Jan. 30, 1962 W. L. SPIELMAN 3,018,549

CAN OPENER

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FIG. 1.

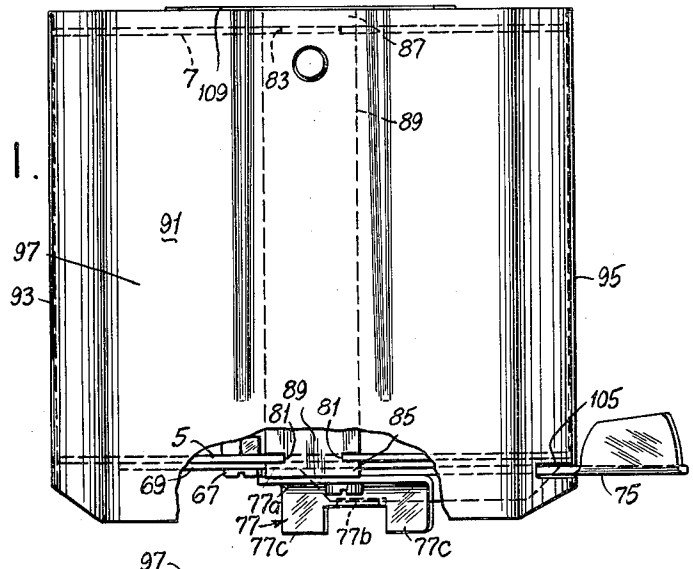


FIG. 2.

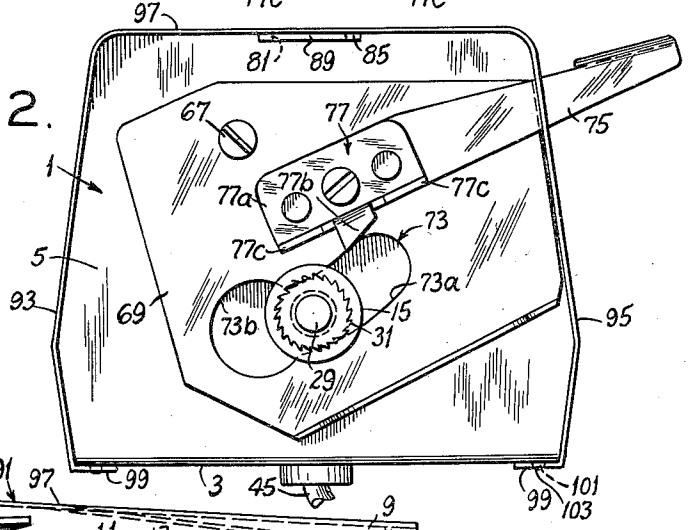
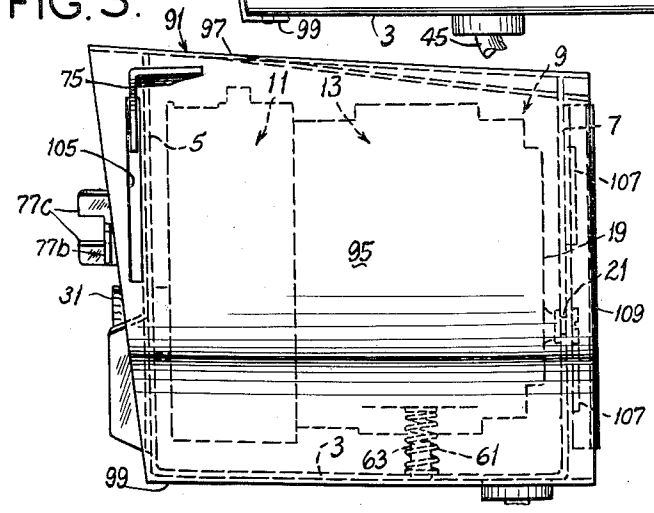


FIG. 3.



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FIG. 4.

