Aug. 29, 1961 R. M. PINETTE 2,997,785

AUTOMATIC CAN OPENER

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Fig. 13.

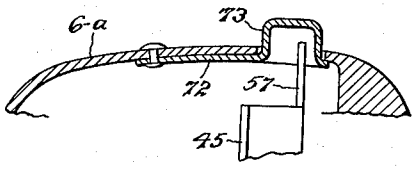


Fig. 1.

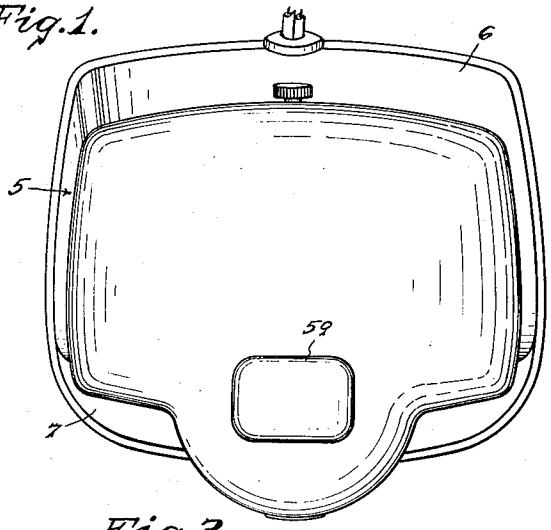


Fig. 2.

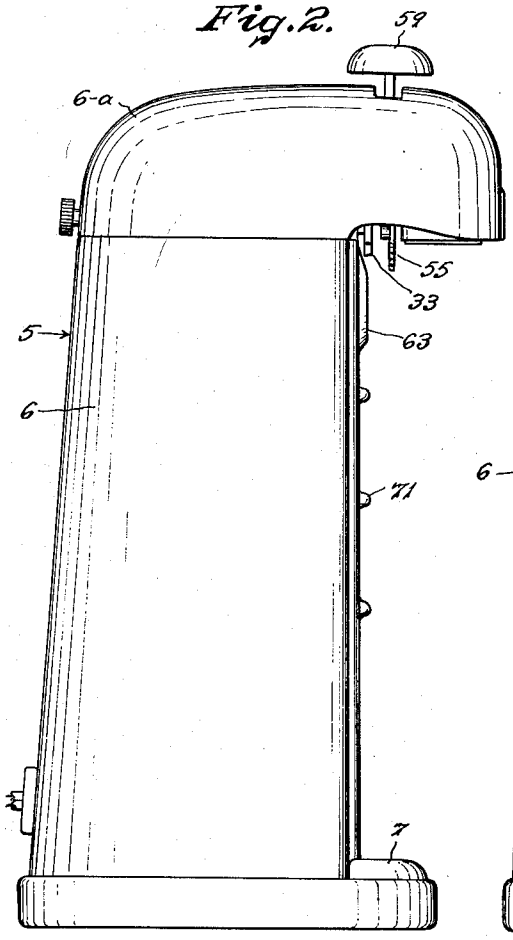
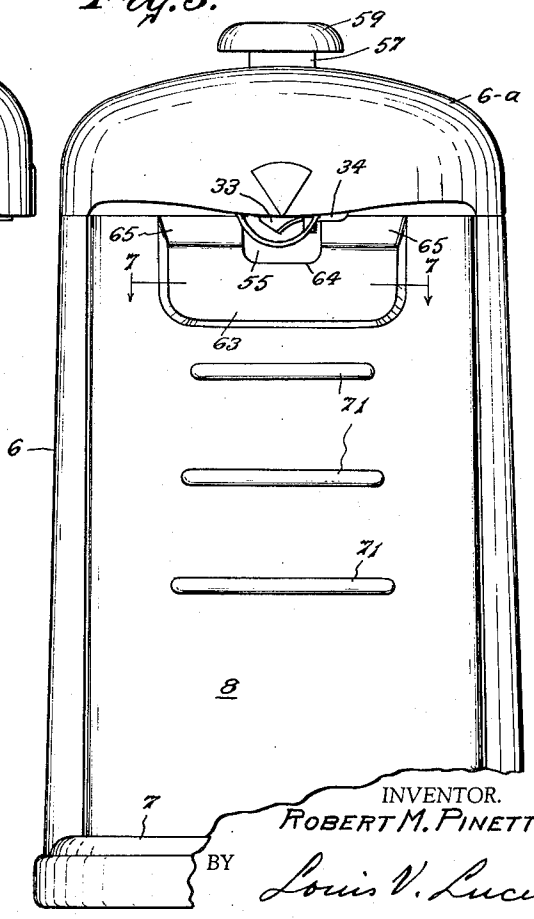


Fig. 3.



