United States Patent

Swanke et al.

[15] **3,689,999**

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[54] **CAN OPENER**

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[21] Appl. No.: **86,410**

[52] **U.S. Cl.** .....**30/4 R,** 192/67 R

[51] **Int. Cl.** **B67b 7/38**

[58] **Field of Search**.....30/4; 192/67 R

[56] **References Cited**

UNITED STATES PATENTS

3,487,542 1/1970 Hamwi.....30/4 R

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[57] **ABSTRACT**

An electrically powered can opener for use as a household appliance in which all of the working parts that may become contaminated with the contents of opened cans are removable for cleaning as a unit for sanitary and safety reasons without disturbing the carefully adjusted assembly of a unitary self-camming cutter and feed wheel. The drive of the feed wheel can also be quickly interrupted for safety reasons and automatically re-established for operation.

18 Claims, 9 Drawing Figures

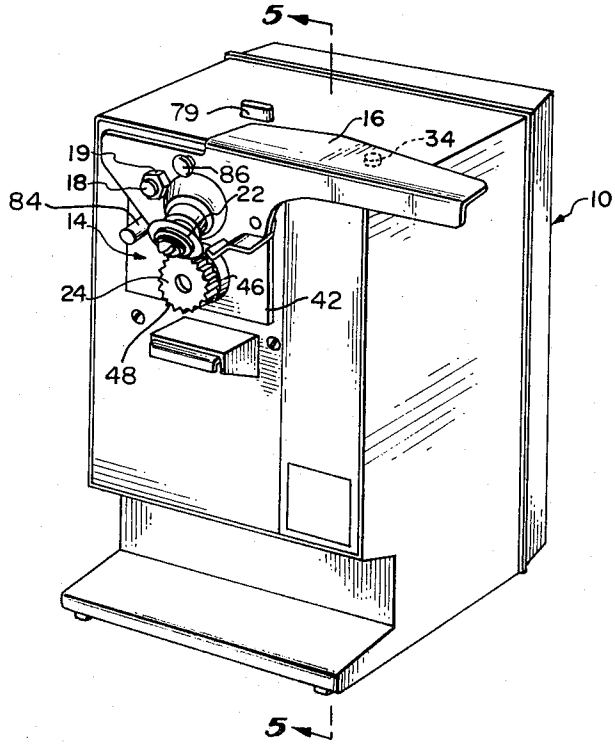


FIG. 1

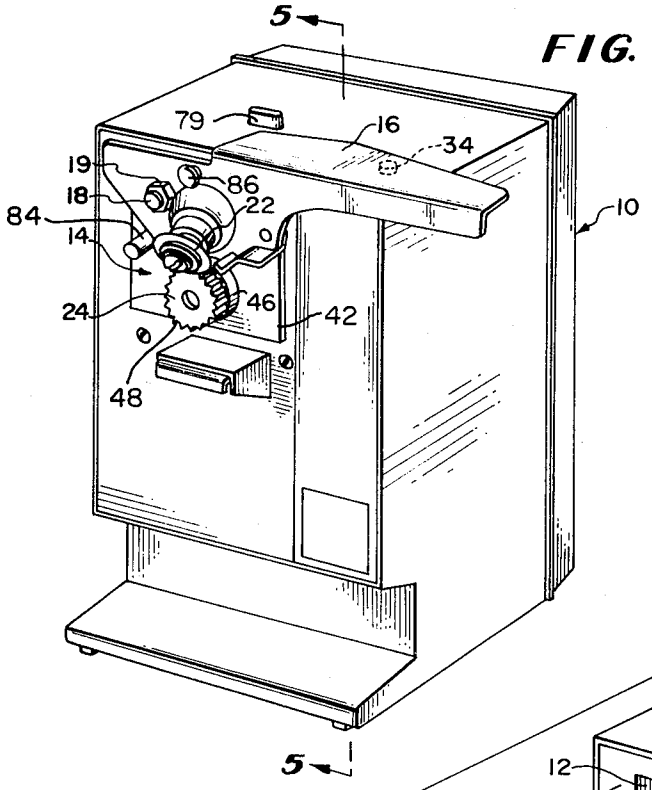


FIG. 2

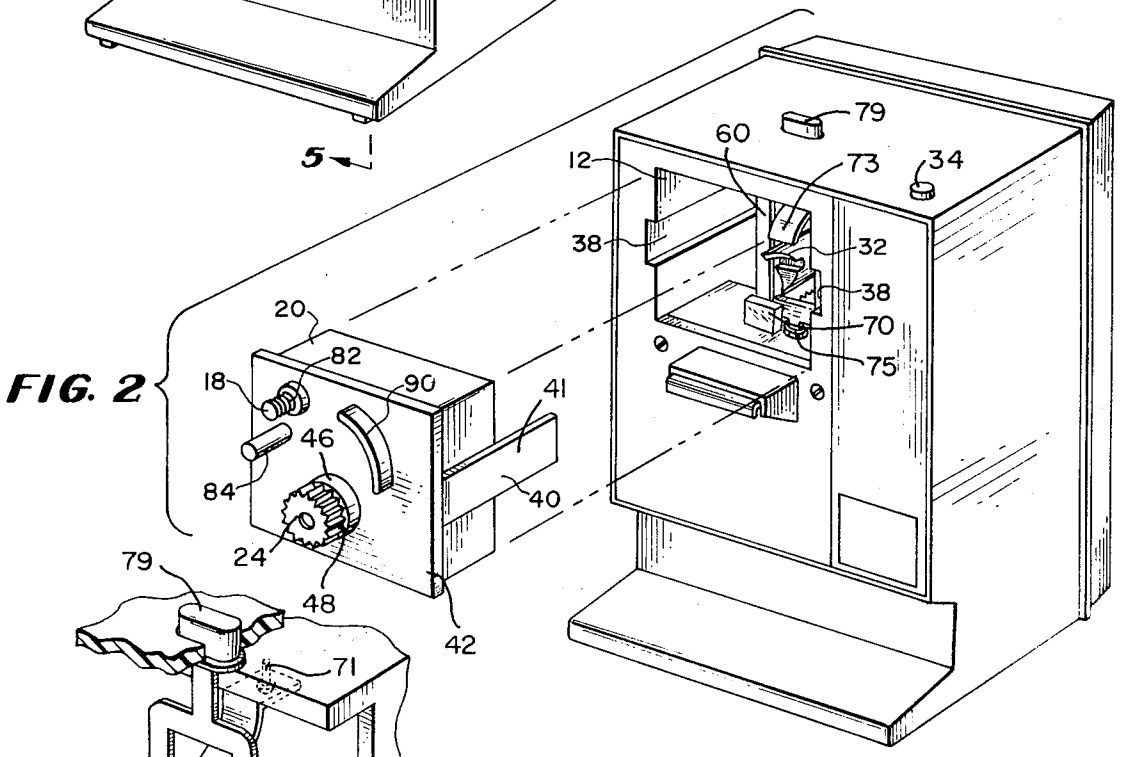
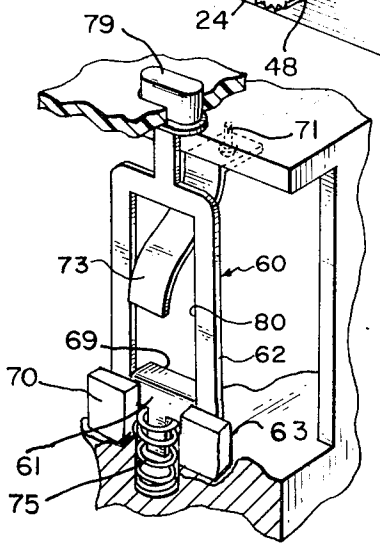


FIG. 3



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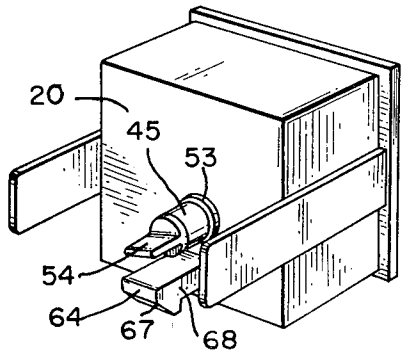


