Dec. 8, 1964 A. L. A. POSENER 3,159,912

AUTOMATIC ELECTRICAL POWER CAN OPENER

Filed March 5, 1962 4 Sheets-Sheet 1

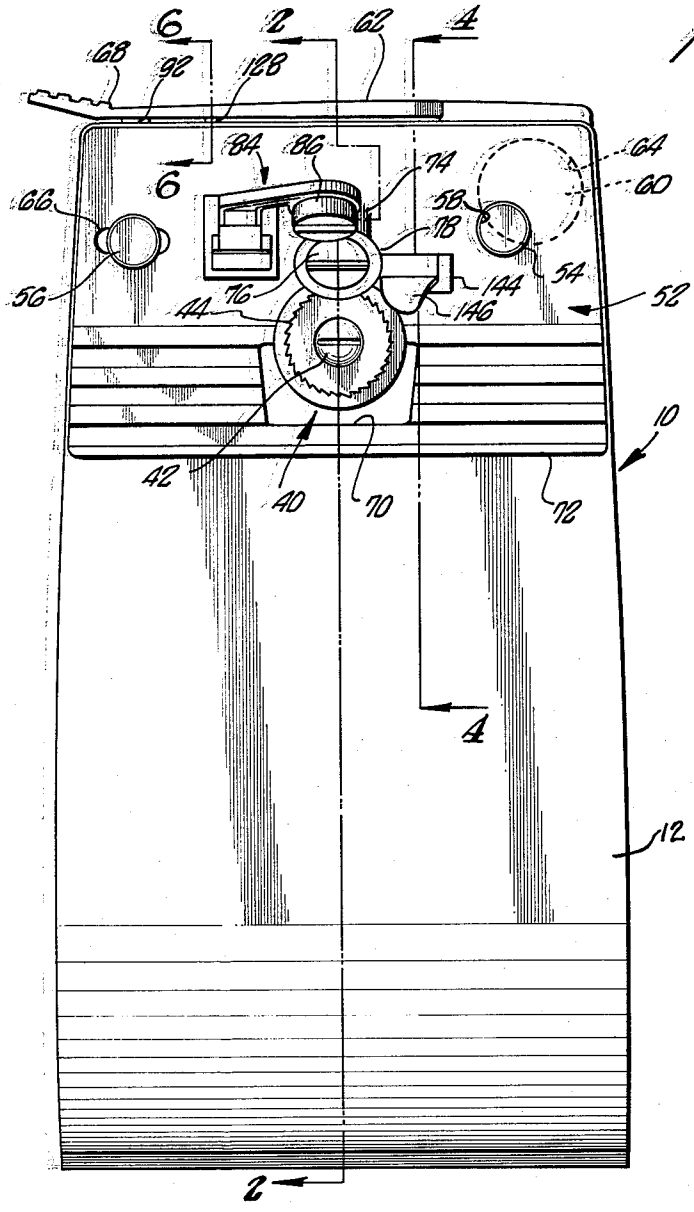


FIG. 1.

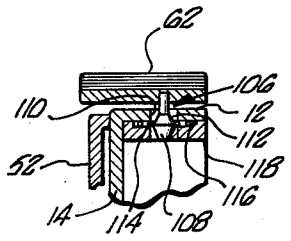


FIG. 6.

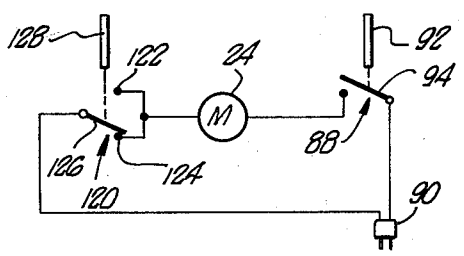


FIG. 3A.