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AUTOMATIC CAN OPENER

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Fig. 4.

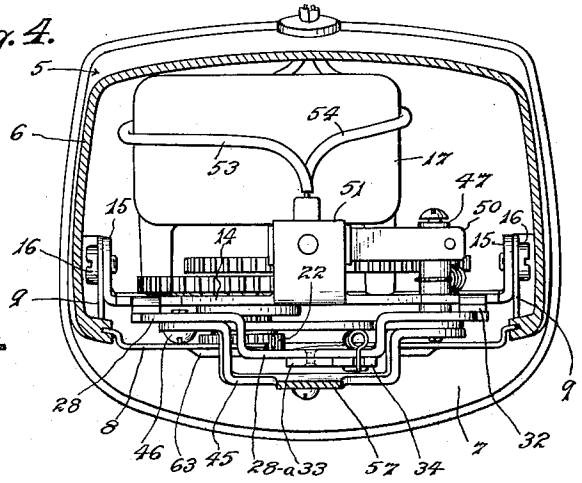


Fig. 7.

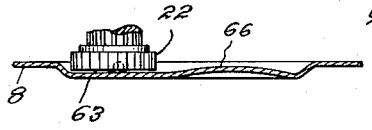


Fig. 5.

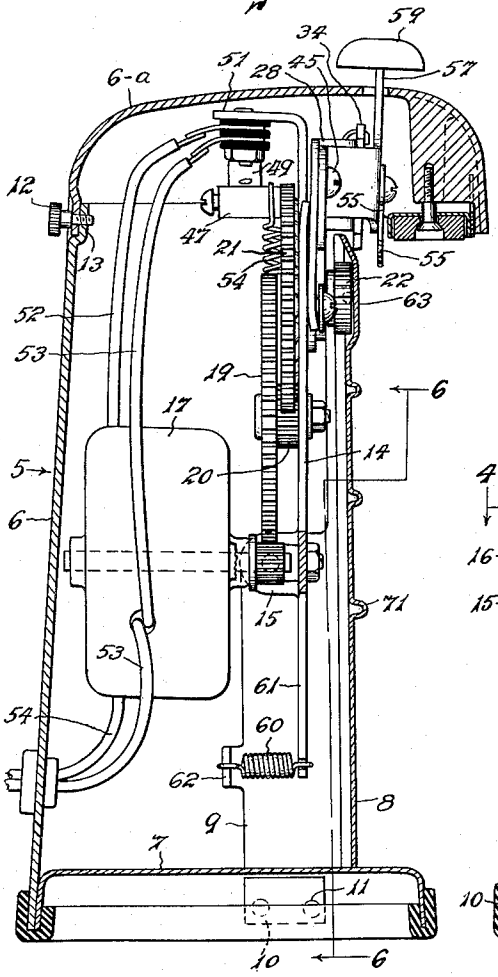
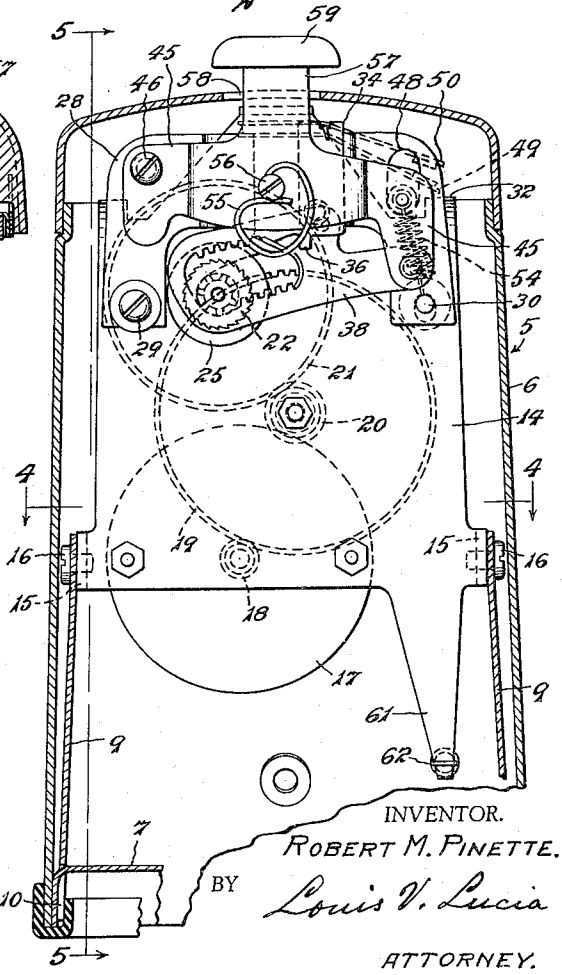


Fig. 6.



