Nov. 10, 1964 G. L. CONGDON ETAL 3,156,044

ELECTRIC CAN OPENER

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Fig. 1

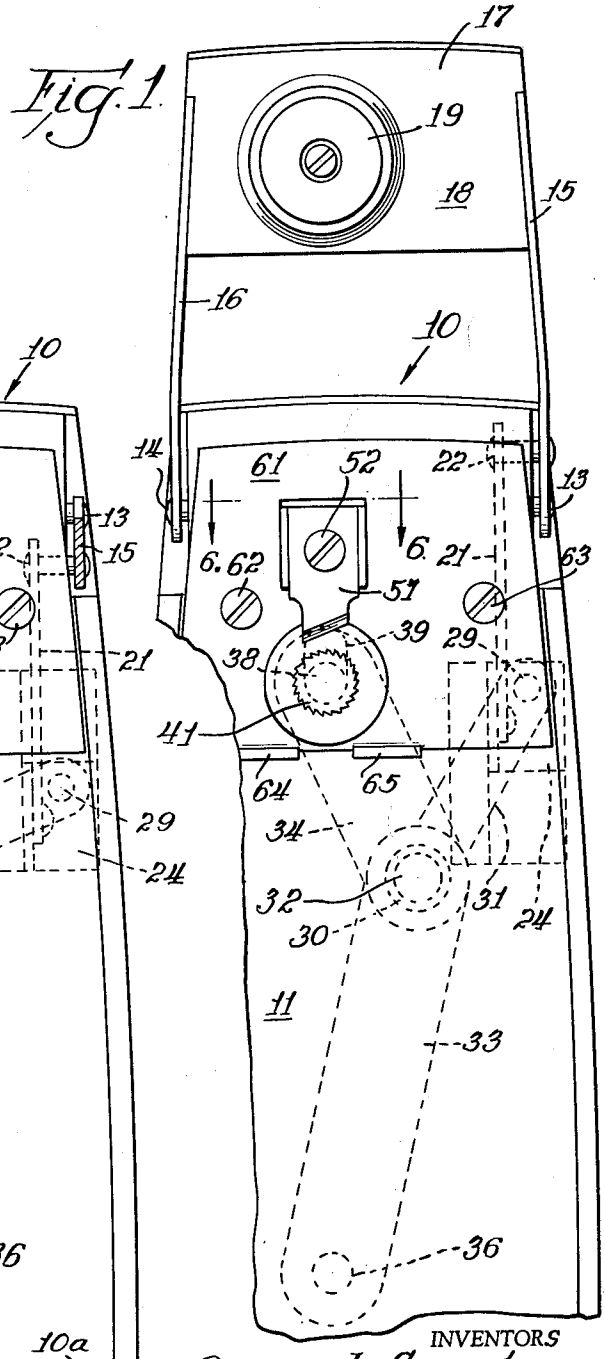
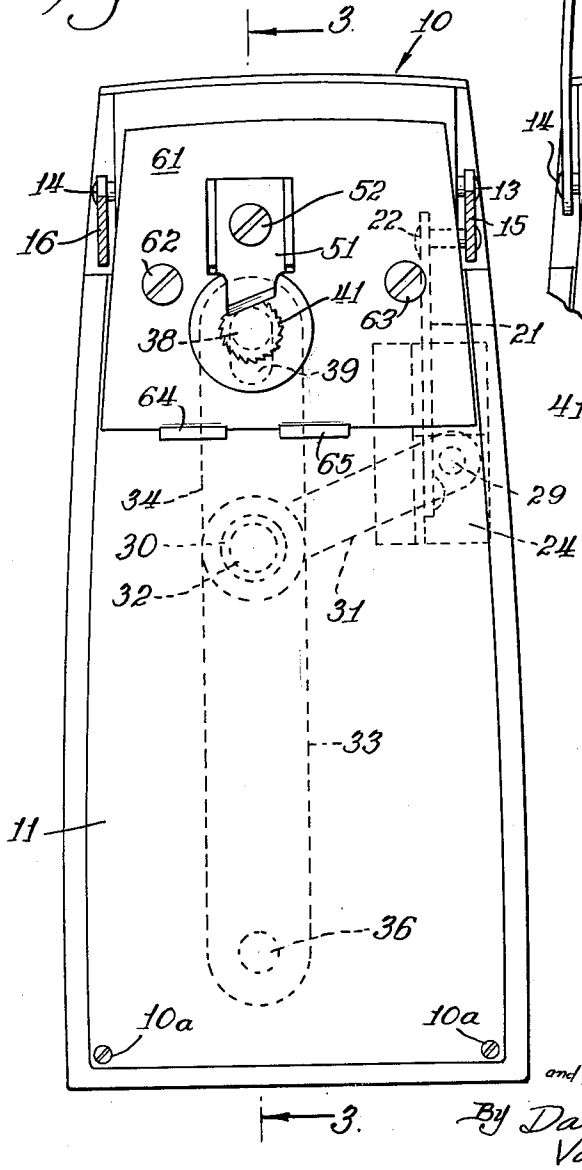



