Dec. 19, 1967 R. K. CARLSON ET AL 3,358,365

CONTAINER OPENER

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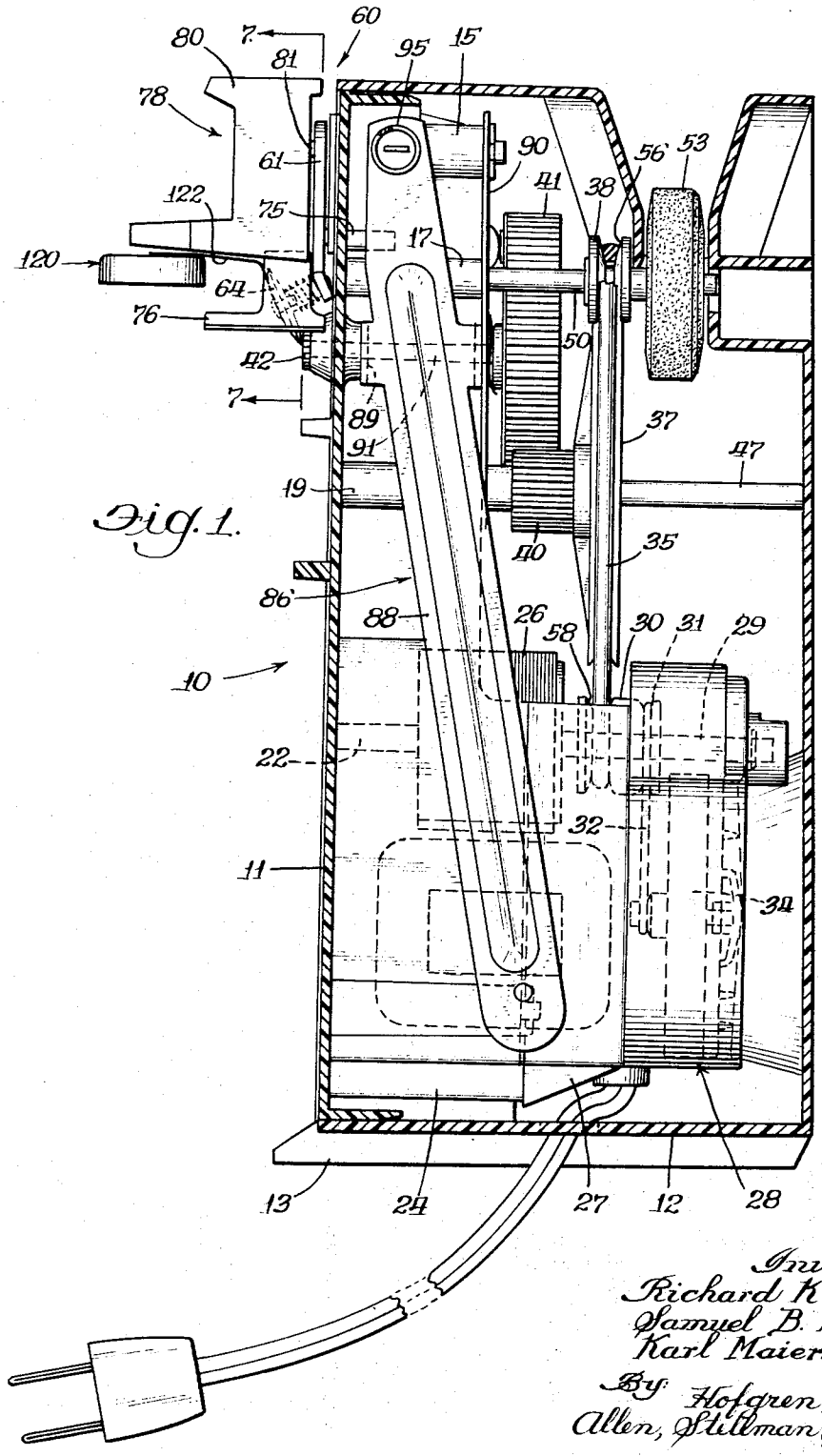

Fig. 1.

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By: Hofgren, Wegner, Allen, Stellman & McCord
Attys.

Fig. 2.

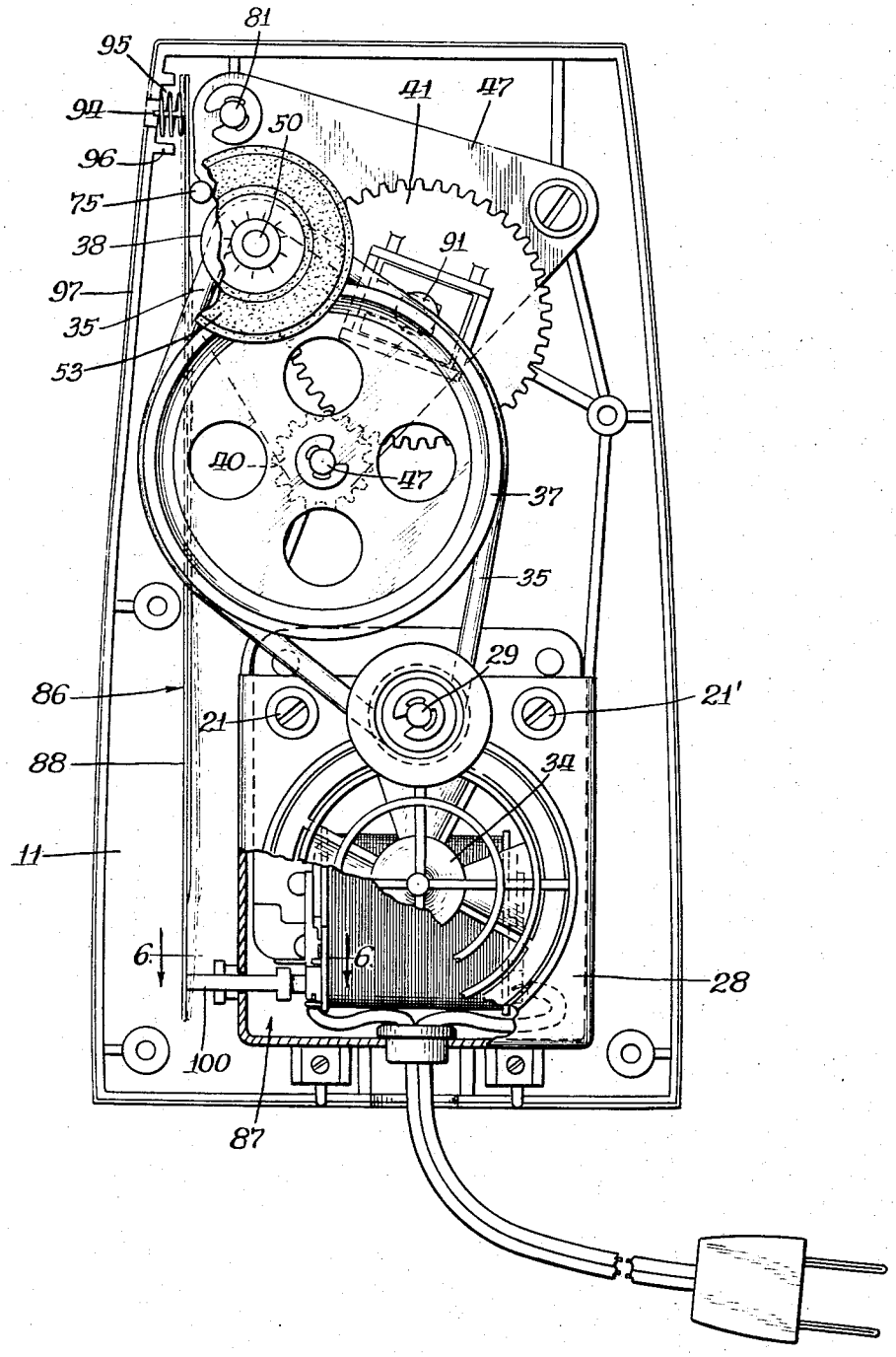
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Fig. 3.