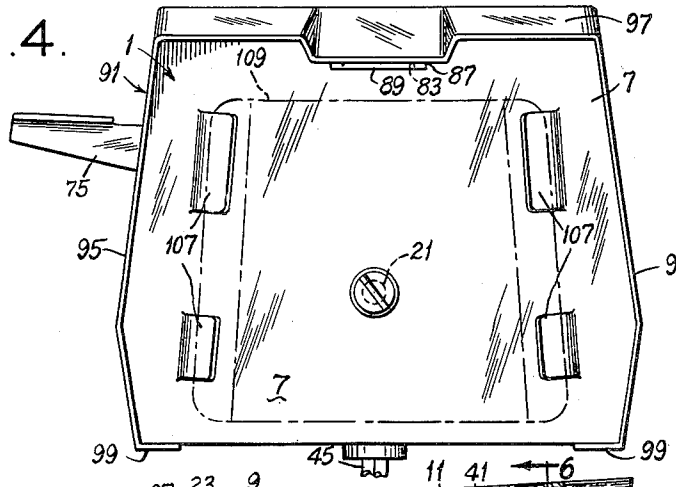


FIG. 5.

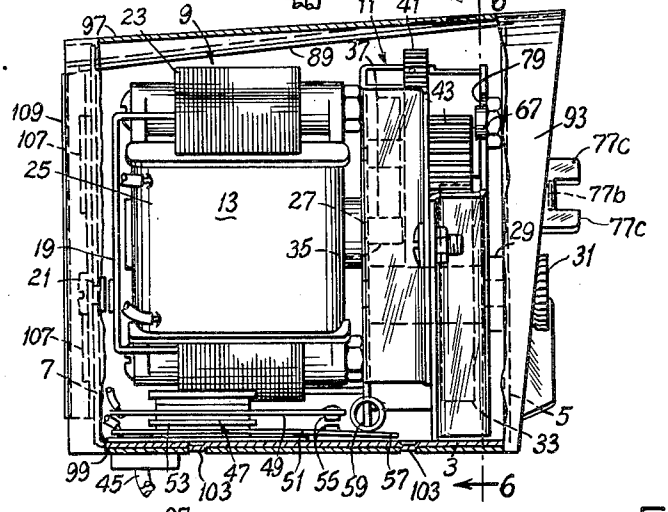


FIG. 6.

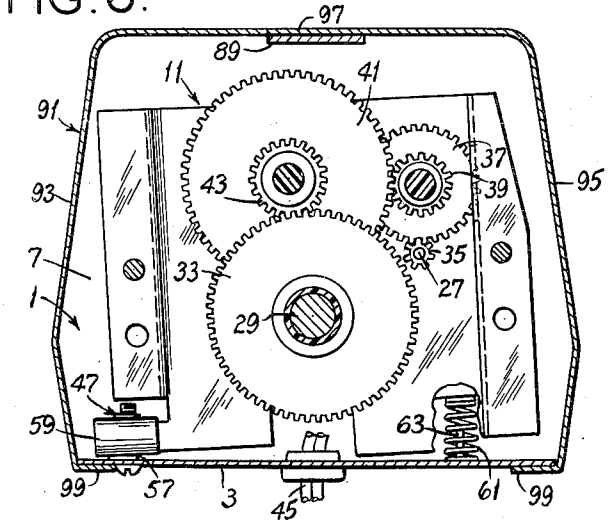
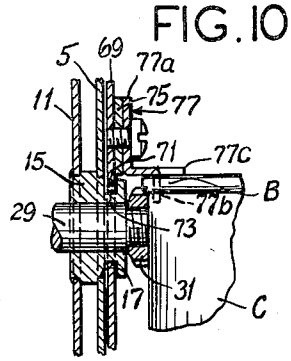


FIG. 10.



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FIG. 7.