Fig. 2




INVENTORS

George L. Congdon

and John A. Benkovich

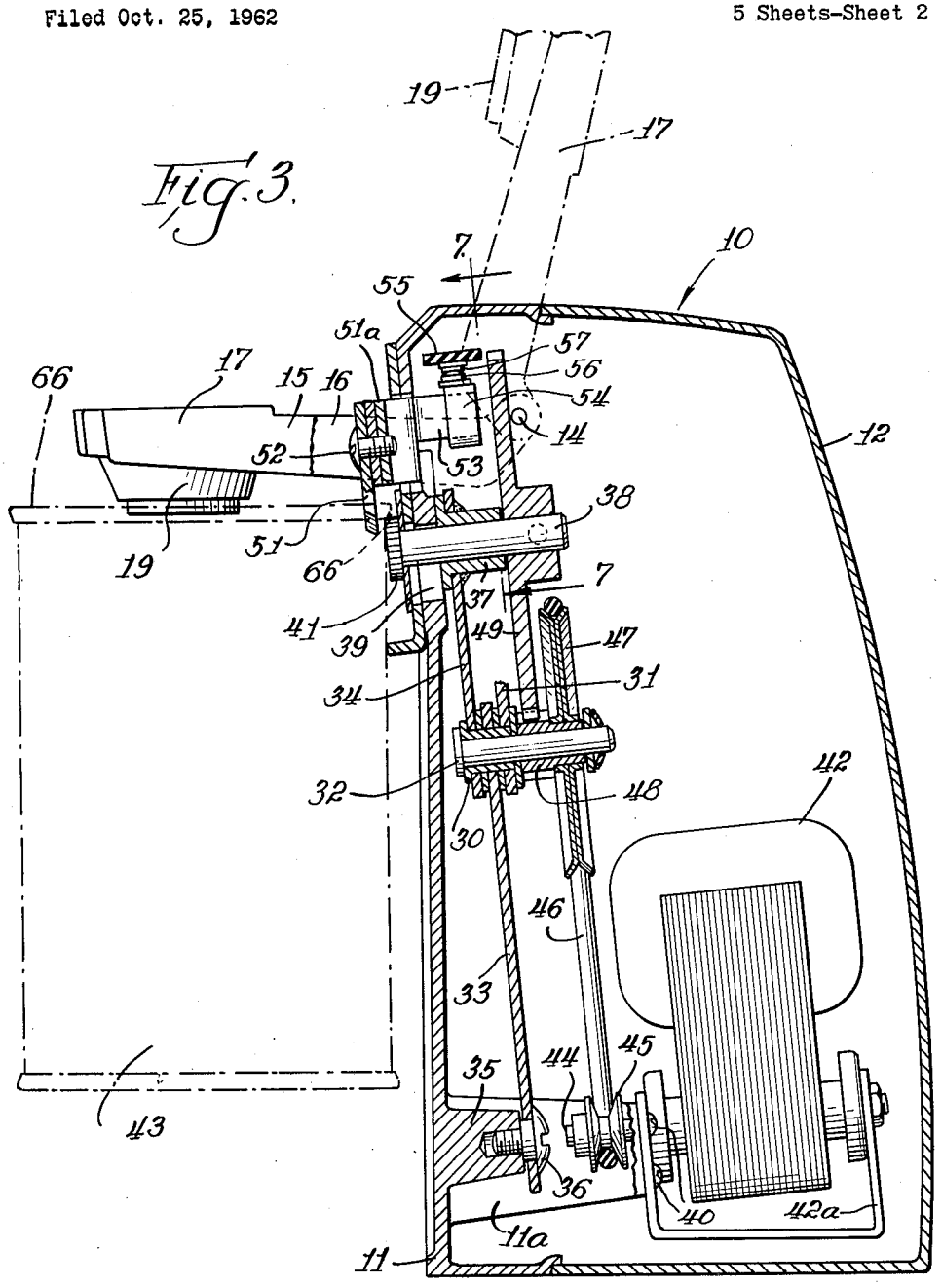
By Darbo, Robertson & Vandenburgh Attys.

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Fig. 3.




INVENTORS

George L. Congdon

and John A. Benkovich

By Darbo, Robertson & Vandenburgh Attys.

