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MOTOR-DRIVEN CAN OPENER

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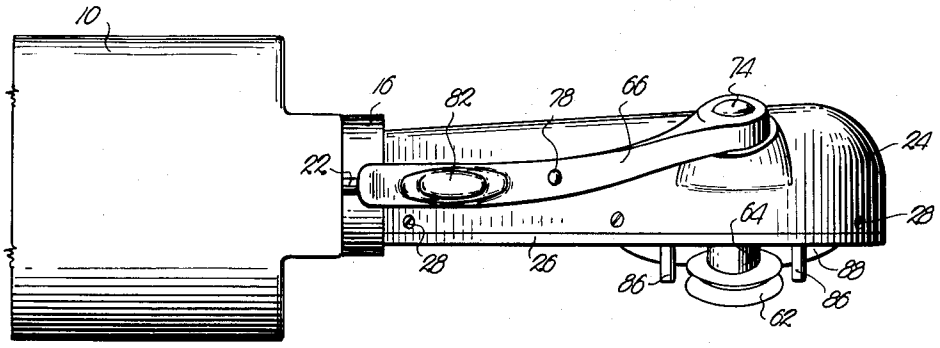


Fig. 1.

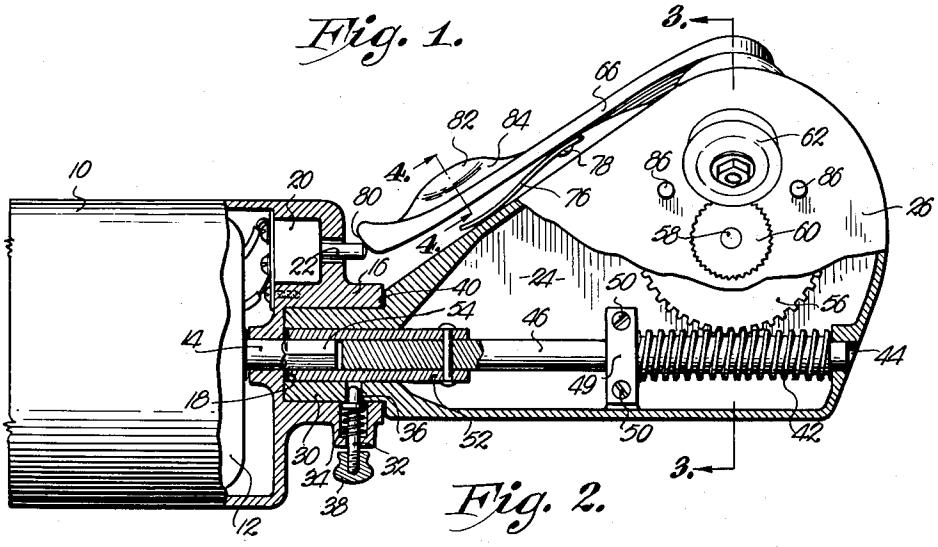


Fig. 2.

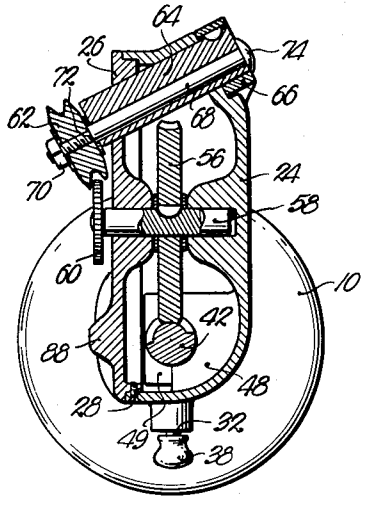


Fig. 3.

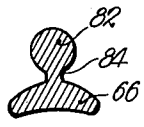


Fig. 4.

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MOTOR-DRIVEN CAN OPENER

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9 Claims. (Cl. 30—4)

The present invention relates in general to can openers and it deals more particularly with that type of can opener having a cutter adapted to cut the top of the can inside the bead.

One of the main objects of the invention is to provide a can opener having power-operated mechanism for advancing the can relative to the cutter during the lid-severing operation. I prefer to employ an electric motor as the prime mover, and another important object of the invention is to provide a unit wherein the can opener proper may easily be removed from the motor and associated electrical components for cleaning.