FIG. 4

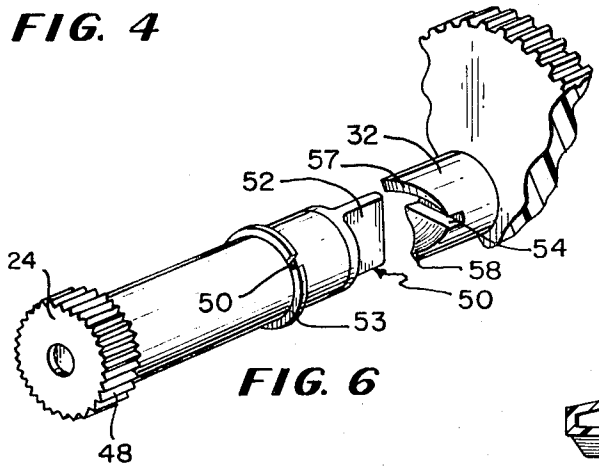


FIG. 6

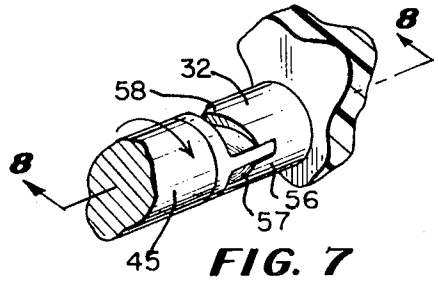


FIG. 7

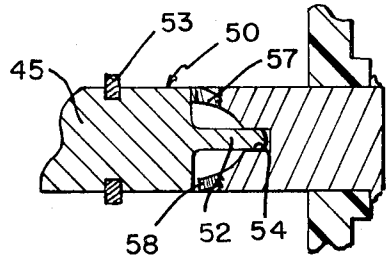


FIG. 8

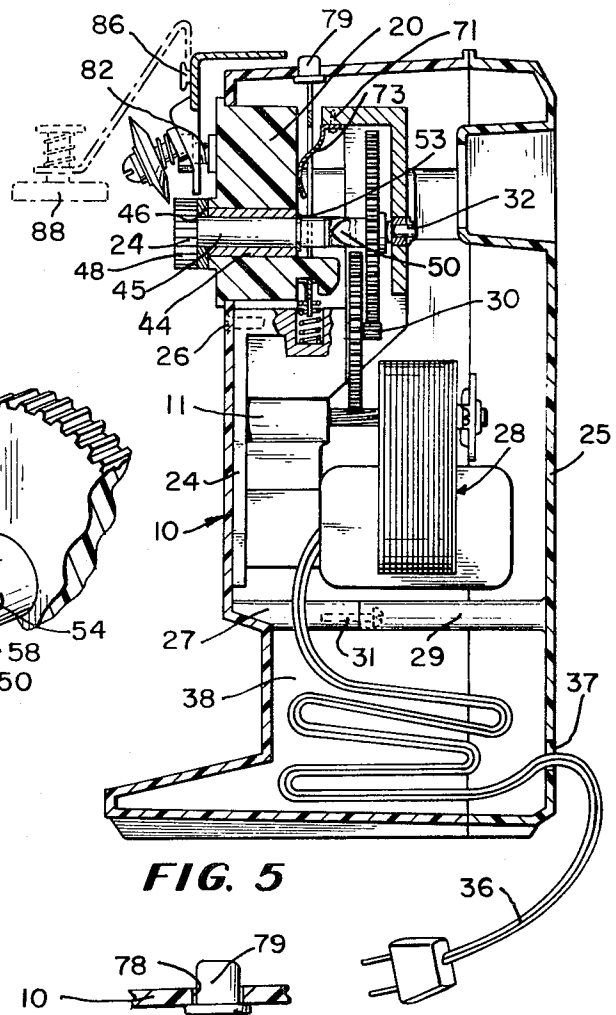


FIG. 5

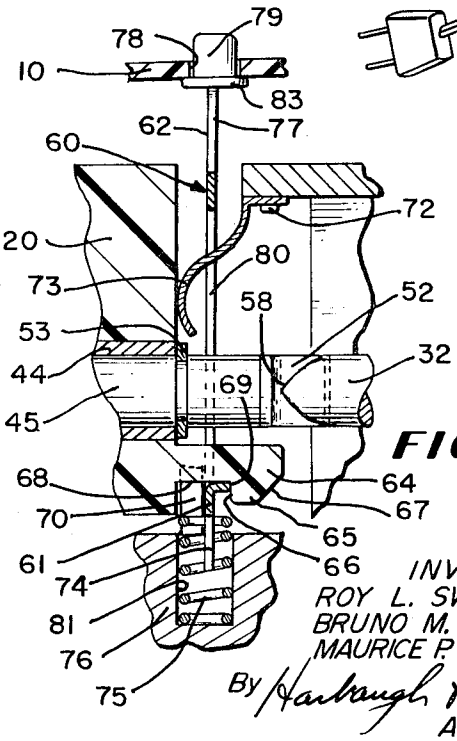


FIG. 9

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CAN OPENER

BACKGROUND OF THE INVENTION

It is conventional in opening a sheet metal food can to support the conventional sealing rim bead of the can on a power rotated feed wheel and to lower a cutter, such as a knife or shear wheel to pierce the can top and trap the bead. This cutting action reacts to force the bead downwardly against the teeth of the feed wheel. Then as the feed wheel is rotated the supported bead is fed past the cutter for the cutter to sever the can top progressively along the inner side of the bead.

The cutter is generally carried by a handle that is pivotally mounted to lower the cutter with respect to the feed wheel to initiate the severance and the clamping of the bead for feed purposes, and to raise the cutter to release the bead and can after the can top has been severed.

The framework or housings heretofore provided for powered can openers have been made of casting metal in which a pin shaft carrying the handle has been pivotally mounted as journalled in casting metal to withstand in a radial direction the piercing load of the cutter. The cutter in turn is preferably carried by another journal pin, secured to the handle and both pins are subjected to the heavy axial load imposed by the clamping action of the can bead when trapped between the cutter and feed wheel during the can opening operation. The resulting forces on the pins are axially divergent from the handle and require axial force supporting elements such as washers at the ends of the pins to support the cutter and the handle in operative position. Although good wearing metal washers can be adjustably provided for the cutter support, it is difficult to provide any suitable support means for the handle pin shaft end particularly when providing removability of the handle to clean the cutter. Furthermore, the radial forces also encountered tend to distort the journal in the casting metal because of its relative softness. Bearing metal inserts increase cost.