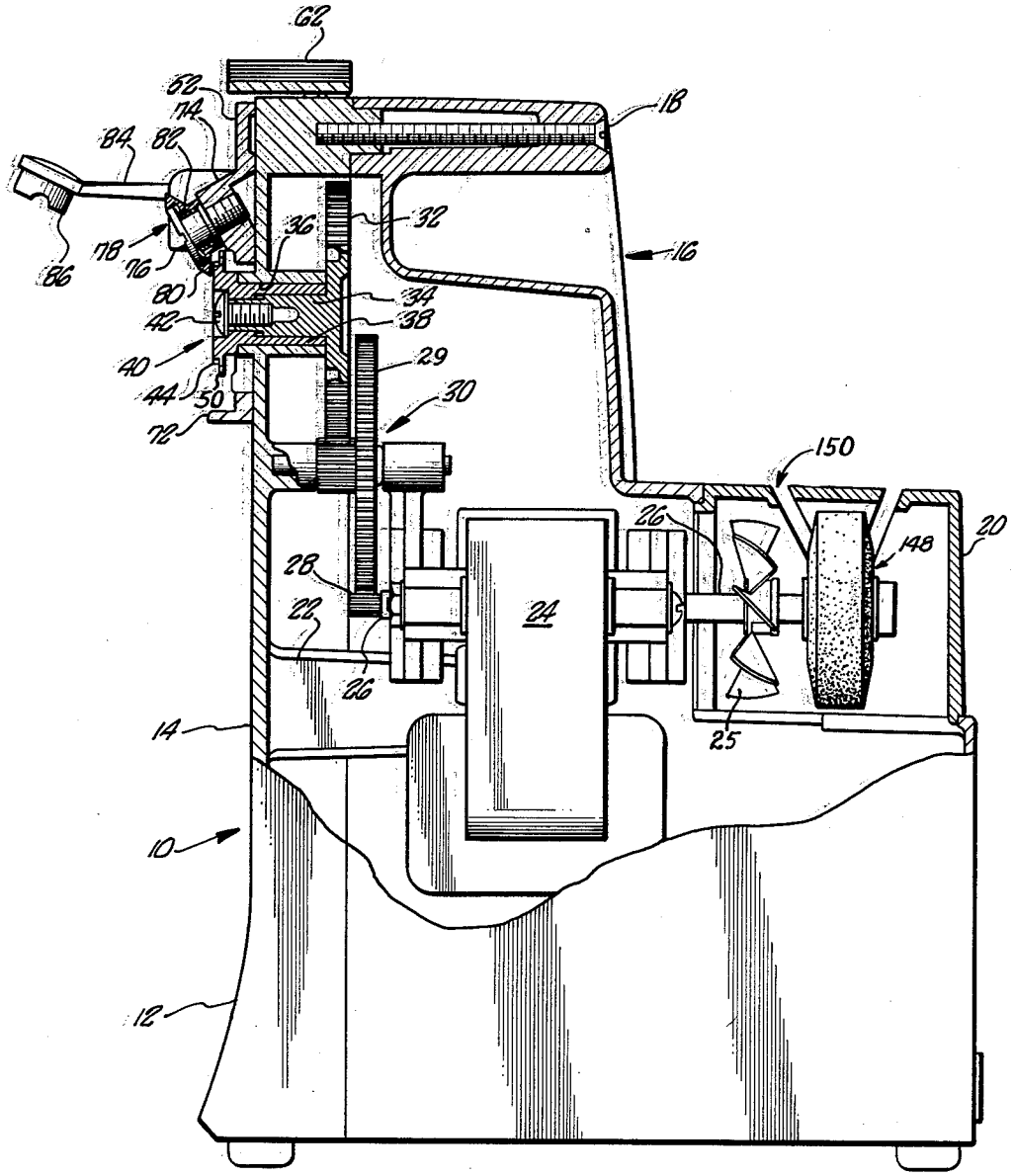
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AUTOMATIC ELECTRICAL POWER CAN OPENER

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FIG. 2



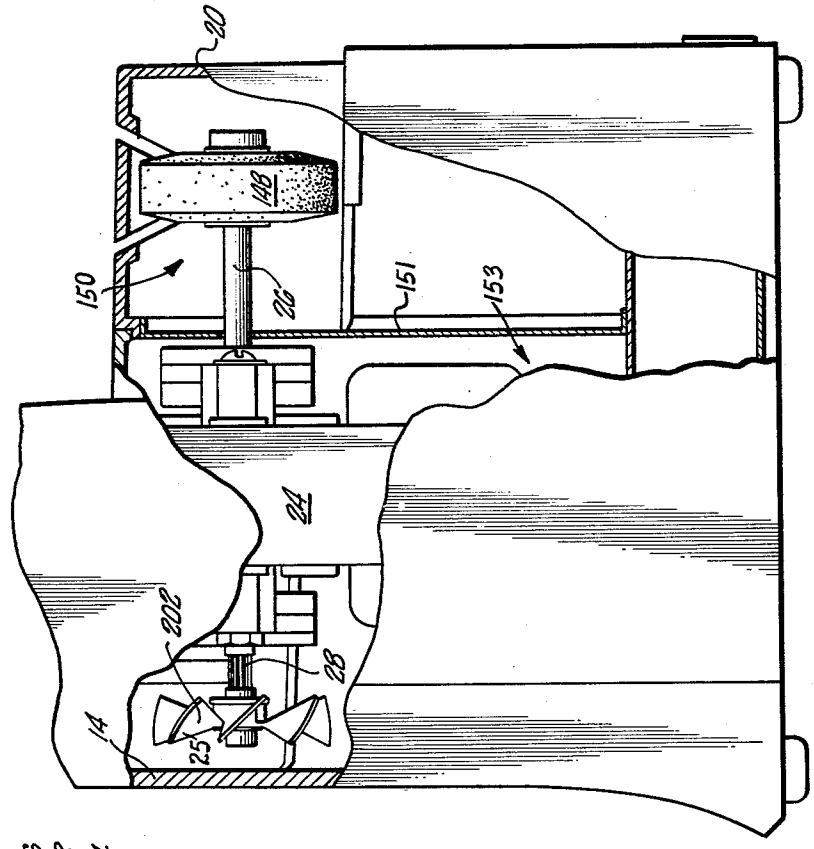
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AUTOMATIC ELECTRICAL POWER CAN OPENER

