ELECTRIC CAN OPENER WITH CAN SENSING MEANS

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ABSTRACT

An electric can opener having a rotatable cutter which cuts through and around a seaming (outer) wall of a double seam (chime) by which a can end is secured to a can body. The rotatable cutter and a tractor wheel turn about axes which are substantially perpendicular to each other. The tractor wheel can be axially shifted by manual movement of an operating lever. The tractor wheel has a conical surface disposed to engage a chuck (inner) wall of a chime and a cylindrical surface disposed to engage the top of a chime. Associated with the cutter is a shoulder wheel that rides on the outside of a can below a chime so that the can opener will hold a can after a seaming wall is cut entirely around a can and until a can is deliberately released by axially shifting the tractor wheel out of engagement with a chime. A first abutment above a chime and ahead of the tractor wheel (the direction of rotation of a can being the reference) extends forwardly from a can opener housing. A second forwardly extending abutment above a chime is located behind the tractor wheel.

11 Claims, 15 Drawing Figures
ELECTRIC CAN OPENER WITH CAN SENSING MEANS

Prior to a can cutting operation the tractor wheel is axially shifted far enough from the cutter to freely admit a chime pressed against the cylindrical surface of the tractor wheel and the second abutment, thus orienting a chime at a proper angle for engagement by the cutter when, thereafter, the tractor wheel is axially shifted toward the cutter. Such movement of the tractor wheel squeezes a chime between the cutter and the tractor wheel and sinks the periphery of the cutter into a seaming wall.

The cutter is positioned with the plane of its cutting rim at an angle to the direction of cut around a chime. Hence, sinking the cutter into a seaming wall raises a small hump at the top of a chime. Also depression of the operating lever an electric motor is actuated to start rotation of the tractor wheel and consequent turning of a can with respect to the cutter. As the can turns about the cutter the tilted position of the cutter swings the can about the axis of rotation of the tractor wheel, as explained in Fyfe U.S. Pat. No. 3,510,941 issued May 12, 1970, the tilting being in a direction such that the chime of the can, while remaining in engagement with the driving tractor wheel, swings out of contact with the second abutment and into contact with the first abutment. In this position the top of the can is almost horizontal. This swinging of the can increases the height of the hump. Continued operation of the motor causes the cutter wheel to cut around the seaming wall of the chime behind the tractor wheel, the hump moving forwardly away from the tractor wheel as cutting progresses until the hump approaches the tractor wheel from behind at which time the hump reaches a sensor that rides on the top of the chime behind the tractor wheel. The hump lifts the sensor slightly before a 360° rotation of the can or, in other words, just before the cut is completed. Lifting the sensor initiates the actuation of a mechanism for deactivating the operation of the can opener electric motor. The deactivating mechanism includes a tripping device for deenergizing the motor. The tripping device has a delay cycle which is commenced when the sensor reaches the hump. The delay cycle permits continuation of the cutting operation for a few additional degrees of rotation of the can beyond the point where the hump lifts the sensor. Thereupon, the motor is deenergized, with the can opener stopping at or slightly beyond the end of a 360° rotation and the cutting cycle is completed. The can is released from the can opener by raising the operating lever to shift the tractor wheel away from the cutter.

SUMMARY OF THE INVENTION

1. Purposes of the Invention
It is an object of the present invention to provide a simple, economical electrical can opener which will cut through a can chime seaming wall and which can be used to open cans of the full range of diameters now used by the canning industry and, further, which can be employed by housewives having a low degree of manual dexterity and strength.

It is another object of this invention to provide an electric can opener of the character described which creates a hump at the top of a chime as a cut is made in a seaming wall and also means for sensing the arrival of the hump near the completion of a cut and responsive to such sensing halting the powered cutting operation.

It is another object of this invention to provide an end-of-cut sensor for an electric can opener of the character described which is not a differential torque sensing device and which insures a full 360° cut of the can.