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Fig. 4

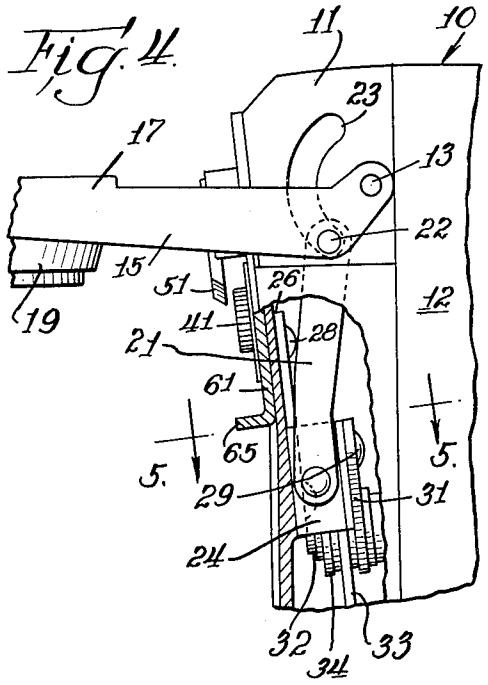



Fig. 5

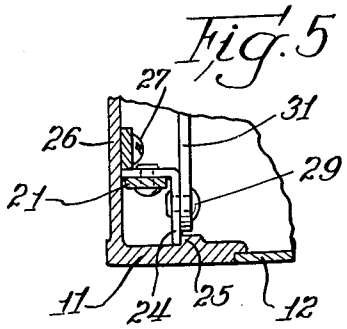



Fig. 6

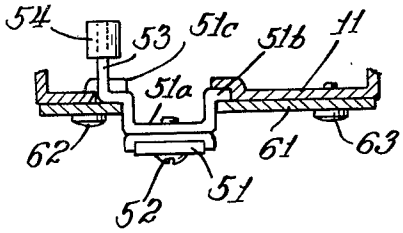
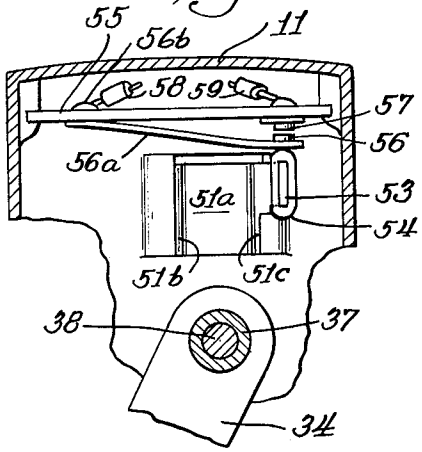



Fig. 7




INVENTORS

George L. Congdon

and

John A. Benkovich

By Darbo, Robertson & Vandenburgh Attys.

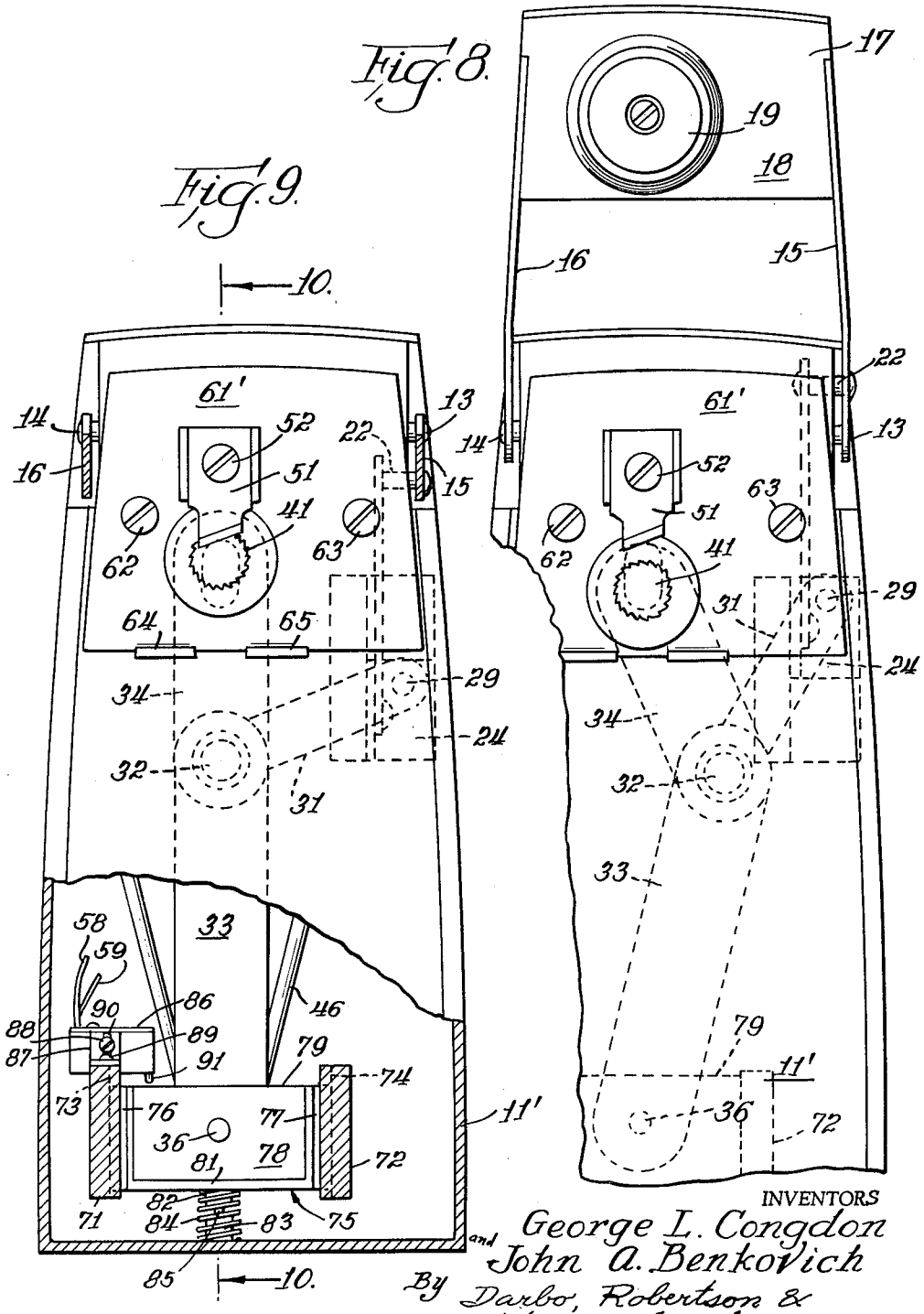
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ELECTRIC CAN OPENER

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Fig. 8.

Fig. 9.