Any increase in clearance anywhere due to wear develops a looseness that affects adversely the action of the cutter and feed wheel. This occurs generally by the bead not being clamped properly, whereby it escapes its cutting position or is damaged so that it cannot be machine cut to the bewilderment of a housewife.

SUMMARY OF THE INVENTION

These problems are eliminated with many additional advantages attained by utilizing a unitizing removable block of simple form and of a harder material that carries the handle, cutter, and feed wheel with adequate journal length for the shafts as a permanent and closely adjusted assembly which can be easily slipped into and out of operative position in a cast metal frame with wide clearances and without appreciable wear or strain on any parts. A non-fouling re-engageable coupling between the drive shaft and the feed wheel shaft removes all wear and thrust of the feed wheel from the housing by confining all bearing and thrust loads to the permanently assembled cutting unit.

Repair, and replacement if needed, is thereby easily accomplished if the cutter and feed wheel are damaged, and, cleaning of all can opener parts contaminated by can contents are easily accomplished manually or by dishwasher without any dis-assembly of coacting can engaging parts.

Original assembly of the can opening elements can be under vise-held conditions with close tolerances of minimal wear parts including highly tempered cutters and feed wheels on shafts of any selectable size and design. This includes suitable lubricant anti-fouling O-ring seals, if desired, for heavy duty can openers which structurally are otherwise alike.

A push button releases the unit for spring displacement without disturbing any mechanical organization of shaft supports or adjustments and permits a snap back into working position of the removable unit with the drive and driven shafts automatically meshing in alignment.

The unit is shaped with respect to its housing support to prevent its rotation so that the driven shaft may be located off-center to the mountings of the unit without mis-alignment strain between the drive and driven shafts, whereby the cutter working position, the pivotal axis of the handle, and the axis and periphery of the feed wheel are arranged to urge the handle to its closed position once a cutting operation is initiated with the can in working position. The handle in turn can hold the power switch closed.

