April 18, 1961 R. L. ROHDE ET AL 2,979,815

ELECTRIC CAN OPENER

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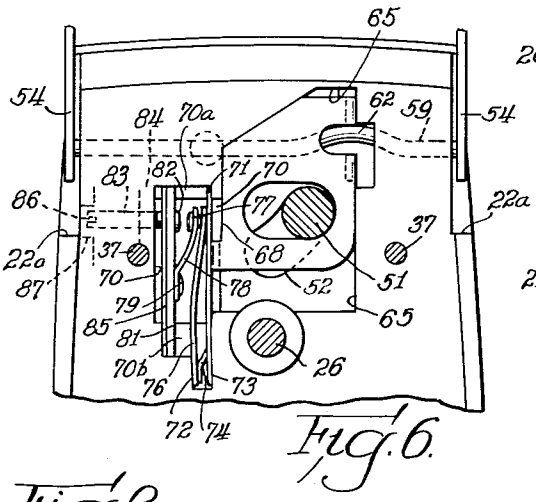


Fig. 6.

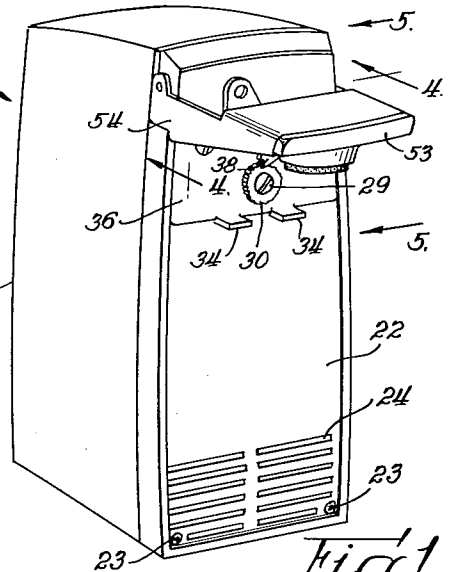
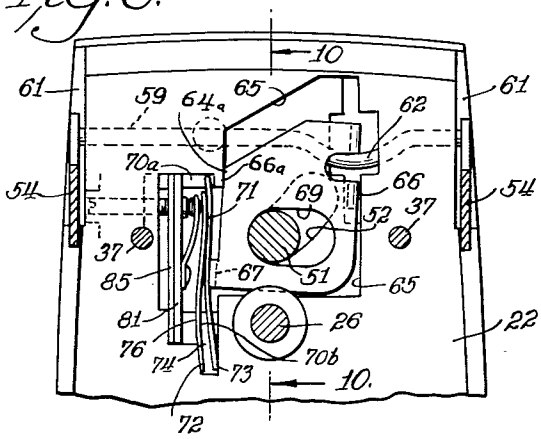


Fig. 1.

Fig. 8.



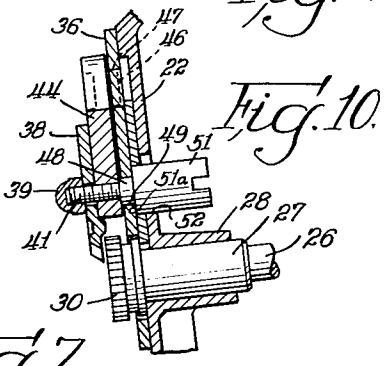
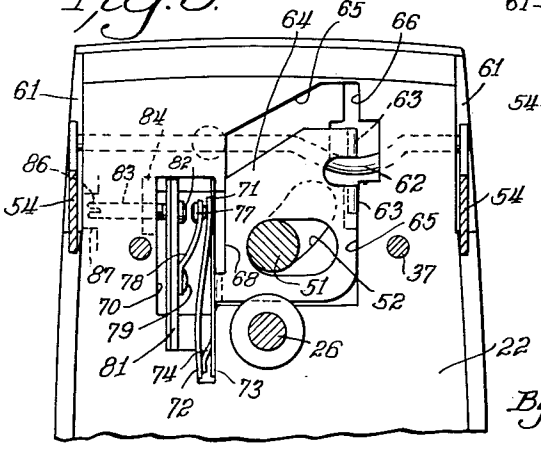
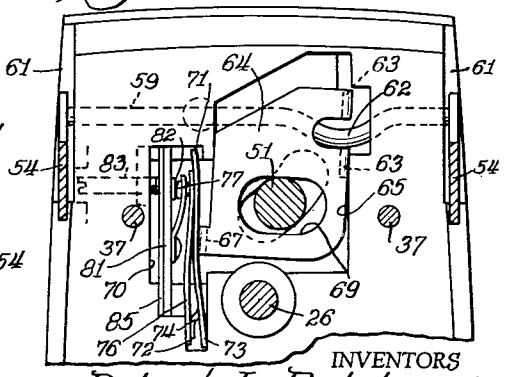