INVENTORS

George L. Congdon

and John A. Benkovich

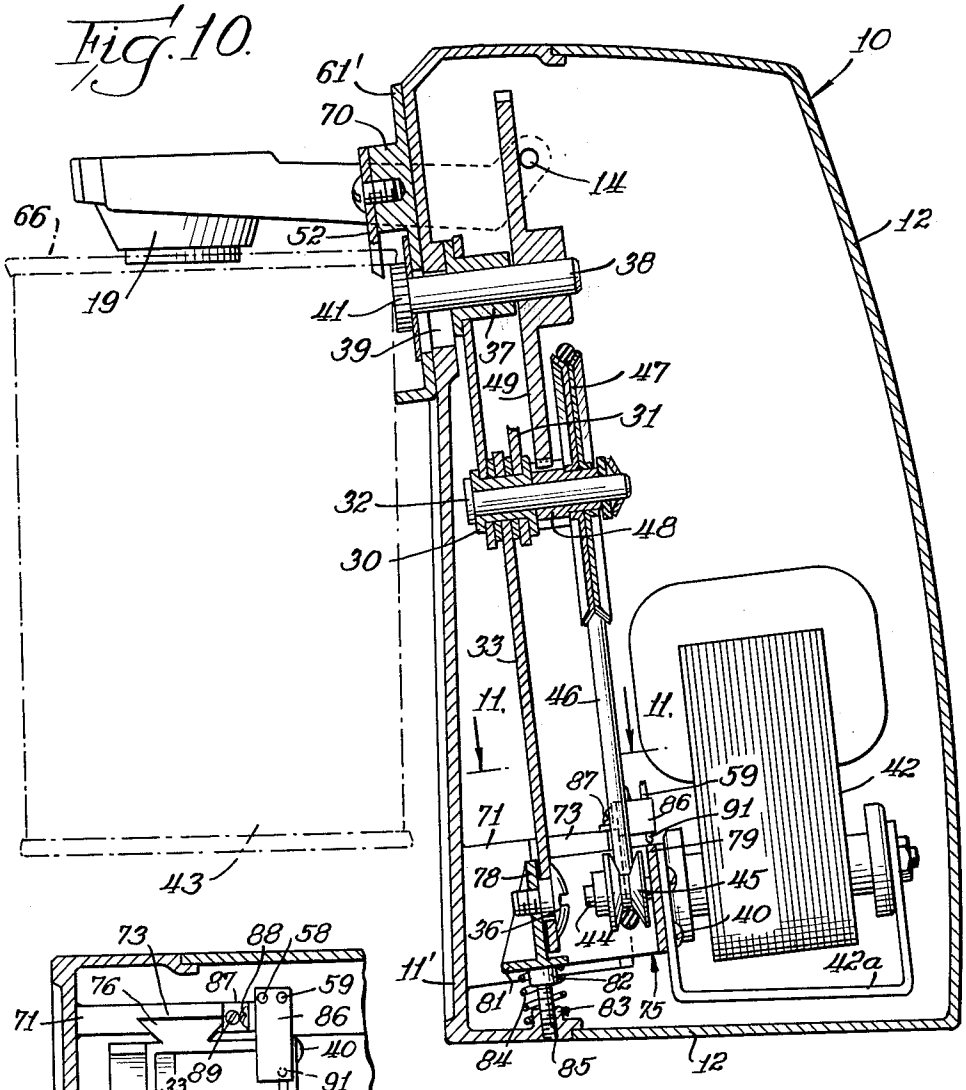
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Fig. 10.



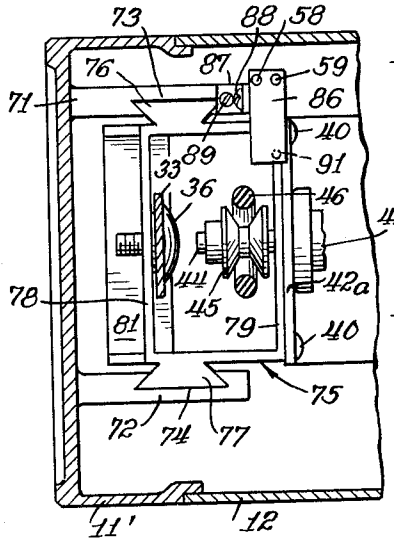




Fig. 11.

INVENTORS
George L. Congdon
and John A. Benkovich
By Darbo, Robertson & Vandenburgh Atty's.

United States Patent Office 3,156,044 Patented Nov. 10, 1964



3,156,044

# ELECTRIC CAN OPENER

George L. Congdon, Fort Atkinson, and John A. Benkovich, Beloit, Wis., assignors to Burgess Vibrocrafters, Inc., Grayslake, Ill., a corporation of Illinois

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13 Claims. (Cl. 30—4)

This invention relates to improvements in can openers, and especially electric motor-driven can openers having a vertically movable can turning wheel assembly operable, following the initiation of the can lid puncturing and cutting phase by an operator, automatically to cut the lid from a can and then stop.

The improved can opener structure of the present invention is characterized by a toggle type linkage assembly which raises and lowers the can turning wheel into precutting, cutting and retracted positions. The operation of the can opener is fully automatic following the initiation of the lid puncturing and cutting phase by an operator who places the bead of a can to be opened upon the can turning wheel and lowers the operating handle to move the can turning wheel into its precutting position and start the motor. From this position the automatic operation begins, whereafter the puncture and the severing of the lid of the can, and the stopping of the motor all are accomplished by the can opener without the intervention of the operator. Upon the completion of this opening operation, the can is supported by the opener until the operator takes action to remove it therefrom.

The main object of the present invention is to provide an electric motor powered can opener with improvements residing in a novel means for initiating and controlling the puncturing and cutting operation, including a toggle linkage assembly for moving a can turning wheel vertically into precutting, cutting and retracted positions. A related object is to provide a can opener wherein the device operates automatically after the can turning wheel has been moved into a precutting position and ceases to operate when the lid of a can has been severed.

