Jan. 28, 1969 R. H. FROST ET AL 3,423,825

CAN OPENER

Filed Jan. 30, 1967 Sheet 1 of 3

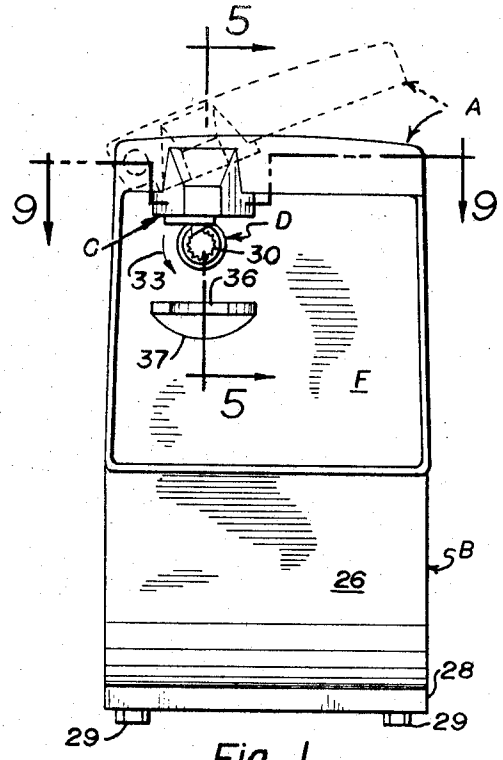


Fig. 1

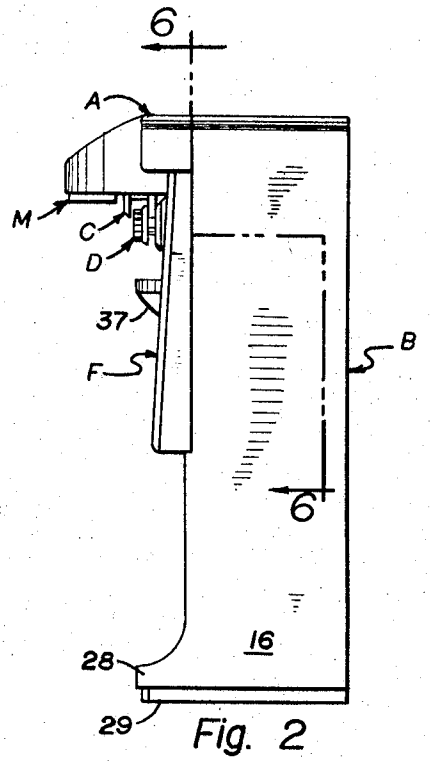


Fig. 2

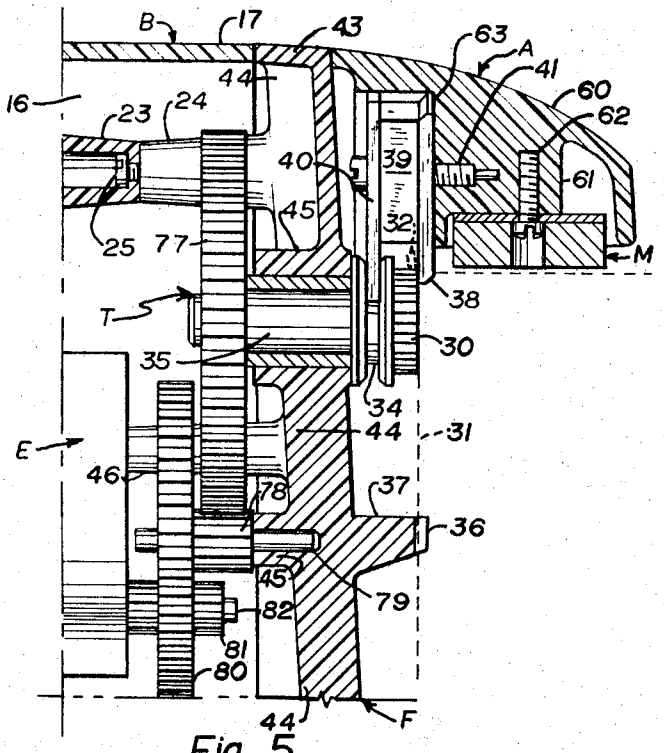


Fig. 5

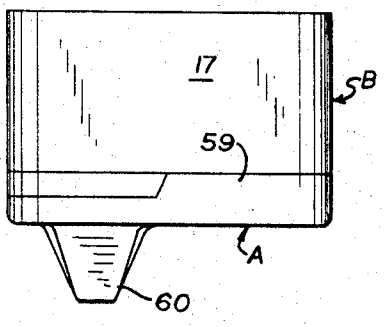


Fig. 3

INVENTORS
Richard H. Frost
John Maguire
BY Van Valkenburgh & Lowe
ATTORNEYS

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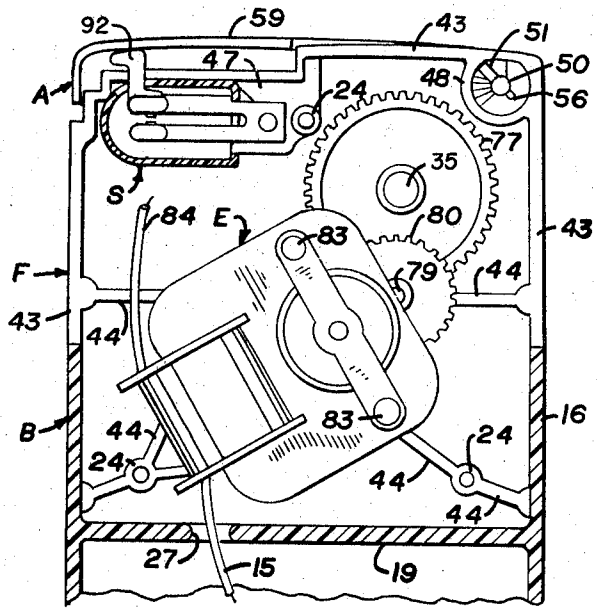