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AUTOMATIC CAN OPENER

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Fig. 8.

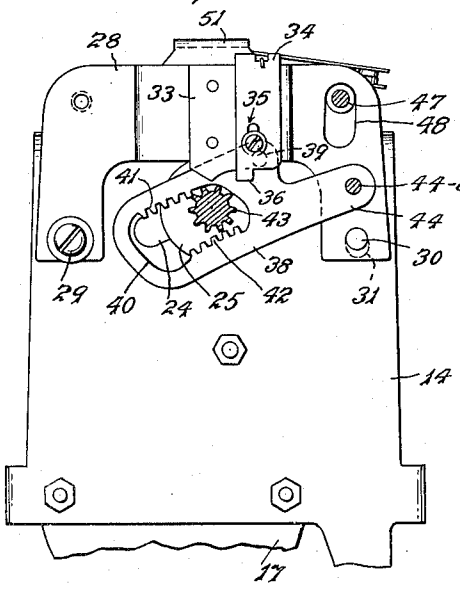


Fig. 9.

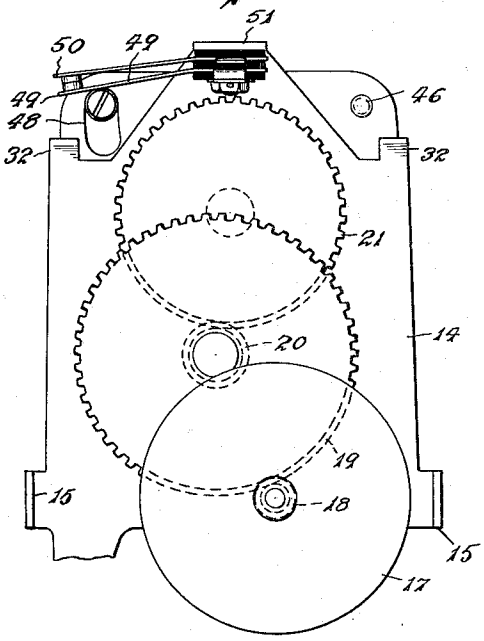


Fig. 10.

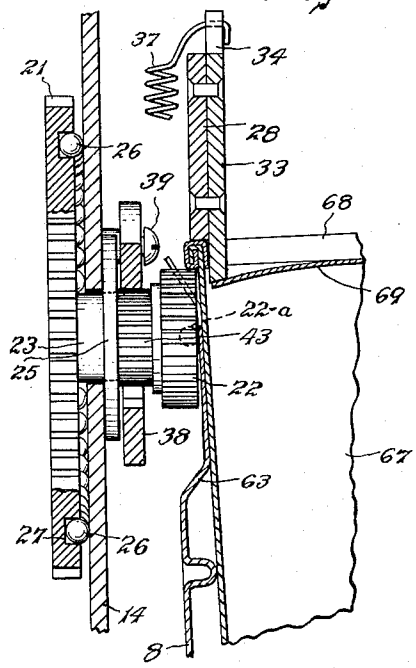


Fig. 11.

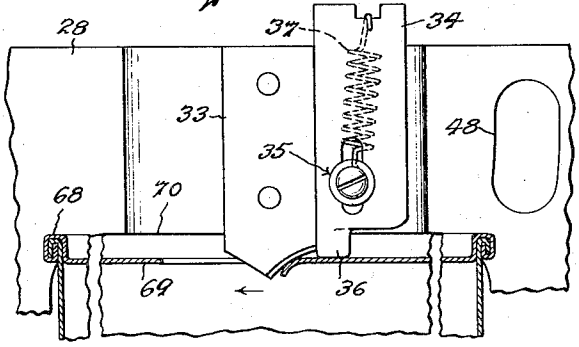
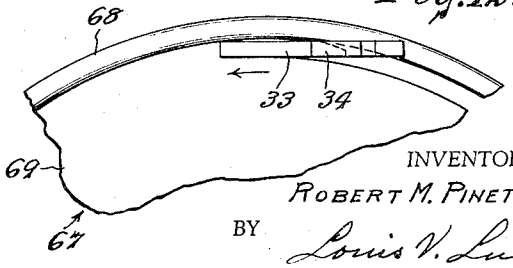


Fig. 12.