Other objects and advantages of the invention will become apparent from the following detailed description of the invention taken in conjunction with the accompanying drawings, in which:

FIGURE 1 is a front view of the can opener, partly broken away, showing the toggle linkage assembly in dotted lines and the can turning wheel in a retracted position relative to the resiliently mounted cutter blade;

FIGURE 2 is a front view of the can opener showing the toggle linkage assembly in dotted lines and the can turning wheel in cutting position;

FIGURE 3 is a cross-sectional view taken at line 3—3 of FIG. 2 with a can in lid cutting position being illustrated in broken lines;

FIGURE 4 is a fragmentary view partly in cross section of the upper portion of the device illustrating the mechanical linkage between the operating handle and the slide plate when in cutting position;

FIGURE 5 is a fragmentary view of the said mechanical linkage taken at line 5—5 of FIG. 4;

FIGURE 6 is a detail view in cross section of the cutter blade assembly taken at line 6—6 of FIG. 1;

FIGURE 7 is a fragmentary sectional view taken at line 7—7 of FIG. 3 and showing the switch mechanism in an open position;

FIGURE 8 is a view similar to that of FIG. 1, with portions broken away, and showing a modification of the can opener of the invention, the modified device having a fixed cutter blade and a switch that is closed as a result of downward pressure on the can turning wheel;



FIGURE 9 is a front view of the modification shown in FIG. 8 with portions broken away and the can turning wheel in cutting position;

FIGURE 10 is a section as viewed at line 10—10 of FIGURE 9; and

FIGURE 11 is a fragmentary section as viewed at line 11—11 of FIGURE 10.

Although the following disclosure offered for public dissemination is detailed to ensure adequacy and aid understanding, this is not intended to prejudice that purpose of a patent which is to cover each new inventive concept therein no matter how others may later disguise it by variations in form or additions or further improvements. The claims at the end hereof are intended as the chief aid toward this purpose; as it is these that meet the requirement of pointing out the parts, improvements, or combinations in which the inventive concepts are found.

The improved can opener of the present invention includes a housing generally **10**, formed by a front panel **11** secured to the open front of an enclosed back **12**. The two are connected by screws **10***a* extending through panel **11** and threaded into bosses of the back **12**. Pivotally supported on panel **11**, as at pivot pins **13** and **14**, are the arms **15** and **16** of an operating handle **17**. A plate **18** forming a part of handle **17** is secured between the extensions of the arms **15** and **16**. Plate **18** also forms a mount for a magnet **19** for purposes hereinafter described.

Interiorly of the housing **10** is a link **21** which is pivotally mounted at its upper end on a crank pin **22**. Pin **22** is secured to the arm **15** of the operating handle to be movable with said arm. As shown in FIGURE 4, crank pin **22** extends through an arcuate slot **23** in front panel **11** with the slot permitting movement of the pin as the handle is raised and lowered. Connected to the lower end of the link **21** is a slide plate **24** which moves vertically in a trackway formed by boss **25** on the inner side wall of the front panel **11** and rail **26** secured to the inner front wall of the front panel by screws **27** and **28** as shown in FIGS. 4 and 5.

Pivotally secured to the slide plate **24**, as by the pivot pin **29**, is a second link **31**. The other end of link **31** is supported on a bushing **30** on a toggle pin **32**. Link **31** is movable in an essentially sidewise direction to apply a mechanical sidewise force to the toggle joint at the toggle pin **32**. The sidewise force from link **31** moves pin **32** sidewise causing members **33** and **34** which are pivotally mounted thereon to move to and from a substantially vertical position as shown in FIGURES 1 to 3. The lower link **33** is pivotally secured at its lower end to a boss **35** formed integrally with the rear side of the panel **11**, as by the pivot screw **36**. The upper link **34** is secured at its upper end to a bushing **37** which is movable with said strap link. Links **33** and **34** along with pin **32** form a toggle joint.

Journaled in bushing **37** is a drive shaft **38** which extends outwardly through a vertical opening **39**, in the front panel **11**. Affixed to the outer end of the drive shaft is a can turning wheel **41**. Wheel **41** is mechanically connected to motor **42** to be turned thereby to rotate the can **43** shown in FIG. 3 in dot dash lines.

Motor **42** includes a frame member **42***a* which is secured to a U-shaped mounting bracket **11***a* formed as an integral part of front panel **11**. Frame member **42***a* and bracket **11***a* are attached as by means of screws **40**. The position of the motor is such that the motor shaft **44** is coaxial with the pivot screw **36**. Thus, as the toggle link **33** moves about the axis of pivot screw **36**, a fixed distance is maintained between toggle pin **32** and the axis of motor shaft **44**. It also is apparent that the movement of the toggle does not change the distance between toggle pin **32** and shaft **44**. These relationships

are significant since toggle pin 32 is employed as a shaft in the power transmission system.

The power transmission system includes a pulley 45 secured to the motor shaft 44. An O-ring type belt 46 is driven by the pulley 45 and in turn drives an intermediate pulley wheel 47. The intermediate pulley wheel 47 is fixedly mounted upon the extension of the hub of an intermediate pinion gear 48 for turning said gear. The pinion gear 48 is rotatably mounted upon the pivot pin 32. Meshing with the pinion gear 48 to be turned thereby is a gear 49. The gear 49 is fixedly secured to the drive shaft 38.