A further object is to provide a motor-driven can opener wherein the motor is started incident to the normal insertion of an unopened can in proper lid-severing position; and which is halted incident to the removal of the opened can following the lid-severing operation.

Additional objects of the invention, together with the features of novelty whereby the objects are achieved, will appear in the course of the following description.

In the accompanying drawings which form a part of the specification and are to be read in conjunction therewith, and in which like reference numerals are employed to indicate like parts of the various views:

Fig. 1 is a plan view of a can opener embodying my invention;

Fig. 2 is a side elevational view of the can opener, parts having been broken away for purposes of illustration;

Fig. 3 is a transverse cross section taken along the line 3—3 of Fig. 2 in the direction of the arrows; and

Fig. 4 is an enlarged cross-sectional view taken along the line 4—4 of Fig. 2 in the direction of the arrows.

Referring more particularly to the drawings, the reference numeral 10 indicates a motor housing containing a motor 12 whose shaft 14 projects from the housing at the forward end thereof. The opposite end of the housing is provided with a suitable bracket or other conventional means (not shown) for mounting the housing on a wall or other stationary support, whereby the motor is fixed in generally horizontal position as shown in Figs. 1 and 2.

At its forward end the housing has an outwardly projecting central boss 16, this being hollowed out to form a socket 18 coaxial with the motor shaft 14. Above the latter is a normally open switch 20, suitably enclosed by an integral forwardly projecting portion of the housing as shown; the switch is of the push button type having a plunger 22 which when depressed (i. e., moved toward the left as seen in Fig. 2) closes the switch causing the motor 12 to operate. As will be understood by those versed in the art, the switch-actuating plunger 22 is spring-biased to return to the position shown in Fig. 2 when the depressing force is removed, at which time the switch interrupts the circuit to motor 12.

The body of the can opener proper comprises a hollow shell or housing 24, the open side of which is closed by a cover 26 secured to the shell by screws 28. Enlarged

at its forward end, the can opener body tapers rearwardly and terminates in a hollow stub or neck 30 normally received in the socket 18 of the motor housing. It should be understood that the exterior of this stub and the interior of the socket are complementary cylindrical surfaces which fit snugly together without binding. They are held together by means of a detent 32 carried on the underside of boss 16 and biased upwardly by a coiled spring 34 so that its upper end is received in a hole 36 on the underside of stub 30. The detent is provided at its lower end with a knob 38 by means of which it can be drawn downwardly against the tension of the spring thereby to permit the stub 30 to be withdrawn axially from socket 18. When assembled as shown in Fig. 2, the can opener body has, adjacent the stub, a shoulder 40 which seats against the end of boss 16.

Within the hollow can opener body is a worm 42, the forward end of which is journaled in the housing at 44, while the rearwardly extending worm shaft 46 is journaled in a split bearing block 48, 49; one half of the bearing block (48) is an integral boss on the inside of housing 24 as shown in Fig. 3, while the other half (49) is secured thereto by means of screws 50. Pinned to the rearmost end of worm shaft 46 is a coupling collar 52 which is journalled in stub 30. Motor shaft 14 is squared at its end as shown at 54 to fit in a complementary socket formed by the interior of the coupling collar; or, alternatively, the end of the motor shaft may be provided with longitudinal splines adapted to be received in corresponding grooves in the bore of the collar. While the collar thus serves as a torque transmission coupling between the two shafts, it will be understood that when detent 32 is withdrawn to unlatch the can opener body from the motor housing, the withdrawal of stub 30 from socket 18 is accompanied by withdrawal of the end of the motor shaft from the coupling collar 52.

Rotation of the worm 42 serves to turn the worm gear 56 at reduced speed, this gear being keyed or otherwise secured to a cross shaft 58. The cross shaft is journaled in opposite sides of the housing as shown in Fig. 3, and rigidly secured on one end thereof is a serrated feed wheel 60.