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FIG. 1



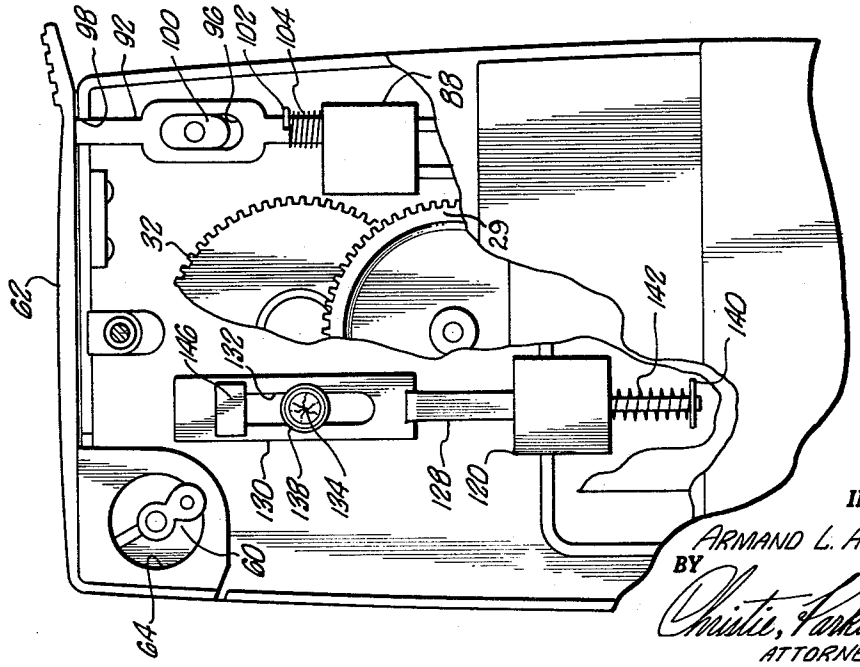


FIG. 2

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AUTOMATIC ELECTRICAL POWER CAN OPENER

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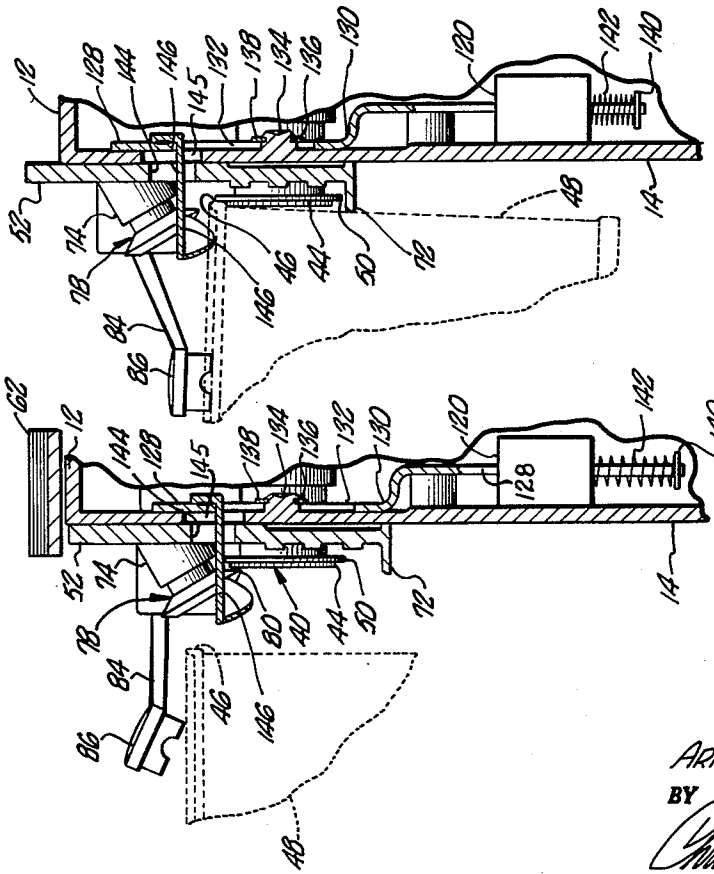


