Oct. 3, 1961 I. JEPSON ET AL 3,002,274

CAN OPENER

Filed June 30, 1960 5 Sheets-Sheet 1

Fig. 1.

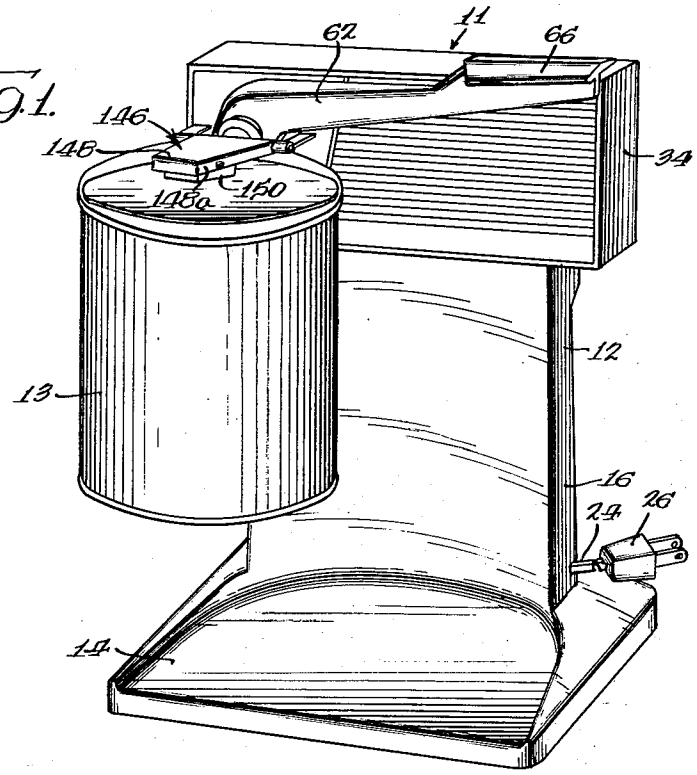
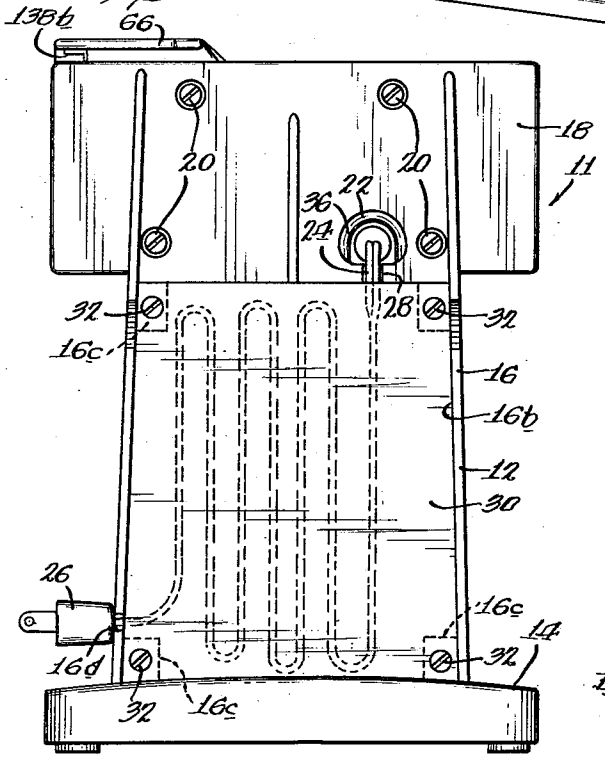


Fig. 2.



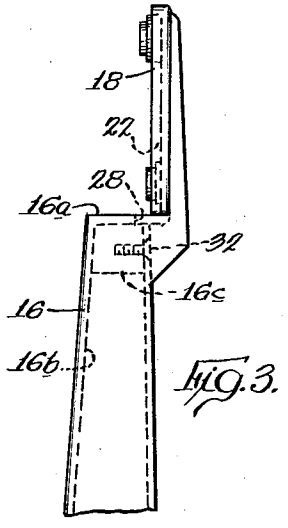


Fig. 3.

INVENTORS:
Ivar Jepson
Gilbert R. Wolter
By
George R. Clark
Atty

Oct. 3, 1961 I. JEPSON ET AL 3,002,274

CAN OPENER

Filed June 30, 1960 5 Sheets-Sheet 2

Fig. 4.

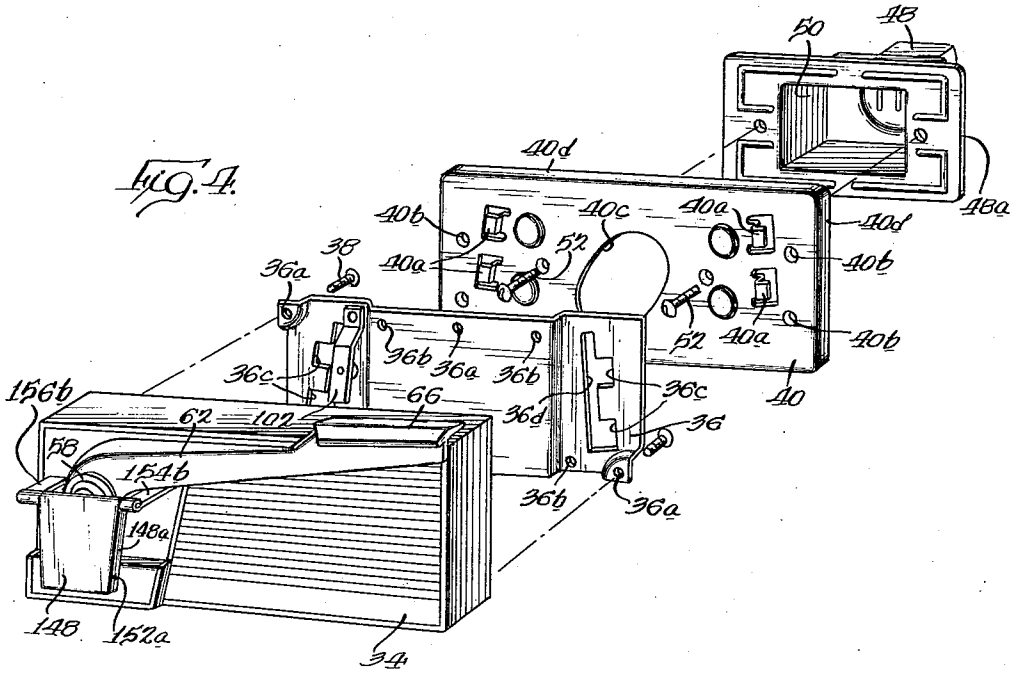
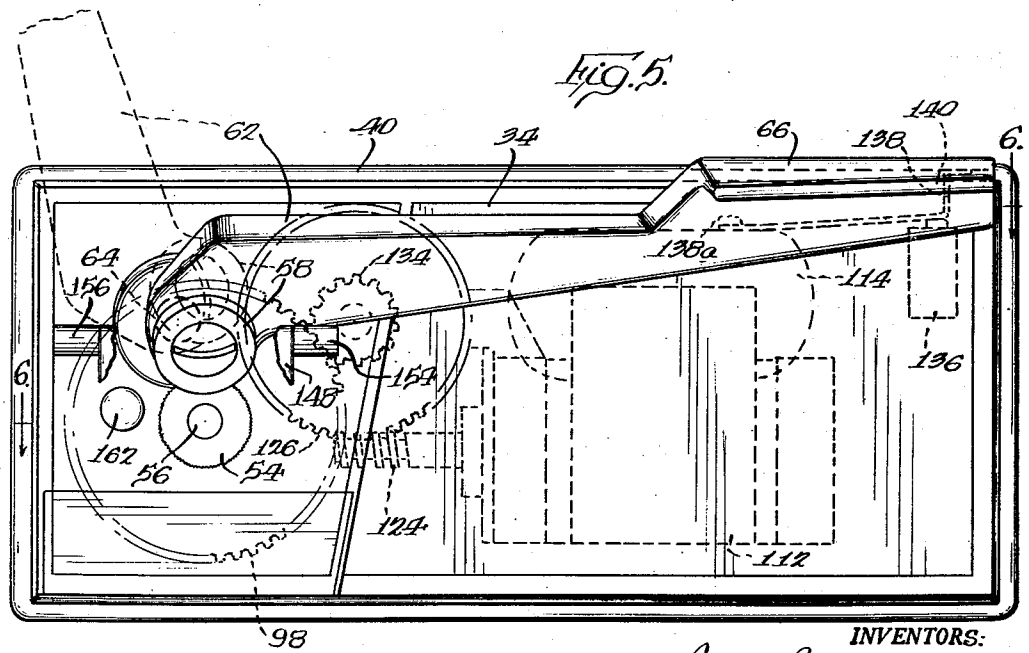


Fig. 5.