Fig. 10.

Fig. 7.

Fig. 9.





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Fig. 2.

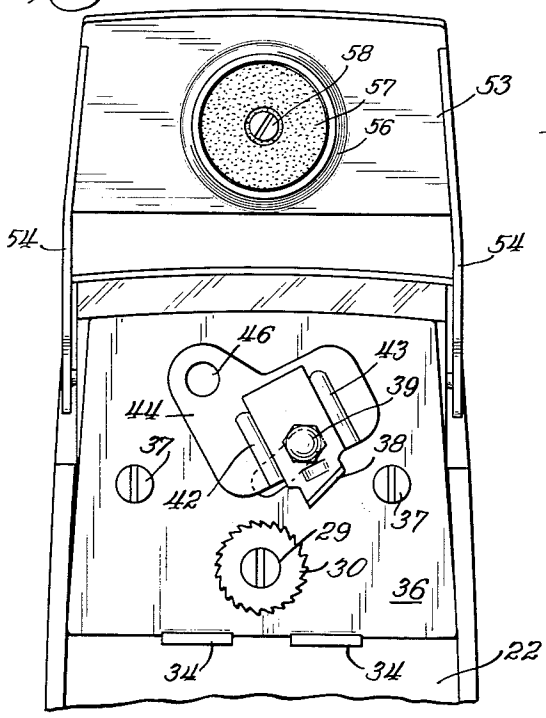
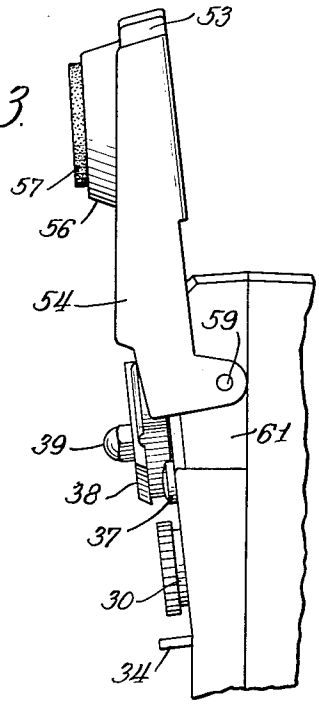


Fig. 3.



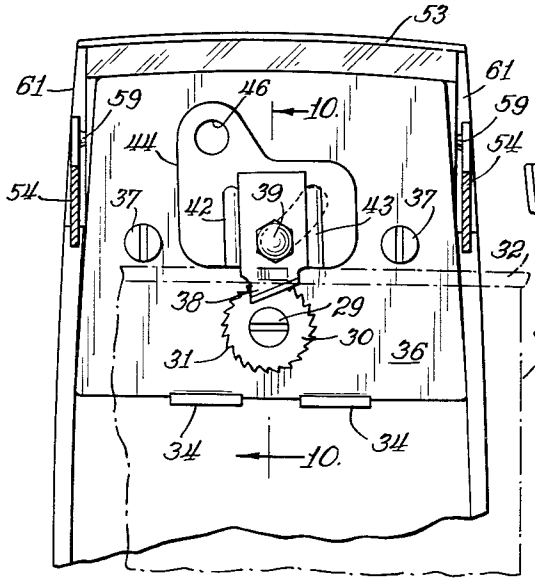
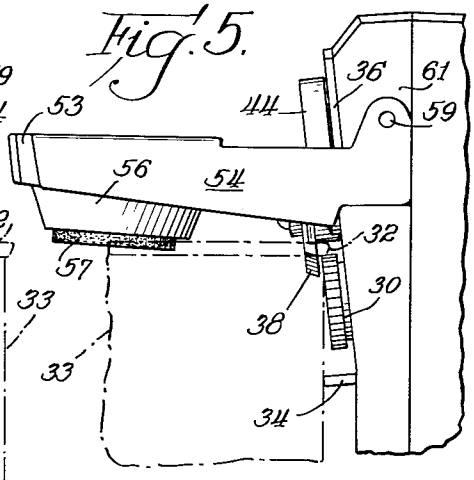


Fig. 4.