Fig. 6

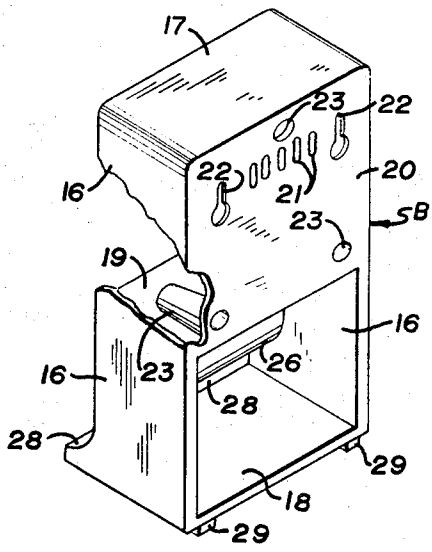


Fig. 4

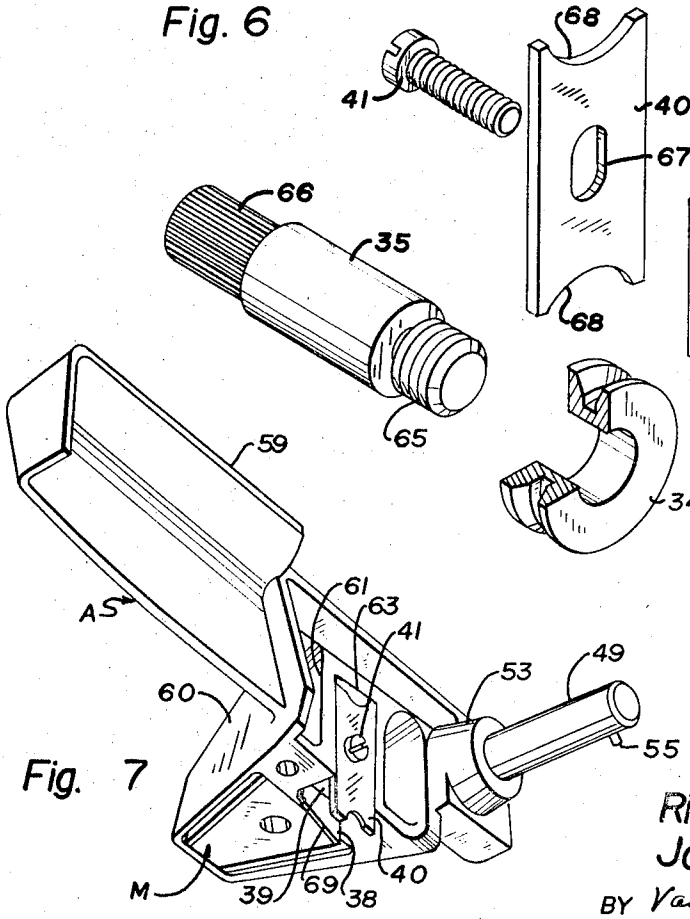


Fig. 7

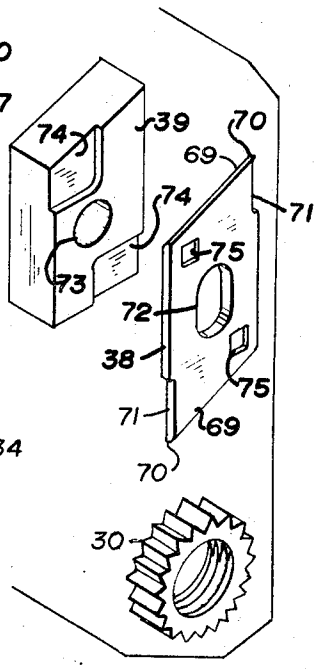


Fig. 8

INVENTORS
Richard H. Frost
John Maguire
BY Van Valkenburgh & Lowe
ATTORNEYS

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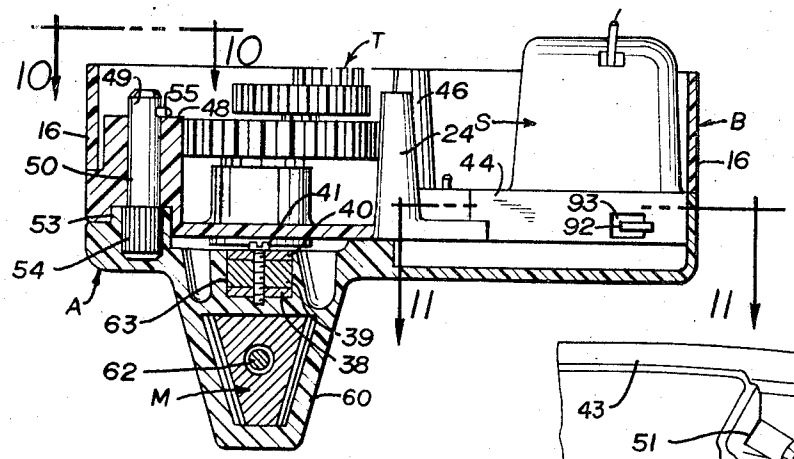


Fig. 9

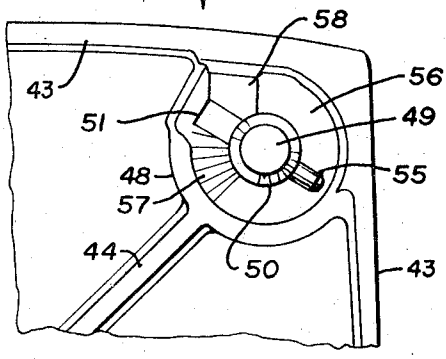


Fig. 10

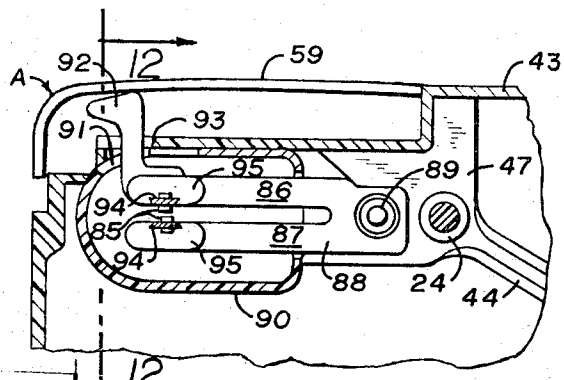