FIG. 3

FIG. 4

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United States Patent Office 3,159,912 Patented Dec. 8, 1964

3,159,912
AUTOMATIC ELECTRICAL POWER CAN OPENER

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Filed Mar. 5, 1962, Ser. No. 177,620
4 Claims. (Cl. 30—4)

This invention is directed to improvements in apparatus for automatically opening cans and the like.

It is a general object of apparatus for performing the operation of opening cans to have an optimum utility in the home kitchen at a minimum of expense to the consumer. To accomplish this, it is desired that the apparatus be simple, compact and portable as well as rugged in its design. Further, the apparatus should operate automatically to simply and efficiently open cans with a minimum of servicing over a maximum period of time.

To accomplish this general object, most devices for opening cans start with the basic combination of an electric motor mounted within a housing to rotate a driving wheel. The driving wheel is rotatably carried by the housing to engage the under side of the bead of a can. Movably coupled to the housing, above the driving wheel, is a rotary cutter. The cutter is shiftable, by operation of a hand-operated lever, into cutting position with the driving wheel by engaging the top of the can immediately adjacent the bead. In this position rotation of the driving wheel rotates the can in contact with the rotary cutter to completely sever the top from the can.

Although by this combination of elements the prior art apparatus has effected a can opening operation, they have only partially accomplished the above objective. For example, to energize the electric motor, thereby causing a rotation of the driving wheel, a switch is provided which is generally operated by the final movement of the hand-operated lever in shifting the rotary cutter into cutting position with the driving wheel. Thus, to open a can with the prior art apparatus, the operator must often manually maintain the lever in a position to close the switch. When employing the apparatus to open a can, this means that the operator is required to remain at the apparatus until the can is completely open. He is not free to perform other acts.

Further, it has been found in practice that the rotary cutter of most prior art apparatus, with use, tends to become frozen by foreign matter working between the rotary cutter and the coupling to the housing. When this occurs the cutting operation is materially impeded. Freezing of the cutter in such apparatus is prevented by frequently cleaning the cutter and its coupling to the housing. This entails completely removing the cutter from the housing.

In addition, the driving wheel design of the prior art apparatus is such that the wheel, in contacting the underside of the bead, also engages the side of the can below the bead. Thus, as the can rotates, the driving wheel tends to crush and tear any paper label on the can. The torn label accumulates at the driving wheel to interfere with the rotary movement of the can which impedes the cutting operation of the can opener.

The present invention, therefore, provides an improved can opener design which is fully automatic, simple and efficient in its operation and one which overcomes the above-identified weaknesses in the prior art apparatus.

To accomplish this, the present invention combines a housing having an electric motor mounted therein, a shaft coupled to the motor and a driving wheel rotatably coupled to the motor. The driving wheel is carried by the housing and is positioned to contact the underside of a can bead to rotate the can in response to rotary

movement of the shaft. The driving wheel has an annular toothed portion which engages the underside of the bead and means for limiting the contact of the toothed portion with the side of the can below the bead. Preferably, the limiting means takes the form of an annular shoulder extending radially outward beyond the toothed wheel. The shoulder engages the side of the bead when the toothed portion is in contact with the underside of the bead to maintain the toothed portion out of contact with the side of the can.

Movably supported by the housing above the driving wheel is a rotary cutter. The rotary cutter is adapted for shifting movement into cutting position relative to the driving wheel by engaging the top of the can immediately adjacent to the bead. Preferably, the rotary cutter is bearing-mounted for rotation relative to the housing by a sleeve arrangement composed of a plastic-like material. The sleeve arrangement prevents the rotary cutter from freezing. A clean cutting operation by the rotary cutter is thus assured.

The rotary cutter is shifted into cutting position relative to the driving wheel by hand-operated means. Once the cutter and driving wheel are in cutting position, the hand-operated means is engaged by a lock member which maintains it in position. Moreover, the hand-operated means is adapted to energize the motor automatically after the rotary cutter is in cutting position relative to the driving wheel. Means are further included for automatically shutting off the motor when the top has been completely severed from the can. As a consequence, after once energizing the electric motor the operator is free.