It is a further object of this invention to provide a tripping mechanism which is operated responsive to the almost substantial completion of a chime cut for continuing the cut a few degrees to complete a 360° rotation of a can during cutting whereby to insure full separation of a can end from a can body.

It is another object of this invention to provide an electric can opener having a motor for driving the cutting wheel together with mechanical sensing means for detecting the completion of a cut and for thereupon deenergizing the motor.

Further objects and features of this invention will be apparent upon consideration of the following description when read in conjunction with the drawings.

2. Brief Description of the Invention
A can opener which cuts through a seaming wall of a chime by which a can end is secured to a can body. The can opener has a rotatable cutter and a tractor wheel. The tractor wheel has a conical chuck wall engaging surface and also has a coaxial cylindrical surface parallel to the axis of the tractor wheel. The cylindrical surface is disposed to engage the top of a chime. The cutter and the tractor wheel are rotatable about axes at right angles to one another. The can opener includes first and second abutments extending forwardly from a face of a can opener housing about a chime. The abutments are ahead of and behind the tractor wheel, respectively, considered in the direction of movement of a can during a cutting operation.
Prior to a powered can cutting operation the tractor wheel is axially shifted far enough in front of the cutter to freely admit a chime with the chime pressed against the cylindrical surface of the tractor wheel and against the second abutment whereby to orient the seaming wall at a proper angle for engagement by the cutter when the tractor wheel is axially shifted toward the cutter upon depression of an operating lever. Rearward movement of the tractor wheel squeezes the chime between the cutter and the conical surface of the tractor wheel and sinks the periphery of the cutter into the seaming wall. Engagement of the chime with the tractor wheel and second abutment as aforesaid determines the angle of the top of the can with respect to the plane of the cutting rim of the cutter before a can opener motor is energized. Upon depression of the operating lever a can opener electric motor is actuated to start rotation of the tractor wheel and consequent turning of the can. As the can starts to turn the cutter swings the can about the axis of rotation of the tractor wheel, causing the chime to move away from the second abutment and into engagement with the first abutment while remaining in engagement with the tractor wheel, as explained in Fyfe, U.S. Pat. No. 3,510,941, issued May 12, 1970.

The cutter wheel has associated with it a shoulder wheel that rides on a side of a can below a chime. Engagement of this shoulder wheel with the outer surface of a can holds the stationary can against the tractor wheel after the cutter wheel has completed its cut of the seaming wall and until the can is deliberately released by axial outward displacement of the tractor wheel away from the housing upon lifting of the operating lever.

As the cutter sinks into the seaming wall and as the can changes its inclination in the manner aforesaid, a hump is raised on the top of the chime. This hump is used to determine when the cutting operation is substantially complete, such determination being in lieu of the differential torque sensing means employed in conventional electrically powered can openers. For this purpose the can opener includes a sensor which rides on the top of the chime behind the tractor wheel. The sensor is not actuated as the hump leaves the tractor wheel, but rather continues to ride at a constant elevation on the top edge of the chime. However, when the hump completes almost $360^\circ$ of rotation and approaches the tractor wheel, the hump lifts the sensor. When the sensor is lifted it actuates a tripping mechanism which initiates a delay cycle. This tripping mechanism, after a few more degrees of rotation of the can past the cutter, shuts off the motor. The delay provided by the tripping mechanism permits the cutter to cut through the seaming wall up to and past the hump at the beginning of the cut so as to provide for complete separation of the can end from the can body.

**BRIEF DESCRIPTION OF THE DRAWINGS**

In the accompanying drawings in which is shown one of the various possible embodiments of the invention:

**FIG. 1** is a perspective view of the electric can opener of the invention illustrating the position of a can as it is approached into engagement with the idle can opener;

**FIG. 2** is an exploded perspective view of the main components of the electric can opener;

**FIG. 3** is an enlarged fragmentary front view of the can opener and illustrates the position of a can upon engagement by the cutter and tractor wheel at the instant that the cutter sinks into a seaming wall;