Fig. 11

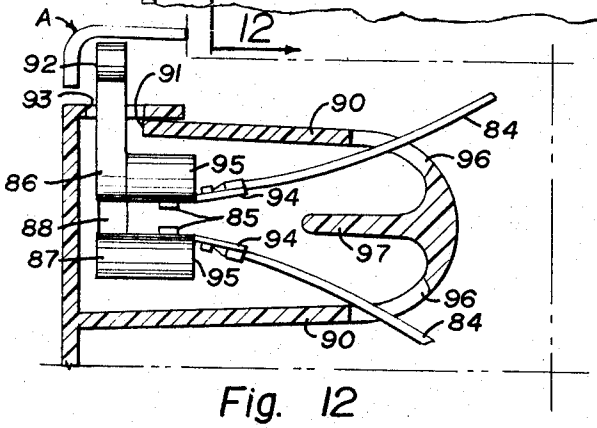


Fig. 12

INVENTORS
Richard H. Frost
John Maguire
BY Van Valkenburgh & Lowe
ATTORNEYS

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3,423,825

CAN OPENER

Richard H. Frost, 4900 Larkspur Blvd., and John Maguire, 6116 S. Longview, both of Littleton, Colo. 80120

Filed Jan. 30, 1967, Ser. No. 612,646
U.S. Cl. 30—4 7 Claims
Int. Cl. B67b 7/38, 7/34, 7/32