INVENTORS:
Ivar Jepson
Gilbert R. Wolter
By
George R. Clark
Atty

Oct. 3, 1961 I. JEPSON ET AL 3,002,274

CAN OPENER

Filed June 30, 1960 5 Sheets-Sheet 3

Fig. 6.

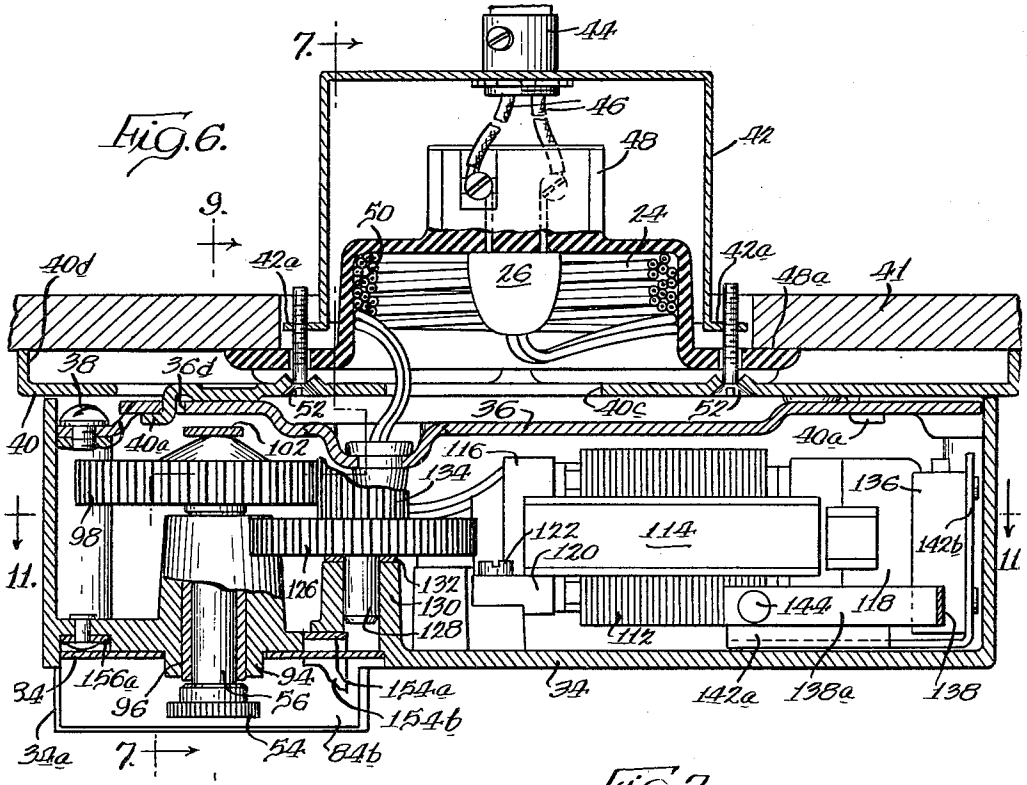


Fig. 7.

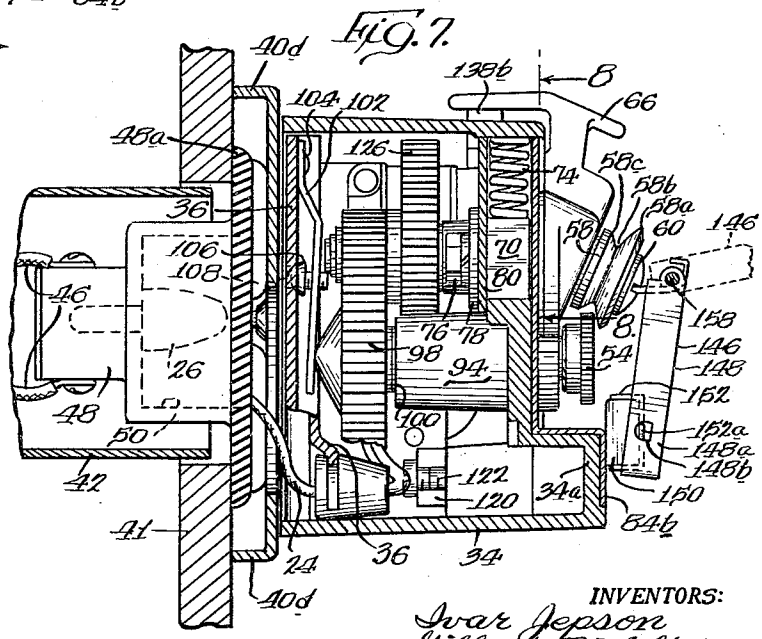
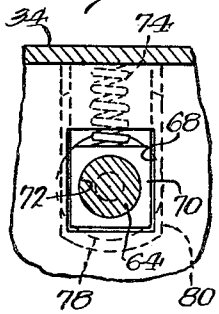


Fig. 8.



INVENTORS:
Ivar Jepson
Gilbert R. Wolter
By
George E. Clark
Atty

Oct. 3, 1961 I. JEPSON ET AL 3,002,274

CAN OPENER

Filed June 30, 1960 5 Sheets-Sheet 4

Fig. 9.

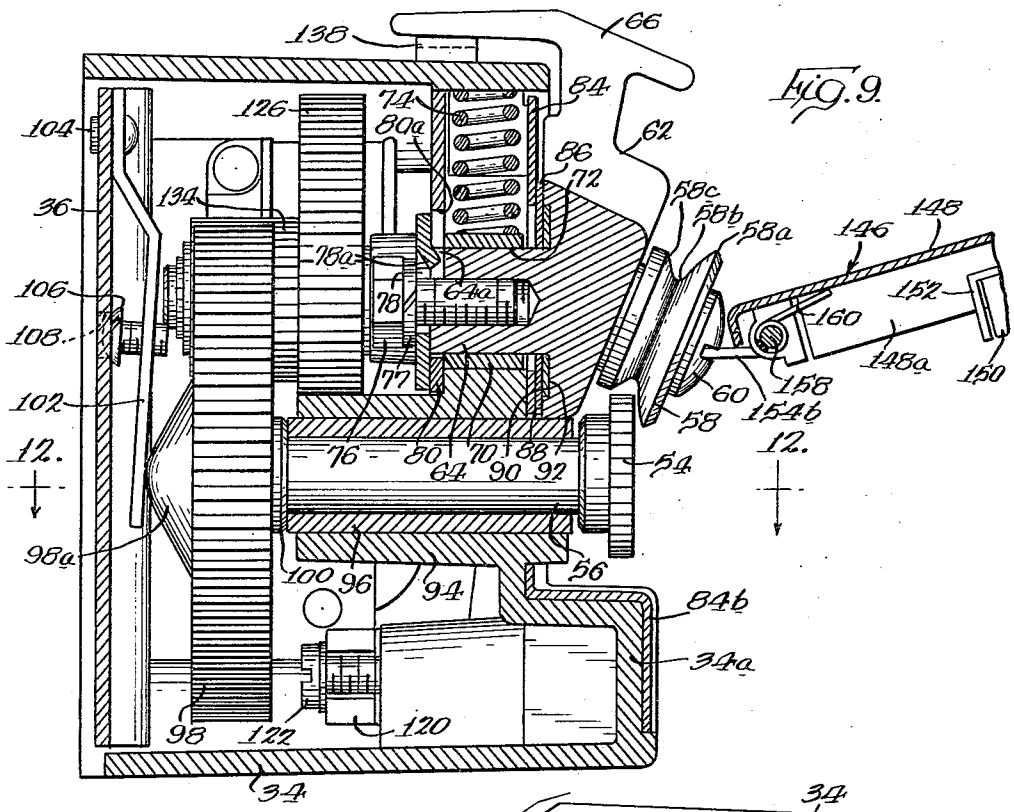
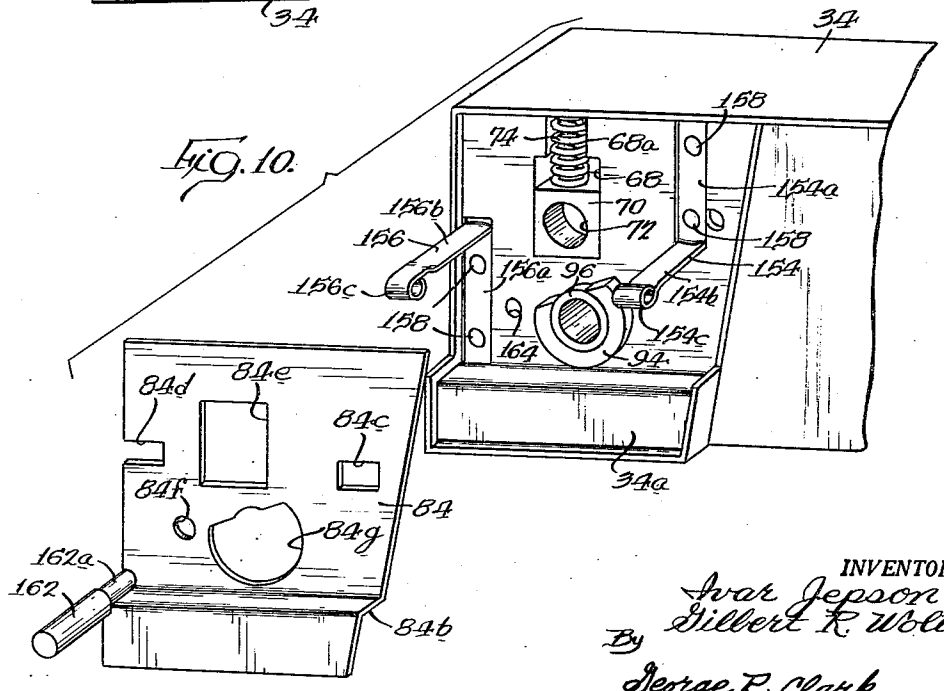