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United States Patent Office 2,997,785 Patented Aug. 29, 1961

2,997,785

AUTOMATIC CAN OPENER

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(78 Water St., Brunswick, Maine)

Filed May 1, 1959, Ser. No. 810,289
19 Claims. (Cl. 30—4)

This invention relates to an automatic can opener and more particularly to a power driven device for automatically opening cans upon being inserted into said device.

An object of the present invention is to provide novel improvements in the structure and mechanism of the automatic can opener described in my U.S. Patent No. 2,896,319 issued July 28, 1959.

A further object of this invention is to provide an improved and highly efficicent mechanism which is more economical to produce, as well as highly efficient in its operation and extremely durable under hard usage.

Further objects and advantages of this invention will be more clearly understood from the following description and the accompanying drawings in which:

FIG. 1 is a plan view of a can opener embodying the present invention.

FIG. 2 is a side view thereof.

FIG. 3 is a front view of said can opener.

FIG. 4 is a plan view with the casing shown in section on line 4—4 of FIG. 6 and with parts shown in elevation.

FIG. 5 is a sectional side view of said can opener on line 5—5 of FIG. 6.

FIG. 6 is a sectional front view with parts thereof shown in elevation.

FIG. 7 is a fragmentary, sectional view on line 7—7 of FIG. 3.

FIG. 8 is a front view showing a portion of the mechanism of said can opener.

FIG. 9 is a rear view thereof.

FIG. 10 is an enlarged side view of a portion of the mechanism illustrating the operation.

FIG. 11 is a front view thereof.

FIG. 12 is a fragmentary, plan view of the cutting mechanism and a can illustrating a cutting operation.

FIG. 13 is a sectional, side view showing a modified form of the manually operable handle.

In the embodiment of my present invention which is illustrated in the drawings, the numeral 5 denotes a casing having a body portion 6 which is mounted on a base 7 and has a front plate 8 thereon that closes said body portion; the said front plate fitting within the open front of the body portion 6 and having inwardly extending side portions 9—9 with foot portions 10—10 that extend through slots in the base 7 and are secured thereto by suitable means, such as spot welding, as indicated at 11.

A cover 6–*a* is detachably mounted upon said casing and secured thereto by means of a binding screw 12 that extends through said cover and is threaded to a flange 13 at the top of the body portion.

My improved can opening mechanism provided by the present invention includes a supporting plate 14 which has rearwardly extending ears 15—15 pivotally mounted on the portions 9—9 by means of pivot screws 16—16. An electric motor 17 is mounted upon the said supporting plate 14 and has a pinion 18 which drives an idler gear 19 that has a pinion 20 which rotates a drive gear 21. Said drive gear rotates a feed wheel 22 which is mounted on a hub 23 which extends from said gear 21 and projects through and is movable in a slot 24 in the supporting plate 14, that is arcuate about the axis of the pinion 20. A washer 25 is mounted upon said hub 23 and overlies the surface of the supporting plate bordering the slot 24. A series of bearing balls 26 are provided in an annular groove 27 in said gear 21 and roll against the rear surface of the supporting plate 14 to prevent tilting of the gear relatively to said supporting plate.

A carrier plate 28 is pivotally mounted upon the supporting plate 14 by means of a pivot stud 29 and the opposite side of said carrier plate has a stop pin 30 which projects through a slot 31 in said supporting plate. The said carrier plate is loosely mounted upon the pivot stud 29 so that it can swing forwardly thereon relatively to the supporting plate 14 and the relative movement between said supporting and carrier plates is limited by stops 32—32 which are in the form of ears that are bent forwardly from said supporting plate and engage the rear surface of the carrier plate.

A cutter member 33 is rigidly mounted upon said carrier plate and projects downwardly therefrom to cooperate with the feed wheel 22 as will be hereinafter more fully described.

A guide member 34 is slidably mounted upon said carrier plate, by means of a pin and slot connection 35, and has a downwardly extending projection 36. A spring 37 is provided for urging said guide member downwardly upon said carrier plate to normally locate the projection 36 in front of said cutter member.

A rack member 38 is pivotally mounted at 39 upon said supporting plate and has an arcuate slot 40 therein and rows of teeth 41 and 42, in the top and bottom edges of said slot, respectively, which are meshable with the teeth of a pinion 43 that rotates with the hub 23 and the feed wheel 22. The said rack member 38 has an extension 44 which is pivotally connected at 44–*a* to a downward extension on an actuating lever 45 which is pivotally mounted at 46 upon the carrier plate 28. Said actuating lever has an actuating stud 47 thereon that projects rearwardly through a slot 48 in the carrier plate 28 and actuates an electric switch that includes a pair of flexible contact bars 49 and 50. Said contact bars are mounted upon an extension 51 extending rearwardly from the supporting plate 14, and are electrically insulated from each other by suitable insulating spacers as shown. The said switch is connected in series with the motor 17 by means of conductors 52 and 53.