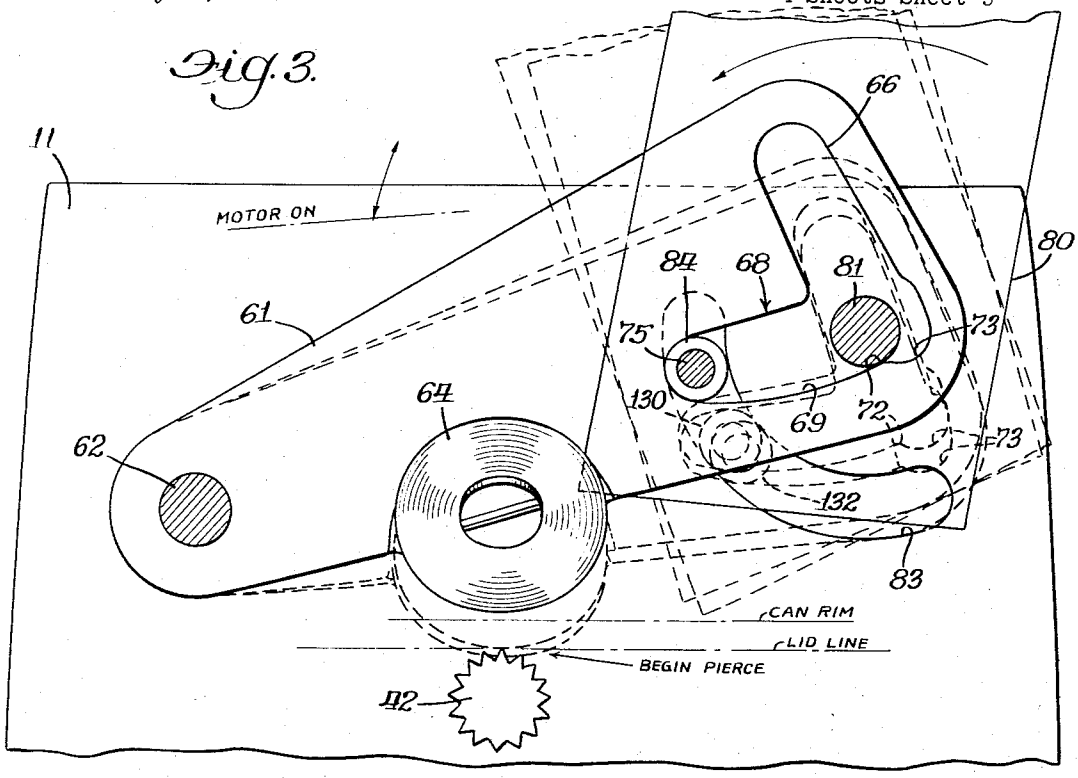
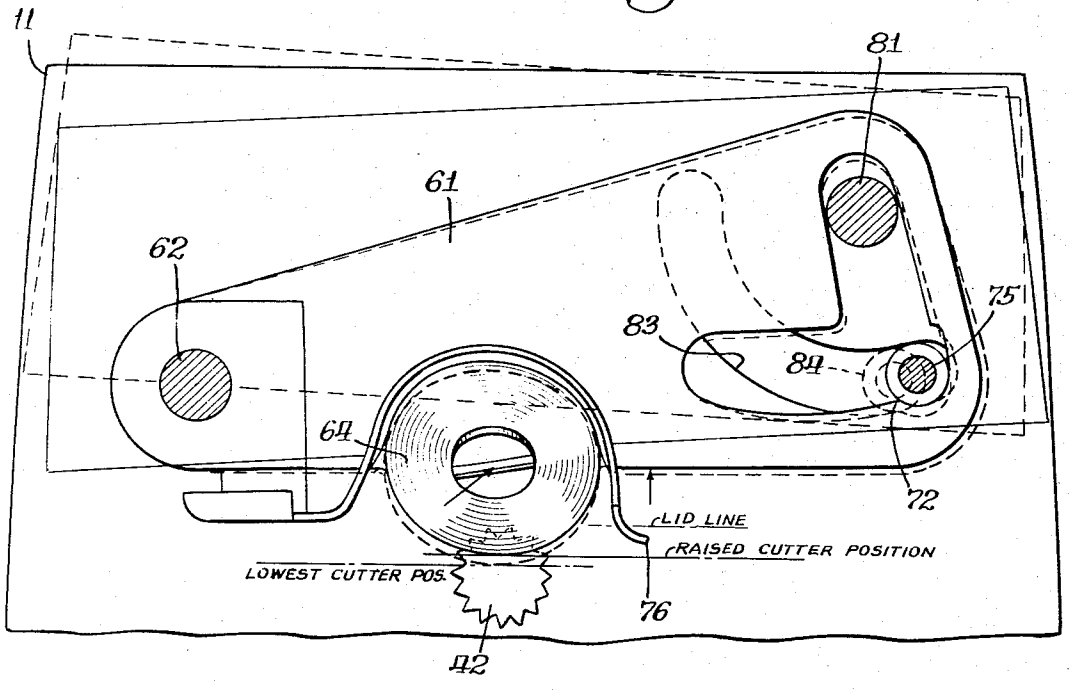


Fig. 4.