**FIG. 4** is a sectional top view taken substantially along the line 4—4 of FIG. 3, the tractor wheel being shown in solid lines in its retracted position adjacent the housing in which position a chime of a can to be cut is squeezed between the tractor wheel and the cutter, and the tractor wheel being illustrated in dot-and-dash lines in its forwardly extended position in which position a chime is adapted to be inserted between or withdrawn from the space between the tractor wheel and the cutter;

**FIG. 5** is a vertical sectional view taken substantially along the line 5—5 of FIG. 4 and illustrates the relationship between the tractor wheel and the cutter; in this figure, likewise, the tractor wheel is shown full lines in its retracted position and in dot-and-dash lines in its extended position;

**FIG. 6** is a forwardly-looking sectional view taken substantially along the line 6—6 of FIG. 4 and illustrates, inter alia, the tripping mechanism with the delay cycle;

**FIG. 7** is a vertical sectional view taken substantially along the line 7—7 of FIG. 6 and illustrates the sensor, the tripping mechanism and the relationship between the tractor wheel and the cutter;

**FIG. 8** is a forwardly-looking vertical sectional view taken substantially along the line 8—8 of FIG. 4, the same illustrating the operating lever assembly and the tripping mechanism;

**FIG. 9** is an enlarged top sectional view taken substantially along the line 9—9 of FIG. 3 and illustrating the camming mechanism for axially shifting the tractor wheel; here, too, the tractor wheel is shown in full lines in its retracted position and in dot-and-dash lines in its extended position;

**FIG. 10** is an enlarged sectional view taken substantially along the line 10—10 of FIG. 4 and illustrates the cutting rim of the cutter in cutting relationship with respect to a seaming wall of a can chime, the shoulder wheel being shown in a position engaging the outer surface of a side wall of a can to hold a can in position during and after completion of cutting and until a can is deliberately released by axial shifting of the tractor wheel away from the chime;

**FIG. 11** is a forwardly looking sectional view taken substantially along the line 11—11 of FIG. 4 and illustrates the position of a can as a chime is initially inserted between the cutter and the tractor wheel while the latter is in forwardly extending position, a chime at this time resting against the tractor wheel and a first abutment to the rear of the tractor wheel, such direction being considered with respect to the direction of rotation of the can after the cutter has commenced powered operation;

**FIG. 12** is a sectional view similar to FIG. 11, but illustrates the can shortly after the start of a cutting operation, this figure showing the altered angular position of a chime after the cutter has started and the can has been swung with respect to the tractor wheel from a position in which a chime engages a trailing first abutment and is clear of a leading second abutment to a position in which a chime engages the leading second abutment, i.e., abutment forward of the tractor wheel in the direction of rotation of the can, and is clear of the first abut-
ment, said figure also illustrating the hump raised in the top of a chime as the cutter is sunk into a seaming wall and a can is swung in the aforesaid manner;

FIG. 13 is a sectional view similar to that of FIG. 12, but illustrates the cutter near completion of cutting when a sensor lever is being lifted by the raised hump, such lifting initiating a delay cycle at the termination of which the powered operation of the can opener is stopped and the cut through a seaming wall has proceeded through a full 360° so as to complete detachment of a can top from a can body;

FIG. 14 is a schematic representation of the electrical components of the can opener; and

FIG. 15 is a perspective view of a can with a cut can end separated from a can body.  

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now in detail to the drawings, and, more particularly, to FIG. 1, there is shown an electric can opener 20 embodying this invention for removing a top end 23 of a can 22. The can 22 may be of any conventional size, as the electric can opener is operative with a wide range of can opener heights and diameters, thicknesses of chimes and kinds of can-forming material.

The can opener includes a front housing 24 which fits together with a rear housing 26 to enclose most of the operating components of the can opener. The can opener receives electrical energy from a male electrical plug 28 which is connected to a driving motor (later described) through a wire 30. The rear housing 26 supports a housing 34 for conventional knife sharpening components, and the front housing 24 supports a cover 36 for a tractor wheel 50 the location, mounting and operation of which are subsequently detailed. As is hereinafter described, the tractor wheel is axially shiftable to squeeze a chime of a can 22 between it and a free-turning cutter 48 and is also rotatable to in turn rotate the can 22 against said cutter 48 (see FIG. 10).