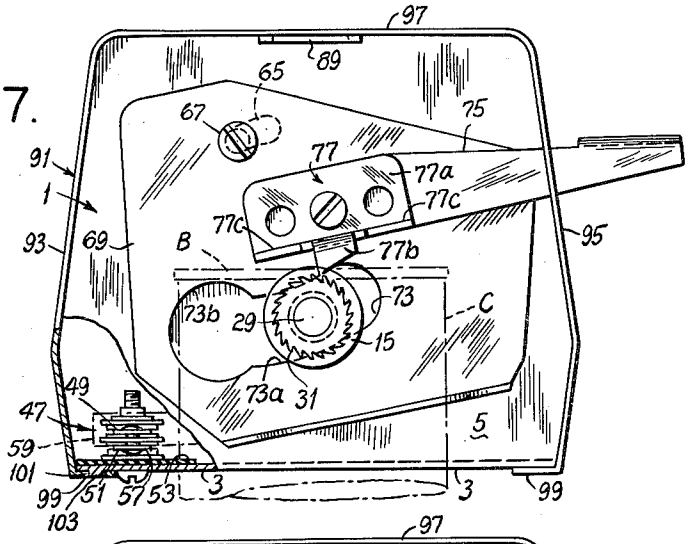


FIG. 8.

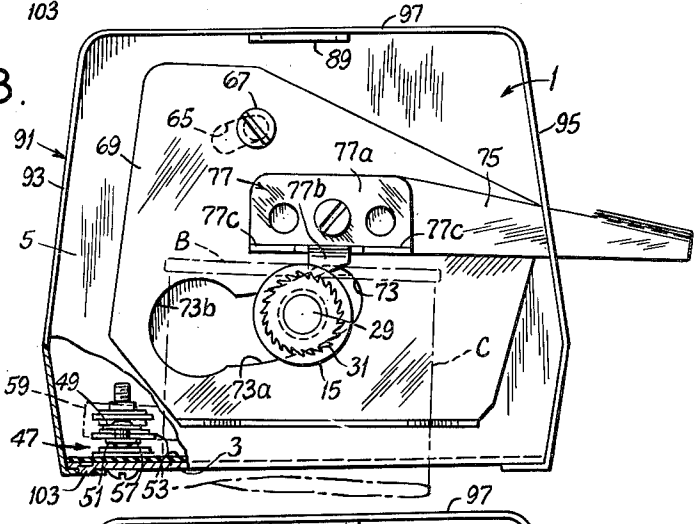
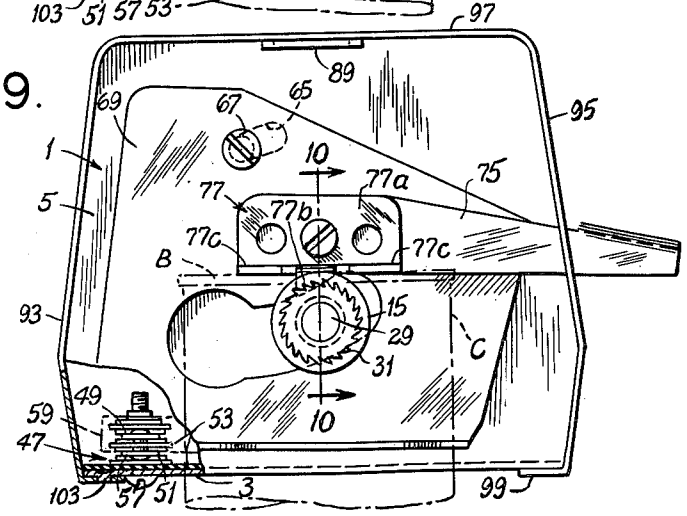


FIG. 9.



United States Patent Office 3,018,549 Patented Jan. 30, 1962

3,018,549

CAN OPENER

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Filed Feb. 6, 1961, Ser. No. 87,128
17 Claims. (Cl. 30—4)

This invention relates to can openers, and more particularly to an electrically operated can opener.

Among the several objects of the invention may be noted the provision of an improved electric can opener of the type having a can driving wheel for rotating a can, an electric motor for driving the wheel, and a blade for cutting the can, adapted to utilize power from the motor to drive the blade through the can at the start of a cutting operation, instead of requiring the user to exert sufficient manual force to drive the blade through the can; the provision of a can opener such as described adapted automatically to maintain the motor in operation after the cutting operation has been started, without requiring the user to hold down a lever or the like, and adapted automatically to shut off the motor upon completion of the cutting operation; and the provision of a can opener such as described which is of economical easy-to-assemble construction, easy to use, and reliable in operation. Other objects and features will be in part apparent and in part pointed out hereinafter.

The invention accordingly comprises the constructions hereinafter described, the scope of the invention being indicated in the following claims.