The push button unit release also serves as a safety release turning off the electrical power since a spring urges the unit out of a full drive engagement to a secondary one from which the overlapping drive elements will free the clutch and do so without disengaging the unit from its housing supported position. In this position however, the unit can be re-engaged or removed at the will of the user while still supporting a can against spilling. The involuntary reaction of a user pressing the release button, thus provides a safety result.

Another safety is to raise the handle far enough to release the power switch button. This stops operation but will not release the can. This arises from the relationship in which the switch is held down by the reaction forces on the cutter until the cut is finished and the spring of the switch is freed of the cutting load that is holding it closed. The handle need only be moved far enough to open the switch with a slight over-run of the motor that reduces the working engagement enough at the cutter to permit this.

The axially engaged drive is axially free enough to enable the axial clamping load on the feed wheel to be borne in whole or in part within the rugged removable unitized assembly and at closely spaced points whereby an economy of metal stock can be accomplished. In fact, the major remaining structural portions, the motor and the reduction gearing can be non-critically located in its assembled position since the low RPM of the drive wheel enables wide tolerances for coaxial and longitudinal mis-alignments.

Having described the salient relationship of the invention and the objects accomplished thereby it will be seen from the description which follows how simple and inexpensive is the structure, operation and man-adapted characteristics of a can opener embodying the invention operated by mechanically unskilled users of household appliances as compared with conventional power operated can openers.

IN THE DRAWINGS

FIG. 1 is a perspective view showing the arrangement of elements in a can opener embodying the invention;

FIG. 2 is a similar view to that of FIG. 1 showing the removability of a unit journaling the feed wheel with handle and cutter of FIG. 1 removed for the sake of clarity;

FIG. 3 is a fragmentary close-up view of the rear of the recess shown in FIG. 2;

FIG. 4 is a perspective rear view of the removable unit showing the rear end of the driven shaft;

FIG. 5 is a vertical section taken on line 5—5 of FIG. 1;

FIG. 6 is a break-away perspective showing of the drive and driven shaft connection for the feed wheel;

FIG. 7 is a close-up perspective view of the clutching construction for the drive and driven shafts;

FIG. 8 is a section taken on line 8—8 of FIG. 7; and

FIG. 9 is a side elevation partly in vertical section through the latch construction shown in FIG. 3.

Referring to FIGS. 1 and 5, a frame 11 is shown in a housing 10 having a recess 12 (FIG. 2) in it slidably receiving a unit 14 therein which includes a handle 16 pivotally mounted as at 18 on the block 20 to rotatably carry a cutter wheel 22 on pin means 23 towards and away from a peripherally toothed feed wheel 24 journalled in the block. The cutter and feed wheels are permanently mounted on the block to sever a drum top from the rim bead of conventional cans having edibles in them that are purchased for household consumption.

A cover member 25 closes the back of the housing which is fully open for ease in casting and assembly and includes interengaging threaded studs 27 and hollow struts 29 fastened together by round headed screws 31.

As shown in FIG. 5 the housing is of plastic and receives the cast metal frame 11 that is secured thereto by screws 26 for mounting a constant speed electrical induction motor 28 along with shafts and gears 30 of high ratio reduction transmission whose output shaft is referred to herein as a drive shaft 32. The motor is energized by a spring opened single pole single throw push button switch 34 connected in series with one wire of the extension cord 36 whose excess length is stuffed in a space 38 in the bottom of the housing through an opening 37. It will be observed in FIGS. 2 and 5 that the clutch end of the drive shaft 32 extends to within the recess 12.

Horizontally disposed side grooves 38 slidably receive mating side rails 40 on the block 20 in supporting relation and preferably extend beyond the rear of the block as at 41 to visually assist in inserting the block to its working position preferably with a front marginal flange 42 overlapping the joints between these members when assembled. The flange 42 serves as a depth stop for the block 20 and can either be received in a corresponding marginal offset around the mouth of the recess or, as shown, preferably rests flatly against the planar front face of the housing to eliminate any corners in the housing that may be difficult to clean. In both instances, it would provide for the proper intermeshing between the drive shaft 32 and driven shaft 45 which will now be described.