A spring 54 is anchored to the stud 30 on the carrier member 28 and secured to the stud 47 to bias the actuating lever 45 towards its normal position and thereby also bias the rack member 38 into its normal position, as shown in FIG. 6.

The said actuating lever 45 carries a yieldable feeler member in the form of a wire spring 55 which is mounted upon said actuating lever by means of a screw 56, and projects downwardly therefrom for the purpose hereinafter described. An extension 57 is preferably provided on said actuating lever to project upwardly therefrom through a slot 58 in the cover 6–*a* and carry a handle 59 whereby the activating lever may be operated manually when desired.

In order to normally retain the mechanism forwardly in the casing, there is provided a spring 60 which is anchored at one end to an extension 61 from the supporting plate 14 and at its other end to a projection 62 from one of the side portions 9—9. Said spring normally urges said supporting plate and the mechanism thereon forwardly and thereby retains the feed wheel 22 adjacent the rear surface of an embossment 63 on the front plate 8 which has a central notch 64 in its upper free edge and inwardly inclined portions 65—65 at opposite sides of said notch.

A ball 22–*a* is preferably provided in the center of said feed wheel 22 to minimize friction between the wheel and said rear surface.

As illustrated in FIG. 7, the embossment 63 is preferably formed with an inwardly extending portion provid-

ing a cam surface 66 for the purpose hereinafter described.

In the operation of my improved mechanism above described, a can to be opened, indicated at 67 in FIGS. 9 and 10, is first placed with the flange 68 of its cover in the notch 64 so that said flange is disposed in the path of the feed wheel 22. The said can is then raised so that its cover will engage the feeler member 55 and lift the actuating lever 45 against the tension of the spring 54. This will cause the stud 47 to raise the electrical contact bar 49 into engagement with the contact bar 50 and thereby close the electric circuit and energize the motor 17. At the same time, the upward movement of the actuating lever 45 will cause downward rocking movement of the rack member 38 and bring the teeth 41 of said member into mesh with the pinion 43. The energization of the motor 17 will then cause counterclockwise rotation of said pinion 43 and thereby cause the hub 23 to travel upwardly in the slot 24 and carry the gear 21 with it about the axis of the pinion 20 to the upper end of the slot 24. Said rotation of the pinion 43 will carry the feed wheel 22 towards the right, as shown in FIG. 6, and upwardly in the slot 24 into engagement with the bottom of the flange 68 whereby said feed wheel will rotate the can. This will also cause the can to be raised and the cover 69 thereof to be pushed upwardly against the point of the cutter member 33 so that said point will penetrate the cover.

During the movement of said feed wheel toward the right, it will engage the cam surface 66 and swing the entire mechanism inwardly on the pivots 16—16 so that the cutter 33 will be forced into contact with the inside of the flange on the can. Continual rotation of the said feed wheel will then rotate the can and cause the cover 69 thereof to be completely cut off. When the cutting operation upon the can cover is completed, said cover will move downwardly and allow downward movement of the actuating lever 45 which will then cause the rack member 38 to rock upwardly and bring the teeth 42 thereof into mesh with the pinion 43 and at the same time cause disengagement of the switch contact bar 49 from the bar 50 and thereby de-energize the motor. The momentum of said motor will then momentarily continue rotation of the pinion 43 and said pinion will move the hub 23 and the feed wheel 22 thereon back to its normal position, whereupon the can opening operation is completed and said pinion 43 may continue to rotate within the untoothed portion of the rack member adjacent the teeth 42 until the momentum of the motor has terminated.

It will be noted that as the can is pushed upwardly against the feeler spring 55 to start a cutting operation, the flange of the can will move into position in back of the projection 36 of the guide member 34, so that the said projection will guide the flange to the cutter 33 and prevent disengagement therefrom during the cutting operation.

It will also be noted that the carrier plate 28 has a U-shaped formation 28–*a* with a lower edge providing a shoe portion 70 which is engaged by the top of the can flange. The upward pressure applied to said flange by the feed wheel 22 causes the entire mechanism to rock inwardly on the pivots 15—15 and thereby force the cutter 33 against the inside of said flange, as it is being cut, and smooth its cut edge against the inside of the can.

As the feed wheel is returned to its normal position, it will become disengaged from the can flange and said flange will slide down the inclined side wall portions 65—65 of the front plate 8 to thereby facilitate removal of the can from the cutting mechanism.