ABSTRACT OF THE DISCLOSURE

An improved can opener which includes a unitary body frame having a face plate mounted therein, which face plate carries the operative components. A driver head outstands from the face plate and includes a serrated roller adapted to grip the rim of a can and to turn the can as the head rotates. A lift arm pivotally secured to the face plate above the driver head carries a cutter head, having a reversible knife blade which pierces and cuts the can lid adjacent to the rim and alongside the roller, and a spacer, whose undersurface may press the can rim against the roller when the lift arm is lowered. The lift arm is removable without tools, to permit the cutter head to be cleaned. A circumferentially grooved guide wheel on the driver head adjacent to the roller is engaged by a guide plate on the cutter head when the arm is lowered to hold the knife alongside the roller. The driver head, mounted on a shaft, is connected, through a speed reducing gear train, to an electric motor carried within the shell. A magnet on the lift arm catches the severed lid. The motor is turned on by a switch carried by the face plate and having a finger contacted by the lift arm when it is depressed to a position where the cutter head and driver head are properly interengaged.

SUMMARY OF THE INVENTION

The invention resides in providing a semi-automatic can opener with a novel and improved arrangement of a cutter and driver adapted to more effectively grip the rim of a can, rotate the can as the rim is forcibly moved between the cutter and driver with the lid being severed therefrom. The invention further resides in a simplified arrangement of components to support, effect engagement of, and to drive these several operational members in an effective, positive manner, while reducing structural strain on the parts.

SPECIFICATION

This invention relates to can openers, and more particularly to semi-automatic, motor operated can openers, a primary object of the invention being to provide in a compact, well formed can opener improved cutter and driver arrangements which quickly remove the lid of a can without undue strain and wear to the components thereof.

Another object of the invention is to provide a novel and improved can opener adapted to effectively and tightly grip the rim bead of a can placed therein and to hold this bead against the serrated roller to produce a positive lid cutting action as the roller moves the rim of the can about the cutter and to retain an intermeshed arrangement of the components of a drive head and cutter head to offset lateral forces between the cutter knife and the roller without imposing lateral strains upon the framework of the can opener.

Another object of the invention is to provide a cutter head mounted on an actuating lever or arm without impairment of visibility in placing a can in position for the lid to be removed.

Another object of the invention is to provide such an arm which is removable without tools, to permit the cutter knife to be cleaned.

A further object of the invention is to provide an electrical drive whose operation is initiated by a switch means responsive to the cutter head and driving head being fully intermeshed and the can lid is pierced before such switch means is actuated.

Another object of the invention is to provide a simple, manually operative actuating arm adapted to be placed in position through an opening operation and to thereafter retain the can within the opener until it is released by the operator.

Another object of the invention is to provide a means and facility for holding the lid as it is removed from the can, without interfering with visibility in placing a can for removal of its lid.

Further objects of the invention are to provide a novel and improved can opener which is a simple, sturdy, low cost, neat appearing, rugged and durable unit.

With the foregoing and other objects in view, all of which more fully hereinafter appear, our invention comprises constructions, combinations and arrangements of parts and elements defined in the appended claims and illustrated in preferred embodiment in the accompanying drawings, in which:

FIG. 1 is a front elevation of a semi-automatic can opener constructed in accordance with this invention, with an actuating arm shown in a down position, as for a can opening operation, and with broken lines indicating the arm in an up position, as for release of the can or placement of another can in position for opening;

FIG. 2 is a side elevation of the can opener of FIG. 1;

FIG. 3 is a top plan view of the can opener of FIG. 1;

FIG. 4 is an isometric, rear view of a body shell per se of the can opener, with portions of a side wall broken away to show parts otherwise hidden from view;

FIG. 5 is a fragmentary, vertical section, taken along line **5—5** of FIG. 1 but on an enlarged scale and with the outline of a can being cut therein shown in broken lines;

FIG. 6 is a fragmentary, offset vertical section, taken along line **6—6** of FIG. 2, but on an enlarged scale;

FIG. 7 is an isometric, rear underside view of the actuating arm of the can opener of FIGS. 1 and 2, but on an enlarged scale;

FIG. 8 is an exploded isometric view of the components forming the driving and cutting heads of the can opener, on a larger scale than FIG. 7;

FIG. 9 is a fragmentary, offset horizontal section, taken along line **9—9** of FIG. 1, but on an enlarged scale;

FIG. 10 is a fragmentary rear elevation of an upper corner of a face plate, taken from the position of line **10—10** of FIG. 9, but on an enlarged scale;

FIG. 11 is a fragmentary, vertical section detail, taken along line **11—11** of FIG. 9, but on an enlarged scale, and showing the actuating arm in rest position; and

FIG. 12 is a fragmentary, vertical section taken transverse to FIG. 11 along line **12—12** of FIG. 11.