In the accompanying drawings, in which one of various possible embodiments of the invention is illustrated,

FIG. 1 is a plan view of an electric can opener of this invention with part of a cover broken away;

FIG. 2 is a front elevation of the can opener;

FIG. 3 is a right side elevation of FIG. 2;

FIG. 4 is a rear elevation of the can opener;

FIG. 5 is a left side elevation of FIG. 2 with the cover partly broken away;

FIG. 6 is a vertical section taken on line 6—6 of FIG. 5;

FIGS. 7, 8 and 9 are front elevations, with parts broken away, showing certain moved positions of parts; and

FIG. 10 is a vertical section taken on line 10—10 of FIG. 9.

Corresponding reference characters indicate corresponding parts throughout the several views of the drawings.

Referring to the drawings, an electric can opener constructed in accordance with this invention is shown to include a main frame generally designated 1 comprising a bottom 3, a vertical wall 5 at the front of the bottom, and a vertical wall 7 at the rear of the bottom. This frame, as illustrated, is economically formed from a sheet metal blank bent to U-shape, the legs of the U constituting the front and rear walls 5 and 7, and the base of the U constituting the bottom 3. A combination electric motor and speed reducer unit generally designated 9 is pivoted in the frame for rocking movement on a horizontal axis which extends in front-to-rear direction adjacent the bottom of the frame. Unit 9 essentially comprises a gear housing 11, which is located adjacent front wall 5, and an electric motor 13 mounted on the rear of housing 11. The latter has a tubular pivot member 15 (see FIG. 10) which is pivotally received in an opening 17 in the front wall 5 of the frame. Rear support for unit 9 is provided by a pivot member 19 at the rear of the motor having a stud received in an opening 21 in the rear wall 7 of the frame coaxial with member 15 and opening 17.

Motor 13 comprises the usual stator 23, including field coil 25, and the usual armature on motor shaft 27. The latter extends parallel to the pivot axis of unit

9 above and toward the right of this axis as viewed from the front of the can opener. A shaft 29 is rotatably mounted in the tubular pivot member 15 and has a toothed can driving wheel 31 fixed on its forward end immediately outward of the forward end of member 15. The rearward end of shaft 29 extends into the gear housing 11 and has a spur gear 33 fixed thereon. Housing 11 contains a train of speed-reducing spur gears for driving wheel 31 from motor shaft 27, the gears in the train being designated 35, 37, 39, 41 and 43. Gear 35 is fixed on the motor shaft. Gears 37 and 39 are clustered; gears 41 and 43 are clustered. The last gear 43 of the train meshes with gear 33, and is adapted on rocking of unit 9 to remain in mesh with gear 33 while swinging around the axis of gear 33.

Current is adapted to be supplied to motor 13 via a two-wire cord 45 under control of a switch 47 mounted on the bottom 3 of the frame. This switch comprises a pair of spring blades 49 and 51 mounted one above the other on bottom 3 and insulated from the bottom 3 and from each other by means of insulation blocks such as indicated at 53. The blades extend forward from blocks 53 toward the front of the can opener adjacent the left side of the bottom 3 and carry contacts such as indicated at 55 adjacent their free ends. The lower blade 51 has an extension 57 beyond the contact thereon engageable by an insulation-covered finger 59 on gear housing 11. Spring bias of blade 51 tends to close contacts 55. Unit 9 is biased by a coil compression spring 61 to rock counterclockwise as viewed from the front of the can opener, and as viewed in FIG. 6, toward the retracted position in which it appears in FIGS. 5 and 6 wherein finger 59 bends blade 51 down to hold contacts 55 open. Spring 61 is held centered by a tang 63 struck up from bottom 3 of main frame 1. Thus, with the unit 9 in the stated retracted position, the motor 13 is deenergized, but upon clockwise rocking of unit 9 away from retracted position, contacts 55 close for energizing the motor.