Fig. 10.



INVENTORS:
Ivar Jepson
Gilbert R. Wolter
By
George R. Clark
Atty

Oct. 3, 1961 I. JEPSON ET AL 3,002,274

CAN OPENER

Filed June 30, 1960 5 Sheets-Sheet 5

Fig. 11.

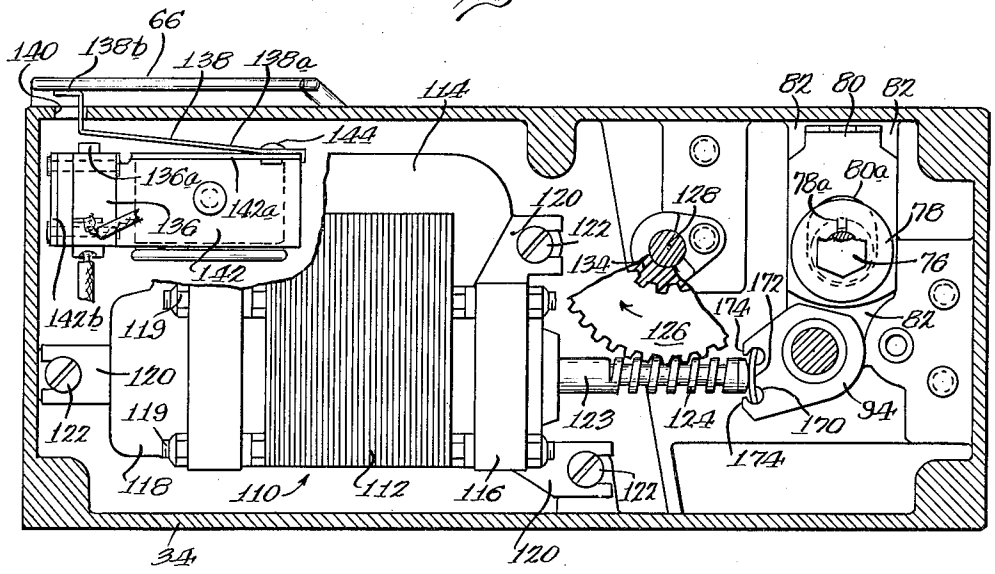


Fig. 12.

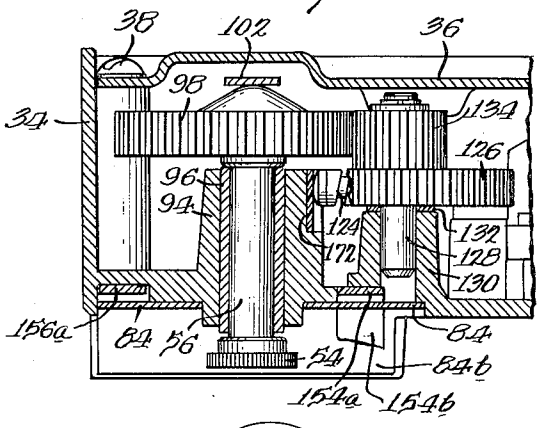
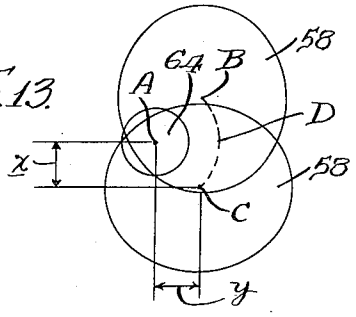


Fig. 13.



INVENTORS:
Ivar Jepson
Gilbert R. Wolter
By George R. Clark Atty

United States Patent Office

3,002,274
Patented Oct. 3, 1961

3,002,274

CAN OPENER

Ivar Jepson, Oak Park, and Gilbert R. Wolter, Elmhurst, Ill., assignors to Sunbeam Corporation, Chicago, Ill., a corporation of Illinois

Filed June 30, 1960, Ser. No. 39,888
23 Claims. (Cl. 30—4)

This invention relates generally to can openers, and, more particularly, to improvements in power operated can openers.

This invention represents an improvement in the well-known type of can opener employing a power driven, serrated feed wheel which cooperates with a freely rotatable cutter wheel mounted for relative movement with respect to the feed wheel. When these wheels are in the cutting positions, the feed wheel engages the lower edge of the bead around the upper lip of the can while rotating the can. The cutter wheel is positioned on the other side of the can wall from the feed wheel where it penetrates the can lid. A peripheral groove in the cutter wheel adjacent the cutting edge receives the can lip and, by virtue of its overlapping relation with the feed wheel, grips the can wall therebetween. This type of can opener has much appeal because of its inherently simple construction involving a limited number of necessary elements.

In recent years attempts have been made to utilize a motor driving means for can openers in lieu of the hand operated crank mechanism which has been well known for many years. These attempts at power driving can openers have for the most part, been clumsy, makeshift arrangements in which an electric motor has merely been combined with an existing manual can opener construction. Other prior art automatic openers have included very elaborate mechanisms and control means to automatically open cans. These complex openers have been too costly to be commercially successful.

It may be appreciated that the labor saving resulting from power operating a can opener is not great. The well-known hand crank operated openers are relatively easy and quick in their operations. It is necessary, therefore, that a power operated can opener have a low selling price if it is to compete successfully with the hand operated can openers. The instant invention relates to a simple, compact, can opener design in which all the necessary functional elements have been retained while reducing the number of parts substantially. The simplifications involve the mounting of all the parts in a small cup-shaped housing and the arrangement for relatively biasing the cutter and feed wheels in the vertical and horizontal directions. In addition, the simple eccentric mounting of the cutter wheel is arranged to function as well as the more complicated mounting designs known in the art.

It should also be kept in mind that with the addition of the power driving means to a can opener, it immediately becomes a more dangerous instrumentality than the hand powered unit. Since most consumers are reluctant to recognize these dangers and to pay an increased price to minimize or to eliminate them, it would be desirable to provide a means for reducing the dangers without adding to the cost of the can opener. The instant invention includes means for guarding the operative elements of the can opener without the addition of any new parts.

Another problem encountered in powering a can opener is that of providing a cord connection between the electric motor used therein and the wall receptacle. While there have been some examples of wall mounted can openers, most of the prior art power can openers have included stand type mounts which would merely rest on a table or

kitchen counter top. We have invented two types of mounting which are suitable for different situations, one being adaptable to certain types of wall mounting and the other being an improved type of stand mounting.

It is therefore an object of the invention to provide an improved can opener which is simple in construction and which has a low manufacturing cost.

A further object of the invention is to provide a power operated can opener which is simple in construction and compact in design.

An additional object of the invention is to provide a power can opener having a simplified housing which supports all of the elements of the opener including simplified means for resilient biasing the operating members into engagement with a can.

A further object of the invention is to provide an improved eccentric type mounting for a can opener cutting element.