Above and outwardly from and cooperating with the can turning wheel 41 in severing the lid of the can is a cutter blade 51. Blade 51 is mounted for limited vertical movement upon the front panel 11 by means of carrier 51*a* which is guided in a vertical way defined in part by guides 51*b* and 51*c* (see FIG. 6). The blade is secured to carrier 51*a* by the screw 52. Integral with and extending rearwardly from the blade carrier 51*a* is an extension arm 53 on which is mounted an insulator knob 54.

Above the knob 54 and supported on the front panel 11 is an insulating strip 55 which carries a contact 57 of a switch mechanism (seen in FIG. 7 in an open circuit relationship). Contact 56 of the switch mechanism is mounted on one end of a relatively strong leaf spring element 56*a*. The other end of the spring element is attached to insulating strip 55 by a rivet 56*b*. Spring element urges contact 56 toward the switch-open position illustrated in FIGURE 7. At the same time it bears against the top of insulator knob 54 to urge carrier 51*a* and blade 51 downwardly. Wires 58 and 59 connect the contacts in series with motor 42 and with a line cord (not shown) to energize the motor upon the closing of the switch.

A front plate 61 is secured to the front panel 11 by screws 62 and 63. The front plate serves to cover the working parts of the can opener and to provide the outwardly extending lugs 64 and 65 which form a cradle against which the body of a can is supported while in rotation. The front plate can be disposed of and the lugs 64 and 65 provided directly upon the front panel without departing from the form of the invention; however, it is preferred to have the front plate. Plate 61 also cooperates with guides 51*b* and 51*c* to form ways for carrier 51*a* as seen in FIGURE 6.

In operation, the operator places the bead 66 of a can 43 upon the can turning wheel 41 in a position to be supported thereby. The operating handle 17 is then lowered to a position immediately above the lid of the can. This is the precutting position where the can turning wheel 41 has been moved upwardly by the toggle mechanism, carrying the can supported on the wheel to a point where the lid makes physical contact with the resiliently mounted cutter blade 51. The resistance of the lid to being pierced forces the cutter blade 41 upwardly. The extension arm 53 and its attached knob 54 are correspondingly forced upward to where the knob raises spring 51*a* to move contact 56 against contact 57. This energizes the motor 42 which through the transmission system drives the can turning wheel 41 in a counterclockwise direction, as viewed in FIGURES 1 and 2. The counterclockwise turning of the can turning wheel rotates the can 43 into the left to right upwardly inclined edge of the blade 51, holding blade 51 at its limit of upward travel. At this stage of the operating sequence the can wheel toggle mechanism is in a position intermediate between that of FIGURE 1 and that of FIGURE 2. The continued turning of the can wheel wheel 41 under power from the motor 42 urges the can lid against the inclined edge of blade 51 with substantial force. The resultant torque impels the toggle mechanism to the fully extended position of FIGURE 2, whereby the can wheel is further raised, driving the can lid



further upward relative to blade 51, puncturing the lid, and establishing the cutting position. While bias leverage is provided by the weight of the handle 17, together with magnetic attraction between magnet 19 and the can lid, the power for puncture is supplied by the motor, hence the operation is fully automatic and independent of the operator, subsequent to starting the motor. During the cut, the handle 17 remains in the position shown by solid lines of FIGURE 3, the magnet 19 being against the lid to prevent same from dropping into the can after severance. As the can is rotated by the wheel 41, the resistance of the lid to the cutting action of the knife exerts a continued upward force against the inclined edge of the blade 51 to hold the blade at its uppermost position and keep the switch contacts closed.

Upon the lid being severed from the can, the upward force upon the cutter blade 51 is relieved and the blade with its carrier and associated extension arm and knob being so biased, move downwardly opening the switch mechanism and deenergizing the motor 42. Even after the motor stops, the opened can is still supported upon the can opener to be removed by first lifting the handle 17 to disengage the can bead from wheel 41 and the cutter blade.

FIGURES 8–11 illustrate an alternative embodiment in which the motor switch is operated by a means responsive to the downward pressure on the can turning wheel 41. The cutter blade 51 is immovably mounted. To this end the front plate 61′, corresponding to front plate 61 of the previous embodiment, has a boss 70 to which the cutter blade 51 is secured by screw 52. As in the initial embodiment, front plate 61′ is affixed to front panel 11′ by screws 62 and 63. Except as hereinafter described, front panel 11′ and front plate 61′ correspond to from panel 11 and front plate 61 of the embodiment of FIGURES 1–7. Neither the front panel 11′ nor the front plate 61′ have openings therethrough at the top, which in the initial embodement were provided for the passage of carrier 51*a*. Adjacent its bottom, front panel 11′ has two inwardly projecting arms 71 and 72. On the adjacent sides of these two arms are V grooves which define dovetail ways 73 and 74 respectively. A movable carrier generally 75 has two dovetail projections 76 and 77 received in ways 73 and 74 respectively for an approximately vertical movement in said ways.

Carrier 75 has a mounting flange 78 into which pivot screw 36 is threaded to pivotally mount toggle link 33. A second mounting flange 79 on carrier 75 serves as a support for motor 42. Bracket 42*a* of the motor is affixed to flange 79 by mounting screws 40. As in the previous embodiment, shaft 44 of the motor is mounted with its axis coaxial with the axis of pivot of toggle link 33 on screw 36. Bottom plate 81 of the carrier has a boss 82 extending downwardly therefrom. A corresponding boss 83 projects upwardly from the bottom of front panel 11. A compression spring 84 encircles bosses 82 and 83 and urges carrier 75 upwardly away from the bottom of the front panel 11′. An adjustable stop screw 85 (FIGURE 10) is threaded through a tapped opening in boss 83.