The top end 23 of the can 22 is axfixed to the side wall of the can by a conventional double seam shown in detail in FIG. 10. The double seam, or chime, consists of an outer retroverted can hook 43 bent over from the top edge of the side wall of the can 22 and located between an inner retroverted cover hook 44 and the seaming (outer) wall 45 of the can end 23. The seaming wall 45 is engaged against the hook 43, although shown spaced from the hook 43 in FIG. 10 for more easily understanding the mode of operation of the can opener 20. The seaming wall 45 is connected by a seaming wall radius 46 (top of the chime) with a chuck (inner) wall 47 which is integral with the can end 23 and which engages the inner surface of the side wall of the can.

As mentioned above, the can opener 20 has a cutter 48 (see FIGS. 2, 3, 5, 7, 10, 11, 12 and 13) which is of the form of two frusto-conical sections joined at their narrow ends and the larger upper end of which has a planar rim that constitutes a cutting edge.  

The tractor wheel 50 has a frusto-conical chuck wall engaging element 51 shown more particularly in FIGS. 2, 4, 5, 9, 11, 12 and 13 and a cylindrical element 53 arranged to engage the top of the seaming wall radius 46 mentioned above in reference to FIG. 10. The elements 51 and 53 are functionally unitary. FIGS. 3, 4, 7 and 11 show the engagement of the seaming radius 46 by the tractor wheel 50. The elements 51 and 53 preferably have knurled can engaging surfaces to facilitate driving of the can seam during the cutting operation.

The tractor wheel is axially shiftable by manual operation of an operating lever, as detailed hereinafter, between an extended position, shown in dot-and-dash lines in FIGS. 4 and 5, and a retracted position, shown in solid lines in the same figures. The cutter faces the frusto-conical element 51 of the tractor wheel and in retracted position is closer to said element 51 than the thickness of a conventional chime. In extended position the cutter is spaced further from the element 51 than the thickness of a conventional chime. As will be seen later the element 51 is spring biased toward the cutter to permit use of this can opener on cans having different thicknesses of chime by enabling the element 51 to adjust its spacing from the cutter in retracted position.

When the chime of a can is to be cut, the tractor wheel 50 is in extended position to leave a larger-than-chime thickness space between it and the cutter. The chime is inserted in this space until the top of the chime at the seaming wall radius 46 is pressed against the cylindrical surface 53. Concurrently the top of the chime is pressed against a stationary trailing abutment (hereinafter the second abutment) 83, i.e., an abutment behind the tractor wheel, the direction of rotation of the can at the tractor wheel during cutting being the reference. The trailing abutment extends forwardly from the front housing 24 and is at a level slightly above the level of the lowermost portion of the cylindrical element 53 whereby the initial position of the can when it is inserted in the can opener is such that the top of the can dips forwardly and downwardly as shown in FIG. 11. Correct initial positioning of the can between the cutter and the tractor wheel is easily effected by an unskilled or uninstructed person due to the simplicity of handling, viz. shifting the tractor wheel to extended position and pressing the top of the chime against two members, these being the tractor wheel and the trailing abutment.

The lower end of the cutter 48 is smaller than the upper cutting end and is disposed to ride in the lower edge of the seaming wall, as shown in FIG. 10, when the cutting edge has passed through the seaming wall and has lightly penetrated the outer surface of the can hook 43 thereby limiting the depth of cut so that only the seaming wall will be cut through fully. For the foregoing purpose the difference in radii of the upper and lower ends of the cutter is slightly greater than the thickness of the metal used to form the cover of a conventional can. The axes of rotation of the tractor wheel and cutter intersect at a right angle.