Referring more particularly to the drawings, the can opener of this invention is formed as an upright, box-shaped member which is of a size convenient for setting upon a drainboard or table to hold and open conventional sizes of cans. The basic members of this unit, as in FIGS. 1 and 2, include a body shell B and a face plate F mounted on the upper front portion of this shell, which face plate carries the several components which cooperate to form the can opener mechanism. A driver head D outstands from the outer surface of the face plate and is adapted to engage the rim of a can during an opening operation. An actuating arm A is pivotally connected to the top of the face plate F, at one side, while a cutter head C mounted on the arm is moved to an operatively associative position with the driver head D whenever the arm A is lowered against the top of the face plate. A

magnet M, also mounted on the arm, is adapted to grip and hold the lid of a can when severed from the can. As in FIG. 5, an electric motor E and gear train T are mounted on the inner side of the face plate to operate the driver head D, while a control switch S, as in FIG. 6, is mounted on the inner side of the face plate, near the top thereof, and is adapted to be closed by depressing the arm to start the motor when the can is ready to be opened. The motor is supplied with current through an electrical cord **15**, a portion of which is shown in FIG. 6 and which may be plugged in a conventional power outlet, it being anticipated that the motor and switch will be designed to operate by any conventional source of electrical power.

The body B, as in FIGS. 2, 4, and 6, is formed as a unitary shell of suitable thickness, as of molded plastic, to provide a rigid structure, with uninterrupted side walls **16**, a top **17**, a bottom **18** and an intermediate shelf **19** dividing the body into upper and lower compartments. The upper compartment is open at the front to receive the components mounted on the inner side of the face plate F of FIGS. 1 and 2, with the edges of this frontal opening being proportioned to fit snugly against the rear edges of the face plate. A rear wall **20** closes the rear of the upper compartment and is provided with suitable vents **21** and conventional slots **22** for hanging the can opener on screws extending from a room wall or cabinet, as well as a series of forwardly projecting, hollow bosses **23** which abut rearwardly extending, end tapped bosses **24** on the face plate, as in FIG. 5, to interlock the members together, as by machine screws **25** extending through and into the respective bosses. The lower compartment, below the intermediate shelf, is closed by a lower front wall **26** but is open at the rear. The lower compartment is adapted to conveniently retain electrical cord **15** when the unit is not in use, the cord extending upwardly through a suitable opening **27** in the intermediate shelf, to connect with the switch S and motor E in a conventional manner. The base of the body may also be formed with a frontal toe **28** and feet **29** to better stabilize the unit and to enhance its appearance.

In accordance with this invention, the driver head D, as in FIG. 5, includes a knurled or circumferentially serrated drive roller **30** for rotating a can **31** through engagement with the underside of the can rim **32**, as with the roller **30** rotating in the direction of arrow **33** of FIG. 1. Both roller **30** and a grooved guide roller **34** are mounted on the end of a shaft **35**, driven by gear train T, while the side of the can engages a concave or flat front surface **36** of a boss **37** extending outwardly from face plate F. The can lid is severed by a plate knife **38**, the details of the preferred construction of which will be described later, while knife **38**, a spacer block **39** and a knife guide plate **40** are mounted on arm A, as by bolt **41**, with magnet M mounted on the underside of arm A in front of knife **38**, in a position to attract and hold the can top when severed. As will be evident, with arm A in the lifted or dotted position of FIG. 1, the can may be moved directly toward the can opener and can rim **32** placed on top of driving roller **30**, without twisting the can or inserting it under the knife or any other complicated maneuver. When arm A is in the lifted position, neither the can nor the knife or magnet mounted thereon impede the visibility of the drive roller **30**. When the can is so placed, the rear side of the can is almost automatically pushed against surface **36** of boss **37**, so that the arm A can then be lowered and knife **38** pushed through the can top by downward pressure. As soon as the can lid is pierced by the knife, the arm A will close switch S to start motor E and start drive roller **30**, thereby starting the can turning. However, before the switch is closed, guide plate **40** will have entered the groove of guide roller **34**, to insure that, as the can top is pierced, knife **38** will be restrained from any movement outwardly or away from drive roller **30** and this restraint will continue as the can lid is cut. Thus, the cut will be made immediately inside the can rim and maintained immediately inside the can rim around the periphery of the can lid. When the cut is completed, arm A is raised, as to the dotted position of FIG. 1, and the opened can removed by moving it forwardly, without the necessity of twisting the rim out of any closely spaced parts. The severed can lid, adhering to magnet M, may be removed and discarded when desired.