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CONTAINER OPENER

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Fig. 5.

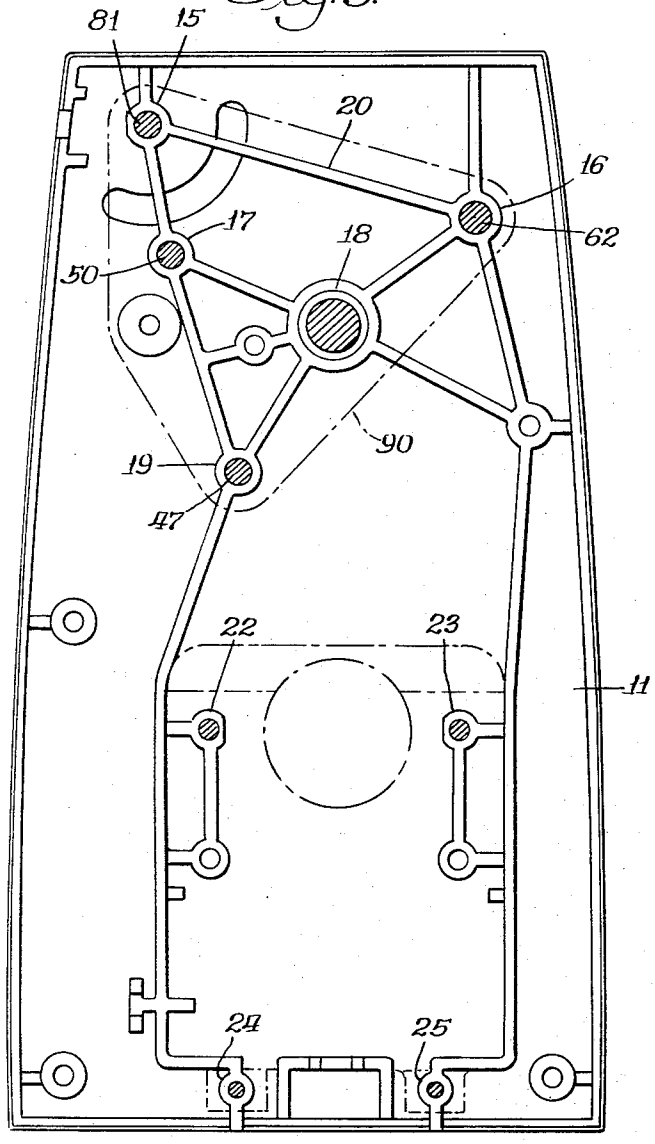


Fig. 6.

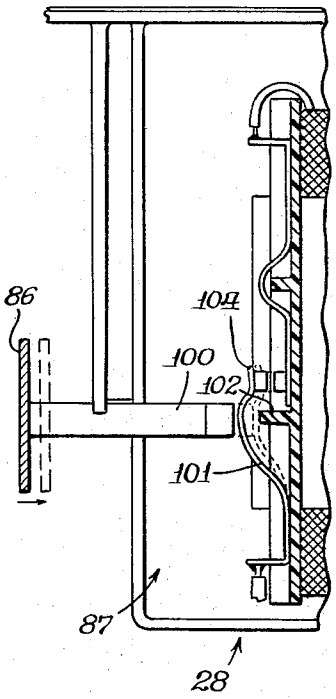
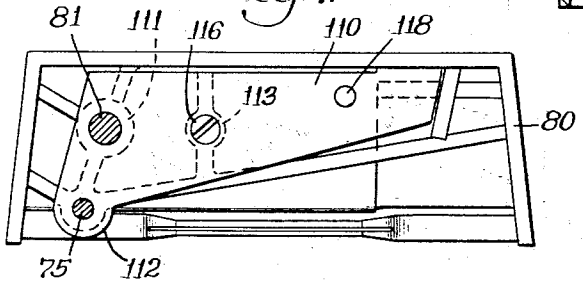


Fig. 7.



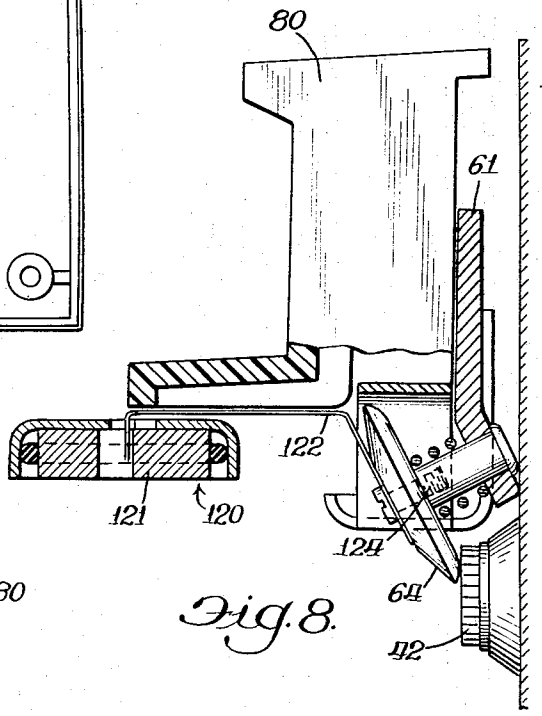


Fig. 8.

United States Patent Office 3,358,365 Patented Dec. 19, 1967

3,358,365

CONTAINER OPENER

Richard K. Carlson, Chicago, Samuel B. McMaster, Deerfield, and Karl Maiershofer, Park Ridge, Ill., assignors, by direct and mesne assignments, of one-half to Cory Corporation, a corporation of Delaware, and one-half to Universal Tool and Manufacturing Corporation, Chicago, Ill., a corporation of Illinois

Filed July 12, 1965, Ser. No. 471,155
24 Claims. (Cl. 30—4)

This invention relates to container openers and more particularly to a motor driven container opener of the type which drives a can in rotation while severing the lid from the can.