As shown in FIG. 5, the block 20 preferably is of thermo-setting plastic with a bearing sleeve 44 preferably cast therein with non-rotational securement. A wear resisting washer 46 (FIG. 5) engages the front end of the bearing 44 to provide a running limit for the feed wheel 24 so that its front face will engage the side of the can below its bead to determine the working location of the can and hold the teeth 48 (FIG. 6) in engagement with the full width of radial thickness of the can rim bead. At its rear end the driven shaft 45 is circumferentially grooved as at 50 to receive a C-washer therein to prevent the shaft 45 from being displaced forwardly with respect to the block. Then when the block is free to move, its displacement can be accomplished by axial pressure exerted against the inner end of the shaft for a safety purpose later described.

Referring to FIGS. 6 – 9, the drive and driven shaft engage and disengage in an axial direction parallel to the tracks 40 by means of a tongue and groove clutch 50 in which one shaft has a diametrically disposed axially extending tongue 52 which is transversely rounded appreciably on its exposed edge.

The drive shaft is provided with a mating groove 54, both walls 56 of which are provided with a square contour adjacent the bottom and with a cam-like sloping contour 57 spaced from the bottom and beginning at a rounded apex 58. The cam contour is spirally inclined to a predetermined distance from the bottom of the groove as indicated at 60. Then when the removed block is returned to its working position and the tongue and groove are not in exact alignment to mesh, the slightly rounded end of the tongue engages the cam edges and the driven shaft, being free to rotate, will be rotated thereby and the cams will conduct the tongue to its working position in the groove. In reverse, with the tongue in its working position, it is to be noted that if the block is moved outwardly from its squarely engaged working position, a predetermined distance and the driven shaft is torque loaded, the cams will engage the ends of the tongue and drive the block and shafts to a complete drive separation. This will move the block farther out but not far enough to render the track 40 and groove 38 inoperable to support the block with a can secured between the cutter and feed wheel. Thus, with the handle 16 held down by the work load to sustain actuation of the motor a safety stop of the feed wheel can be attained by spring releasing the clutch drive enough for the cams to engage the tongue. In this relationship it may be observed that the whole unitary block assembly can be released for removal and cleaning by the safety release used for cleaning purposes when the can opener is idle.

Accordingly, for both purposes, a latch 60 including a frame shaped latch member 62 is provided that is disposed vertically and in sliding relationship against studs 70 in the recess at the back side 63 of the frame 11 near the inner end of the walls of the recess. The rear lower edge 61 of the block 20 is provided with a latch receiver 64 comprising a downwardly extending latch land 65 having a shoulder 66 on the forward side to engage the latching lower edge 61. A cam 67 on the rearward side is provided to initiate the latching operation. The shoulder 66 in its rearmost position is spaced far enough from the rear lower edge 61 to receive the latching element 68 of the frame between the shoulder 66 and upstanding studs 70 at the back end of the recess floor. The latching element comprises the upper edge of the lower member 61 of the latch frame being curled along its upper edge rearwardly to provide a square edge 69 engagement with the shoulder 66 and also assist the cam 67 in its action. The latching cam

land **65** from a material saving viewpoint need be no longer than necessary to mechanically sustain its load and the frame **62** need be no wider than desired to clear the ends of the land. However, studs **70** is provided below the recess adjacent to the studs **70** having a well **81** therein. At the top of the recess an aperture **71** is provided to receive a headed retaining element **72** which can be staked or threaded in place to serve as a retainer for a forwardly pressing leaf spring **73**.

A downwardly extending tongue **74** on the frame **62** receives in supported relation a compression spring **75** received in the well **81** to urge upward engagement of the latch. The upper end of the latch frame **62** has another tongue **77** extending upwardly through a guide opening **78** receiving a push button **79** thereon that is slidably supported in the guide opening in the housing **10** through which it extends far enough, as limited by flange **83** thereon, to be manually actuated to release the latch when desired.

Centrally in the latch member a window **80** is provided to clear the shafts and to receive the working end of the leaf spring **73** to urge forward movement of the block **20** as already suggested whenever the push button is actuated to release the latch.

It will be appreciated from an economy viewpoint that by providing the lugs **70** at the lower part of the recess, and mounting the release button as slidably guided in the housing, the frame **11** need not extend but a short distance above the tracks **38** and these can be located as low in the frame and housing **10** as expediency will permit since the block **20** can be formed with economy of material desired and extend as high in the housing as needed to receive and support cans of conventional heights, it being noted that the frame itself can be located any height within a housing or on a wall.