A plurality of elongated bosses 71 are provided upon the outer surface of the front wall 8 to support the can 67 as the cover thereof is being cut. These ribs are gradually higher in a downward direction so as to support the can at an angle to the feed wheel on the plane of the embossment 63 as illustrated in FIG. 10.

As illustrated in FIG. 10, the lower free edge of the cutting member 33 is at a slight angle, upwardly towards the front, so that as it cuts the cover 69, it will push the said cover inwardly of the can and cut the cover along the lower inner edge of the flange 68. This angled edge of the cutting member is particularly important since it greatly facilitates the cutting operation by avoiding wedging action and side friction against the end of the cutting member and thereby minimizing the amount of drag between the cutting member and the cover during a cutting operation.

In the modified form of FIG. 13, a resilient member, 72, is secured to the underside of the cover 6–*a* and has an inverted cup-shaped portion 73 which fits over the extension 57, for manual operation thereof, and permits said cover to be readily removed.

I claim:

1. An automatic can opener including a casing having a front wall and mechanism contained within said casing for cutting off the cover of a can disposed against said front wall with the cover securing flange thereof extending over the top of said front wall, said mechanism including a supporting member having an upwardly inclined slot therein, a motor mounted in fixed position upon said supporting member, a gear driven by said motor and having an axial hub extending through said slot, a feed wheel mounted upon said hub, and means for causing upward movement of said gear and feed wheel along in said slot to cause engagement of said feed wheel with the flange of said can to rotate said can for a cutting operation upon the cover thereof, and cutter means for cutting said cover during the rotation of the feed wheel.

2. An automatic can opener including a casing having a front wall portion and mechanism contained within said casing for cutting off the cover of a can disposed against said front wall with the cover securing flange thereof extending over an edge portion of said front wall, the said mechanism including a movably mounted supporting member, a motor stationary upon said supporting member, an idler gear driven by said motor, a drive gear rotatably and movably mounted on said supporting member, said supporting member having an upwardly inclined slot therethrough arcuate about the axis of said idler gear, said drive gear having an axial hub extending through said slot and rotatable and movable therein, a feed wheel mounted upon said hub and engageable with the flange of said can, said hub having gear teeth thereon, a rack member pivotally mounted upon said supporting member and having gear teeth thereon engageable with said teeth on the hub, means actuated by the can upon being placed into position to be opened against said front wall portion for actuating said rack member to move the gear teeth thereof into mesh with the teeth of said hub, means for energizing said motor upon movement of said rack member into mesh with the teeth on said hub whereby rotation of the drive gear by the motor will cause movement of said hub upwardly in said slot and thereby cause the feed wheel to move into engagement with the cover flange of said can for rotating said can for an opening operation, and cutter means for cutting the cover of said can during the rotation thereof by the feed wheel.

3. An automatic can opening mechanism including a pivotally mounted supporting member, a motor mounted upon and carried by said supporting member, an idler gear rotatably mounted upon said supporting member, a pinion on said idler gear, a drive gear meshing with said pinion, said supporting member having an upwardly inclined slot arcuate about the axis of said idler gear, said drive gear having a hub extending through said slot and movable therein while said drive gear remains in mesh with said hub, a feed wheel carried upon said hub and projecting forwardly from said mechanism, a pinion on said hub, a rack member pivotally mounted upon a

supporting member and having opposed series of teeth meshable with the pinion on said hub for moving said hub in opposite directions in said slot, a carrier member pivotally mounted on said supporting member, an actuating member pivotally mounted on said carrier member and connected to said rack member for rocking it about its pivot to move the teeth thereof into mesh with the teeth on opposite sides of the pinion on said hub, a shoe portion on said carrier member, a cutter secured to and projecting downwardly from said shoe portion, and an electric switch operable by movement of said actuating member to cause energization of said motor upon said rack member being moved into mesh with the gear teeth of the pinion on the hub when the can is forced against said actuating member.