The face plate F is a comparatively heavy, rigid member formed with a peripheral, rearwardly extending flange **43** to increase its thickness and rigidity, as in FIG. 6. The rear edge of this flange is adapted to abut against the front edge of the frontal opening of the body shell B. Ribs **44** extend across the inner side of the face plate to further enhance its rigidity, connecting with the rim and mounting bosses **24**, as well as shaft bosses **45** and a motor mounting boss **46** of FIG. 5, all of which outstand from the inside of the face plate. In addition, an elongated boss **47** may be formed at one upper corner of the inner wall of the face plate, as in FIGS. 6 and 11, for mounting the switch S, while a heavier boss **48** may be formed at the opposite upper corner of the face plate, as in FIGS. 9 and 10, for a pivot shaft **49** of arm A. A transverse hole **50** and merging slot **51** extend through boss **49** for a purpose described later. One corner of the face plate, shown at the upper left in FIG. 6 just above switch S, is offset to accommodate a portion of arm A when overlying the face plate, so that the top surface of the arm may be flush with the top edge of the face plate when arm A is in the rest or dotted position of FIG. 6.

The lift arm A of FIG. 7 is formed as a rigid member adapted to lie transversely across the top portion of the face plate, as in FIG. 1. A boss **53** formed at an inner corner is socketed to carry the transverse mounting shaft **49**, which fits in the hole **50** in the face plate F. The front side of the face plate F is inset about the hole **50**, as in FIG. 9, to receive the boss **53**, so that the projecting end of the boss **53** contacts the shoulder so formed, to hold the arm A at a selected position in front of the face plate. Outer end **54** of shaft **50** is enlarged and knurled so as to be attached securely to arm A, as when molded therein, while the inner end is provided with a transverse pin **55** which holds shaft **49** and arm A securely by bearing against the arcuate, planar inner surface **56** or shoulder of boss **48**, as in FIG. 10. Slot **51** is sized to receive the lock pin **55** when the arm A is rotated to register the pin with the slot. Accordingly, the arm A is connected to and disconnected from the face plate, without tools, by inserting or retracting the shaft **49** in hole **50** with pin **55** moving through slot **51**. The slot **51** is oriented to require such connection or disconnection of the arm with the face plate when the arm is about 180 degrees out of its normal position over the face plate, so that when the arm is in its normal position, the pin engages the inner shoulder **56** of the boss and even when the arm is lifted through an arc of as much as 90 degrees, the pin will remain in engagement with the shoulder of the boss, as will be evident from the position of pin **55** in FIG. 9, which corresponds to the raised or dotted line position of FIG 1. When the arm is raised above this position, however, the pin will move around to an inclined, slight cam-like surface or ramp **57** on the boss, leading to the slot, which frees the arm and permits the arm to be removed from the unit, as for cleaning cutter head C, through removal of the arm by pulling shaft **49** through hole **50** with pin **55** in slot **51**. When the arm is replaced, engagement of pin **55** with cam surface **57** will pull the arm against the face plate as it is lowered onto the top of the face plate. A rearwardly extending stop **58**, on the opposite side of slot **51** from ramp **57**, prevents arm A from being turned in the wrong direction after pin **55** is inserted through slot **51**.

The handle portion of arm A, at the end opposite shaft **49**, and as in FIG. 7, is formed with a top flange **59** which is adapted to overlie the top of the face plate F, within the offset thereof previously mentioned. When lowered, the flange **59** contacts switch S to start operation of the can opener, as will be hereinafter described. The arm A also includes a rigid, outstanding wing **60**, at an intermediate position, and having a central rib **61**, as in FIG. 5, on the underside of which magnet M is mounted, as by a cap screw **62**, the wing also having a rear, rectangular socket **63** in which the cutter head C is mounted, as in FIGS. 5 and 9.

The components forming the driver head D, shown in FIG. 8, are mounted upon the drive shaft **35**, through the outer end **65** of the shaft being threaded and drive roller **30** being internally threaded, as shown, to secure both guide roller **34** and drive roller **30** to the shaft, the guide roller having a bore to clear threads **65**. Drive roller **30** may be formed integrally with guide roller **34**, if desired, as for simplicity in manufacture. The direction of threads **65** is such that the threads will be tightened when turned in the direction of arrow **33** of FIG. 1, i.e. when shaft **35** is rotated. Inner end **66** of drive shaft **35** may be knurled, for a press fit in a gear of gear train T. Guide plate **40** has a central slot **67** for adjustment on bolt **41** to properly engage the circumferential groove of the guide roller **34**, while each end **68** of the guide plate is arcuate and concave, not only to conform with the curvature of the guide roller **34** within the groove thereof, but also to permit the guide plate to be reversed in position, should one end become worn. Both ends of knife **38**, for similar reversibility, have an inclined cutting edge **69** having a can lid piercing point **70** laterally inclined through a notch **71** which is formed, as by grinding, at a slight angle to the central axis of the knife. Knife **38** is also adjustable upwardly and downwardly through a central slot **72**. Spacer **39** has a thickness to permit a precise positioning of the knife plate **38** alongside the face of the drive roller **30** when the guide plate **40** is within the groove of the guide roller, having a central hole **73** for bolt **41** and diametrically opposed, corner notches **74** which receive correspondingly positioned lugs **75**, struck from the side of knife **38** shown in FIG. 8 but extending from the opposite side, to facilitate holding the cutter head assembly in position.