Referring now to the operation of the handle **16** in which the relative positions of the pivotal axes are so arranged that when opening a can the load upon the cutter **22** holds the handle down to sustain actuation of the switch **34**. Moreover, the pin **18** upon which the handle **16** is mounted is terminally threaded with a heavy thread **82** (FIGS. **2** and **5**) and the nut **19** engaging same has an axially long mating thread for squareness and stability. The nut is welded to the handle and the handle thereby is pivoted in guided relationship with a right hand thread as the handle **16** is operated so that the movement of the handle provides a component of clamping force on the bead of a can as the cutter **22** completes its piercing action on the down stroke of the handle and the handle moves deeper and starts the motor **28**.

Whenever it is desired to stop the cutting action without releasing the can the block release latch **60** can be actuated as a safety release and the spring **73** will urge partial separation of the block and start the separation of the drive and driven shafts. Thereafter the cams **57** on the walls **56** will further separate the shafts until either the handle **16** clears the power button **34** or the cams **57** on the shafts clear their drive engagement. The drive engagement can be re-established when desired without releasing the can, but to restart the motor the handle **16** will have to be raised enough to clear the button **34** and thereafter the motor restarted by the handle being pressed all the way down if the remeshing of the drive has been accomplished. Otherwise, the can must be released either with or without removal of the block before the cams **57** and tongue **52** may be re-engaged.

A conventional handle stop pin **84** is provided limiting the arc of handle movement to a working arc and a button **86** is carried by the handle to receive a magnetic can top retriever **88**. A rail **90** correspondingly cammed guides the handle in supporting relation.

Accordingly, it will be appreciated how the improved can opener conforms to the habits of a user both for usefulness and safety, and how the objects of the invention are obtained with a construction that is simple, easy to assembly and service for complete cleanliness of all parts that may come in contact with the contents of a can being opened, and how various modifications can be provided without departing from the spirit of the invention.

What is claimed is:

1. In a power driven can opener having a housing defining a front opening, a recess in its upper portion and a low speed drive shaft accessible within the lower part of the recess, the combination therewith of:

a unitary means movable to and from a working position within said recess and non-rotatively supported therein and including:

a. a block;

b. a pin carried by said block above the level of said drive shaft and supported against axially directed forces thereon;

c. a handle carried by said pin at the front face of the block in limited relative rotational relationship with respect to the block and extending laterally beyond said recess for access and manual arcuate movement thereof;

d. pin means carried by said handle;

e. a feed wheel and driven shaft assembly journalled on said block engaging in driven relationship with said drive shaft and with the axis of said pin disposed approximately within a vertical projection of the circumference of the drive wheel;

f. a cutter carried by said pin means on said handle for movement from a position marginally above and ahead of said feed wheel to a working position above and overlapping said feed wheel;

means activating said drive shaft actuated by said handle being moved to its advanced position; and

manually actuated means carried by said housing releasably engaging said block to hold said unitary means in said working position and said shafts in drive relationship when said activating means is actuated.

2. The combination called for in claim **1** including resilient means intermediate said housing and unitary means to urge said unitary means from its working position upon release of said manually actuated means.

3. The combination called for in claim **1** including cam means actuated by operative movement of said handle to advance and retract said cutter and feed wheel in an axial direction with respect to each other simultaneously with piercing and releasing a can being opened.

4. The combination called for in claim **3** in which said cam means comprises a threaded relationship

between said unitary means and handle for pivotally supporting said handle and cutter for axial displacement of the cutter towards said feed wheel as the cutter is driven by the handle to pierce and sever a can top.

5. The combination called for in claim 1 in which said handle in its advanced position horizontally overlaps said activating means a distance less than the distance of axial travel between said shafts to engage and disengage said drive and driven shafts.

6. The combination called for in claim 1 in which said block and housing include interengaging slide tracks parallel with the axis of said driven shaft of a length greater than the distance of axial travel between said shafts to engage and disengage said drive and driven shafts.