Fig. 5.



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ELECTRIC CAN OPENER

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Filed May 8, 1959, Ser. No. 811,933

16 Claims. (Cl. 30—4)

This invention relates to motorized can openers, and has more particular reference to an improved opener characterized by fully automatic operation following initiation of the can lid cutting cycle by the operator.

In its fullest capabilities, the can opener of the present invention features a mechanical linkage system operated upon to first close the drive motor control switch to initiate the cutting operation, then maintain the closed position of the switch during the cutting operation, and finally automatically to open the switch to stop the motor when the lid has been completely severed from the can. The can opening cycle is initiated by an operator who places the can in position upon the can turning wheel and manipulates a handle which moves the cutter blade into position and, at the same time, brings the control system into operative position which starts the motor and opens the can by completely severing the lid therefrom. Thereupon, the motor stops, but the can is still retained in the opener apparatus until removed by lifting it therefrom after returning the operating handle to its initial position.

The principal object of the invention is to provide an automatic electric can opener operable to sever the lid from a can following a single initiating operation and having sufficiently simple and rugged construction to assure dependable and trouble-free operation for a long period of time. A subsidiary object is to devise a mechanical control system whereby the force resulting from the resistance of the metal from which the lids of cans are made to cutting is transmitted to a control switch to close the same and thereby activate the driving motor of the can opener to first pierce the lid and then cut it close in to the bead around the top of the can. Desirably, and as a further and important object of the invention, discontinuance of the cutting resistive force upon completion of the lid severing operation brings about the opening of the switch to stop the motor and thus the turning of the can. Another object is to provide means for moving the cutting and control mechanism into position for cutting and to remove the same to permit withdrawal of the opened can upon the completion of the operation.

A further object is to provide an adjustment means whereby the switch element may be accurately positioned to insure proper response to the mechanical control mechanism.

Other objects and important features of the invention will be apparent from a study of the following specification taken with the drawings which together describe and illustrate a preferred embodiment of the invention. Other embodiments may be suggested to those having the benefit of the teachings herein, and such other embodiments are intended to be reserved especially as they fall within the scope and purview of the subjoined claims.

In the accompanying drawings:

Fig. 1 is a perspective view of an improved motor driven can opener embodying the improvements according to the present invention;

Fig. 2 is an enlarged front view of a portion thereof,

showing the operating handle and cutting and control mechanism in retracted position;

Fig. 3 is a side view of Fig. 2;

Fig. 4 is a front view taken at the line 4—4 of Fig. 1, looking in the direction of the arrows, showing the operating handle and the cutter blade in cutting position;

Fig. 5 is a side view of Fig. 4;

Fig. 6 is a front view corresponding to that of Fig. 2 but having the front plate removed to show the can opener cutting and control mechanism in retracted position;

Figs. 7, 8 and 9 are views similar to that of Fig. 6, but showing the cutting and control mechanism lowered into operative positions, the three-figure sequence showing the mechanism in precutting position with the switch held closed due to the cutting resistive force, and finally with the switch open following completion of the cutting operation, and

Fig. 10 is a section taken along the line 10—10 of Figs. 4 and 8, looking in the direction of the arrows, and showing the support for the can turning wheel and the cutter blade cooperating therewith.

Referring now to the drawings, the improved can opener according to the present invention is referred to by the reference numeral 20 and includes a housing 21 having secured thereto a front panel 22. The front panel 22 is preferably made by die casting, and is secured to the housing 21 by mounting screws 23, and the lower end of the front end of the front support panel 22 may be provided with ventilating louvers 24 for the cooling of a drive motor, not shown, mounted and operating within the housing 21.

