revolution in the main drive shaft is necessary. Consequently, many customers may be very rapidly served either hot or cold commodities in a condition ready for instant consumption.

From the foregoing, it is apparent that we have provided a novel and highly efficient apparatus for serving commodities from closed containers such as tin cans, in a purely sanitary manner. Nothing contacts the commodity contained in any can except a clean knife blade, which is used one time only. The empty can itself including the used knife blade and severed cover is at once discharged totally without the housing of the machine, and the problem of absolute cleanliness and sanitation is reduced to a virtual minimum. Further, it will be noted that the instant invention occupies a relatively small space and may be operated as an independent unit or operatively connected with a machine that maintains canned commodities at the proper temperature and effects a prompt delivery of a selected can.

It will be understood that modifications and variations may be effected without departing from the scope of the novel concepts of the present invention.

We claim as our invention:

1. In a machine for dispensing edibles from cans, can placing means, holding means to restrain the can from rotation, means for feeding a new knife blade to sever the cover from each can, cover holding means, tipping means to empty the opened can and then right the same, means to eject the knife blade into the can after the cover has been severed from the can, means to release the cover from said cover holding means to dispose it into the can over the ejected knife blade, and means to remove the can to a waste receptacle.

2. In a machine for dispensing edibles from cans, can placing means, holding means to restrain the can from rotation, means for feeding a new knife blade to sever the cover from each can, cover holding means, tipping means to empty the opened can and then right the same, means to eject the knife blade into the can after the cover has been severed from the can, means to release the cover from said cover holding means to dispose it into the can over the ejected knife blade, a waste receptacle, a chute leading to said receptacle, and means to drop the can into said chute.

3. In a machine for dispensing edibles from cans, can placing means, holding means to restrain the can from rotation, means for feeding a new knife blade to sever the cover from each can, cover holding means, tipping means to empty the opened can and then right the same, means to eject the knife blade into the can after the cover has been severed from the can, means to release the cover from said cover holding means to dispose it into the can over the ejected knife blade, a waste receptacle, a chute leading to said receptacle, and means to drop the can into said chute, and a removable lining in said chute.

4. In a machine for dispensing edibles from cans, can placing means, holding means to restrain the can from rotation, means for feeding a new knife blade to sever the cover from each can, cover holding means, tipping means to empty the opened can and then right the same, means to eject the knife blade into the can after the cover has been severed from the can, means to release the cover from said cover holding means to dispose it into the can over the ejected knife blade, a waste receptacle, a chute leading to said receptacle, and means to drop the can into said chute, a casing enclosing all said means and part of said chute, and said receptacle being outside said casing.

5. In a machine for dispensing the contents of cans, a magazine of can opening blades, a rotary blade carrying assembly movable to penetrate the can cover and then sever the same by the carried blade, and blade feeding means arranged to discharge the used blade and contemporaneously position a new blade from said magazine in said assembly, and can tipping and re-righting means timed to function when the can cover is severed.

6. In a machine for dispensing the contents of cans, a magazine of can opening blades, a rotary blade carrying assembly movable to penetrate the can cover and then sever the same by the carried blade, and blade feeding means arranged to discharge the used blade, and contemporaneously position a new blade from said magazine in said assembly, and can tipping and re-righting means timed to function when the can cover is severed, cover holding means to maintain the cover out of the way while said tipping means operate, and cover discharge means operable after the can is re-righted.

7. In a machine for dispensing the contents of cans, a magazine of can opening blades, a rotary blade carrying assembly movable to penetrate the can cover and then sever the same by the carried blade, and blade feeding means arranged to discharge the used blade and contemporaneously position a new blade from said magazine in said assembly, and can tipping and re-righting means timed to function when the can cover is severed, cover holding means to maintain the cover out of the way while said tipping means operate, and cover discharge means associated with said blade feeding means to discharge the cover after the ejection of the used blade, both the blade and cover falling into the empty can.

8. In a machine for opening a can and dispensing the contents therefrom, can holding means comprising a pair of intermediately pivoted tong levers, a can gripping element on each of adjacent ends of said levers, resilient means tending to spread said gripping elements, and cam means to periodically force the gripping ends of said levers toward each other overcoming the action of said resilient means and hold the can stationary, rotary cutting means to sever the cover from the can while it is held by the gripping ends of said levers, said elements being mounted for rotation relatively to said levers, and drive means to rotate one of said elements and accordingly the other when in gripping position to empty a can held by said elements.

9. In a dispensing machine including can opening and emptying means, can disposal means including an arm pivoted at one end, opposed inwardly extending spaced lugs on the other end of said arm, resiliently biased means on said arm carrying a magnet and normally projecting said magnet between and beyond said lugs, means to pivot said arm to engage a can by said magnet, a stop element, and means to forcibly return said arm abruptly against said stop element to spring said magnet between said lugs and brush off the can.

10. The method of dispensing the contents of a can automatically, including the steps of severing the cover from a can with a blade, holding said cover, emptying and re-righting the can, ejecting the used blade into the can, and dropping the severed cover into the can over the ejected blade.

11. The method of dispensing the contents of a can automatically, including the steps of severing the cover from a can with a blade, holding said cover, emptying and re-righting the can, ejecting the used blade into the can, and dropping the severed cover into the can over the ejected blade, and transferring the empty can with the blade and cover therein to a waste receptacle.

12. In a machine for opening cans and the like, can holding means, blade carrying means, drive mechanism to move one of said means toward the other and rotate one of said means relatively to the other to drive a blade held by said blade carrying means through the can cover and then sever the cover from the can, can emptying means, and blade ejecting means associated with said blade carrying means and timed to operate after said emptying means and eject the used blade into the empty can and replace the used blade with a new blade for the next operation.

13. In a machine for opening cans and the like, can holding means, blade carrying means, drive mechanism to move one of said means toward the other and rotate one of said means relatively to the other to drive a blade held by said blade carrying means through the can cover and then sever the cover from the can, cover holding means associated with said blade carrying means to retain the severed cover, can emptying means, and cover and blade ejecting means also associated with said blade carrying means timed to operate after said emptying means and eject the used blade first and then the cover on top of the blade into the empty can and replace the ejected blade with a new one for the succeeding can.

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2,831,591	Morton	Apr. 22, 1958
2,840,899	Mullich	July 1, 1958
2,840,900	Mullich	July 1, 1958