A shoulder wheel 49 which turns with the cutter 48 presses against the side wall of a can below the double seam during cutting and after a cut has been completed and so long as the tractor wheel is in retracted position, retains the can in the can opener. Shifting the tractor wheel to extended position releases the shoulder wheel from the can and permits the can to be disengaged from the can opener.

The tractor wheel 50 is rotatable with a spindle 64, upon which it is fixed, when a motor 70, shown in FIGS. 2 and 14, is energized. The motor 70 is energized to initiate the cutting sequence of operations by rotating the tractor wheel 50 when an operating lever 90 is manually depressed. FIG. 8 depicts the raised idle posi-
tion of an operating lever 90 in dot-and-dash lines and the lowered operative position in solid lines. The lever 90 protrudes through a slotted opening 92, shown in FIGS. 2 and 8, in the front housing 24 of the can opener 20. The operating lever 90 is journaled on a drive shaft 57 and is axially movable and rotatable with respect to the drive shaft. The drive shaft 57 is integral with the spindle 64 to which the tractor wheel 50 is affixed. The lever 90 has a raised cam 94, shown in FIGS. 4 and 9, in the form of a pair of diametrically aligned shallow radial ribs of curved cross section which in the idle position of said lever enter slots 93 (FIG. 9) in the rear of a nylon disc 82. The nylon disc 82, which is fixed in a circular opening 67 in the front housing 24, supports a bushing 80 in which the drive shaft 57 is journaled. The bushing 80, which is shown best in FIGS. 5 and 9, is stationary but the drive shaft is axially shiftable as well as rotatable therein. FIGS. 4, 5 and 9 illustrate by dot-and-dash lines the axial position of the tractor wheel 50 in its idle position and also its chime-pinching position by solid lines after the lever 90 is depressed.

When the lever 90 is depressed to its operative position the ribs of cam 94 on the lever 90 leave the slots 93 in the nylon disc 82 to can the drive shaft 57 rearwardly against a pin 84 and a spring 86 so as to move the tractor wheel 50 closer to the cutter 48. This movement also compresses teller springs 85 and the coil spring 86. Spring 86 normally forces the drive shaft 57 forwardly and the tractor wheel 50 away from the cutter 48. The reason for utilizing the larger-than-chime-thickness space between the wheel 50 and the cutter 48 before depressing the lever 90 is twofold: first, to permit a cutting operation upon different thickness of can chimes or double seams; and second to permit easy introduction of the can chime into the space prior to the initial penetration or cut of the cutter 48 into the outer seaming wall 45.

The coil spring 86 is a return spring that biases the tractor wheel toward extended position when the operating lever is raised and the cans 94 are seated in the slots 93. The teller springs 85 permit the drive shaft and tractor wheel to accommodate different thicknesses of chime and variations in thickness of a chime along the length thereof.

A leading first abutment 96 extends forwardly from the front housing 24, said first abutment being in front of the tractor wheel in the direction of rotation of a can being cut. As a matter of convenience and design both abutments 83, 96 are carried by the nylon disc 82. The leading first abutment 96 is desirably at about the same horizontal level as the level of the lowermost portion of the cylindrical element 53 of the tractor wheel. Thus said first abutment is spaced above the chime when the chime is initially correctly pressed against the tractor wheel element 53 and the trailing abutment 83 as shown in FIG. 11.

To initiate the cut of a chime the chime is placed between the extended tractor wheel and the cutter, being pressed against the tractor wheel element 53 and the trailing abutment 83 as just mentioned. When the operating lever 90 now is depressed the drive shaft 57 and the tractor wheel will shift rearwardly to squeeze the chime between the tractor wheel 50 and the cutter 48. This causes the cutter to sink, i.e., bite, into the seaming wall 45 of the double seam chime. As best seen in FIGS. 11-13 the plane of the cutting rim of the cutter is located in a fashion such that the cutting rim tilts rearwardly and downwardly so that when the can subsequently is turned the cutter will ride down on the seaming wall and, since the cutter is stationary, the chime will rise. The inclination (drive angle) of the cutter with respect to the plane of the chime will also, when the can starts to rotate, swing the can from the starting position of FIG. 11 in which the top of the can dips downwardly and forwardly, clear of the leading abutment 96, to a running (cutting position) as shown in FIG. 12 wherein the top of the can engages the leading abutment and is substantially horizontal. In such running position the top of the can is clear of the trailing abutment 83.