It is a further object of the invention to provide a can opener of the type having a feed wheel and cutter wheel with novel means for mounting the feed wheel and cutter wheel thereon with adjustable resilient biasing means for the feed wheel accessible from outside of the housing.

An additional object of the invention is to provide a magnetic lid holder which may also serve as a guard for the operation mechanism of the can opener.

It is a further object of the invention to provide a wall mounting means for an electric can opener whereby the can opener may be mounted on the wall in any convenient location or may be mounted on the wall directly over a plug receptacle.

It is an additional object of the invention to provide a stand mounting for an electric can opener wherein cord storage means are provided.

Further objects and advantages of the present invention will become apparent as the following description proceeds and the features of novelty which characterize the invention will be pointed out with particularity in the claims annexed to and forming a part of the specification.

For a better understanding of the present invention, reference may be had to the accompanying drawings, in which:

FIG. 1 is a front perspective view of the can opener utilizing the stand type mounting and having a can in operating position therein;

FIG. 2 is a rear elevational view of the stand mounted can opener shown in FIG. 1;

FIG. 3 is a partial side elevational view of the top of the can opener stand shown in FIGS. 1 and 2;

FIG. 4 is a perspective view of the can opener in FIG. 1 showing in exploded relation the mounting plates for wall mounting the can opener;

FIG. 5 is an enlarged front view of the can opener of FIG. 3 with the lid retaining means removed;

FIG. 6 is a modified sectional view taken substantially along line 6—6 of FIG. 5;

FIG. 7 is a sectional view taken along line 7—7 of FIG. 6 including the lid holding means;

FIG. 8 is a fragmentary sectional view taken along line 8—8 of FIG. 7;

FIG. 9 is a sectional view taken along line 9—9 of FIG. 6;

FIG. 10 is a fragmentary perspective view of one end of the housing showing several of the parts in exploded relation and showing the operating lever, the can cover holder and various other parts removed;

FIG. 11 is a sectional view taken along line 11—11 of FIG. 6;

FIG. 12 is a fragmentary sectional view taken along line 12—12 of FIG. 9; and

FIG. 13 is a schematic layout of the cutter wheel mounting.

Referring to the drawings in which like numerals designate like parts throughout the several views, the can opener, which is shown with various types of mounting or support throughout the figures, is designated generally by the reference numeral **11**. In FIG. 1 the can opener **11** is shown with a stand support **12** which is designed to support the can opener on a table or kitchen counter top. A can **13** is shown in FIG. 1 in operative position in the can opener **11**. The support **12** is substantially L-shaped when viewed from the side including a horizontally disposed base portion **14** and a vertically positioned upright portion **16** which extends from the rear portion of the base. For the purpose of mounting the can opener **11** on the stand support **12** there is provided a rearwardly displaced mounting plate **18** at the top of the upright **16**. The upright **16** terminates in a flat supporting shelf **16***a* which supports the can opener in its position secured to the mounting plate **18**.

To mount the can opener **11** on the plate **18**, a plurality of mounting screws **20** are utilized which extend through the plate **18** into engagement with the can opener **11**. An opening **22** has been formed in the mounting plate **18** to permit a can opener power cord **24** to extend therethrough. The opening **22** has been made sufficiently large so that a plug **26** secured to the end of the power cord **24** may be passed therethrough on assembling the can opener to the stand **12**. The entire stand support **12** including the base **14**, the upright **16** and the mounting plate **18** is a single piece of molded plastic.

Since the can opener is normally used in the kitchen where there are many conveniently located outlets, a power cord of about 4 feet in length is normally provided with the can opener. Since in many instances the electrical outlet will be no more than a foot or so from the location in which the can opener is to be used, it is desirable to have a means available for varying the available length of the power cord. In the instant design, this is accomplished by forming the upright **16** with a recess or cavity **16***b* within which the unused section of the power cord may be stored. To permit the power cord **24** to enter the recess **16***b* the opening **22** is slotted downwardly at **28**.

To retain a portion of the power cord within the recess **16***b*, a metallic plate **30** is utilized as a closure member. The plate **30** is the same size as the opening of the recess **16***b* and is supported in the opening on four bosses **16***c* which are formed integrally with the plastic support **12**. A plurality of self-tapping screws **32** may be used to secure the closure plate **30** in position. One of the outer walls of upright **16** is slotted at **16***d* to permit the power cord **24** to exit from the recess. The slot **16***d* is formed of such a depth that the plate **30** clamps the cord **24** therebetween. It should be understood therefore that the lower left-hand screw **32** as viewed in FIG. 2 must be loosened to adjust the length of power cord extending from the recess **16***b*. Once the selected amount of cord is extending therefrom, the same lower left screw **32** may be tightened down forming a strain relief which prevents more cord from being withdrawn from the recess.

The mechanism of the can opener is enclosed within a cup-shaped housing member **34** which has an opening facing toward the rear. Cooperating with the housing **34** to complete the chamber within which the mechanism is mounted there is a plate member **36**. The plate **36** has a number of holes **36***a* formed therein which receive screws **38** to assemble the plate **36** to the housing **34**. In addition to the openings **36***a*, the plate **36** is provided with four threaded openings **36***b*, three of which are visible in FIG. 4, to receive the mounting screws **20** which extend through the mounting plate **18** of the stand support **12**.

In the event the can opener is to be mounted on the wall, it is necessary that means be available to mount the can opener thereon without the use of screws extending inwardly from the rear. To accomplish this end,

a separate wall plate **40** is utilized, as is best shown in FIGS. 4, 6 and 7. The wall plate **40** includes four offset lugs **40***a* which project inwardly from the plane of the plate. The plate member **36** has four openings **36***c* which are positioned to correspond to the location of the lugs **40***a*. Thus, upon moving the wall plate **40** against the plate member **36** the lugs **40***a* may be positioned to extend through the openings **36***c*. Each vertically aligned pair of openings **36***c* are interconnected by an elongated slot **36***d* which extends upwardly past the uppermost openings **36***c*. After the lugs **40***a* have been inserted into the openings **36***c*, the plate **36** may be moved downwardly so that the lugs **40***a* move vertically in the slots **36***d* into locked engagement with the plate **36**.

It can be readily apreciated that the wall plate **40** may be mounted on any convenient wall by means of screws extending through openings **40***b* provided thereon. An enlarged opening **40***c* positioned in the center of the wall plate **40** permits the power cord to extend therethrough. In instances where there is a convenient terminal box located in the kitchen, it may be desirable to mount the can opener directly over the terminal box so that there will be no problem of extending the power cord from the can opener to the terminal box. In such instances, the wall plate **40** may take the form of a substantially cup-shaped member having outwardly extending walls **40***d*. The walls **40***d* are designed to engage the plaster wall **41** as is best shown in FIG. 6. The purpose of the cup-shaped design is to allow room for a wall receptacle which normally includes a flange extending from the wall opening for the terminal box across the surface of the plaster wall.

In FIG. 6 there is shown a conventional electrical terminal box **42** which is secured in the plaster wall **41** by any suitable means, such as for instance, by screwing or nailing the box **42** to the studding of the wall. Electrical power is brought into the terminal box by means of a suitable cable which is joined to the terminal box by a connector **44**. A pair of wires **46** are shown extending inwardly to connect to a plug receptacle **48** mounted within the terminal box.

While it is conventional to employ plug receptacles which are substantially flush with the wall surface, it would be impossible to mount the can opener flush with the wall if means were not provided to accommodate the power cord **24** and the plug **26**. To provide room for these parts the plug receptacle **48** has been provided with an inwardly extending recess **50** within which the plug **26** and the coiled cord **24** are received. The receptacle **48** has an integrally formed flange **48***a* which extends outwardly from the top of the recess **50**. The flange **48***a* is molded with suitable openings to receive mounting screws **52** which extend therethrough into threaded engagement with assembly tabs **42***a* provided on the terminal box **42**. Upon inspection of FIG. 6 and the location of the flanges **48***a* overlaying the face of plaster wall **41**, it becomes obvious that the inwardly directed walls **40***d* on the wall plate **40** are necessary to assure flush mounting of the can opener while at the same time not interfering with the outwardly extending portions of the receptacle **48**.

Turning now to the mechanism of the can opener, we note that there are two operative members on the front of the can opener which effect the removal of the lid of a can. One of these is a serrated feed or drive wheel **54** which is carried by the outer end of a shaft **56**. Mounted immediately above the feed wheel in overlapping relationship therewith is a cutter wheel **58**. The cutter wheel **58** is retained in place by means of a screw **60**. As can best be seen in FIG. 9, the axis of rotation of the cutter wheel **58** is inclined at approximately **23** degrees to the horizontal and to the axis of the feed wheel shaft **56**. The cutter wheel **58** is displaced a small amount to the left of the feed wheel **56** when in its cutting position. FIGS. 5, 7 and 9 show the cutter

wheel 58 in its operative or can cutting position with respect to the feed wheel 54 while FIG. 13 shows a schematic layout of the mounting of cutter wheel 58.