A snap-action switch, such as a microswitch, 86 is secured to arm 71 by an angle bracket 87. The two legs of the bracket are secured to switch 86 and arm 71 by screws 88 and 89 respectively. Means are provided for adjusting the vertical height of switch 86 as for example slot 90 in the leg of angle bracket 87 to which is affixed the switch 86. Switch 86 has an actuating plunger 91 positioned to contact carrier 75. Wires 58 and 59 are connected to switch 86 and in series with the motor 42 and the line cord (not shown). Switch 85 is normally closed and is opened when plunger 91 thereof is depressed (i.e. raised as viewed in the drawings).

Spring 84 is of sufficient strength to normally offset the downward forces thereon from the weights of the various parts affixed to carrier 75, etc., as well as to de-

press (or raise) plunger 91 of switch 86. When handle 17 is raised as illustrated in FIGURE 8, carrier 75 presses upwardly on plunger 91 to open switch 86 and deenergize motor 42. As was the case with the embodiment of FIGURES 1–7, a can whose lid is to be cut is positioned on can turning wheel 41. Handle 17 then is lowered toward the top of the can.

The initial downward movement of the handle 17 commences pivoting the adjacent ends of toggle links 33 and 34 toward the left in FIGURE 8, straightening the toggle. This initial movement of the toggle raises can turning wheel 41 to press the lid of the can against cutter blade 51. The downward pressure of cutter blade 51 on the lid of the can provides sufficient resistance to the further upward movement of can turning wheel 41 and the can so that the toggle forces carrier 75 downwardly compressing spring 84. As the carrier 75 releases plunger 91 of switch 86, the switch is closed to energize the motor. The energizing of the motor commences the rotation of can turning wheel 41 in a counterclockwise direction as viewed in FIGURES 8 and 9.

The initial rotation of the turning wheel 41, and the rotation of the can resulting therefrom, result in cutting blade 51 puncturing the lid of the can and thereafter the cutting of the lid as the can continues to rotate. At the time of puncturing, the toggle straightens out to its full length. This coupled with the fact that the continued rotation of the lid of the can into the inclined edge of the cutter blade applies a downward force to the can, the can turning wheel and the toggle results in the continued compression of spring 84. This maintains the carrier in the position illustrated in FIGURE 9, despite a slight upward movement of the can and drive shaft 38 upon the occurrence of puncturing. With carrier 75 depressed, plunger 91 of switch 86 remains released so that switch 86 continues to be closed and motor 42 energized.

When the lid is completely severed from the can, the downward force exerted by the inclined edge of cutter blade 51 no longer is present and spring 84 pushes carrier 75 upwardly a slight distance raising the toggle, the can turning wheel and can. The upward movement of carrier 75 depresses plunger 91 to open switch 86 and deenergize the motor. When the user is ready to remove the can, handle 17 is raised to separate the can turning wheel 41 from cutter blade 51 and allow the can to be withdrawn from therebetween.

Invention is claimed as follows:

1. A can opener comprising: a housing including a front panel having an elongated vertical slot therein; a cutter blade mounted on the outside of said panel above said slot; a shaft extending through and guided by said slot and guided by the housing for vertical movement in the slot; a can turning wheel secured to the outer end of said shaft, said can turning wheel being located behind and below said cutter blade; an operating handle pivotally supported on said panel on the upper portion thereof; a toggle joint assembly in said housing and including two end connections, one of which receives said shaft and the other of which is supported by the housing against substantial vertical movement, said handle being operatively connected to said assembly between said two ends to move the can turning wheel vertically in said slot in response to movement of the handle; and power means in said housing and connected to said shaft to impart a rotary movement to the can turning wheel.

2. A can opener in accordance with claim 1, wherein said toggle assembly includes a toggle pin between said ends and having an axis; said power means including an electric motor and speed reduction transmission means connected between said motor and said shaft to impart turning movement to said shaft and can turning wheel, said transmission means having an intermediate member rotatable about an axis coincident with the toggle pin axis.

3. A can opener in accordance with claim 2, wherein said toggle assembly includes two toggle links pivotally connected by said toggle pin, one of said links being pivotally mounted about said shaft at a point on the link spaced from said pin, the other link being mounted for pivotal movement about an axis at a point on the link spaced from said pin; said motor including a drive shaft rotatable about an axis coincident with said pivotal axis of the other link.



4. A can opener comprising: a housing; a carrier mounted within the housing for generally vertical movement; a can cutting means having an inclined cutting edge; a can rotating wheel; operating means connected to said wheel to rotate said wheel and to move said wheel away from and toward said cutting means to permit a can to be inserted therebetween when they are separated and to bring the cutting means and wheel into operative engagement with the can as they are brought together, said operating means including an electric motor connected to rotate the wheel in a direction such that the lid of the can is moved into the inclined cutting edge when the wheel and can are rotated to produce forces on the wheel and on the cutting means tending to separate the two, and a toggle joint connected to the wheel to move the wheel with respect to the cutting means; one of said means being connected to said carrier to urge said carrier in a given direction by said force; resilient means to urge said carrier in the opposite direction of said given direction while yielding to the movement in said given direction when said force is applied; and an electrical switch positioned to be actuated by the movement of the carrier, and connected to the motor to close the circuit to the motor when said carrier moves in said given direction.