In the past, can openers of this general type have been provided with means for automatically starting rotation of the can feed wheel preparatory to cutting and for automatically stopping the can feed wheel after the lid is severed. However, these prior devices have the serious disadvantages of necessitating many complicated parts and in some instances can sensing projections outside the can opener housing where they may be misaligned during use. Furthermore, some prior automatic can openers employ switches remotely positioned from the electric drive motor for energizing the motor. The type of switch required in a remote location is rather expensive and has the further disadvantage that it does not compensate for manufacturing errors in the switch actuating mechanism so that the feed drive motor will not start and stop rotation of the feed wheel at the proper times. Another problem in these prior electric can opening devices, is that they require expensive cast metal chassis or frames to support the operating elements of the opener. While plastic face plates and cover members for the metal frames have been provided in the past, a metal frame was required to support the operating elements.

According to the present invention, a pivotally mounted cutter carrying plate is provided which is cammed to the cutting position by an operating handle. The handle is constructed to first pivot the plate and cutter downwardly piercing the can and then permit the cutter to retract a short distance under the influence of the cutting forces on the cutter. Before the plate is moved upwardly the motor is automatically energized in response to the position of the operating handle. A spring continuously urges the handle, and indirectly the cutter, away from the cutting position so that when the cutting forces cease upon severance of the can the cutter drops slightly permitting the spring to rotate the operating handle away from the cutting position which serves to deenergize the feed drive motor. This construction provides a new and simplified container opener heretofore unknown in the art.

Further, according to the present invention a flexible contact switch is provided adjacent the electric drive motor rather than remotely spaced therefrom as in prior art devices. This permits the use of a less expensive switch construction. An elongated pivotally mounted flexible actuator driven by the operating handle, when it is near the cutting position, permits accurate switch actuation without post-assembly adjustment even under rather loose manufacturing tolerances.

Another feature of the present device is that the operating elements of the can opener are mounted in a plastic chassis or frame member. As noted above heretofore known can opening devices include a metal frame member as the less expensive plastic materials were thought inadequate to provide the necessary support for the operating elements. However the present inventors have found that by providing integral, elongated bosses in the non-metallic frame for the various operating shafts and pivots with a relatively thin metal plate fixed to the

end of the bosses that the operating shafts could be adequately supported by mounting them both in the plastic bosses and in the metal plate. In this manner the radial forces on any one shaft are transferred and distributed across the plate to the other shafts or pivots thereby providing a strong and rigid structure.

It is therefore a primary object of the present invention to provide a new and improved can opener of the type described in which a pivotally mounted cutter carrying plate, the position of which is responsive to the cutting forces, energizes the drive motor to begin the cutting operation and deenergizes the drive motor when the lid is severed.

A further object of the present invention is to provide a new and improved electric can opener of the type described immediately above wherein a pivotal manual handle having a camming pin is provided to cam the cutter carrying plate into position. The cam pin is resiliently biased away from the cutting position by a spring and biased towards the cutting position by the cutting forces through the cutter plate. Upon lid severance the cutter carrying plate drops permitting the pin to move the influence of the spring thereby deenergizing the feed wheel drive motor.

Another object of the present invention is to provide a new and improved electric can opener of the type described above which employs a non-metallic main frame member to support the operating elements of the can opener in a less expensive manner than heretofore known in the prior art.

A further object of the present invention is to provide a new and improved electric can opener of the type described above which includes a flexible actuator for remotely closing the motor switch contacts in a manner to accurately time the opening and closing of the contacts even under rather loose manufacturing tolerances in the actuating mechanism.

A still further object of the present invention is to provide a new and improved electric can opener of the type described above in which the electric motor is mounted directly on a plastic main frame member in a manner heretofore unknown in the prior art. An extensible drive belt is provided between the drive motor and the can rotating feed wheel so that inaccuracies in the non-metallic frame member will not affect the drive torque to the feed wheel. An ancillary object relating to the feed wheel drive is the provision of pulleys having convex driving surfaces so that belts of varying diameter may be employed effectively to transmit torque from the electric motor to the feed wheel.

Another object of the present invention is to provide a new and improved electric can opener of the type described immediately above in which the electric motor driven belt drives an abrading wheel for use as a knife sharpener. The abrading wheel is mounted on a shaft carrying a similar pulley with convex drive surfaces to compensate for varying belt widths and belt wear.

Other objects and advantages will be readily apparent from the following detailed description taken in connection with the accompanying drawings, in which:

FIG. 1 is a cross-section of the present can opening device;

FIG. 2 is a rear elevation of the present can opening device with the cover member removed.

FIGS. 3 and 4 are schematic illustrations of the cutter carrying plate in various positions during the can opening cycle;

FIG. 5 is a rear elevation of the plastic main frame member;

FIG. 6 is a fragmentary cross-section taken generally along line 6—6 of FIG. 2 showing the motor switch;

FIG. 7 is a rear elevation of the operating handle taken generally along 7—7 of FIG. 1; and

FIG. 8 is a fragmentary elevation, partly in cross-section, showing the cutter and lid magnet.

Referring to FIGS. 1 and 2, the electric can opener generally designated by the numeral **10** is seen to include a generally vertical frame member **11** supported within a one-piece cover member **12** having supporting feet **13** thereon. The main frame member **11** is preferably injection molded of a suitable plastic such as polystyrene. The frame member **11** has a plurality of rearwardly projecting bosses **15, 16, 17, 18** and **19** integral therewith connected by integral support webs **20** as shown more clearly in FIG. 5. The ends of the bosses **15** to **19** lie in a common plane substantially parallel to the forward face of frame member **11**. Extending from the lower portion of the frame member **11** are a plurality of motor mounting bosses **22, 23, 24** and **25**. Bosses **22** and **23** directly abut one side of the motor stator plates of the electric motor **28** and receive fasteners **21** and **21'** extending therethrough. Bosses **24** and **25** abut the motor housing flanges **27**. Suitable fasteners in the mounting flanges **27** extend into the bosses **24** and **25** and are supported therein.

Electric motor **28** has a drive shaft **29** which receives a pulley **30**, preferably constructed of a plastic such as nylon, fixed thereto by suitable means (not shown). Pulley **30** has a first drive groove **31** which receives a belt **32** for rotating a cooling fan **34** for the motor.

Pulley **30** also receives an elastic flexible O-ring **35** which engages and drives a feed wheel pulley **37** and an abrading wheel pulley **38**. The feed wheel pulley **37** has an integral gear **40** which drives a feed gear **41** which in turn is connected to drive the can rotating feed wheel **42**.

Pulley **37** is rotatable on shaft **47** which is mounted in projecting boss **19**. Pulley **38** is rotatably mounted on shaft **50** which is in turn mounted in boss **17**. A knife sharpening abrading wheel **53** is fixed to the projecting end of pulley **38** so that when the motor **28** is energized, the knife sharpening wheel will rotate.