The front wall 5 of frame 1 has an arcuate slot 65 therein above and to the left of the axis of can driving wheel 31. As illustrated, the arc on which slot 65 extends is centered in the axis of the wheel. A pivot member 67 is slidable in this slot from one end thereof to the other. A plate 69 is pivoted on this pivot member on the outside of front wall 5. Pivot member 15 (see FIG. 10) has an annular groove 71 immediately outward of front wall 5. Plate 69 has an arcuate slot 73 having a portion 73*a* of a width slightly greater than the diameter of member 15 at the bottom of groove 71 but less than the outside diameter of member 15, and having an enlarged left end portion 73*b* larger than the outside diameter of member 15 for permitting plate 69 to be placed against the outside of front wall 5 in the assembly of the can opener. The arc on which slot 73 extends is centered in the axis of pivot member 67. A manually operable lever 75 is secured to the plate 69 on the outside thereof, and a can cutting blade member 77 is secured on the outside of lever 75. Member 77 consists of a sheet metal blank bent to have a vertical flange portion 77*a* which engages the outside face of lever 75, a cutting blade portion 77*b* offset from the plane of wheel 31, and outwardly extending ear portions 77*c* on opposite sides of the blade. Lever 75 extends to the right of the can opener as viewed from the front thereof.

Gear housing 11 has a shoulder 79 engageable by the pivot member 67, the arrangement being such that member 67 rocks unit 9 clockwise about the axis of pivot member 15 on movement of member 67 away from retracted position at the left end of slot 65. Clockwise rocking of unit 9 is limited by engagement thereof with

the upper end of tang 63. As previously described, when unit 9 rocks clockwise away from its retracted position, contacts 55 are closed for energizing the motor 13.

With the assembly of lever 75, plate 69 and blade 77*b* in the retracted position in which they appear in FIG. 2 (lever 75 raised), a can C may be applied to the wheel 31 with the outwardly directed bead B at the top of the can bearing on the wheel. On pushing down lever 75, assembly 75, 69 and 77*b* first pivots clockwise about the axis of pivot member 67, which then is located at the left end of slot 65, until the blade 77*b* engages the top of the can. Then, on further pushing down of lever 75, assembly 75, 69 and 77*b* pivots clockwise about the axis of pivot member 15, which acts as a stop means for assembly 75, 69 and 77, and pivot member 67 moves toward the right from its retracted position at the left end of slot 65, thereby rocking unit 9 clockwise, against the bias of spring 61, about the axis of pivot member 15. This results in closure of contacts 55 to energize motor 13. The latter drives wheel 31 counterclockwise via the speed-reducing gear train, thereby driving the can counterclockwise as viewed from above. The lever 75 is held down to hold the blade 77*b* in frictional engagement with the top of the can (light pressure on the lever is sufficient). The friction of the can top (which is turning counterclockwise as viewed from above) on the tip of the cutting blade 77*b* causes torque to be exerted through the blade 77*b* on plate 69, and the latter is thereby power-driven clockwise about the axis of pivot member 67 to drive the blade down through the can top, thereby to start the cutting of the latter. The cutting action has a braking effect on wheel 31 and hence on gear 33 fixed on wheel shaft 29. With gear 33 thus braked, power from motor 13 acting through the gear train causes gear 43 in mesh with gear 33 to tend to swing bodily clockwise about the axis of gear 33. This holds unit 9 in advanced position against the return bias of spring 61 to hold contacts 55 closed. When the can top has been completely cut, the braking effect terminates, and spring 61 rocks unit 9 back to retracted position to open contacts 55 and deenergize the motor.

The upper edges of walls 5 and 7 are provided with notches 81 and 83, respectively, which notches serve to hold ears 85 and 87 of a clamping strap 89 outside of the respective main frame wall. The strap provides a means for holding the upper edges of the walls in their proper position.

An inverted generally U-shaped cover 91, the legs of the U constituting side walls 93 and 95 and the base of the U constituting a top 97, is adapted to be positioned over the main frame 1 so as to substantially enclose the space bounded by the main frame. The cover may be constructed of flexible sheet material, such as, for example, sheet aluminum, and the walls thereof have inwardly directed bottom flanges 99. These flanges have openings 101 therein which are adapted to receive projections 103 located adjacent the side edges of the bottom 3 of the main frame 1 and extending downward therefrom. Side wall 95 of the cover is provided with a slot 105 for receiving lever 75. Cover 91 is conveniently sprung on the main frame prior to assembly of lever 75 and member 77 with plate 69, and may be readily removed, after withdrawal of lever 75 through slot 105.