To permit loading of a can, it is necessary that the feed wheel and the cutter wheel be mounted for relative movement so that they may be moved apart to permit insertion of the lip of the can therebetween. To accomplish this movable mounting of the cutter wheel, there is provided an operating lever 62 to which the cutter wheel is affixed by the aforementioned screw 60. The cutter wheel 58 is rotatably supported on a boss which extends outwardly from lever 62 and which receives screw 60. The operating lever 62 is a one-piece diecasting including a mounting boss 64 and a handle portion 66. This supporting boss for the cutter wheel 58 may be an integrally cast portion of lever 62 or it may take the form of a steel bearing suitably secured to the lever 62 as by casting the lever around a steel insert. The handle portion 66 is disposed at the outer end of the operating lever 62 and includes a generally horizontally extending portion which is adapted to be engaged by the hand of the operator to rotate the operating lever in a clockwise direction, as seen in FIGS. 1 and 5. In FIG. 5, the operating lever 62 is in two positions; the solid lines showing the operating or can cutting posiiton and the dotted lines showing the load position. As may be seen by the dotted line showing of lever 62 in FIG. 5, the cutter wheel 58 is displaced upwardly about half an inch as a result of the operating lever's being rotating through an angle of about 100 degrees. This upward displacement of the cutter wheel is caused by the eccentric mounting of the cutter wheel 58 with respect to the mounting boss 64.

It would be desirable to have the cutter wheel 58 move in a direction as close to perpendicular as possible in moving from the load position to the can cutting position. Many of the prior art can openers have utilized lever and slide arrangements so that the cutter wheel is restricted to straight vertical movement. Such arrangements, however, are generally more bulky and more complex than the simple eccentric mounting of the cutter wheel on the operating lever. Prior art can openers using this eccentric type of arrangement have positioned the axis of rotation of the lever substantially directly above the axis of the cutter wheel. With such an arrangement, the cutter wheel tends to move almost horizontally during a portion of its movement into the cutting position. When the cutter moves horizontally in such a manner, the cutting edge of the wheel has a tendency to engage the lid of the can at a point spaced from the lip of the can because of the inclined axis of the cutter. When the cutting edge pierces the lid at a point spaced from the lip or cylindrical wall, there is a fragment of the lid left attached to the wall of the can. It is considered desirable to sever the entire lid as close to the lip as possible and leave no such lid fragments attached to the can.

In FIG. 13, a schematic showing is provided of the relative positions of the pivotal axis of the operating lever 62 and the cutter wheel 58 as seen in the load position and in the can cutting position. The pivotal axis of the lever 62 is located at the intersection of the center lines marked A. The elliptical profile of the cutter 58, as viewed from the front as in FIG. 5, is shown in a lowered or operating position and in a raised or load position. The geometrical centers of the elliptical showings in the load and operating positions are designated by letters B and C, respectively. The dotted arc D extending between the points B and C represents the path followed by the center of the cutter as it moves from the load to the operating position. To illustrate the relationship between points A and C, the vertical and horizontal spacings of these points are indicated by the letters X and Y, respectively. By making the distances X and Y approximately equal, the desired movement of the cutter wheel 58 is obtained. By locating the points B and C at approximately 45 degrees above and 45 degrees below point A, applicants have succeeded in approaching as closely as possible the desirable condition of having the cutter wheel move straight vertically as it pierces the can. This arrangement, as shown in FIG. 13, has permitted applicants to employ a compact eccentric mounting for the cutter wheel, while achieving the characteristics of the more complicated and more expensive cutter wheel mountings.

In severing the lid from the can it is necessary that the bead around the upper edge of the can be gripped between the feed wheel 54 and the cutter wheel 58. The cutting of the lid is actually performed by the circular sharpened edge 58*a* of the cutter 58. The cutter wheel 58 has a groove 58*b* and a conical surface 58*c* positioned rearwardly of the cutting edge. The grooved portion 58*b* and conical surface 58*c* of the cutter cooperate with the serrations on the cutter wheel 54 to grip the bead of the can tightly. The feed wheel may then rotate the can into continuous cutting engagement with the cutter 58 to completely remove the lid of the can.

Since the bead along the top edge of the can is not always of the same height or thickness, it is necessary for the can opener to include means for compensating for these variations. To compensate for the variations in bead height, the bearing means supporting the mounting boss 64 of the operating lever is resiliently biased in the vertical direction. As may best be seen in FIGS. 8 and 10, the housing 34 is provided with an elongated slot 68 in the forward wall above the feed wheel shaft 56. Received within the slot 68 is a rectangular bearing block 70, the center portion of which has a horizontally extending bore 72 formed therein. The bore 72 is adapted to receive and pivotally mount the boss 64 of the operating lever 62. The slot 68 is formed with a reduced portion 68*a* at its upper end to closely enclose a biasing spring 74. The biasing spring 74 urges the bearing block 70 and the operating lever 62 which mounts therein toward a lowermost position in slot 68. The feed wheel 54 and cutter wheel 58 are positioned close together so that when the smallest can bead is inserted between the two wheels, the spring 74 is compressed slightly to apply a gripping force on the can bead. It may easily be appreciated that in the case of higher beads the spring 74 is merely compressed to a greater extent.

The bearing block 70 and its biasing spring 74 are maintained in their positions in the slot 68 by the assembly means for the operating lever 62. The mounting boss 64 of the operating lever has a threaded hole on its inner end to receive an assembly bolt 76. In engagement with the assembly bolt 76 is a retaining washer 77 immediately against which is positioned a bearing washer 78. On the inside of the washer 78 a locking key or tab 78*a* is formed thereon. The tab 78*a* on the washer is received in a groove 64*a* in the mounting boss 64. The interengagement between the tab 78*a* and the groove 64*a* causes the bearing washer 78 to rotate with the boss 64 as the operating lever is moved between the load and the can cutting positions. Such an arrangement allows the bolt 76 to rotate with the boss 64 and prevents loosening of the bolt. Actually the washer 78 is not in direct engagement with the housing 34 along the edges of the slot 68. An elongated retainer 80 lies against the wall of housing 34 to close the inside openings of the slot 68. To allow the mounting boss 64 to extend therethrough, the retainer 80 has an oval hole 80*a* formed therein. The plate 80 is retained against displacement laterally of the axis of mounting boss 64 by means of integral projections 82 formed on the inside of housing 34 as may best be seen in FIG. 11. The washer 78 is of such diameter to engage the portions of retainer 80 adjacent the oval opening 80*a* and prevent displacement of the retainer axially of the mounting boss 64.

The outer face of the slot 68 is covered in part by a chrome plated steel plate 84 which extends across a portion of the front wall of the can opener beneath the op-

erating wheels. The plate **84** serves as a decorative trim piece as well as performing certain essential functions. One of these functions is the closing of the front side of the slot **68** to prevent displacement of the biasing spring **74** from the slot.

To retain the plate **84** in engagement with the housing and to provide a controlled force resisting rotation of the operating lever **62**, there is provided a thrust washer **86** which is positioned between the operating lever **62** and the trim plate **84** as is best shown in FIG. 9. The operating lever **62** is formed with an annular shoulder **88** which is in engagement with the thrust washer **86**. Immediately inside of the annular shoulder **88** adjacent the base of the mounting boss **64** there is an annular groove **90** which is adapted to receive a spring washer **92**. The spring washer **92** asserts a force between the thrust washer **86** and the groove **90** on the operating lever **62** and assures a relatively constant frictional resistance to the rotation of the operating lever **62**.

It should be appreciated that through the use of the annular shoulder on the operating lever and the inner assembly means on the operating lever for the purpose of securing the retainer **80** and the trim plate **84** in place, an extremely simplified construction has been provided for resiliently mounting the operating lever **62**.