Thus depression of the operating lever performs a first function of causing the cutter to bite into the seaming wall as shown in FIG. 10. The depth of bite is limited by abutment of the lower end of the cutter against the lower outer surface of the seaming wall. Moreover depression of the operating lever with consequent shifting of the tractor wheel element 51 against the chuck wall 47 and a squeezing of the chime between the elements 50 and the cutter will bring the shoulder wheel to bear against the side wall of the can below the chime so that even after cutting of the seaming wall has been completed and the tractor wheel has stopped rotating the can will be held by the can opener until the operating lever is raised and the tractor wheel thereby returned by the spring 86 to extend position.

The depression of the lever 90 also performs another function in that it initiates, after a predetermined delay, the operation of the motor 70. When the lever 90 is depressed, the tip of a wire element 87 attached to the lever and constituting an extension thereof slides upwardly in a vertical slot 78 in a vertically movable guide 89. The guide 89, which is shown particularly in FIGS. 2 and 8, is attached to an actuating element 100 of a normally open switch 102. Due to the vertical orientation of the slot 78, the initial depression or movement of the lever 90 does not close the switch 102, shown in FIGS. 2, 8 and 14. However, after the lever 90 has moved the tractor wheel 50 sufficiently far to make the cutter 48 bite into the seaming wall 45 of the chime of the can 22, further downward movement of the lever 90 raises the guide 89 to close the contacts of the switch 102. As shown in FIG. 14, the switch 102 is in series with the motor 70 so that the motor 70 is accordingly energized during the latter part of the movement of the lever 90.

When the motor 70 is energized, it causes, as is hereinafter described in detail, the tractor wheel 50 to rotate and in turn to rotate the can 22 in a clockwise direction as viewed from the top of the can opener 20, e.g., as seen in FIGS. 1, 4 and 9. The motor 70 has a high speed output pinion 72, shown in FIGS. 2 and 6, that drives a gear 71 on a shaft 79. The shaft 79 is journaled in a bearing 73 mounted on the casing of the motor 70. A pinion 77 turns with the gear 71 to in turn drive another gear 76. The gear 76 is fixed on the drive shaft 57 described above, and the drive shaft 57 is supported by a stationary mounting plate 74 at one end and by the bushing 80 at the other end. The drive shaft 57 and plate 74 are also shown in FIGS. 4 and 5. A reduced rear end 55 of the drive shaft 57 is journaled in a socket 85a which houses the pin 84 and the spring 86, described above. When the lever 90 is depressed, the spring 86 is compressed. The gear 76 is functionally integral with the shaft 57 and for this purpose has splines.
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Reverting to the operation of the can opener, after the operating lever has been depressed to squeeze the chime of the can between the tractor wheel and the cutter and after the tractor wheel has started to turn so as to rotate the can past the freely turning cutter in the direction of the arrow A, the cutter initially rides down the chime because of the inclination (dive angle) of the cutter so that the chime rises bodily; concurrently the chime and can swing to lift the front of the can (as seen in FIG. 11) and depress the rear until the top of the chime is horizontal and the chime of the can rides against the leading abutment to prevent further swinging of the chime. These concurrent actions of raising and swinging the chime displace metal of the sealing wall and sealing wall radius upwardly to form a hump 120 above the start 127 of a slit 119 in the sealing wall formed by the cutter through the sealing wall to the hook 43. The slit 119 lengthens as the can opener operates (see FIG. 12). The sealing wall radius raises in back of the tractor wheel due to the dive angle of the cutter; however the hump remains higher than such raised radius. The hump and raised radius are clear of the trailing abutment 83. The chime and can rock slightly as the hump 120 rides under and against the leading abutment 96, but the rocking is unnoticeable and does not affect operation of the can opener. The height of the hump over the raised radius 46 is small but definite, a typical such height being between about 0.005 inches to 0.020 inches. As is hereinafter described, the detection of the hump 120 as it approaches the cutter (see FIG. 13) is utilized to shut off the operation of the motor 70 and thereby halt the cutting of the can 22.