A drive shaft 26 is journaled in a bushing 27 supported in a cylindrical boss 28 formed integrally with the front panel 22 and projecting from the back face thereof into the interior of the housing. The can turning wheel 30 is affixed upon the exposed end of shaft 26, and held thereon by screw 29, the toothed portion of the wheel being spaced from the front panel 22, as shown.

The can turning wheel 30 has teeth 31 thereon for engaging the bead 32 of a can 33 shown in phantom outline in Figs. 4 and 5. As seen particularly in Figs. 3 and 5, the can 33 is arranged to bear against a cradle-forming pair of laterally spaced projections 34 from a front plate 36 which plate is held to the front side of the panel 22 by means of screws 37 tapped into panel 22. As will be seen, this plate 36 covers parts of the working mechanism and, as a matter of convenience, supports the cutter blade assembly which could, if it is desired to eliminate the front plate, be supported directly by panel 22.

The can 33 is held in position against the can turning wheel 30 by a can cutter blade 38. This blade 38 is adapted to puncture the top or lid, not shown, of the can 33 and to cut the same close in to the bead 32, while the can 33 is being turned by the can turning wheel 30. The blade 38 is held by an acorn nut 39 and a stud 41 between a pair of spaced guide shoulders 42 and 43 on a crank 44. The crank 44 is pivotally mounted by means of a stub pin 46 journaled at 47 in the front plate 36. The crank and the cutter blade 38 supported thereby are held against the front plate 36 by the stud 41 which passes through front plate 36 at an arcuate slot 49 therein. Preferably, stud 41 is threaded into and through crank 44 so that acorn nut 39 may be removed to replace the cutter 38 without disassembling stud 41 from the crank. The main body portion 51 of stud 41 is larger in diameter than the portion 48 within slot 49 to form a shoulder 51*a* which bears against the rear surface of plate 36 adjacent slot 49 to hold the crank and blade assembly in position on the plate. An arcuate slot 52 in the front

panel 22 (see also Figs. 6, 8 and 9), corresponding to slot 49 in the front plate 36, permits movement of stud 41 with crank 44 about its pivot. The arcuate slots 49 and 52 have a common center at the stub pin 46, so that the crank 44 carrying cutter blade 38 can be swung about the pin 46 over the front plate 36.

Structure is provided for moving crank 44 and blade 38 about the stub pin 46 over the front plate 36 to operating position with respect to the top of the can 33, so that the rotation of the can by the can turning wheel 30 will cause the knife 38 to cut out the lid thereof. To this end there is provided an operating handle 53 having arms 54 which flank the sides of the front frame 22, the handle 53 and its arm 54 being arranged to swing through an arc of approximately 90 degrees in a vertical plane from a retracted position as seen in Figs. 2, 3 and 6 to operating positions as seen in Figs. 4 and 5 and 7 to 9. The handle 53 has a support 56 for a permanent magnet 57 held to the support 56 by means of a screw 58, the magnet 57 being for the purpose of holding a severed can lid.

The arms 54 of the operating handle are fast to a shaft 59 supported in spaced flanges 61 of the front panel 22. The shaft 59 has a throw 62 therein which is embraced by a pair of spaced lugs 63 of a follower plate 64. The follower plate 64, which, as will be seen, serves both as a transport to move the operating and control mechanism into and out from can opening position and as a lever to operate the motor switch, is guided in a recess 65 formed in the front panel 22 in the back face thereof. The follower plate 64 is also guided by the lugs 63 in guide slot 66 in the front panel 22 (see particularly Figs. 6 to 9, inclusive wherein the front plate 36 has been removed to show the mechanism now being described). The follower plate 64 is also guided by a lug 67 extending therefrom which normally is guided along a surface 68 formed at an opening 70 in the panel 22. Opening 70 also accommodates the switch structure.

The follower plate 64 is the heart and soul of the improved can opener mechanism and is the key to the invention herein described and claimed. Its function must be thoroughly understood before the mode of operation of the can opener can be followed. Although, as is almost always true of mechanical devices of this kind, the particular form of the follower plate may be altered, the plate or its equivalent must transmit certain movements to start and automatically accomplish the cutting operation and stop the motor and can turning wheel when the operation has been completed.