In view of the above, the present invention, by its specific combination of improved design features, provides an overall improved apparatus for automatically opening cans which eliminates the need for continuous manual control while in operation, and provides an improved rotary cutter-drive wheel combination which does not freeze with use and which does not bind or tear the paper labels of the can to impede the cutter operation.

The above, as well as other features of the present invention, may be more clearly understood by reference to the following detailed description when considered with reference to the drawings, in which:

FIGURE 1 is a front view of the apparatus of the present invention;

FIGURE 2 is a sectional right side view of the apparatus of the present invention taken along line 2—2 of FIGURE 1;

FIGURE 3 is a partial rear view of the apparatus with certain parts broken away to illustrate the novel automatic shut-off feature;

FIGURE 3A is a schematic diagram of the electrical circuit of the present invention;

FIGURE 4 is a sectional view of the apparatus taken along line 4—4 of FIGURE 1;

FIGURE 5 is a sectional view taken along line 4—4 of FIG. 1 with a can engaging the driving wheel of the apparatus;

FIGURE 6 is a partial section taken along lines 6—6 of FIG. 1 to more clearly illustrate the locking arrangement for the hand-operated lever of the exemplary embodiment of the invention; and

FIGURE 7 is a partial side view of the apparatus with certain parts broken away to illustrate an alternative arrangement of the cooling fan part of the present invention.

Although the specific improvements embodied by the overall design of the present invention are applicable to power can openers in general, they will be described in detail as specific improvements in an electric can opener and knife sharpener apparatus of the type described in the U.S. Patent 2,897,589, issued August 4, 1959. Accordingly, for more specific details on the operation of

the apparatus not constituting parts of the present invention, reference may be made to this patent.

Referring to the drawings (particularly FIGS. 1 and 2), the exemplary embodiment of the present invention includes a housing represented generally at 10, which includes three body sections, namely, a front section 12 having a vertical side or front wall 14, a rear section 16 coupled to the front section by a screw member 18, and a cover section 20 mounted on the rear section 16 to cover a knife sharpening portion of the apparatus indicated generally at 150.

Mounted within the housing 10 by an arm member 22 which extends from the side wall 14 is an electric motor 24. Coupled to the electric motor for rotation therewith is a shaft 26, which extends on either side of the motor 24.

The end of the shaft 26 adjacent the side wall 14 forms a gear 28. The gear 28 engages a gear 29 in a reduction gearing arrangement, represented generally at 30. The gear 29 is staked pinion 30 which engages gear 32. Gear 32 is affixed to shaft member 34 which is journalled in the side wall 14 for rotation about the centerline axis of gear 32. Extending around the shaft 34 and supported within a tubular opening 36 in the side wall 14 is the hub or hollow shaft 38 of a driving wheel 40. The driving wheel 40 abuts an outer surface of the side wall 14 adjacent the tubular opening 36 and is coupled to the shaft 34 by a screw 42. In this manner, the driving wheel 40 rotates with the gear 32 in response to rotation of the motor shaft 36.

The driving wheel 40 includes an annular toothed portion 44 adapted to contact the under side of the bead 46 of a can 48 (illustrated in FIGS. 4 and 5). Immediately adjacent the gear or toothed portion 44 is an annular shoulder 50. The annular shoulder 50 extends radially outward beyond the toothed portion 44 between the toothed portion and the side wall 14. The toothed portion 44 is proportioned to allow the annular shoulder 50 to act as a stop for the can 48. Specifically, the shoulder 50 engages can bead 46 to prevent the outer surface of the toothed portion 44 from contacting the side of the can 48. This prevents the driving wheel 40 from damaging a paper label that might be on the can 48; and it avoids the possibility of a torn label binding the driving wheel 40.

Positioned along the side wall 14 and apertured at 70 to allow the driving wheel 40 to extend therethrough is a mounting plate 52. The mounting plate 52 is movably coupled to the side wall 14 by a pair of screw members 54 and 56. As illustrated in FIGURE 1 and described in detail in the aforementioned U.S. patent, the screw member 54 extends through an opening 58 in the mounting plate 52 and is coupled to a cylindrical hub 60. The hub 60 forms a component part of a hand-operated lever arm 62 and is mounted for rotation in an opening 64 in the side wall 14. The screw 56 is threaded into wall 14 through a longitudinal slot 66 in the mounting plate 52. Due to this arrangement, movement of an end 68 of the lever arm 62 in a clockwise direction (with reference to FIG. 1) produces an upward sliding movement of the mounting plate 52 relative to the side vertical wall 14.