As the frame **11** is injection molded of a suitable plastic material, it is difficult to maintain an accurate location of the motor mounting bosses **22** to **25** with respect to the abrading wheel and feed pulley bosses **17** and **19**. These production variations would ordinarily result in wide variations in the transmission efficiency if a common gear train were employed. In the present device, the elasticity of O-ring **35** compensates for these variations as it is stretchable and can accommodate for variations in shaft locations while maintaining a substantially constant transmission efficiency.

The pulleys **30** and **38** are designed to accommodate O-rings of a varying cross section. It is desirable to have steep sides on the pulleys to provide the necessary wedging action on the O-ring to transmit the necessary drive torque without slippage. With conventional flat sided pulleys with steep sides, it is possible to achieve the necessary wedging action but the effective radius of the belt on the pulleys varies significantly thereby changing the drive ratio. For a given nominal size O-ring, the actual cross section of the ring will vary from ring to ring because of manufacturing tolerances. Furthermore, the cross section of the O-ring may diminish after use as a result of wear. In the present device the sides of pulleys **30** and **38** have an increasing slope so that even with O-ring variations, the ring will be wedged securely between the sides without slipping and without significantly changing the mechanical advantage of the drive. As the pulleys are called upon to supply more torque, the ring is drawn into a steeper sided portion of the pulley so that it does not slip. The ring engaging surfaces on pulley **38** and the ring engaging surfaces **58** on pulley **30** are convex in any radial plane to provide this increasing slope so that a relatively large variation in belt cross section will not significantly change the effective radius of the belt on the pulleys. Therefore, variations in available torque for the abrading wheel **53** and the feed wheel **42** are minimized.

Turning now to the cutter operating mechanism generally designated by the numeral **60** in FIG. 1 and shown in part in FIGS. 3 and 4, a generally triangular cutter carrying plate **61** is pivotally mounted on the forward face of the frame member **11** and has a pivot pin **62** fixed in the left end thereof as shown in FIGS. 3 and 4. Pin **62** is pivotally mounted in the boss **16** in the frame member **11** as shown in FIG. 5. Cutter plate **61** carries a generally disc shaped cutter **64** which is spring biased in a conventional manner. Cutter **64** projects angularly from the lower edge of the cutter plate.

As shown clearly in FIG. 3 in solid lines, the cutter plate **61** has a first generally arcuate slot **66** therein substantially aligned on a circle drawn about the axis of pivot shaft **62**. A second camming slot **68** intersects the slot **66** and is generally aligned on a line intersecting the axis of pivot **62**. Slot **68** has a curved cam portion **69** effective during the can piercing operation. A high point **72** on slot **68** controls the lowermost position of the cutter plate **61**. A pocket **73** is defined in the end of slot **68** for receiving a cam pin **75** when the cutter is in the cutting position. Pocket **73** is below the high point **72** of the cam.

The cutter carrying plate **61** has a can hold-down foot **76** fixed thereto as shown in FIG. 4.

An operating handle assembly generally designated by the numeral **78** is provided for pivoting the cutter carrying plate **61** from a retracted position to the can cutting position. The operating handle or lever assembly **78** includes a generally rectangular plastic handle frame member **80** having a pivot pin **81** fixed thereto at one corner which extends through slot **66** in the cutter plate **61** and rotatably mounted in frame member boss **15**. The handle **80** thus is pivotal about the fixed axis of pivot shaft **81**.

Spaced below and to one side of the pivot shaft **81** (when the handle is horizontal) is a camming pin **75** also mounted within the handle frame **80**, as shown in FIGS. 1, 3, 4 and 7. The cam pin **75** extends through slot **68** in the cutter plate, through an arcuate slot **83** in the frame member **11** and into the interior frame member **11** as shown in FIG. 1. A roller **84** is rotatably mounted on the cam pin **75** between the frame **11** and the handle frame **80**, and is adapted to engage the surfaces of the camming slot **68** in the cutter plate **61**.

As the operating handle **78** is rotated counterclockwise from the inactive generally vertical position, shown in solid lines in FIG. 3, the roller **84** rolls on the cam surface **69** forcing the cutter plate downwardly in a clockwise direction so that the cutter **64** pierces the lid of the can. As roller **84** reaches the high point **72** of slot **68** as shown in dotted lines in FIG. 4, the handle is substantially horizontal and the bottom edge of cutter plate **61** angles slightly downward. As will appear hereinafter, the feed wheel automatically begins rotation after additional rotation from this position. A small further movement of the roller **84** from this position causes the cutting force acting on the cutter **64** and the force of the can on the hold-down foot **76** to rotate the cutter plate **61** counterclockwise a short distance forcing the roller **84** into the pocket **73** in slot **68**. It should be understood that in this position the cam pin **75** is over-center such that the cam pocket **73** tends to rotate the pin and the handle **78** in counterclockwise direction about pivot pin **81**. This is due to the fact that in this cutting position the cam pin **75** is spaced further from plate pivot **62** than the handle pivot **81** is spaced from pivot **62**, and also due to the inclination of the pocket **73**. The cutting force and the force of the can rim on hold-down foot **76** maintain the cam pin **75** in pocket **73** until the lid is severed, at which time the cutting forces cease and the force of the can rim on foot **76** is insufficient to maintain cam pin **75** in the pocket **73** against the biasing force of a spring, described below, and at that time the cam pin will move to the left approximately to the position shown in dotted

lines in FIG. 4 whereat the drive motor is deenergized automatically and the cutter carrying plate **61** drops slightly.

A flexible actuator member **86** and a switch assembly **87** are provided for energizing the feed wheel drive motor **28** when cam roller **84** moves past the lowest cutter position shown in dotted lines in FIG. 4. This assembly is also effective to deenergize the feed wheel drive motor when the camming pin **75** moves from the cutting position shown in full lines in FIG. 4 in response to a cessation of the cutting forces on cutter **64** when the lid is severed. As shown in FIGS. 1 and 2, the actuator **86** includes an elongated laterally flexible member **88** having transversely projecting ears **89** pivotally mounted between the frame member **11** and a frame support plate **90** for rotation about a horizontal axis **91**. As shown clearly in FIG. 2 the upper end of actuating member **88** has a projection **94** which receives a compression spring **95**. Spring **95** thus biases the elongated actuator member **88** against the camming pin **75** when the pin is in the can cutting position. The biasing spring **95** is of sufficient strength to lower the cutter plate against the upward force of the hold-down foot and the force exerted by the can friction on the cutter **64**. In one exemplary construction, compression spring **95** was designed to exert a force on the order of about 5 pounds. Spring **95** is seated between integral projections **96** on a rearwardly projecting flange **97** circumscribing frame member **11**. The actuator **88** is positioned so that it will close switch **87** when the handle **80** is approximately horizontal. The forces exerted on the cutter carrying plate **61** by the hold-down foot **76** and the spring **95** are small compared to the cutting force to assure that when the cutting force drops out when the lid is severed, the cutter plate will drop and the switch **87** will open. In the exemplary construction noted, the force of the hold-down foot **76** was approximately 10 pounds.