The movement of the follower plate is essentially vertical, some cocking or sidewise shifting being permitted in response to forces transmitted to the plate due to punching or cutting pressure applied to the cutter blade by the metal of the can lid. The transport function of the follower plate is effected largely by the vertical movement thereof, while the motor switch controlling function involves the cocking or sidewise shifting of at least a portion of the plate. The vertical position of the plate, as between retracted and operating positions, is controlled by the position of the can opener operating handle 53 through the throw 62 of shaft 59 operating between lugs or stops 63 which may be an integral part of the follower plate. Lug 67, which may also advantageously be an integral part of the follower plate, is located on the opposite side of the plate from lugs 63 and serves to operate the switch as a result of sidewise movement of lug 67 as the follower plate is cocked or shifted slightly, or rotated somewhat about throw 62 as a pivot under the influence of the forces transmitted from the can lid as will be more fully described hereinafter.

The follower plate 64 has a horizontal slot 69 therein, the width of this slot being somewhat greater than that of arcuate slot 52; i.e., somewhat greater than the diameter of the enlarged portion 51 of stud 44. Stud 51 passes through this slot 69 in follower plate 64 also, as above noted, through slot 52 in the fixed front panel 22. With

this arrangement, downward movement of operating handle 53 lowers follower plate 64 and, since stud 51 passes through slot 69 in the follower plate, the crank carrying the cutter blade is swung in a clockwise direction about its pivot pin 46. The extent of this downward movement of operating handle 53 is limited by shoulders 22*a* in the sides of front panel 22 upon which the arms 54 of the operating handle come to rest. At this, advantageously approximately horizontal, position of the operating handle, magnet 57 is brought close to, or in contact with, the lid of the can, and the tip of cutter blade 38 is brought to rest upon the lid immediately adjacent the inner surface of the bead at the top of the can. This movement, and the resulting posture of the parts of the mechanism, is illustrated in the transition from the arrangement shown in Fig. 6, showing the retracted position; to that of Fig. 7, showing the pre-cutting position of the mechanism.

Referring particularly to Fig. 7, it will be noted that although the throw 62 on shaft 59 is in engagement with follower plate 64 and pressing downwardly upon the lower lug 63 thereof due to the weight of handle 53, the follower plate is not in its lowermost permissible position but is somewhat cocked by clockwise rotation about a pivot at the point of engagement of stud 51 with the follower plate. Upon the lowering of the operating handle, and before the puncturing of the lid of the can, rotation of crank 44 is limited by engagement of the tip of the cutter blade with the lid of the can and stud 51 fastened to the crank, is momentarily held at this intermediate precutting position corresponding to this limit of movement of the crank. With the blade unable, momentarily, to move downwardly below the level of the lid of the can, the upward force exerted by stud 51 against follower plate 64 at the upper edge of slot 69 results in the above-mentioned limited rotation of the follower plate so that this plate, acting as a lever, moves switch actuating lug 67 of the follower plate toward the switch structure, not yet described in detail, to close the switch and actuate the motor. The motor, driving and turning wheel 30 in a counterclockwise direction, rotates the can with the cutter blade resting with some pressure upon its lid, with the result that the lid is immediately punctured and the cutter blade sinks lower into cutting position, permitting crank 44 to swing around a little farther, to the position shown in Fig. 8 which is the lid cutting position. Due to the location of the crank pivot above and slightly to the left of the cutting edge of the cutter blade 38, the initial and continued turning of the can continues the exertion of force, now with a major horizontal component, against the follower plate 64 by stud 51 to keep the motor switch closed by holding the position of controlling lug 67 of the follower plate in switch closing position. It will be noted that in this shifting of the follower plate, it tends to pivot about corner 64*a* of follower plate 64 bearing against shoulder 66*a* of guide slot 66.

When the lid of the can has been completely severed, the force exerted by stud 51 against the follower plate is relieved and a spring associated with the switch structure moves the lug 67 and follower plate away from the switch to open the circuit and stop the motor. The relative positions of the parts of the mechanism under this condition are illustrated in Fig. 9. Since the cutter blade is still in its lowermost position, the can is retained upon the can opener apparatus and may be removed at will by the operator by grasping the can and lifting handle 53 to again raise the crank and cutter blade to retracted position and release the can for removal. The severed lid of the can is lifted by the magnet with the handle.