5. A can opener comprising: a housing having a front with a slot therethrough, said slot being elongated in upwardly and downwardly directions; a rotatable shaft extending through said slot and guided by said housing for upward and downward movement; a can turning wheel affixed to the shaft and positioned outside the housing; means to support said shaft and wheel including a toggle joint within the housing and including two links, one link being pivotally mounted on said shaft, a pivot member forming a pivotal mounting for the other link, said two links being pivotally connected to each other at points thereon spaced from said shaft and from said pivot member, and operating means to move the links toward and away from alignment to move the shaft in the slot and to raise and lower the wheel; power means within the housing and connected to the shaft to rotate the shaft and the can engaged by the wheel in a given direction, said power means including an electric motor; a can cutting member in front of the housing and having an inclined cutting edge, said cutting member being positioned in juxtaposiiton to the wheel with the inclined cutting edge facing in the reverse of the given direction in which the can is rotated whereby the can in moving into the edge creates forces on the wheel and cutting member tending to separate the two; and carrier means within the housing and connected to one of said members, said carrier being movably mounted and adapted to yieldably resist the force applied to the member by the cam lid moving into said inclined edge; switch means operatively connected to the motor and to the carrier to close the circuit to the motor when said carrier yields to the application of said force.

6. A can opener as set forth in claim 5, wherein the can cutting member is connected to the carrier and the pivot member is fixed.

7. A can opener as set forth in claim 5, wherein the pivot member is connected to the carrier and the cutting member is fixed.

8. A can opener as set forth in claim 5, wherein the pivot member is spaced from the shaft and approximately directly below the shaft, and the toggle joint includes a third link pivotally connected to the first two links at the pivotal connection therebetween, said opener including an operating handle pivotally connected to the housing, and means connecting the handle and the third link to

move the first two links into and out of alignment with each other.

9. A can opener as set forth in claim 8, wherein the motor has a shaft coaxial with the axis of the pivot member, the power means includes an intermediate member connected to the links and rotatable about the pivotal connection therebetween, and means interconnecting said motor shaft and the intermediate member and the intermediate member and the shaft of the can turning wheel.

10. An electric motor powered can opener comprising: a housing with a front panel having an elongated vertical slot therein; a switch mechanism to control said electric motor mounted at the rear of said panel; an operating handle pivotally supported on the upper portion of said panel and including a crank portion; a slide plate vertically slidable on the rear side of said panel; a connecting member pivotally connected to the crank portion and plate to move the plate in response to movement of the handle; a first link pivotally connected at a lower end thereof to the rear side of said panel; a drive shaft extending through said slot for vertical movement therein; a can turning wheel secured to said drive shaft outwardly of said panel; a second link pivotally connected at the lower end thereof with the upper end of said first link, said second link having said drive shaft journaled in an upper end thereof; a third link pivotally connected to the first two links at the pivotal connection therebetween, said third link also being pivotally connected to said slide plate; a cutter blade mounted on said front side of said panel outwardly and above said can turning wheel, said blade cooperating with said can turning wheel to sever the lid from a can interposed therebetween as said can turning wheel and shaft are moved to an upper position in said vertical slot by said handle and the shaft is rotated; and transmission means connected between said motor and drive shaft to impart rotary movement to said can turning wheel upon said switch mechanism being closed to energize said motor.

11. An electrically powered can opener in accordance with claim 10 in which said cutter blade is resiliently mounted on said panel and said blade having attached thereto and extending rearwardly therefrom an extension arm to close said switch mechanism to energize said motor when the lid of a can to be opened exerts an upward force upon said blade.

12. An electrically powered can opener comprising: a housing having a front panel with an elongated vertical slot therein; an electric motor and a switch mechanism therefor mounted at the rear of said panel; a can turning wheel assembly extending through said slot with a can turning wheel outwardly of said panel, said assembly being movable vertically in said slot and being guided therein by said housing; a cutter blade resiliently mounted



on said panel above and in front of said can turning wheel; transmission means connected between said motor and said can turning wheel assembly to impart rotary movement to said wheel when said motor is energized; an operating handle pivotally supported on the upper portion of said panel; a toggle joint assembly connected between said handle and said can turning wheel assembly to move said can turning wheel assembly vertically as said handle is raised and lowered; and an extension arm extending inwardly from said cutter blade to close said switch mechanism to energize said motor as the said cutter blade is forced upwardly by the lid of a can to be opened.

13. An electrically powered can opener comprising: a housing having a front panel with an elongated vertical slot therein; an electric motor with a shaft and switch mechanism therefor mounted on the rear of said panel; a cutter blade resiliently mounted on the front upper portion of said panel above said slot; a drive shaft extending through and movable vertically in said slot; a can turning wheel secured to said shaft and positioned outwardly of said panel behind and below said cutter blade; an operating handle pivotally supported upon the upper portion of said panel; a toggle joint assembly connected between said handle and said drive shaft to move said can turning wheel vertically in said slot as said handle is raised and lowered, said joint assembly including an end connection, an end pivot and a center pivot therebetween, said end pivot being coaxial with the motor shaft, said end connection being connected to said drive shaft; transmission means connected between said motor and said drive shaft to impart rotary movement to said can turning wheel, said transmission means having an intermediate member thereof coaxial with the center pivot of the toggle joint assembly, a drive member on the motor shaft and a driven member on the drive shaft, said members being operatively connected; and an extension arm extending inwardly from said cutter blade to close said switch mechanism and energize said motor to turn said can turning wheel when the lid of a can to be opened exerts an upward force upon said cutter blade.


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WILLIAM FELDMAN, *Primary Examiner.*