Above the feed wheel is a can cutting element of conventional construction, this comprising an annularly grooved cutter wheel 62. The cutter wheel is mounted for movement toward and away from the feed wheel as follows: Extending diagonally through the housing is a sleeve 64, the cylindrical exterior of which is journaled in the two sides of the housing as shown in Fig. 3. A lever arm 66 is keyed or otherwise secured to one end of the sleeve for turning it about its own axis. Parallel to this axis but offset laterally therefrom is a spindle 68 which, due to its eccentricity, will move in an orbit about the central axis of the sleeve upon turning of the latter; in Figs. 2 and 3 the spindle is shown occupying the lowest position in this orbit. Cutter wheel 62 is centrally apertured and received on one end of the spindle, the latter being reduced in diameter whereby the cutter wheel is clamped between the nut 70 and shoulder 72 on the spindle. The opposite end of the spindle is provided on enlarged head 74 whereby the spindle and cutter wheel assembly is restrained against axial movement while being able to rotate freely in sleeve 64.

Referring to Fig. 2 it will be seen that lever arm 66 normally is maintained elevated slightly above the housing 24 by means of a leaf spring 76 which is secured to the underside of the arm by a rivet 78. The free end of the arm comprises a beveled tip 80 which in this position of the arm engages but does not depress the actuating plunger 22 of switch 20; since the switch therefore is open, motor 12 is nonoperative when the arm is in the position illustrated in Fig. 2.

Remembering that the spindle-cutter wheel assembly is shown in its lowest position in Fig. 3, it will be appreciated, referring to Fig. 2, that if the free end of lever arm 66 is swung upwardly from the position shown it will turn the sleeve 64 clockwise and cause the cutter wheel to travel in a clockwise orbit about the central axis of the sleeve. For the first 90° of movement of arm 66, the cutter wheel will, in other words, travel leftwardly and upwardly; and on the next 90° of movement of the arm, the cutter wheel will continue its upward movement but travel toward the right so that when 180° rotation of the arm has been completed, the cutter wheel will occupy a position spaced directly above that in which it is shown in Fig. 2.

With the cutter wheel thus spaced above and clear of the feed wheel 60, the marginal bead at the upper end of a can may be inserted between the two wheels. By now swinging lever arm counterclockwise back to the position shown in Fig. 2, the cutter wheel is moved downwardly in a counterclockwise arc or orbit and, at its lower outer margin, punctures the lid of the can just inside the bead so that the can is ready for the lid-severing operation. A rather substantial force is required to puncture the lid and this conveniently is applied to arm 66 by squeezing it toward the housing 24. When the metal of the lid "gives way" before the cutter 62 in the puncturing operation, it does so quite suddenly and as a result the applied force on the arm carries it downwardly not only to the position shown in Fig. 2 but past that position; accordingly, on the final portion of the downward movement, the beveled tip 80 acts as a wedge or cam pushing the plunger 22 to the left as shown in Fig. 2, whereupon switch 20 closes the circuit for motor 12. The motor therefore causes worm 42 to rotate, turning worm gear 56 and feed wheel 60 slowly in a counterclockwise direction, thereby to advance the bead of the can past cutter wheel 62.

During this cutting operation the bead of the can is of course gripped between the feed wheel 60 and the cutter wheel 62. As the bead travels past the cutter, the can is steadied in an erect position by means of pins 86 engaging the bead of the can forwardly and rearwardly of the cutting region; also a boss 88 engages the side wall of the can below the feed wheel to assist in maintaining the can in proper position during the operation.

When the can has completed one full revolution, its lid will be severed, and the downward pressure on arm 66 can be released. Spring 76 then will restore the arm to the position shown in Fig. 2 relieving the pressure on plunger 22 whereupon switch 20 returns to its normally open condition, interrupting the circuit of the motor 12 and halting the rotation of feed wheel 60. The can can now be removed from the can opener by lifting upwardly once more on the lever arm 66 and turning same through an arc of approximately 180°. To facilitate such upward movement of the arm, I prefer to provide it with a finger grip 82 comprising a somewhat elongated boss on the top of the arm and connected thereto by a constricted neck 84.

Due to the fact that the outer marginal edge of the cutter wheel penetrates the lid during the lid-severing operation, it is not unusual for it to come into contact with the contents of the can. As small portions of the latter are picked up on the margin of the cutter wheel, they spread or are transferred onto the feed wheel and associated parts, so in the interest of cleanliness and sanitation it is desirable to frequently clean the operative components of the can opener mechanism proper. My arrangement makes this very simple and easy, inasmuch as by merely withdrawing the detent 32, the entire forward portion of the can opener can be uncoupled from the motor housing and immersed in a soapy bath or otherwise cleaned without in any way endangering the electrical components. Thereafter, it is only necessary to reinsert the stub 30 in socket 18 and allow the detent to relatch the members together; the motor shaft 14 will, of course, automatically be recoupled to the worm shaft 46 at the same time.