As the cut 119 is made the radius 46 is raised along the length of the chime until almost a full 360° slit 119 has been formed. To shut off the can opener 20 after completion of 360° of the slit 119, a sensor 130 is provided which is fast on a horizontal pin 132 (see FIGS. 2, 9, 11, 12 and 13) turning in a brass bushing 134. The bushing 134 is supported in the disc 82 at the front of the housing 24. The tip of the sensor 130 rests against the top edge of radius 46 of the chime and is lifted slightly when it encounters the hump 120 approaching the cutter and tractor wheel from the rear. If the detection of the hump 120 by the sensor immediately halts the motor operation, the sealing wall would not have been cut a full 360° since the sealing wall would not have been slit beneath the start of the hump and the can top 23 would remain hanging by a thread of metal below the hump. The detection or sensing of the hump accordingly functions to stop the motor 70 only after a predetermined delay so as to permit the cut 119 to continue for a few degrees up to the full 360° cutting operation and, optionally, a few degrees beyond.

The sensor pin 132 is in one piece with a sensor lever 136 which is biased by a coil spring 138 to the sensor idle position shown in full lines in FIGS. 8 and 11. The sensor lever 136 (see particularly FIGS. 2 and 8) has at the top of its upper end a notch 139. In the idle position of the can opener 20, or while the can 22 is being cut, but before the hump is reached, the notch 139 of the lever 136 rests in a notch 144 in the undersurface of a bar 140 (FIGS. 4 and 8) carried by a plate 142 shown in FIGS. 2, 4, 5, 6 and 7. The plate 142 is jour- nelled at its left side as viewed in FIG. 6 on the station-
tractor wheel 50. The operating lever 90 is still de-
pressed and has not as yet been raised to restore the can opener 20 to idle condition and release the can 22. When the lever 90 is raised or restored to its idle “OFF” position, it raises an extension 171 (see FIGS. 2, 4 and 6) of a spring 170 having a section of tight con-
volutions rotatable on a support rod 161. The support rod 161 together with another support rod 160 attach the plate 74, as shown in FIG. 4, to the front panel of the front housing 24. The extension 171 lies on and en-
geages the top of the lever 90 as is shown particularly in FIGS. 4 and 8, so that it is raised by the lever 90 when the lever is lifted after the cutting is completed and it is desired to release the can. The spring 170 is held against axial shifting on the rod 161 by a stop collar 189 shown in FIG. 7. The spring 170 has an offset portion 193 extending under the plate 142. When the extension 171 is lifted, the offset portion 193 lifts the plate 142, rotating it about the shaft 152 and thereby lifting the disc 150 off the gear 76. With the disc 150 separated from the gear 76, the spring 163 restores the cam 162 to its idle position and re closes the switch 166.

When the plate 142 is raised, it lifts therewith the bar 140 attached thereto above the level of the tip of the sensor lever 136. The sensor lever 136, urged by spring 138, returns the notch 139 to the notch 144 under the bar 140 thereby to hold the plate 142 raised for the next cutting cycle. The lever 90 is held in its raised po-
sition by a handle return cam 178, shown in FIGS. 6 and 8, which is forced upwardly by a cantilever spring 179. The lever also is held in its raised OFF position by cooperation between the cam ribs 94 on the lever and the slots 93 in the back of the nylon disc 82. The return cam 178 has a tooth 199 which engages a notch 200 in the camming surface of the lever 90. FIG. 8 illustrates in solid lines the position of the return cam 178 when the lever 90 is depressed, and in dot-and-dash lines its position relative to the lever 90 when the lever 90 is in its normal or raised position. The tooth 199 engages a notch 201 in the camming surface of the lever 90 when the lever is in its depressed ON position.