The lower end of the flexible actuator **88** engages a switch plunger **100**. As is shown in FIG. 6 the switch **87** is of a generally conventional construction and includes a flexible contact carrying arm **101** and a stop member **102** for limiting the inward movement of plunger **100**. The flexible arm **101** permits a small amount of over travel of the plunger **100** after contacts **104** are closed and the motor is energized.

The actuator assembly **86** is designed to impose a light force on switch **87** so that the switch closes approximately when the handle member **80** is horizontal. As shown in FIG. 2 when the handle member is slightly below horizontal, cam pin **75** engages the upper end of a flexible member **88**. A small further movement of the pin to the left, as viewed in FIG. 2, produces a virtually instantaneous rotation of flexible member **88** around a pivot axis **91** and the rapid closing of switch contacts **104**. Note that the switch contacts as viewed in FIG. 6 are relatively close to one another. Further movement of the pin **75** toward the can cutting position merely results in a flexure of the elongated member **88** (as shown in dotted line in FIG. 2) and some bending of the flexible contact carrying arm **101**. It is apparent that because of the sensitivity of the switch actuator **86** and the switch **87** that tolerances in the position of the actuator **86**, the switch **87** or the cam pin **75** will not adversely affect the proper energization of the motor **28**. Furthermore, the flexibility of actuator **86** prevents additional forces from being applied to cam pin **75**.

Turning again to the construction of the plastic main frame member **11**, it will be recalled that this frame is constructed to support all of the operating shafts of the can opening device in addition to the electric motor itself. Support plate **90** as shown in FIGS. 1 and 2 and in dotted lines in FIG. 5 is seen to be a relatively thin plate of irregular shape preferably constructed of metal. Plate **90** is mounted on the plastic bosses **15** to **19** and receives the operating shafts and pivots as shown in FIG. 5. Each of these shafts is supported in their respective bosses, which as noted above are plastic, and in the support plate **90**. The plate **90**, rather than providing any independent support, transfers the radial load on one shaft to the others thereby distributing the load over all the shafts and pivots. In this manner the bosses **15** to **19** can withstand a much greater radial shaft load than would ordinarily be possible.

As seen in FIG. 7, the handle frame **80** is constructed in a similar manner to the main frame **11** and it is also constructed of a plastic material such as polystyrene. A generally triangular support plate **110** is mounted on the distal ends of projecting bosses **111**, **112** and **113**. Plate **110** is fastened to the plastic handle **80** by a Phillips head screw **116** threaded in boss **113**. The handle pivot shaft **81** extends into boss **111** and is supported therein and in the plate **110**. Cam pin **75** is mounted in a similar manner in boss **112** and the plate. An alignment pin **118** on the handle projects through a suitable aperture in plate **110**. Radial forces on pivot shaft **81** or cam pin **75** are distributed to the other members, the screw **116**, and the pin **81** thereby distributing the load all across the handle **80**.

As shown in FIG. 8 a magnet assembly **120** is provided including a magnet **121** carried by a resilient arm **122** received on a cutter shaft **124**.

One important feature in the present construction is that cutter member **64** pierces the container lid during its downward movement and then withdraws slightly to the cutting position. This results in a "pierce" in the lid which is wider than the cutter, allowing the motor rotor to turn before it sees a load. For example, if the pierce is ⅛ inch larger than the cutter, the feed wheel **42** will turn 1/16 of a turn before the "lid load" is applied to the rotor. If the drive ratio between the motor rotor and the feed wheel is 32 to 1, the rotor will turn through two revolutions before the lid load is applied. In this manner the drive system develops some inertia and running friction rather than static friction before the full load is applied to the motor. Furthermore, the enlarged pierce in the lid of the container allows the motor rotor to move the O-ring **35** from its "set" position in the pulleys prior to the application of the full cutting load. This feature of reduced load starting minimizes the necessary motor size for the unit.

While the operation of the present device is believed apparent from the following detailed description, it is believed that the functions of the device will be more readily appreciated from the following operational description.

The operating handle **80** is manually retracted to its retracted position slightly over vertical as shown in solid lines in FIG. 3. Cutter **64** is then spaced from the feed wheel **42** so that a can rim may be inserted and rested on the feed wheel **42**. Handle **80** is then rotated clockwise and the following sequence of events occurs:

(1) Roller **84** carried by the handle **80** moves to the position generally designated by the numeral **130** driving the cutter **64** down into engagement with the lid of the can,

(2) As roller **84** moves from position **130** to position **132**, the cutter **64** stretches the lid material and at position **132** (whereat the cutter is in the lower position shown in FIG. 3) cutter **64** pierces the lid of the can,

(3) Further rotation of the pin **84** from position **132** causes the cutter to enlarge the pierce until roller **84** reaches the dotted line position shown in FIG. 4. At this point, the handle **80** is almost horizontal and the cutter **64** is in its lowermost position as shown. Roller **84** then engages the high point **72** of cam slot **68**. The piercing of the can lid is then complete, and

(4) A small further movement of roller **84** clockwise from the position shown in FIG. 4 causes pin **75** to engage the upper end of the elongated actuator member **88** and rotate the actuator against the biasing force of spring **95** closing switch **87** and energizing the motor **28**. The feed

wheel 42 begins rotation at this time so that the cutting forces on cutter 64 and the force of the can rim on the hold-down foot 76 urge the cutter plate 61 in a counterclockwise direction a small distance upwardly thereby forcing roller 84 and cam pin 75 to the solid line position shown in FIG. 4 in the pocket of slot 68. In this position, the handle 80 is pivoted somewhat below vertical. Feed wheel 42 then continues rotating until the lid is completely severed. When the cutting forces on cutter 64 cease, the force on the hold-down foot 76 is insufficient to maintain the cutter plate 61 in its raised position against the biasing force of spring 95, and the cutter plate drops to the lowest cutter position as shown in FIG. 4. This permits the biasing spring 95 to move the pin 75 leftward as shown in FIG. 4 thereby opening switch 87 and deenergizing the drive motor 28 so that the can stops its rotation. The can is then removed by rotating the handle 80 clockwise to its retracted position shown in the solid lines in FIG. 3.