From the foregoing it will be seen that this invention is one well adapted to attain all of the ends and objects hereinbefore set forth, together with other advantages which are obvious and which are inherent to the apparatus.

It will be understood that certain features and subcombinations are of utility and may be employed without reference to other features and subcombinations. This is contemplated by and is within the scope of the appended claims.

Inasmuch as many possible embodiments of the invention may be made without departing from the scope thereof, it is to be understood that all matter herein set forth or shown in the accompanying drawings is to be interpreted as illustrative and not in a limiting sense.

Having thus described my invention, I claim:

1. In a can opener, a body having a can cutter thereon, a feed wheel rotatably mounted on said body in spaced relation to said cutter to receive a portion of a can therebetween, an arm on said body operatively connected to said can cutter and movable to shift said cutter toward said feed wheel to close the space between the two, a feed wheel drive shaft journaled in the body, speed reduction gearing between said shaft and said feed wheel, a motor having a housing, means for detachably mounting said body on said housing, a motor shaft, a detachable coupling between the motor shaft and the feed wheel drive shaft, a motor switch carried by said housing, and an actuator on said switch in a position to be engaged and operated by said arm upon movement thereof.

2. A can opener as in claim 1 wherein said detachable mounting means includes a spring-biased detent for latching the body and motor housing together.

3. A can opener as in claim 1 having spring means between said arm and body normally maintaining the arm in an inoperable position relative to said actuator but yieldable to permit displacement of said arm from said position in a direction to operate the actuator.

4. In a can opener of the type having a can cutter element and a cooperating feed wheel element, a prime mover having a frame and a drive shaft, a control device mounted on said frame and operable to start and stop said prime mover, a can opener body detachably mountable on said frame and having mechanism connected to said drive shaft when so mounted, said mechanism including said feed wheel element, an arm swingably mounted on said body and having a normal position, said arm movable in one direction from normal and having a portion positioned to engage and actuate said control device upon such movement thereby to control the prime mover, one of said elements being movably mounted on said body for displacement away from the other element, and an operative connection between said one element and said arm for so displacing such element upon movement of the arm in the opposite direction from its normal position.

5. A can opener as in claim 4 wherein said arm has a finger grip comprising a raised boss on the arm.

6. A can opener as in claim 4 wherein the portion of said arm which is effective to engage said control device comprises a tapered camming wedge.

7. A can opener as in claim 4 having spring means between said arm and body yieldably resisting movement of the arm in said one direction from its normal position.

8. In a can opener of the type wherein the can opener mechanism is carried by a body having pivoted thereon an arm swingable in one direction to puncture a can and swingable in the opposite direction to release a can from the mechanism; the improvement which comprises a motor having a housing and a shaft, a switch fixedly positioned on said housing and connected to said motor for starting and stopping same, a coupling for detachably mounting said body on said housing, said coupling in-

cluding means for indexing the position of said body relative to that of the motor housing so that said switch is in the path of said arm and adapted to be actuated thereby upon movement of the arm in said can-puncturing direction, and means coupling said motor shaft to said can opener mechanism to drive same when said body is so mounted on the motor housing.

9. In a can opener of the type having a body carrying thereon a can cutter element, a cooperating feed wheel element and means for moving one of said elements toward or away from the other element at will under control of an arm pivotally mounted on the body to swing in either direction; the improvement which comprises a motor having a housing and a shaft, a switch fixedly positioned on said housing and connected to said motor for starting and stopping same, a coupling for detachably mounting said body on said housing, said coupling including means for indexing the position of said body relative to that of the housing so that such

switch is in the path of said arm and adapted to be actuated thereby upon swinging movement of said arm, and means in said body for connecting said feed wheel element to said motor drive shaft when said body is so mounted on said housing, said detachable coupling between said body and motor housing comprising a spring-biased detent on one of said members and a fixed catch on the other adapted to register with said detent only when said body is properly positioned relative to the motor housing so that said switch is in the path of said arm.

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