The driver head D is driven by the motor E having its speed reduced by the gear train T, so that the driver head shaft **35** rotates at a comparatively slow speed and with a high torque. The gear train T is a simple arrangement, as in FIG. 5, including a drive gear **77** mounted on the inner end of drive shaft **35** and meshing with a pinion **78** mounted upon an intermediate shaft **79** carried in a boss **45** of the face plate. An intermediate gear **80** may be formed integrally with pinion **78** or mounted to rotate together on the same shaft, to mesh with a pinion **81** on the drive shaft **82** of the motor. The motor is one of any of a number of conventional types suitable for the purpose at hand and is mounted upon the face plate by screws **83** of FIG. 6, extending through the motor and connecting in the motor support bosses **46**.

The leads of the motor are connected respectively to one of wires **84** of FIG. 12 and to one wire of the electrical cord **15**, heretofore mentioned, which connects with a power source, and which is connected with the control switch S. The other wire **84** of FIG. 12 is the opposite wire of cord **15**, or extends from a connection of such opposite wire with one wire of cord **15** at motor E. Thus, wires **84**, as in FIG. 12, terminate at contacts **85** within the switch S, which are closed when it is desired to close the circuit and start the motor. The switch S, as in FIGS. 11 and 12, is a fork-like member formed of a rigid but resilient, synthetic resin which is also a non-conductor, and includes arms **86** and **87** extending from a base **88** attached to an integral stud **89** extending from boss **47**, as by a snap ring or a threaded collar formed of insulating material. Boss **47** may also conform to the shape of base **88**, as shown, to hold the base against turning. Arms **86** and **87** extend into and are enclosed by a housing **90**, formed of a suitable non-conducting material and attached, as by cementing, to the rear side of face plate F and also, if desired, to the underside of the top flange of the face plate. Housing **90** is provided with a slot **91** through which a finger **92** extends upwardly from arm **86**, as well as through a corresponding slot **93** in the upper flange of face plate F, shown also in FIG. 9. Finger **92** extends upwardly a sufficient distance above the face plate flange to engage the flange **59** of the lift arm A and maintain arm A in its rest position, shown in FIG. 11. When the arm A is lifted to the dotted position of FIG. 1, a can is placed in position, and arm A is then pushed downwardly to pierce the can top, finger **92** will be moved downwardly to flange **59** to overcome the resilience of upper switch arm **86**. Switch contacts **85** are mounted by clips **94** which are connected to wires **84** and mounted in correspondingly shaped slots in the opposing faces of blocks **95** which extend laterally from the respective arms **86** and **87**. As in FIG. 12, switch housing **90** is provided with slots **96** for the wires **84** and a central rib **97** as a separator for the wires.

When finger **92** is pushed down by arm flange **59**, this flexes the upper arm **86** sufficiently to engage the switch contacts **85** and then cause both switch arms to flex downwardly with a wiping action between the switch contacts, due to a small lateral shifting between the contacts when the legs are being flexed. This flexing action of both switch arms permits a variation in the positioning of the arm A when a can is being opened, such as might occur through variations in the thickness of different can rims and variations in the structure of the rim of any given can. Also, the slight wiping action between the switch contacts will tend to keep the contacts clean and minimize pitting, ordinarily caused by arcing between contacts whenever a switch is opened.

Although this invention has been illustrated and described in preferred embodiment, it will be understood that other embodiments may exist and that various changes may be made, all without departing from the spirit and scope of this invention.

What is claimed is:

1. A can opener having means for supporting:

a drive roller mounted for rotation about a generally horizontal axis and adapted to engage the underside of the rim of a can placed against said drive roller;

means for rotating said drive roller;

an arm mounted for movement between a first position adjacent said drive roller and a second position above said drive roller;

knife means mounted on said arm for piercing the top of said can and for severing said can top as said can is rotated by said drive roller, said knife means including a reversible blade having at each end a slanting cutting edge and a piercing point at one end of said cutting edge;

a guide plate mounted on said arm and extending downwardly therefrom adjacent said knife;

a guide roller mounted for rotation with said drive roller and engaged by said guide plate, when said knife means is moved downwardly to pierce said can top, said guide plate being reversible and each end being concave and arcuate to fit within a circumferential groove of said guide roller; and

a spacing block between said knife blade and said guide plate provided with a notch at a pair of opposite corners, said knife blade being provided with a pair of laterally extending lugs disposed in position for engagement with the corresponding notch of said spacing block.