While we have shown and described one embodiment of our invention, it is to be understood that it is capable of many modifications. Changes, therefore, in the construction and arrangement may be made without departing from the spirit and scope of the invention as defined in the appended claims.

We claim:

1. In a container opener, the combination comprising: a rotatable feed wheel for driving the container to be opened, motor means for rotating said feed wheel, a cutter member, a cutter carrying member pivotally mounted about a fixed axis movable between a cutting position and an inactive position, a manually controllable member pivotally mounted about a fixed axis and having means supported thereon directly engaging the cutter carrying member to position the same, means for biasing said cutter carrying member away from said cutting position, means including the cutting force for biasing said cutter carrying member toward the cutting position, and means responsive to the position of said cutter carrying member for stopping rotation of said feed wheel.

2. In a container opener, the combination comprising: a feed wheel for driving the container in rotation, means for rotating said feed wheel, a cutting member, a cutter carrying member pivotally mounted about a fixed axis, lever means pivotal about a fixed axis separate from and directly engaging said cutter carrying member for moving said member between an inactive position and a container cutting position, means for biasing said cutter carrying member toward the inactive position, means responsive to the cutting force for biasing said cutter carrying member toward the cutting position, and means responsive to the position of said lever for automatically terminating rotation of said feed wheel when the container is severed.

3. In a container opener, the combination comprising: a rotatable feed wheel for driving the container in rotation, means for rotating the feed wheel, a cutter, a cutter carrying member pivotal about a fixed axis, said cutter carrying member having a cam groove therein, a pivotally mounted lever having a projection engaging said groove for pivoting said cutter member between an inactive position and a cutting position, means engaging said projection for biasing said projection in one direction and said cutter member toward the inactive position, means responsive to the cutting forces for biasing said projection in the opposite direction, and means responsive to the position of said projection for rendering said feed wheel rotating means inactive when the container is severed.

4. In a container opener, the combination comprising: a feed wheel for driving a container in rotation, means for rotating said feed wheel, a cutter, a cutter carrying plate pivotally mounted about a fixed axis, said cutter being fixed to said plate at a point spaced from said plate pivot, a first slot in said plate generally aligned on an arc about the plate pivot, a second cam slot in said plate generally aligned with a line extending through said plate pivot, a lever for pivoting said cutter plate between an inactive position and a cutting position, said lever having a fixed pivot extending through said first slot and a projection spaced from said pivot, said projection engaging said second cam slot, said lever being movable to the over-center container cutting position where said projection is spaced further from said plate pivot than said lever pivot is spaced from said plate pivot, means responsive to the cutting forces for maintaining said cutter plate in the cutting position, means for biasing said cutter plate away from said cutting position, and means for automatically stopping rotation of said feed wheel when the container is severed.

5. In a container opener as defined in claim 4, wherein said means for biasing the cutter plate away from the cutting position includes a spring connected to urge the lever projection away from its over center position so that when the container is severed and the cutting forces on the cutter plate cease the spring will urge the lever projection and the cutter plate downwardly; said feed wheel rotating means including an electric motor, switch means for connecting said motor to a source of supply, means responsive to the lever projection position for actuating said switch to energize the motor when the projection is approximately the same distance from said cutter plate pivot as said lever pivot is therefrom; and means responsive to the lever projection position for deenergizing said motor when the cutting forces terminate permitting said projection to move away from the over center position.

6. In a container opener as defined in claim 5, wherein said lever projection responsive means includes an elongated flexible switch actuator, said actuator being pivotally mounted with one end engaging said switch and the other end engaging said lever projection, said spring being mounted to bias said other end of said actuator toward said lever projection, whereby rotation of said lever toward the cutting position will cause engagement of the lever projection with said actuator and movement thereof to close said switch.

7. In a container opener, the combination comprising: a generally vertical frame member, a feed wheel extending from said frame member adapted to drive a container in rotation, a motor mounted on said frame member spaced from said feed wheel, said motor having a switch adjacent thereto substantially spaced from said feed wheel adapted to connect said motor to a source of supply, a cutter member mounted on said frame member, means for relatively moving said feed wheel and said cutter member to an inactive position and a cutting position; and a switch actuating assembly for closing and opening said switch as the cutter member and feed wheel approach and withdraw from the cutting position including an elongated flexible member having one end connected to move in response to said relative movement of the cutter member toward the cutting position, the other end being connected to said switch, said flexible member being pivotally mounted with the pivot being closer to said one connected end than the other, whereby over-travel of said one end of the elongated member after the switch is closed will result in a flexure of the elongated member.

8. In a container opener as defined in claim 7, wherein said elongated member is longitudinally flexible.

9. In a container opener, the combination comprising: a non-metallic frame member having a plurality of integral bosses extending rearwardly therefrom and terminating in a plane substantially parallel to the forward face of said frame member, said bosses having bores therein, a support plate mounted on the distal ends of said non-metallic bosses and having openings therein aligned with said boss bores, operating shafts extending through said support plate and into said bores, said shafts being supported in said plate and in said frame member, at least one of said shafts having a portion thereof ex-

tending from said plate on the side thereof opposite said bosses, and drive means connected to said portion of said one shaft.

10. In a container opener as defined in claim **9**, and further including a feed wheel for driving a container in rotation, a feed wheel drive shaft extending through one of said bosses and said support plate, gear means connected to rotate said drive shaft, a cutter carrying plate on the forward face of said frame member, said plate being pivotally mounted on a shaft extending through one of said bosses and said support plate.

11. In a container opener as defined in claim **10**, and further including a handle member for operating said cutter plate, said handle being pivotally mounted on a shaft extending through one of said bosses and said support plate.

12. In a container opener as defined in claim **11**, and further including a shaft for supporting an abrading wheel extending through said support plate and into one of said bosses.

13. In a container opener as defined in claim **9**, wherein said frame member is molded plastic.

14. In a container opener, as defined in claim **9**, and further including a motor spaced from said support plate and mounted directly on said non-metallic frame member, a feed wheel for driving a container in rotation, a drive shaft connected to said feed wheel and extending through one of said bosses and said support plate, and elastic drive means between said motor and said drive shaft to compensate for inaccuracies in the location thereof on said frame member.