While any suitable switch structure may be employed to control the can opener motor, provided, only, that it can be operable by the movements above described of lug 67 of follower plate 64, a simple and effective switch structure is shown and described by way of example.

The several elements of the switch are contained within an opening **70** provided for the purpose in front panel **22**, pockets **70***a* and **70***b* being provided in the front panel structure to retain the switch elements in position. A leaf spring **71** is supported, cantilever fashion, between spaced shoulders **72** and **73** provided by the front panel structure. An insulating strip **76** is arranged alongside leaf spring **71** to insulate the latter from the contact and conductor elements of the switch, and a resilient finger **74**, advantageously formed from an integral with leaf spring **73**, bears against the bottom end of insulating strip **76** to hold the latter in place and, as its principal function, to hold the lower portion of leaf spring **71** tightly against the shoulder **73** of opening **70** whereby lateral displacement of leaf spring **71** resulting from movement of follower plate **64**, and especially lug **67** thereof, as described, is resiliently opposed to provide a normally open switch.

Switch contacts **77** and **82** are mounted on a stiff insulating base strip **81**, contact **77** being mounted on the switch base by means of a spring conductor strip **78** riveted or otherwise permanently fastened to base strip **81** at **79**. The spring contact arm **78** is biased to continuously urge the spring contacts apart and press the contact end of spring arm **78** against insulating strip **76** whereby this contact will follow the movement of leaf spring element **71** of the switch. The contact arm **78** and contact **82** are connected by means of suitable wiring and an appropriate circuit, not shown, with the can opener motor.

While switch base **81** may be installed in fixed position in the front panel structure of the can opener, it is desirable to provide means for adjusting the location of contact **82** in order to match switch operation with movements of the follower plate **64** and thereby assure proper operation of the can opener. To this end, an adjusting screw **83** is threaded into and through an abutment **84** projecting rearwardly from front panel **22** and preferably formed integrally therewith. This adjusting screw **83** bears against an insulating strip **85** which latter lies alongside switch base **81**. The adjusting screw is provided with a slotted head **86** for turning the screw to adjust the switch, an opening **87** being provided in the flange **61** for access to the screw. This opening is uncovered when operating handle **53** of the can opener is raised.

It should be explained that provision may be made for the final movement of the crank and cutter blade from the pre-cutting to the extreme cutting position by means of one or more expedients. The necessary play may be provided by spacing lugs **63** of the follower plate sufficiently to permit a necessary vertical movement of the follower plate with handle **53** and shaft **59** with its throw **62** in extreme operating position, as shown in Fig. 1, the upper position of the follower plate being shown in Fig. 7 and subsequent lowermost position thereof being shown in Figs. 8 and 9. Alternatively, the necessary play may be provided by slot **69**, its width being sufficiently greater than the diameter of stud **51** to permit the crank to rotate from pre-cutting to final cutting position without substantial vertical movement of the follower plates. In the drawings, play is provided both at the connection of throw **62** with the follower plate and also between the stud **51** within the slot **69** and the sides of the slot. As a third alternative, the mechanism may be so arranged that handle **53** is lowered to an intermediate position corresponding to the pre-cutting position of the mechanism, settling to the final position shown in Fig. 1 with the shifting of the cutting mechanism from the pre-cutting to the ultimate cutting position of the blade.

It will be understood that the electric can opener herein described is automatic in the sense that starting, cutting and stopping of the motor is controlled by the changing pattern of forces originating with the cutter blade following initiation of the cycle by the operator. To remove the lid from a can, it is only necessary to place the can in

position upon the turning wheel and lower the operating handle. The cycle of operations is then accomplished automatically and the opened can may be removed at the convenience of the operator by retracting the handle and removing the opened can.

While the invention has been described in terms of a preferred embodiment thereof, its scope is intended to be limited only by the claims here appended.