While the spring **74** and the mounting structure for the operating lever provide a means for gripping the can bead and compensating for variation in the height of the bead, it is also necessary to provide means for relative movement of the cutter wheel and feed wheel in the horizontal plane to compensate for variation in thickness of the wall of the can. To perform this function, an extremely simple mechanism has been provided which may be readily adjusted from the exterior of the housing after the can opener has been assembled. The above-mentioned feed wheel shaft **56** is journalled in the front wall of the can opener housing **34** by means of a boss **94** formed integrally with housing **34** and a sleeve type bearing **96** which is pressed into the opening in the bearing boss **94**. Mounted on the inner end of the feed wheel shaft **56** is a molybdenum impregnated nylon gear **98**. The nylon gear **98** has a metallic insert **100** molded with the gear. The insert **100** assembles in the press fit on the end of the feed wheel shaft **56**. The rear face of gear **98** has a spherical surface **98***a* which extends across the metallic insert **100**. The sleeve bearing **96** is of such a length that there is some axial play in the feed wheel shaft **56**. Thus the distance between rear edge of feed wheel **54** and the forwardmost portion of the insert **100** is greater than the length of sleeve bearing **96**. To bias the feed wheel shaft forwardly a cantilever spring **102** is mounted on the rear plate member **36** by means of a rivet **104**. The free end of spring **102** is adapted to engage the spherical bearing **98***a* on the nylon gear.

Because of the desire to obtain a reasonably constant biasing force on the feed wheel shaft **56**, it is necessary to provide adjusting means for the cantilever spring **102**. It can easily be appreciated that with the many necessary tolerances in the spring **102**, in the housing **34**, and in the rear plate member **36**, it would be almost impossible to obtain a constant biasing force without some adjustment means. To accomplish this adjustment, a screw **106** is threadedly received in the cantilever spring **102** intermediate of the mounting rivet **104** and the point at which the spring engages the spherical bearing surface **98***a*. A hole **108** which is slightly smaller in diameter than the head of the screw **106** is provided in the back plate member **36**. Thus, a screw driver may be inserted through the hole **108** to adjust the screw **106** after the back plate has been assembled to the housing **34**. Through the engagement of the head of screw **106** with the back plate **36**, the force applied by the cantilever spring **102** to the feed wheel shaft **56** may be varied.

To provide the power for driving the can opener **11**, a small series wound motor **110** is employed which is somewhat similar to the motor shown in Jepson Patent No. 2,688,184. The motor **110** includes a horseshoe type field **112** having a field coil **114** located at the bight portion of the U-shaped field laminations. The brushes and the armature bearings are supported on a pair of molded nylon end bells **116** and **118**. The end bells **116** and **118** are secured together by means of threaded rod members **119** which extend parallel to the axis of the motor through the field laminations as well as the end bells. To mount the motor within the housing **12** the nylon end bells are formed with integral supports **120** which are engaged by retaining screws **122** to secure the motor in place.

The motor **110** includes an armature shaft **123** which has formed integrally on its outer end a worm **124**. The worm **124** is positioned in driving engagement with a molybdenum impregnated nylon spur gear **126**. The gear **126** is mounted for rotation on a stub shaft **128** which is pressed into an opening in a boss **130** formed integrally with the housing **34**. A suitable bearing washer **132** is positioned between the gear **126** and the end of boss **130**. The rearwardly extending end of shaft **128** is provided with an additional bearing washer and suitable retaining means. Integrally formed with the spur gear **126** is a smaller spur gear **134** which is in driving engagement with the gear **98** mounted on the feed wheel shaft **56**. By means of the worm **124**, the gears **126**, **134** and **98**, a substantial gear reduction may be obtained between the motor **110** and the feed wheel shaft **56**.

The motor **110** is designed to run in such a direction that the gear **126**, as seen in FIG. 11, rotates clockwise. In rotating the gear **126** in the clockwise direction there is, of course, a considerable axial force placed on armature shaft **123**. Rather than attempting to absorb this force in the bearings of motor **110**, a separate thrust absorbing means is provided. The bearing boss **94** for the feed wheel drive shaft **56** has a channel-like portion **170** formed along one edge thereof. The channel **170** extends generally parallel to the feed wheel shaft **56** and perpendicular to the armature shaft **123**. Received within the channel **170** is a nylon bearing plate **172** which is positioned to be engaged by the end of the armature shaft **123**. To retain the bearing plate **172** in position, a pair of overhanging ribs **174** are provided along the edge of the channel **170**. As may be seen in FIG. 11, the nylon bearing plate **172** has been flexed slightly to permit assembly into the channel **170**, the resilience of the plate **172** thereafter holding it assembled within the channel. The channel **170** and the cooperating ribs **174** are cast integrally with the bearing boss **94** thereby providing an extremely simple means of supporting the thrust bearing for the armature shaft **123** and worm **124**.

As has been explained above, the end bells **116** and **118** of the motor **110** are formed of nylon or any other suitable plastic insulating material. Since the gear **126** and the thrust bearing **172** are also made of plastic, the motor parts including the field and the armature are completely insulated from the metal housing **34** of the can opener.

For the purpose of completing the circuit through the motor **110** at the time the operating lever has moved the cutter wheel into the can cutting position, a switch **136** is mounted within the housing **34** in close proximity to the handle portion **66** of the operating lever. Since the switch **136** is mounted within the housing **34**, an operating member **138** is included which has a portion extending outwardly through an opening **140** in the upper wall of the housing **34**. Upon downward movement of the operating lever **62**, the handle portion **66** engages the upper end of the operating member **138** and moves it downward. The operating member **138** includes a resilient supporting portion **138***a* which biases the upper end into engagement with the handle portion **66**. The upper end of the operating member is provided with a small bent over portion **138***b* which actually engages the handle portion **66**. The end of the supporting portion

138*a* remote from the handle engaging portion 138*b* is mounted on a switch bracket 142 by means of a rivet 144 or other suitable retaining means. The bracket 142 is a flat plate which is secured to the front wall of the housing 34 and has a pair of mutually perpendicular walls 142*a* and 142*b* extending rearwardly therefrom. The wall 142*a* serves to support the operating member 138 while the vertically extending wall 142*b* supports the switch 136. The switch 136 is a normally open switch having an operating button 136*a* positioned beneath the operating member 138. The resilient supporting portion 138*a* of the operating member is sufficiently strong to bias the operating member 62 out of engagement with the button 136*a* when no force is being exerted on handle portion 66. Thus, the motor 110 is energized only while downward pressure is applied to the handle portion 66.

Mounted on the front wall of the can opener housing 34 is a magnetic lid holding mechanism 146. Magnetic type lid holders are well known in the can opener field. They are designed to retain the lid after it is severed from the can and prevent the lid from dropping into the food contained in the can. The lid holding mechanism 146 includes a pivotally mounted lid holder 148 on which a magnet 150 is loosely supported. The magnet 150 is secured in a channel-shaped member 152.

The lid holder 148 includes downwardly extending sidewalls 148*a* which form a cup-like enclosure to receive the magnet 150 and its channel-shaped holder 152. Two of the opposed sidewalls 148*a* are formed with openings 148*b* to receive tabs 152*a* which extend outwardly from the ends of the channel-shaped member 152. The tabs 152*a* are loosely received in openings 148*b* in walls 148*a* so that the magnet is free to pivot and be displaced slightly with respect to the lid holder 148. This provision for relative movement between the magnet 150 and the lid holder 148 is necessary so that the magnet may adjust itself to optimum engagement with the somewhat irregular surfaces of can lids.

The lid holding mechanism 146 also includes a pair of L-shaped support members 154 and 156 which pivotally support the lid holder with respect to the can opener housing 34. As may be best seen in FIGS. 10 and 12, vertically extending portions 154*a* and 156*a* of the support members are recessed in shallow grooves in the face of the housing 34 and are secured thereto by means of rivets 158. The support members 154 and 156 are also provided with horizontally extending portions 154*b* and 156*b* which are located in substantially the same horizontal plane.

The outer ends of the horizontally extending portions 154*b* and 156*b* are formed over to provide aligned cylindrical bearing portions 154*c* and 156*c*, respectively. Extending through the bearing portions 154*c* and 156*c* is a pin 158 which pivotally supports the lid holder 148. A helical spring member 160 received on pin 158 is adapted to engage the lid holder 148 and bias it to an uppermost position in which it is inclined slightly to the horizontal as is best shown in FIG. 9. One end of spring member 160 is in engagement with support 156 while the other end engages lid holder 148. Since the lid holder 148 is substantially horizontal when in engagement with the lid of a can, as shown in FIG. 1, the lid holding mechanism 146 has a tendency to raise the lid upwardly out of the top of the can when the lid is severed from the can, as may be seen in FIG. 1.