15. In a container opener as defined in claim **14**, wherein said motor includes a motor shaft, a pulley mounted on said motor shaft, said pulley having a circumferential groove therein with driving faces, said faces being generally convex, said elastic means frictionally engaging said surfaces to be driven thereby, so that the pulley may accommodate elastic drive means of different sizes and still maintain the necessary torque for drivng the feed wheel drive shaft.

16. In a container opener as defined in claim **15**, wherein said elastic means is a resilient O ring.

17. In a container opener as defined in claim **15**, and further including a second pulley having convex drive surfaces, a shaft supporting said second pulley and mounted in said support plate and one of said bosses, a third pulley between said first and second pulleys connected to drive said feed wheel drive shaft, said third pulley being of larger diameter than said first and second pulleys, said elastic means including a resilient O ring surrounding said pulley for transferring torque from said first pulley to said second and third pulleys.

18. In a container opener, the combination comprising: a frame member, a feed wheel mounted for rotation in said frame member, a cutter carrying plate on one side of said frame member movable between an inactive position and a container cutting position; a manual handle for moving said cutter plate including a non-metallic handle frame, said handle frame having a plurality of integral bosses extending therefrom and terminating in a single plane, said bosses having bores therein, a handle support plate mounted on the ends of said bosses, a handle pivot shaft mounted in one of said bosses and extending through said support plate, said support plate also providing a mounting for said pivot shaft, said pivot shaft extending into and supported in said frame, and a cam shaft mounted in another of said bores and said support plate, said cam shaft being connected to move said cutter carrying plate.

19. In a container opener, the combination comprising: a non-metallic frame member having integral bosses extending therefrom, a metal support plate mounted on the ends of said bosses, a cutter carrying plate on the forward face of said frame member and pivotally supported in said frame member and in said support plate, a cutter on said cutter plate, a rotatable feed wheel adjacent said cutter plate and mounted in said frame member and said support plate, said cutter plate having a first slot therein generally aligned on an arc about said pivot, said cutter plate having a second cam slot therein generally aligned on a line passing through said pivot, said second slot intersecting said first slot and extending further from said pivot than said first slot, a pivotal operating lever assembly mounted in said frame and said support plate including a pivot received in and slidable with respect to said first slot, a cam pin mounted in said operating lever and extending into said second slot to effect pivotal movement of the cutter carrying plate, said operating lever being movable to a container cutting position where the cam pin is in the end of the second slot furthest away from said cutter plate pivot, spring means urging said cam pin away from the container cutting position, means responsive to the cutting forces for urging said pin toward the container cutting position, a motor for rotating said feed wheel mounted directly on said non-metallic frame member, a flexible contact switch for said motor mounted adjacent thereto, a pivotal flexible lever engaging said cam pin and connected to actuate said switch, said motor having a pulley with convex diverging friction surfaces, and an O ring engaging said surfaces and adapted to drive said feed wheel.

20. In a container opener the combination comprising: a rotatable feed wheel for driving the container to be opened, a cutting member, means for relatively moving said feed wheel and said cutting member including means for relatively moving said feed wheel and cutter member together to pierce the container lid and means for thereafter withdrawing the cutter to a cutting position, and electric motor means for rotating said feed wheel while said cutting member and feed wheel are in the cutting position whereby the starting load on said electric motor means is reduced.

21. In a container opener the combination comprising: a feed wheel for driving a container in rotation, electric motor means for rotating said feed wheel, a cutter, a cutter carrying plate pivotally mounted about a first axis, said cutter being fixed to said plate at a point spaced from said plate pivot, a first slot in said plate generally aligned on an arc about the plate pivot, a second cam slot in said plate generally aligned with a line extending through said plate pivot, said cam slot extending away from said pivot beyond said arc, a lever for pivoting said cutter plate between an inactive position and a cutting position, said lever having a pivot extending through said first slot and a projection spaced from said lever pivot and engaging said cam slot, said cam slot and means including and projection cooperating so that said cutter pierces the container and then withdraws slightly therefrom whereby the cutter initially pierces an enlarged opening in the container to minimize the starting load on said electric motor means.

22. In a container opener, the combination comprising: a rotatable feed wheel for driving the container to be opened, motor means for rotating said feed wheel, a cutter carrying member movable between a cutting position and an inactive position, manually operable means for moving said member from the inactive position to a position piercing the container and to a cutting position, means for biasing said member away from the cutting position, means for energizing said motor means after the container is pierced, means including the cutting force for biasing said member toward the cutting position, and means responsive to the position of said cutter carrying member for deenergizing said motor means.

23. In a container opener, the combination comprising: a generally vertical frame member, a feed wheel extending from said frame member adapted to drive a container in rotation, a motor mounted on said frame member spaced from said feed wheel, said motor having a switch adjacent thereto adapted to connect said motor

to a source of supply, a cutter member mounted on said frame member, means for relatively moving said feed wheel and said cutter member to an inactive position and a cutting position; and a switch actuating assembly for closing and opening said switch as the cutter member and feed wheel approach and withdraw from the cutting position including an elongated flexible member having one end connected to move in response to said relative movement of the cutter member toward the cutting position, the other end being connected to said switch, whereby over-travel of said one end of the elongated member after the switch is closed will result in a flexure of the elongated member, said elongated member being longitudinally flexible and pivotally mounted between the engaged ends thereof adjacent said frame member, said motor including a motor housing; said switch including a flexible contact member within said housing, and a plunger slidably mounted in said housing and engaging at one end said elongated member and at the other end the flexible contact member whereby the switch will close upon the initial pivotal movement of the elongated member and further movement thereof will merely bend said resilient contact member and said elongated member.

24. In a container opener, the combination comprising: a non-metallic frame member having a plurality of integral bosses extending rearwardly therefrom and terminating in a plane substantially parallel to the forward face of said frame member, said bosses having bores therein, a support plate mounted on the distal ends of said non-metallic bosses and having openings therein aligned with said boss bores, operating shafts extending through said support plate and into said bores, said shafts being supported in said plate and in said frame member, a cutter carrying plate on the forward face of said frame member,

said cutter plate being mounted on one of said shafts or pivotal movement, a manual handle for moving said cutter carrying plate including a non-metallic handle frame, said handle frame having a plurality of integral bosses extending therefrom and terminating in a single plane, said bosses having bores therein, a handle support plate mounted on the ends of said bosses, one of said shafts being a handle pivot shaft and extending from the forward face of said frame member, said handle pivot shaft being mounted in one of said handle frame bosses and said handle support plate, and a cam shaft mounted in another of said handle frame bores and said support plate, said handle cam shaft being connected to move said cutter carrying plate.

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