Invention is claimed as follows:

1. In a can opener including an electric motor and a switch therefor and a can turning wheel mounted and connected for rotation by said motor; a cutter blade pivotally mounted with a retracted position removed from said can drive wheel and a cutting position and an intermediate precutting position in operative adjacency with said wheel; a mechanism for moving said cutter blade from said retracted position to said precutting position; said mechanism including a handle adapted from manual operation, a follower plate connected at one extremity with said handle and operatively associated with said switch at an opposite extremity thereof, and a stud fixedly associated with said blade and connected with said follower plate intermediate the above-mentioned extremities thereof; the arrangement being such that the resistance force applied to said cutter blade by the lid of a can is transmitted to said follower plate by said stud and acts to rotatably shift said follower plate to close said switch and actuate said motor to turn said wheel and cause said cutter to pierce the lid of the can and move to the cutting position wherefrom a generally sidewise force applied to said blade is transmitted to said follower plate to keep said switch closed so long as the sidewise force is maintained.

2. Can opener structure in accordance with claim 1 and including spring means rotationally biasing the follower plate in a direction tending to permit the opening of said switch whereby said switch is opened and said motor stopped upon discontinuance of the application of force to said blade.

3. Can opener structure in accordance with claim 1 wherein structural play is provided in a connection of the follower plate in the mechanism whereby the cutter is permitted to move from precutting to cutting position without movement of the handle.

4. Can opener structure in accordance with claim 3 wherein the play is provided at the connection of the follower plate with the handle.

5. Can opener structure in accordance with claim 3 wherein the play is provided at the connection of the follower plate with the stud.

6. Can opener structure in accordance with claim 1 and including means for adjusting the position of the switch with respect to the follower plate to assure closing and opening of said switch at the respective positions of said follower plate.

7. Can opener structure in accordance with claim 1 wherein the switch is a normally open switch.

8. A can opener having a housing and an electric drive motor therein and a support panel mounted on the front thereof, a can turning wheel journaled in said panel and connected in driving relation with said motor, a crank pivotally mounted on said panel above said wheel, a cutter blade on the free end of said crank, a follower plate arranged for vertical reciprocation and limited sidewise movement upon said panel under said crank, said follower plate having a horizontal slot therein, a stud affixed to said crank and extending into said slot, a switch arranged in said panel adjacent one side of said follower plate, a handle including lever means connected with the opposite side of said follower plate for raising and lowering said plate to cause corresponding movement of said crank, the arrangement being such that a force applied by said stud to said follower plate in a direction in the range from upwardly to sidewise toward said switch causes at least a portion of said plate to move toward said switch to

close the same and hold it closed so long as the force is applied.

9. Can opener structure in accordance with claim 8 wherein the support panel is provided with an arcuate slot having its center of curvature at the axis of the crank pivot and the stud passes through both the horizontal slot in the follower plate and also said arcuate slot.

10. Can opener structure in accordance with claim 8 wherein the support panel includes a fixed front plate covering the follower plate and switch and the crank is pivotally mounted on said front plate, said front plate having an arcuate slot therein having its center of curvature at the axis of the crank pivot and the stud passes through said arcuate slot into the horizontal slot in the follower plate.

11. Can opener structure in accordance with claim 10 wherein the support panel is provided with an arcuate slot registering with the arcuate slot in the front plate and the stud passes through both said arcuate slots and also through the horizontal slot in the follower plate.

12. Can opener structure in accordance with claim 8 wherein the horizontal slot in the follower plate is wider than the diameter of the stud therein whereby to permit limited movement of the crank with respect to the follower plate and handle.

13. Can opener structure in accordance with claim 8

wherein the follower plate is provided with a pair of spaced stops at the connection of the lever means of the handle with said follower plate and said lever means includes an element arranged between said stops, the distance between said stops being greater than the thickness of said element whereby to permit limited movement of said follower plate with respect to said handle.

14. Can opener structure in accordance with claim 8 wherein the lever means included with the handle comprises a horizontal shaft journaled in the support panel and having a throw at the connection thereof with the follower plate, said follower plate including stop means engageable by said throw to raise and lower said follower plate by movement of said handle to turn said shaft about its axis.

15. Can opener structure in accordance with claim 8 and including spring means arranged to bias the follower plate in the direction tending to permit the switch to open whereby to stop the drive motor upon substantial discontinuance of the application of force by the stud to the follower plate.

16. Can opener structure in accordance with claim 15 wherein the spring means comprises a leaf spring interposed between the follower plate and the switch.

No references cited.