Mounting plate 52 has a shoulder member 72 extending outwardly (i.e., towards the front of the apparatus) from the bottom of its lower part. The shoulder member 72, as illustrated in FIGURE 5, is engaged by the side of the can 48 when it is positioned for opening. The shoulder 72 positions the can laterally from the outer face of the driving wheel 40. It also acts as a guide for the can as it rotates in response to the rotary movement of the driving wheel 40.

Extending outward and down from the mounting plate 52, at a point above the driving wheel 40, is a support member or projection 74. A cutter 78 is rotatably supported on the support member 74 by a screw 76. The rotary cutter 78 is positioned so that its annular cutting edge 80 can be moved immediately adjacent the outer surface of the driving wheel 40. Further downward movement of the rotary cutter 78 causes cutting edge 80 to puncture the top of the can 48 directly adjacent the inner side of the bead 46. At this point it cooperates with the driving wheel 40 and the guide, shoulder 72 to clamp the can 48 in a cutting position with the under side of the bead 46 bearing on the toothed portion of the driving wheel 40. Rotary movement of the driving wheel 40 thereafter rotates the can 48 because the teeth of gear 44 grip bead 46. The result is that the cutting edge 80 severs the top from the can 48 adjacent the inner side of the bead 46.

As illustrated in FIGURE 2, a sleeve member 82 supported on screw 76 acts as a bearing for the rotary cutter 78. Preferably, the sleeve member 82 is formed of a plastic-like material such as nylon or Teflon. This provides a long life bearing for the rotary cutter 78 and it substantially prevents the cutter from freezing due to impaction of foreign matter between the cutter 78 and its support member 74.

Also coupled to the mounting plate 52, at one side of the rotary cutter 78, is a spring-loaded arm 84 carrying a magnet 86. The arm 84 is normally maintained in a horizontal plane outward from the mounting plate 52 to provide close spacing between the top of the can 48 and the magnet 86 when the can 48 is positioned for opening, as illustrated in FIGURE 4. In this manner, the magnet 86 readily attracts the top of the can 48 and the spring biased arm 84 moves downwardly as indicated in FIGURE 5, to allow the top to engage the magnet. After the top of the can 48 is completely severed from the can, the spring returns the arm 84 (and the top of the can) to its normal position.

To selectively energize the electric motor 24 to produce the above-described rotary movement of the driving wheel 40, the present invention utilizes a mechanically operated switch 88. The switch, which is most clearly represented in FIGURE 3, operates in an electrical circuit illustrated in FIGURE 3A. In particular, the switch arrangement includes a normally open switch 88 connected between one side of the winding of motor 24 and an electrical power plug 90. The plug 90 is connectible to a conventional 120 volt 60 cycle A.C. power supply. To provide for the selective closing of the switch 88, an arm member 92 is coupled to the movable switch arm 94 of the switch 88. The arm member 92, which includes a vertical slot 96, extends upward from the switch 88 and through an opening 98 in the top of the front section 12 of the housing 10 (FIG. 3). Extending from the rear of the wall 14 through the slot 96 is a lug 100. The slot 96 is longer than the lug 100 to allow the arm 92 to be movable in a vertical direction, guided by the lug 100. Extending around the arm 92, between a shoulder 102 and the upper mounting surface of the switch 88, is a spring-member 104. The spring member 104 normally urges the arm 92 upward to extend beyond the opening 96. In this position the switch 88 is open to prevent current flow to the motor 24. Since the arm member 92 normally extends above the top of the housing 10 the lever arm 62 in shifting the rotary cutter 78 into cutting position with the driving wheel 40 engages the arm 92. Downward movement of the lever arm 62 thus causes the arm 92 to mechanically close the switch 88, thereby completing an electrical circuit to energize the motor 24.

When the lever arm 62 is in a position to effect an energizing of the motor 24, it is engaged by a locking arrangement that holds the arm in a down position and thereby maintains the switch 88 closed. This permits the operator, after once energizing the motor, to move away from the apparatus of the present invention and perform other acts within the kitchen. Preferably, the locking apparatus of the present invention includes, as illustrated in FIGURE 6, a locking pin 106 extending from the lower surface of the lever arm 62. The locking pin 106 has an enlarged, diamond-shaped end section 108 which

passes through an opening 110 in the top of the front section 12 of the housing 10. In passing through the opening 110 the pin 106 engages and is forced within the central opening 112 of a retaining spring 114. The retaining spring 114 is positioned within the slot 116 formed by cooperating adjacent surfaces of the top of the front section 12 and a plate 118.