4. A can opening mechanism including a casing, a supporting member pivotally mounted within said casing, a motor mounted upon and carried by said supporting member, an idler gear rotatably mounted upon said supporting member and driven by said motor, a pinion coaxial with and connected to said idler gear, a drive gear in mesh with said pinion, said supporting member having an upwardly inclined slot arcuate about the axis of said pinion, a drive gear in mesh with said pinion and having an axial hub extending through and movable in said slot, a series of gear teeth surrounding said hub, a feed wheel mounted upon the outer end of said hub, a rack member pivotally mounted upon said supporting member and having an elongated opening therethrough through which the teeth on said hub extend, said opening having in its opposite edges separate series of gear teeth adapted to mesh with the teeth on said hub from opposite sides thereof, a carrier member pivotally mounted on said supporting member and having a shoe portion extending forwardly and disposed above said feed wheel, a cutter extending downwardly from said shoe portion forwardly of the feed wheel, an actuating member pivotally mounted upon said carrier member, a pivotal connection between said actuating member and rack member, means upon said actuating member engageable by the cover of the cam for moving said actuating member to cause pivotal movement of said rack member and engagement of a series of said teeth thereof with the teeth upon the hub, an electric switch, means for operating said switch for closing an electric circuit, upon movement of said actuating means by the can cover, to cause energization of the motor for rotating the said hub while the teeth thereof are in mesh with the teeth of the rack member and causing movement of said hub in said inclined slot whereby the said feed wheel is moved upwardly into engagement with the flange of the can cover, and spring means for moving the actuating member, upon the cover being cut off, to disengage the said series of teeth of the rack member from the teeth on the hub of the drive wheel and engage therewith the opposite series of teeth of said rack member for causing return movement of the feed wheel towards the lower end of said slot and to cause opening of said electric switch for de-energizing the motor.

5. An automatic can opener including a base, a supporting member pivotally mounted on said base, a motor carried by said supporting member in fixed position thereon, an idler gear and pinion driven by said motor, said supporting member having an inclined arcuate slot therethrough about the axis of said gear, a drive gear in mesh with said idler pinion and having a hub extending through said slot whereby said drive gear is rotatably and movably mounted in said slot for movement about the axis of the idler pinion while retained in mesh therewith, a pinion on said hub, a rack member pivotally mounted on said supporting member, opposed series of teeth meshable with opposite sides of the pinion on said hub upon pivotal movement of said rack member, a carrier member pivotally mounted upon said supporting member for forward and rearward movement thereon, an actuating member pivotally mounted upon said carrier member, said rack member having an extension pivotally connected to said actuating member for operating said rack member to selectively move said series of teeth into mesh with the pinion on said hub, spring means normally biasing said actuating member whereby the rack member is retained in raised position, a feed wheel on said hub disposed forwardly of the rack member, a cutter member depending from the carrier member forwardly of said feed wheel, an electric switch operable to close upon upward movement of said actuating member to cause energization of said motor, and means on said actuating member engageable by a can cover for moving said actuating member upwardly as said cover is moved into position to engage said cutter member.

6. An automatic can opener including a base, a front wall extending upwardly from said base and having side portions extending rearwardly therefrom, a supporting member pivotally mounted upon said side portions for forward and rearward movement relatively to said front wall, spring means yieldingly retaining said supporting member in forward position, a carrier member pivotally mounted upon said supporting member for forward and rearward movement thereon, an electric switch mounted on said supporting member rearwardly of said carrier member, a cutting member on said carrier member, an actuating member pivotally mounted on said carrier member, a rack member pivotally mounted on the supporting member, means including said rack member for moving said feed wheel into position to engage the flange of a can and to rotate said can relatively to said cutting member, the said rack member being pivotally connected to the actuating member for operation thereby, a feeler spring extending downwardly from said actuating member and engageable with the cover of a can in engagement with said cutting member, spring means yieldingly retaining said actuating member in a downward position whereby said rack member is retained in an upward position, an electric switch is series with said motor and mounted upon said supporting member, and a stud on said actuating member operable upon the actuating member being raised for closing said switch to cause energization of the motor.

7. A can opener including a base, a supporting member pivotally mounted on said base, a motor mounted on said supporting member and movable therewith, an idler gear rotatably mounted on said supporting member, said supporting member having an arcuate slot therethrough about the axis of said idler gear, a drive gear having a hub extending through said slot for rotatably mounting said drive gear for movement about said axis, a feed wheel on said hub extending forwardly of said supporting member, said drive gear having an angular groove therein open towards the rear surface of said supporting member and a series of balls contained within said groove for rotatably supporting said drive gear against said rear surface, a pinion on said hub forwardly of said supporting member, a bearing washer surrounding said hub rearwardly of said pinion and bearing against the front surface of said supporting member for preventing tilting of the feed wheel, means engageable with said pinion for causing movement of said drive gear in said slot to raise the feed wheel into engagement with the can flange, and cutting means engageable with the cover of said can for cutting said cover upon rotation of the can by the feed wheel.