2. A can opener having means for supporting:

a drive roller mounted for rotation about a generally horizontal axis and adapted to engage the underside of the rim of a can placed against said drive roller;
means for rotating said drive roller;
an arm mounted for movement between a first position adjacent said drive roller and a second position above said drive roller;
knife means mounted on said arm for piercing the top of said can and for severing said can top as said can is rotated by said drive roller;
means for connecting said arm to said support means for said movement between said first position adjacent said drive roller and said second position above said drive roller and for additional movement in a direction away from said first position to a third position spaced from said second position; and
means carried by said support means for cooperation with said connecting means for maintaining said arm adjacent said support means during such movement between said first, second and third positions but permitting said arm to be removed from said support means and to be replaced in said support means solely by manual movement of said arm when in said third position.

3. A can opener, as defined in claim 2, wherein:
said arm is provided with a pivot shaft at one end thereof; and
said shaft is provided with a laterally extending pin for holding said arm to said supporting means.

4. A can opener, as defined in claim 3, wherein:
said supporting means is provided with a hole through which said arm shaft is insertable and a slot alongside said hole through which said pin is insertable; and
a boss at the rear edge of said hole for engagement with said pin to hold said arm to said supporting means.

5. A can opener comprising:
a hollow, upstanding body having side walls and an upper compartment open at the front;
a face plate attached to said body and closing the front of said upper compartment;
an exposed drive roller for engaging the underside of the rim of a can mounted on a shaft extending through said face plate;
means mounted on the rear side of said face plate for driving said drive roller shaft;
an arm mounted on said face plate for movement to a lower position adjacent said drive roller and to an upper position above said drive roller;
knife means mounted on said arm and having a cutting edge depending from said arm for movement to a position disposed closely adjacent said roller, for piercing and then severing the lid of a can rotated by said drive roller;
a shaft on which said arm is pivotal, said shaft extending through a hole in said face plate;
means on the inner end of said shaft for retaining said arm in position during movement between said upper and lower positions; and
means associated with said hole in said face plate for permitting removal of said shaft from said face plate and replacement of said shaft solely by manual movement of said arm when the arm is in a position spaced from each of said upper and lower positions.

6. A can opener, as defined in claim 5, wherein:

said arm shaft retaining means comprises a laterally extending pin at the inner end of said shaft;
said face plate is provided with a slot alongside said hole, for insertion or removal of said shaft, with said pin moving through said slot; and
said face plate is provided at the rear thereof with a boss at said hole and having a shoulder for engaging said pin to retain said arm during movement of said arm between said upper and lower positions, said shoulder being spaced from said slot and said boss having a ramp extending between said slot and said shoulder, said slot being positioned so that said arm is movable to a higher position than said upper position, for removal of said arm.

7. A can opener having means for supporting:
a drive roller mounted for rotation about a generally horizontal axis and adapted to engage the underside of the rim of a can placed against said drive roller;
means for rotating said drive roller;
an arm mounted for movement between a position adjacent said drive roller and a position above said drive roller;
knife means mounted on said arm for piercing the top of said can and for severing said can top as said can is rotated by said drive roller;
said arm being provided with a forwardly extending wing disposed above said drive roller, said wing having a rectangular socket on the rear side;
said knife means including a rectangular blade having a slanted cutting edge at each end for reversibility;
a rectangular, reversible guide plate having concave, arcuate ends disposed rearwardly of said knife in said socket;
a spacing block disposed between said knife blade and said guide plate, said knife blade and said spacing block having interfitting means to maintain said knife blade in position;
removable attaching means extending through said guide plate, said spacing block and said knife blade and into said wing for holding said guide plate, block and knife blade in said wing; and
a guide roller having a circumferential groove engaged by said guide plate, when said arm is moved downwardly, and mounted on a shaft adjacent said drive roller to maintain the relative position of the drive roller and knife blade during the severing operation.

References Cited

UNITED STATES PATENTS

2,883,745	4/1959	Bristol	30—4
1,826,324	10/1931	Ormsby	30—15
3,254,406	6/1966	Hubrick	30—4
3,002,274	10/1961	Jepson et al.	30—4
2,017,829	10/1935	Cave	30—8.5
3,018,549	1/1962	Spielman	30—4
3,031,751	5/1962	Hart	30—4
1,986,870	1/1935	West	30—15.5

ANDREW R. JUHASZ, *Primary Examiner.*

G. WEIDENFELD, *Assistant Examiner.*

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