To further provide complete automatic operation of the can opener apparatus of the present invention, means are included for automatically shutting off the motor 24 after the top has been completely severed from the can 48. Preferably, the automatic shut-off arrangement of the present invention, as illustrated in FIGS. 3–5, includes a normally closed switch 120. The switch 120 is electrically connected between the motor 24 and the plug 90, thereby permitting the completion of an electrical circuit for the motor 24 when switch 88 is operated.

The switch 120, as schematically illustrated, includes a pair of fixed electrical contacts 122 and 124 spaced above and below a movable switch arm 126. The switch arm 126 normally engages the contact 124 when a can is not in the opener (illustrated in FIG. 4). When a can is placed in position, arm 126 engages contact 122 (switch 120 closed) and when the top has been completely severed from the can 48, arm 126 is intermediate contacts 122 and 124 which opens the electrical circuit including the motor 24 thereby causing the motor to shut off.

Switch 120 must be held closed when a can is not inserted in the opener so that the motor may be energized to perform other operations of the apparatus. For example, as disclosed in the drawings, the apparatus includes a knife sharpener indicated generally at 150. It must specifically be operable when a can is not being opened.

To effect the automatic opening of the switch 120, the switching apparatus of the present invention includes an arm member 128 extending through the mounting structure of the switch 120. The arm member 128 is coupled to the switch arm 126 within the mounting structure and includes an enlarged portion 130 which extends upward along the rear of the side wall 14. The enlarged section 130 has a vertical slot 132 formed therein. Extending from the wall 14 through the slot 132 is a lug member 134 having an annular slot 136 therein. Positioned around the lug 134 and disposed within the slot 136 is a snap ring 138. The snap ring 138 extends radially beyond the lug 134 to engage the sides of the enlarged portion 130 adjacent the slot 132. In this manner the combination of the lug 134 and the snap ring 138 provides a vertical guide for the arm member 128.

As illustrated, the arm member 128 extends downward through the mounting structure of the switch 120. Positioned around the arm 128 between a shoulder 140 and the lower surface of the mounting structure for the switch 120 is a spring 142. The spring 142 normally exerts a downward force on the shoulder 140 to urge the arm 128 in a position to keep the switch 120 closed (with the switch arm 126 engaging the contact 124).

Coupled to the enlarged section 130 to extend horizontally outward through aperture 145 in wall 14 and an opening 144 in the mounting plate 52 is a can guiding arm 146. Due to the spring 142 the can guiding arm 146 is effectively spring-loaded and is normally positioned (absent a can) along the mounting plate 52 at the upper edge of the driving wheel 40, as illustrated in FIGURES 1 and 4. In positioning the can 48 in cutting position, with the bead 46 resting on the toothed portion of the driving wheel, the can guiding arm 146 is raised to engage and rest upon the top of the can 48, as illustrated in FIGURE 5. This is accomplished by moving the lever arm 62 away from the top of the housing 10 to move the rotary cutter 78 upward from the driving wheel 40. This causes the lower edge of the opening 144 in mounting plate 52 to lift the can guiding arm 146 and the arm member 128. The movement of the arm member 128 produces a movement of the switch arm 126 (mounted in switch 120 and shown schematically in FIG. 3A). Downward movement of the lever arm 62 then allows the spring biased can guiding arm 146 to engage the top of the can 48 as illustrated in FIG. 5.

With the can guiding arm 146 resting on top of the can the spring 142 is in a state of compression and causes the arm 146 to press tightly against the top of the can 48. In this manner the can guiding arm 146 cooperates with the driving wheel 40 and its shoulder member 72 to maintain the can 48 in a cutting position relative to the rotary cutter 78. Also, when the can guiding arm 146 is resting on the top of the can 48 the arm member 128 is positioned to cause the switch arm 126 to engage the other contact 122, thereby again completing the electrical circuit to the motor 24.

At vertical positions for the can guiding arm 146 between its normal position, as illustrated in FIGURES 1 and 4, and its raised position illustrated in FIGURE 5, the switch 120 is open. Thus, when, by operation of the rotary cutter 78 and the driving wheel 40, the top has been severed from the can 48, the spring 142 forces the can guiding arm 146 and arm member 128 downward to open switch 120 which interrupts the electrical circuit including motor 24. In this manner the motor 24 is automatically shut off when the top has been completely severed from the can 48.

As illustrated in FIGURE 2, a fan 25 is fixedly supported on the shaft 26 between the motor 24 and the grinding wheel 148 of the knife sharpener 150. As the shaft 26 rotates in response to the operation of the motor 24, the fan blows air past the motor 24, thereby effecting a cooling of the motor.