8. An automatic can opener including a base, a supporting member pivotally mounted on said base, a motor carried by said supporting member, a drive gear driven by said motor, a feed wheel driven by said drive gear and disposed forwardly thereof, means for moving said feed wheel upwardly upon initial rotation of said drive gear, a carrier member pivotally mounted upon said supporting member and having a U-shaped portion extend-

ing forwardly therefrom above said feed wheel and engageable by the annular bead surrounding the cover of a can in position to be engaged by said feed wheel, a cutter member mounted upon said U-shaped portion of the carrier member and extending downwardly therefrom, an actuating member having a U-shaped portion extending forwardly therefrom and overlying the U-shaped portion of said carrier member, a feeler member on said U-shaped portion of the actuating member engageable by the cover of said can to raise said actuating member, and an electric switch operable by upward movement of said actuating member to cause energization of the motor.

9. A can opener as set forth in claim 8, including a guide member slidably mounted adjacent said cutter member and engageable with the inner side of the angular flange surrounding the cover of the can for guiding said flange to the cutter member.

10. A can opener as set forth in claim 8, including a guide member slidably mounted adjacent said cutter member, a projection depending from said guide member, and spring means yieldingly retaining said guide member in position wherein said projection extends below the cutter member to engage the can flange as the can is raised towards the cutter member into position wherein said cutter member penetrates the can cover.

11. A can opener as set forth in claim 8, wherein said feeler member is resilient and mounted upon said actuating member in front of said cutter and guide members.

12. An automatic can opener as set forth in claim 8, wherein said actuating member has an extension, projecting through a slot in the case, for manual operation thereof.

13. An automatic can opener including a base, a front wall disposed vertically on said base and having side portions extending rearwardly therefrom and secured to said base, a case secured to said base and having a rear wall and side walls connected to opposite side portions of said front wall, a supporting member pivotally mounted on said side portions of the front wall, a cutting mechanism mounted on said supporting member and including a feed wheel disposed adjacent the rear surface of said front wall near the top thereof, spring means normally urging said supporting member forwardly and said feed wheel against said rear surface, said mechanism including means for raising the feed wheel to a position above the top edge of said front wall to engage the flange surrounding the cover of a can positioned against the front of said front wall, a cutting member disposed forwardly of and above said front wall in position to penetrate the cover of said can, actuating means engageable by said cover of the can, and means actuated by movement of said actuating means for initiating the operation of said mechanism.

14. An automatic can opener including a base, a front wall extending vertically from said base, a case having side walls connected with said front wall and a rear wall, the said front wall having an embossment extending forwardly adjacent the top edge thereof, a cutting mechanism movably mounted within said case and including a cutting member disposed above and forwardly of said front wall to engage the cover of a can placed against said embossment with the flange surrounding the cover of said can disposed over the edge of the said front wall, a feed wheel in said cutting mechanism normally disposed against the rear surface of said embossment, and means for raising said feed wheel to engage the flange of said can upon initiation of a cycle of operation of said can opener whereby said feed wheel is moved into engagement with the flange of the can and the can is raised into cutting position relatively to the cutting member; the said embossment being provided with a notch in the upper edge thereof to receive the flange of the can, and inwardly angled sidewall portions in said embossment for guiding said flange downwardly upon being released by said feed wheel.

15. A can opener as set forth in claim 14 wherein said embossment is provided with a cam surface in the rear surface thereof to move said feed wheel rearwardly as it is moved upwardly in the direction of the can flange.

16. An automatic can opener as set forth in claim 14 wherein a ball is provided at the center of the feed wheel to engage the rear surface of said embossment.

17. An automatic can opener as set forth in claim 14 wherein said front wall is provided with spaced horizontal ribs thereon having their front surfaces substantially aligned with said embossment on a plane angled forwardly in a downward direction to engage the side of the can and support it at an angle relatively to the feed wheel as it is held against the front surface of said embossment.

18. A can opener including a supporting member, a cutter mounted upon and projecting from said supporting member, a feed wheel engageable with the bottom of a cover flange on a can and adapted to rotate said can for a cutting operation on the cover thereof, means for moving said feed wheel relatively to said cutter to a position wherein said cutter is disposed adjacent the inside of said flange and penetrates said cover, a guide member slidably mounted adjacent to said cutter and engageable with the inside of said flange for guiding it to said cutter, and means biasing said guide member into engagement with the top of said can cover during a cutting operation thereon.

19. A can opener including a supporting member, a cutter mounted upon and projecting from said supporting member, a feed wheel engageable with a cover flange on a can and adapted to rotate said can for a cutting operation on the cover thereof, means for moving said feed wheel relatively to said cutter to support the can in a position wherein said cutter is disposed adjacent the inside of said flange and penetrates said cover, and a guide member slidably mounted upon said supporting member adjacent to said cutter; the said guide member being biased in the direction of said cover and having a projection yieldingly engageable with the top of said cover and adapted to engage the inner side of said flange and guide said flange to said cutter.

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