The wall 7 of main frame 1 has a plurality of struck-out lugs 107 for mounting the can opener on a trapezoidal bracket 109. It will be understood that this bracket will be attached to any convenient support, such as a wall or stand.

Operation is as follows:

With the lever 75 in raised position (see FIG. 2), a can C is so placed that the bead B thereof bears on the can driving wheel 31. The lever 75 is then pushed downward, thereby pivoting assembly 75, 69, 77 clockwise (as viewed in FIGS. 7, 8 and 9) until the cutting blade 77*b* frictionally engages the can top, and so that the bead B is gripped between the blade and wheel. In FIG. 7, the blade assembly has not quite reached this position, and contacts have not yet been closed. Upon further downward movement of the lever, assembly 75, 69, 77, the motor and speed-reduction unit 9 and the can pivot around the axis of tubular pivot member 15 (through the driving connection between the plate 69 and unit 9 by pivot member 67 engaging shoulder 79). Thus, finger 59 is backed off to allow contacts 55 to close, and the motor is energized. When the motor is energized, the wheel 31 begins to rotate and the frictional engagement of the blade 77*b* and the rotating can top causes the blade to puncture the top. FIG. 8 shows the relative positions of the can and can opening mechanism just as the blade begins to puncture the top. The pressure on the lever 75 may be released as soon as the motor has been energized, because the resistance to rotation of the wheel and gear 33 created by the frictional force of the blade against the can top acting against the rotation of the wheel creates the motor reaction which causes gear 43 to remain in advanced position, holding the motor and speed reducer unit 9 in advanced position to maintain contacts 55 closed. After the can top has been punctured and while the blade 77*b* is cutting the top, the assembly 75, 69, 77 and the can may pivot slightly, although not necessarily, in a counterclockwise direction around the axis of tubular pivot member 15 to bring the can back to a generally vertical position and give the blade a deeper penetration into the can. When the blade has completely cut the top from the can, the frictional force of the top is no longer in effect, and the resistance to rotation of the can is terminated. Hence, the motor reaction to the resistance is no longer present and the spring 61 returns the unit 9 to its retracted position, thereby opening contacts 55 to deenergize the motor. The lever 75 may then be raised, and the can removed from the opener.

While the pivot member 67 is shown to engage a shoulder on the unit 9, it will be understood that this pivot member could be journalled in or fixed to the unit 9, since relative movement between them is not necessarily required.

It will thus be seen that the can opener of this invention will automatically puncture and cut the top of a can when the motor is energized by pivoting the unit 9 in one direction, and that the motor will remain energized until the top has been completely cut from a can even though the pressure on the lever is released immediately after energization of the motor. When the top has been completely cut from a can, the unit 9 automatically swings back to retracted position, and the motor is deenergized.

In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results attained.

As various changes could be made in the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

I claim:

1. In an electric can opener, a can driving wheel, an electric motor and speed reducer unit for driving said wheel, said unit being mounted for movement away from and back to a retracted position, a blade for cutting a can which is being driven by the wheel, and a switch for controlling the motor operable in response to movement of the unit away from retracted position, said unit being held in switch-actuating position in response to resistance to rotation of the wheel caused by cutting action.

2. In an electric can opener as set forth in claim 1, said unit being pivoted for rocking movement about the axis of said wheel.

3. In a can opener as set forth in claim 2, means biasing

said unit toward retracted position, motor reaction to the resistance to rotation of the wheel when said unit is rocked away from said retracted position and while said blade punctures and cuts a can maintaining said unit rocked away from said retracted position.

4. In an electric can opener as set forth in claim 3, said rocking means being pivotable around the axis of the wheel to rock said unit.

5. In an electric can opener as set forth in claim 2, means for rocking said unit about the axis of the wheel, said means being pivotable around a first axis to move the blade into a position for gripping a can in cooperation with said wheel, and pivotable around a second axis to rock said unit.

6. In a can opener as set forth in claim 5, means biasing said unit toward retracted position, motor reaction to the resistance to rotation of the wheel when said unit is rocked away from said retracted position and while said blade punctures and cuts a can maintaining said unit rocked away from said retracted position.