When the lever 136 is pulled back to its idle (off) po-
sition by the spring 138 it fits under the bar 140, it ro-
tates the sensor 130 on the other side of the disc 82 back to its normal lowered position ready for the next can. The lifting of the lever 90 also moves the cams 94 described above in reference to FIGS. 4 and 9, back to engage the depressions 93 permitting the shaft 51 to shift axially back to its normal position. The spring 86, shown in FIG. 5, shifts the tractor wheel 50 to its ex-
tended position away from the inside and top of the chime of the can 20 and shifts the shoulder wheel away from the side wall of the can. Lifting the lever 90 also permits the guide 89 to be lowered and opens the switch 102, this action taking place before reclosing the switch 166.

In this manner, when the lever 90 is raised, the wheel 50 is moved forward to release the can 22, and all parts are reset for the next cutting sequence.

It thus will be seen that there is provided an electric can opener which achieves the various objects of the invention and which is well adapted to meet the condi-
tions of practical use.

As various other possible embodiments may be made of the above invention, and as various changes might be made in the embodiments above set forth, it is to be un-
derstood that all matter herein described or shown in

the accompanying drawing is to be interpreted as illustra-
tive and not in a limiting sense.

Having thus described the invention there is claimed as new and desired to be secured by Letters Patent:

1. An electric can opener for opening a can having an outer seaming wall, a rotatable circular cutter hav-
ing a cutting rim engageable at a dive angle with an outer side of the seaming wall, means opposed to said cutter for forcing said cutting rim into the seaming wall, means for rotating the can against said cutter to cut through the seaming wall and to raise a hump on the top thereof above the start of the cut, and a sensor re-
sponsive to the return approach of said hump to said cutter for halting the operation of said rotating means when the can has rotated a full turn.

2. An electric can opener in accordance with claim 1 wherein the can rotating means includes a tractor wheel having a first surface engageable with the inner side of the seaming wall and a second surface and en-
geable with the top of the seaming wall.

3. An electric can opener in accordance with claim 1 having means responsive to actuation of the sensor for delaying the operation of said can rotating means for a predetermined interval to permit the can to rotate to the start of the cut under the beginning of the hump thereby insuring the separation of the end of the can from the can body.

4. An electric can opener in accordance with claim 3 wherein the sensor is movable and rides on the top of the seaming wall of the can to sense the return of the hump, and said delaying means includes a rotatable cam having a dwell circumference providing for a de-
lay, a normally closed switch controlled by said cam, and means responsive to the movement of said sensor for initiating rotation of said cam to open said switch.

5. An electric can opener in accordance with claim 2 further including a leading abutment and a trailing abutment so positioned that the top of a can engages the second surface and the trailing abutment when the can is inserted into the can opener and the second sur-
face and the leading abutment after the cutting has started.

6. An electric can opener in accordance with claim 5 further including an operating element having an idle position and an operative position, and means responsi-

9. An electric can opener in accordance with claim 2 further including an operating element having an idle position and an operative position, and means respon-
sive to the movement of said element to said operative position for first axially moving the first surface of the tractor wheel against the seaming wall of the can to grip a can between said surface and said cutter and thereafter to initiate the operation of the can rotating means.

10. An electric can opener for opening a can having a chime, said can opener including means for cutting an end of the can and while initiating the cut raising a hump protruding from the can, electrically powered means for creating relative movement between the can and the cutting means and a sensor riding on the can behind the cutting means, and responsive to the return approach of the hump to the cutting means for halting operation of the moving means when the cut is completed.

11. An electric can opener for opening a can having a chime, said can opener including means for cutting a side wall of the chime, selectively operable means for pressing the chime against the cutting means, electrically powered means for rotating the can past the cutting means, means for raising a hump on top of the chime upon initiation of a cut by the cutting means and a sensor responsive to the return approach of the hump to the cutting means for halting operation of the can rotating means when the can has rotated a full turn.

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