While lid holding mechanisms are generally conventional and well known in the art, the holder conceived by applicants performs additional functions heretofore unknown in the art. The mechanism not only grasps and lifts the lid as it is severed from the can, but it also serves as a guard for the drive wheel and cutter wheel mechanism when they are not in use. The inoperative or guarding position of the lid holding mechanism is best shown in FIGS. 4 and 7. As may be seen in these figures, the lid holder 148 has been rotated to a substantially vertical position where it covers the cutter wheel 58 and the feed wheel 54 and prevents one from contacting these parts. In that the biasing spring 160 is continuously operative tending to urge the lid holder 148 to its uppermost position, means must be provided to retain the lid holding mechanism 146 in its guarding position. The magnet 150 is utilized to perform this function.

The lower front edge of the housing 34 is provided with a step or projection 34*a* which extends horizontally immediately below the cutting wheel 54. The step 34*a* extends outwardly into substantial alignment with the face of the feed wheel 54. In this position it serves as a stop for and cooperates with the lid holder 148. With the step 34*a* extending beneath the feed wheel 54 and the lid holder 148 extending across the front of the feed wheel, there is little possibility of a person inadvertently injuring themselves through contact with the feed and cutter wheels 54 and 58, respectively. It should be noted that the step 34*a* also serves as a guide for a can in the operative position, the cylindrical wall of the can resting against it.

The trim plate 84 which was mentioned briefly above in connection with the closing of the front face of slot 68, has a stepped portion 84*b* which conforms to the contour of the housing step 34*a*. The stepped portion 84*b* performs a necessary function with respect to retaining the lid holding mechanism 146 in the guarding or vertical position. Since the housing 34 is of die cast aluminum, a nonmagnetic material, it is necessary to provide a magnetic material on the face of the housing if the magnet 150 is to be utilized in latching the lid holder 148 in the guarding position. Since the trim plate 84 is made of steel, it serves to retain the lid holding mechanism in the guarding position. It should be understood that the spring 160 is made of such a strength that it will not raise the lid holder 148 while the magnet 150 is in engagement with the stepped portion 84*b*. When the magnet 150 is moved a slight distance away from the magnetic material of the trim plate 84, the spring will be sufficient to move the lid holding mechanism 146 to its operative or raised position.

When a can 13 is placed in cutting position in the can opener, as shown in FIG. 1, it is gripped between the feed wheel 54 and the cutter wheel 58 as explained above. Because of the limited engagement of the can by the two wheels and the stepped portions 34*a* and 84*b*, it is necessary to have additional stabilizing means to prevent the can from twisting during the cutting operation. Since the cutter wheel 54 rotates in a clockwise direction as viewed from the front in FIG. 5, there is a tendency for the edge of the can following the cutter, or to the right as seen in FIG. 1, to lift up. As a result, the bead of the can engages and is guided by the horizontal portion 154*b* of the L-shaped support 154. To further guide the can, a horizontally extending pin member 162 is secured to the front of the housing 34 to the left of the feed wheel 54 as seen in FIG. 5. The pin member 162 which engages the cylindrical sidewall of the can and the portion 154*b* of the L-shaped support which engages the lip of the can form a structurally simple arrangement for maintaining the can in proper position with respect to the feed and cutter wheels 54 and 58, respectively, during the can opening operation.

The trim plate 84 described above in connection with the functioning of the cutter wheel biasing means 74 and in connection with the guarding function of the lid holding mechanism 146 also serves a decorative purpose in improving the appearance of the front of the can opener. As may best be seen in FIG. 10, the trim plate 84 has a pair of horizontally spaced openings 84*c* and 84*d* through which the horizontal portions of the L-shaped supports 154 and 156 extend. The trim plate covers the vertical portions 154*a* and 156*a* of the L-shaped supports, these portions being recessed in grooves in the front of the housing 34.

A somewhat larger opening 84*e* positioned between the

openings 84*c* and 84*d* is provided to permit the mounting boss 64 of the operating lever 62 to extend into engagement with the resiliently mounted bearing block 70. The annular shoulder 88 on the operating lever cooperates with the thrust washer 86 to hold the upper portion of the trim plate 84 flat against the front of the housing 34. The guide pin 162 also performs a retaining function in connection with the trim plate 84. The pin 162 has an inner end 162*a* which is of a reduced diameter and extends through an opening 84*f* in the trim plate and a cooperating opening 164 in the housing 34. The end of the pin 162 extending within the housing is peened over with the shoulder on the pin 162 exerting a retaining force against the trim plate 84.

Extending outwardly from the front of housing 34, one end of the feed wheel shaft bearing 96 is visible. Partially surrounding the outwardly extending portion of the bearing 96 is an extension of the bearing boss 94. As may best be seen in FIG. 10, the outer end of the bearing boss extends only approximately two-thirds of the way around the bearing 96. The reason for the elimination of the remainder of the supporting boss 94 in this area is obvious from an inspection of FIG. 9. In order to make the annular shoulder 88 on the operating lever large enough in diameter to provide adequate support, it was necessary to cut away a portion of the bearing boss 94. The trim plate has a suitable irregular opening 84*g* through which the forwardly extending portion of the bearing 96 and the bearing boss 94 may extend.

While there has been illustrated and described a particular embodiment of the can opener of the present invention with several mounting means, it will be understood that various changes and modifications may occur to those skilled in the art. It is intended in the appended claims to cover all those changes and modifications which fall within the true spirit and scope of the present invention.

What is claimed as new and desired to be secured by Letters Patent of the United States is:

1. A can opener comprising a frame, a serrated feed wheel mounted for rotation about a first axis fixed with respect to said frame, an operating lever pivoted about a second axis on said frame and movable between a load position and a can cutting position, a cutter wheel mounted for rotation on said operating lever and positioned eccentrically with respect to said second axis, said cutter wheel in the can cutting position of said lever being spaced substantially the same distance below said second axis as it is to one side of said second axis, said cutter wheel in said load position of said lever being positioned substantially directly above its can cutting position.

2. A can opener comprising a frame, a serrated feed wheel mounted for rotation about a first axis fixed with respect to said frame, an operating lever pivoted about a second axis on said frame and movable between a load position and a can cutting position, a cutter wheel mounted for rotation on said operating lever and positioned eccentrically with respect to said second axis, said cutter wheel in the can cutting position of said lever being spaced substantially the same distance below said second axis as it is to one side of said second axis, said operating lever in rotating from said load position to said can cutting position moving said cutter wheel along an arc which is substantially vertical.

3. A can opener comprising a cutter wheel and a feed wheel mounted for operative engagement with the lip of a can, said feed wheel being mounted to rotate about a first horizontal axis, said cutter wheel being mounted above said feed wheel for rotation about a second axis inclined to the horizontal and spaced closely to a vertical plane including said feed wheel axis, an operating lever being rotatable about a third axis for movement between a load position and a can cutting position, one of said wheels being supported by said lever eccentrically with respect to said third axis for movement of the support wheel toward and away from the other wheel, said supported wheel being positioned on said operating lever along a line extending at about 45 degrees through said third axis when said lever is in its operating position, whereby said supported wheel will move substantially vertically as said lever moves from the load position to the can cutting position.

4. A can opener comprising a supporting frame, a can opening mechanism mounted on said frame and adapted to sever the lid from a can, a lid holder pivotally mounted on said frame adjacent said can opening mechanism, said lid holder being pivotal between a first position and a second position in which the free end of said holder is adjacent the lid of a can being opened by said mechanism, a magnet carried by the free end of said holder, means biasing said holder to said second position, magnetically susceptible material on said frame adjacent said magnet when said holder is in said first position, said magnet and said magnetically susceptible material retaining said holder in said first position until disengaged therefrom.

5. The can opener of claim 4 wherein said housing comprises a casting of nonmagnetic material and said magnetically susceptible means comprises a ferrous plate attached to said frame.

6. The can opener of claim 5 wherein said ferrous plate includes a horizontally disposed stepped portion, said magnet engaging said stepped portion of said ferrous plate when said holder is in said first position.

7. The can opener of claim 5 wherein a can engaging pin projects from the front of said housing adjacent said feed wheel, said pin having an inner end of reduced diameter extending through said ferrous plate and said frame to retain said plate assembled to said frame.

8. A power operated can opener comprising a housing enclosing a motor and reduction gearing therein, a shaft driven through said gearing and extending outside of said housing, a feed wheel secured to said shaft outside of said housing, a disk cutter mounted above said feed wheel for movement relative to said feed wheel in a vertical plane, a pair of horizontally spaced support members extending outwardly from said housing on either side of said cutter, a lid holder pivotally connected along one edge to the free ends of said support members, said one edge of said lid holder extending across and ajacent to said disk cutter, said lid holder being pivotal between a substantially vertical guarding position and a substantially horizontal lid holding position, means biasing said lid holder to said last-mentioned position, and magnetically susceptible means cooperating with said magnet to retain said holder in said guarding position.