7. A can opener as set forth in claim 6, said rocking means including a plate, said blade being fixed to said plate, said plate being pivoted relative to said unit when said means is pivoted around said first axis and fixed relative to said unit when said means is pivoted around said second axis to rock said unit.

8. A can opener comprising a frame, a rotatable can driving wheel carried by the frame, an electric motor and speed reducer unit for driving said wheel swingable with respect to said frame around the axis of the wheel, a switch means responsive to swinging of the unit away from a retracted position for closing said switch, a blade, means carrying said blade movable relative to said frame and said unit for placing the blade adjacent the wheel and movable relative to the frame for moving the unit away from retracted position, whereby the switch is closed and the motor is excited to drive a can inserted between the wheel and the blade to cause puncturing and cutting of the can by the blade, motor reaction due to the resistance to rotation of the wheel while cutting maintaining said unit away from said retracted position and thereby maintaining said switch closed.

9. A can opener as set forth in claim 8, including means biasing said unit toward its retracted position to open said switch, said biasing means returning said unit to its retracted position in the absence of such resistance when cutting has been completed.

10. A can opener as set forth in claim 8, including a member movable with said carrying means for engaging and moving the unit when said carrying means is moved relative to the frame.

11. A can opener comprising a frame, a rotatable can driving wheel carried by the frame, an electric motor and speed reducer unit for driving said wheel swingable with respect to said frame around the axis of said wheel, a switch, means responsive to swinging of the unit away from a retracted position for closing said switch, a blade, means carrying said blade adapted to be pivoted relative to said unit, stop means on said frame limiting the pivotal movement of said carrying means relative to said unit, said carrying means and said unit adapted to be pivoted about said stop means, whereby said blade may be moved

with said carrying means relative to said unit into a gripping position for gripping a can in cooperation with said wheel, and said carrying means and unit may be pivoted together about said stop means to close said switch, thereby to energize the motor to drive a can inserted between the wheel and the blade to cause puncturing and cutting of the can by the blade, motor reaction due to the resulting resistance to rotation of the wheel while puncturing and cutting maintaining said unit away from said retracted position, thereby maintaining said switch closed.

12. An electric can opener comprising a frame having a bottom, a front wall and a back wall, a tubular pivot member mounted in said front wall, a shaft extending through said tubular pivot member, a can driving wheel on the forward end of said shaft, a gear on said shaft rearward of said pivot member, an electric motor and speed reducer unit carried by said tubular pivot member for rocking movement on the axis of said tubular pivot member between said walls, said unit including a speed-reducing gear train, the last gear of which meshes with the gear on the shaft and which is bodily movable about the axis of the shaft, the front wall having a slot therein above said tubular pivot member, a second pivot member shiftable in said slot, a plate pivoted in said second pivot member on the outside of the front wall, a can-cutting blade carried by said plate, said unit being adapted for rocking movement away from a retracted position and being biased toward retracted position, said second pivot member being adapted to rock said unit away from retracted position on shifting of said second pivot in said slot, and a switch for controlling said motor operable on rocking of said unit away from its retracted position.

13. An electric can opener as set forth in claim 12 wherein said tubular pivot member extends forward from said front wall through a slot in said plate.

14. An electric can opener as set forth in claim 13 wherein said tubular pivot member has an annular groove, the slot in said plate having a portion of width slightly greater than the diameter of the tubular pivot member at the bottom of the groove but less than the outside diameter of the tubular pivot member and an end portion of larger size than the outside diameter of the tubular pivot member.

15. An electric can opener as set forth in claim 12 wherein said frame comprises a U-shaped sheet metal member, one leg of which constitutes the front wall and the other the rear wall.

16. An electric can opener as set forth in claim 15 including an inverted generally U-shaped cover, the legs of which constitute side walls, each of the side walls of said cover having an inwardly directed flange at the bottom thereof, said cover being positioned over said frame so as to substantially enclose the space bounded thereby and means for attaching said flanges to the bottom of said frame.

17. An electric can opener as set forth in claim 16 wherein said attaching means comprises a plurality of projections extending downward from said bottom received within respective openings in said flanges.

No references cited.