A preferred arrangement for the fan is illustrated in FIGURE 7. As represented, the fan 25′ is coupled to the shaft 26 at a side of the motor 24 remote from the grinding wheel 148. Pressure fitted between the cover section 20 and a lower surface of the housing 10 is a dust shield 151. The dust shield 151 includes an opening 152 permitting the shaft 26 to pass therethrough. The dust shield 152 together with the housing 10, forms a compartment 153 for the motor 24 which is isolated from the grinding wheel 148. Thus, the fan 25′, in turn, cools the motor 24 without allowing shavings, dust and the like, from the area around the grinding wheel from entering into contact with the motor 24.

What is claimed is:

1. In a can opener, the combination of:

a housing;

a driving wheel rotatably coupled to the housing, said driving wheel including an annular toothed portion for engaging the under side of a bead of a can and an annular shoulder immediately adjacent and extending radially beyond the toothed portion between the toothed portion and the housing for engaging the side of the bead to prevent the toothed portion from contacting the side of the can below the bead; a can guide projecting outwardly from the wall of said housing to bear against the side of said can thereby holding the can away from contact with the flat side of said drive wheel;

a cutter movably mounted on the housing for shifting movement into cutting position with the driving wheel by engaging the top of the can adjacent the bead, and means to steady a can during a can-opening operation and to detect the severing of the top from the can.

2. An electric can opener comprising:

a housing;

an electric motor mounted within the housing;

a relatively shiftable drive wheel and cutter carried by the housing and adapted to engage the side and top,

respectively, of a can for severing the top from the can;

means for coupling the drive wheel to the motor so that the drive wheel rotates to turn the can in contact with the cutter;

electrical circuit means including a normally open switch and a normally closed switch connected in series with the motor operable to energize the motor;

hand-operated means supported on said housing and adapted to shift the drive wheel and the cutter into cutting engagement with a can and to close the normally open switch to energize the motor;

lock means for engaging the hand-operated means to maintain it in the position which closes the normally open switch, said means including a spring constricted aperture in said housing and a diamond-shaped projection on said hand-operated means;

and support means resting on the top of the can for opening the normally closed switch when the top is completely severed from the can to shut off the motor.

3. In an electric can opener in which a can is supported with a serrated drive wheel bearing against the lower edge of the bead on the can and a cutting blade cuts the top adjacent the bead, multiple stabilizing and support means for a can in an operating position comprising, in combination,

first means including an annular shoulder formed integral with the serrated drive wheel to bear against the outer edge of the can bead to restrict the contact of said serrated wheel to the bead and to steady the can,

second means projecting outwardly from the housing of said can opener to bear against a side of the can remote from the bead of the can to hold said can side away from the adjacent face of said drive wheel and to steady the can, and

third means supported for vertical movement with respect to the can to thereby steady the can but biased to bear against the top of said can.

4. In a device for automatically opening a can, the combination of

a housing,

a serrated drive wheel rotatably mounted in a vertical wall of said housing,

motor means operable to rotate said drive wheel,

a plate supported for vertical movement with respect to said wall,

a circular cutter rotatably supported on said plate in a plane forming an acute angle with the plane of rotation of said drive wheel,

manual means operable to move said plate upwardly and away from said drive wheel so that the upper bead of a can may be placed against said serrated drive wheel intermediate said drive wheel and said

cutter and to move said plate downwardly and toward said drive wheel after a can has been inserted to cause the cutter blade to puncture the top of said can adjacent the bead,

means cooperating with a part of said wall to hold said plate in its downward-most position, said holding means including an aperture with an inner annulus defined by a part of said wall, a spring disposed interior of said annulus to resiliently restrict the opening and a diamond shaped projection extending outwardly from said plate to move into said aperture and be held therein by said annular spring,

support means for a can including an annular shoulder formed integral with and adjacent said serrated drive wheel to bear against the bead of a can,

a can guide projecting outwardly from the wall of said housing to bear against the side of said can thereby to hold the can away from contact with the flat side of said drive wheel, and

a downwardly biased, vertically movable can guiding arm which bears against the top of a can,

means to detect the vertical position of said can guiding arm,

means responsive to the upper-most and lower-most positions of said arm to operate said motor means and responsive to an intermediate position of said arm, in which position the outward end of said arm depends into a can after its top its severed therefrom, to interrupt the operation of said motor means, and

means responsive to any non-holding position of said plate to stop the operation of said motor means.

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