9. The can opener of claim 8 wherein said housing comprises a cup-shaped casting of nonmagnetic material, a ferrous plate positioned against said housing behind said cutter and said feed wheel, a horizontally extending rib projecting outwardly from said housing below said feed wheel, said plate having a stepped portion conforming to the contour of said rib, said magnet engaging said stepped portion of said plate when said holder is in the guarding position.

10. A can opener comprising a housing enclosing a motor and reduction gearing therein, a feed wheel mounted on said housing externally thereof, said feed wheel being driven through said reduction gearing, a disk type cutter wheel movably mounted on said housing adjacent said feed wheel whereby a can may be gripped between said wheels and the top removed therefrom as said feed wheel is rotated, a magnetic holder for can tops hingably attached to said housing adjacent said cutter wheel, said holder having a magnet secured on the free end thereof, biasing means urging the free end of said holder upwardly and away from said housing about said hingable attachment, said holder being pivotal to a lower position in which said holder is close to said housing, magnetically susceptible means mounted on said housing adjacent to

said magnet when in said lower position whereby said magnet is attracted thereto retaining said holder in said lower position.

11. In a can opener of the type including a cutter wheel and a feed wheel mounted for rotation on a frame, a lid holder comprising a support member pivotally mounted on said frame, a magnet carried by the free end of said support, said support being pivotal between a first position against said frame and a second position extending outwardly from said frame, said magnet in said second position being adjacent the lid of a can positioned to be opened by said opener, a spring biasing said support into said second position, and magnetically susceptible means on said frame cooperating with said magnet to retain said support in said first position against the biasing force of said spring.

12. A power operated can opener comprising a housing having a motor and reduction gearing mounted therein, wall means in said housing supporting a feed wheel shaft driven by said reduction gearing and carrying at its outer end a feed wheel, a vertically extending slot in said wall means, a bearing block slidably received in said slot, an operating lever having pivot means engaging said bearing block for pivotally supporting said lever with respect to said housing, a pivotally mounted cutter wheel carried by a lever and positioned eccentrically with respect to the pivot axis of said lever, a coil spring engaging said bearing block and the top of said slot to bias said block downwardly, plate means disposed inside said housing covering said slot, said lever pivot means extending through an opening in said plate, and assembly means on the inner end of said lever pivot means, said assembly means cooperating with said lever and plate to retain said bearing block in said slot.

13. The can opener of claim 12 wherein said feed wheel shaft is mounted for limited axial movement, said housing having a removable cover plate positioned rearwardly of the inner end of said feed wheel shaft, and adjustable spring biasing means mounted on said cover plate urging said shaft forwardly, said spring permitting relative movement between said wheels when in cutting position to compensate for variations in can wall thickness and lip height.

14. A can opener comprising a frame including a supporting wall, a feed wheel shaft journalled in said wall and carrying a serrated feed wheel at its outer end, a vertically extending slot in said wall above said feed wheel, an apertured bearing block slidably received in said slot, an operating lever including a boss receivable in the aperture in said block for pivotally mounting said lever on one side of said wall, said lever having a bearing surface surrounding said boss, a pivotally mounted cutter wheel carried by said lever positioned eccentrically so as to move downwardly toward said feed wheel as said lever is rotated, plate means disposed against the other side of said wall covering said slot and being slotted for said boss to extend therethrough, assembly means secured to said boss in sliding engagement with said plate, said assembly means and plate and said lever bearing surface retaining said bearing block within said slot.

15. The can opener of claim 14 wherein said assembly means comprises an enlarged washer and a screw threaded means threadedly received in the end of said boss, said washer and said boss having interlocking means to prevent rotation of said washer.

16. A motor operated can opener comprising a cup-shaped housing having the opening thereof facing rearwardly, a plate member secured to said housing to form a closure for said opening, a motor mounted in said housing, a feed wheel shaft journalled in the front wall of said housing opposite said plate member, reduction gearing drivingly connecting said motor and said shaft, a feed wheel carried by said shaft outside of said housing, a cutter wheel on said front wall mounted for movement between a retracted inoperative position and a cutting position in overlapping relation to said feed wheel, said wheels being mounted to grip the top edge of a can between said overlapping portions when severing the lid therefrom, said feed wheel shaft being mounted for limited axial movement to compensate for differences in thicknesses of the walls of cans gripped between said overlapping portions, and spring means secured to said plate member in biasing engagement with the inner end of said shaft to urge said feed wheel toward said cutter wheel.

17. The can opener of claim 16 wherein said spring comprises a cantilever spring extending at right angle to said feed wheel shaft, a screw threaded adjustment means accessible externally of said housing for varying the biasing force exerted by said spring.

18. A motor operated can opener comprising a housing, a feed wheel and a cutter wheel mounted on the outside of said housing, said wheels being mounted in their operative position with portions overlapping to grip the upper edge of the wall of a can therebetween, a driven shaft extending through the wall of said housing and carrying said feed wheel on its outer end, said driven shaft being mounted for limited axial movement, a cantilever spring mounted on said housing perpendicular to said shaft with the free end thereof in biasing engagement with the inner end of said shaft, screw threaded means threadedly mounted on said spring with one end in engagement with said housing, adjustment of said screw varying the force exerted by said spring on said shaft.

19. The can opener of claim 18 wherein said housing is provided with an opening aligned with said screw threaded means to permit adjustment of said screw.

20. A motor operated can opener comprising a housing, a feed wheel and a cutter wheel mounted on the outside of said housing, said wheels being mounted in their operative position with portions overlapping to grip the upper edge of the wall of a can therebetween, a driven shaft extending through the wall of said housing and carrying said feed wheel on its outer end, a motor mounted in said housing, reduction gearing drivingly connecting said motor and said shaft, said gearing including a plastic gear mounted on the inner end of said shaft, a portion of said gear extending across the inner end of said shaft and providing a spherical plastic bearing projection, said shaft being mounted for limited axial movement, and a cantilever spring mounted on said housing with the free end thereof in biasing engagement with said bearing projection.

21. A can opener comprising a frame including a supporting wall, a feed wheel shaft journalled in said wall and carrying a serrated feed wheel at its outer end, an operating lever having a boss at one end thereof, bearing means in said wall adjacent said feed wheel receiving said boss for pivotally mounting said lever, a cutter wheel carried by said lever positioned eccentrically so as to move toward and away from said feed wheel as said lever is rotated, assembly means secured to the end of said boss to retain said operating lever assembled to said wall, interlocking means on said boss and said assembly means to prevent relative rotation during movement of said lever, and a spring washer positioned on said boss between said lever and said wall to provide resistance to rotation of said lever with respect to said wall.

22. A can opener comprising a housing, a motor mounted within said housing, a feed wheel shaft rotatably mounted in said housing and having one end projecting from the front of said housing, means drivingly connecting said shaft to said motor, a feed wheel mounted on said one end of said shaft, an operating lever having a boss at one end thereof, means on said housing adjacent said feed wheel defining a bearing for receiving said boss, said boss extending through the front of said housing and having a transverse slot and a threaded opening on the inner end thereof, a washer retained against

the inner end of said boss by a threaded assembly means, said washer retaining said operating lever assembled to said housing, and a protuberance on said washer extending into said transverse slot to prevent relative rotation between said washer and said boss.

23. A can opener comprising a rectangular cup-shaped housing having a front wall and a rearwardly facing opening, a motor mounted therein, a feed wheel shaft journalled in said housing extending through said front wall, a feed wheel mounted on the end thereof exterior to said housing for driving engagement with the lip of a can to be opened, said motor having an armature shaft with a worm gear formed on one end thereof, an elongated bearing boss formed in said housing to journal said feed wheel shaft, said bearing boss extending perpendicular to the axis of said armature shaft, gearing drivingly interconnecting said worm and said feed wheel shaft, a bearing plate positioned at the end of said armature shaft to receive the thrust delivered through said worm, and means formed on said bearing boss for receiving and supporting said bearing plate.

References Cited in the file of this patent

UNITED STATES PATENTS

2,615,241	Lawrence	Oct. 28, 1952
2,803,873	Lappin et al.	Aug. 27, 1957
2,825,963	Sykes et al.	Mar. 11, 1958
2,850,799	Dodd et al.	Sept. 9, 1958
2,883,745	Bristol	Apr. 28, 1959
2,897,589	Bodle	Aug. 4, 1959
2,953,850	Kronson	Sept. 27, 1960