7. In a can opener having a housing with a recess in the front face thereof the combination of:

a block slidably removable from said housing;

a driven shaft journalled in said block carrying a feed wheel;

cutter means including a handle pivotally carried on said block for movement to a position above and closely overlapping the feed wheel;

a motor and transmission in said housing including a drive shaft in said recess;

releasable clutch means between said drive and driven shaft for the transmission of torque and disengaged by axial movement of said block; and

releasable latch means securing said block in said housing to release the clutch means.

8. The combination called for in claim 7 including:

resilient means urging separation of said block from said housing; and

resilient means urging said cutter movably out of overlapping coaction with said feed wheel.

9. The combination called for in claim 7 in which said clutch means comprises a tongue on one shaft having a non-circular configuration, a recess on the other shaft having walls mating in tongue transmitting relationship during terminal movement of the shafts in an axial direction towards each other, said walls outwardly of said terminal movement having spiral faces axially engaging said tongue to urge disengagement of said clutch relationship under torque differentials between said shafts.

10. The combination called for in claim 9 in which said tongue is diametrically disposed and axially extending and said recess is a mating groove, both walls of which are provided with a square contour adjacent the bottom thereof and having a cam-like sloping contour extending with a spiral inclination from said square contour to a rounded apex.

11. The combination called for in claim 9 in which said block and housing include interengaging slide tracks parallel with the axis of said clutch means of a length greater than the distance of axial travel between said shafts to engage and disengage said clutch means.

12. The combination called for in claim 7 which includes:

a normally open switch carried by said housing and having an actuating element;

said handle in said position horizontally overlapping said actuating element a distance less than the distance of axial travel between said shafts to engage and disengage said clutch means.

13. The combination called for in claim 7 in which said latch means includes:

a forwardly facing shoulder on said block;

a frame member slidably mounted at the lower end on the housing for coaction with said shoulder to retain said block in its working position and having a tongue and button assembly at the top thereof slidably mounted in an aperture through said housing; and

resilient means urging said frame member into the path of movement of said shoulder.

14. In a can opener having a frame member supporting a motor and speed reduction gearing including a drive shaft axially disposed transversely to the front side of said frame member;

a removable unit guidedly mounted in said frame and comprising a body portion, a driven shaft journalled in said body portion substantially coaxial with said drive shaft;

a feed wheel carried by said driven shaft to engage and propel the rim bead of a can to be opened;

clutch means interconnecting said shafts and disengageable in an axial direction;

a hand actuated lever carrying a cutting element;

means pivotally mounting said hand lever on said body to swing said cutting element toward and away from said feed wheel;

guide means interconnecting said frame and body for supporting the body in a position in which said drive and driven shafts engage and disengage said clutch means, upon relative movement of said body portion and said frame;

said pivotal means comprising cam and follower means carried by said handle and body by which at least a portion of said handle travels towards the cutting wheel has an axial component of movement towards the drive wheel;

said clutch members having elements to urge disengagement under a torque loaded rotary interdrive relationship upon appreciable displacement of said unit; and

a releasable latch means having one element carried by the body and the other element carried by the frame engageable to hold the clutch members in engagement and including manual means for releasing said latch means;

resilient means urging movement of said body in a direction to disengage said interdrive relationship when said manual means is actuated;

said guide means being of a length to partially disengage while still supporting the body on the frame when said clutch members are disengaged.

15. In a power driven can opener having a housing:

a feed wheel for engaging the rim bead of a can to be opened;

driven shaft means carrying said feed wheel and supported on the housing in journalled relation for rotating said feed wheel in a predetermined direction about a predetermined axis;

a cutter for progressively severing the top of a can to be opened marginally along the inside edge of said rim bead;

a handle carrying said cutter and supported on the housing in journalled relation for pivotal movement in a direction counter to said direction of

rotation from a resting position separated from the feed wheel to an position in overlapping relation with said feed wheel and in substantial vertical alignment with and between the axes of said feed wheel rotation and said pivotal movement;

means for urging the handle from its said advanced position including a spring opened switch located in the path of movement of said handle actuated by said handle in said advanced position to supply power to said drive shaft.

16. In a can opener having a housing the combination of:

a block removable from a working position on said housing for cleaning;

a driven shaft journalled in said block carrying a feed wheel;

cutting means including a handle pivotally carried on said block for movement from a position above and closely overhanging the feed wheel to an advanced working position closely overlapping said feed wheel;

a motor and transmission in said housing including a drive shaft;

releasable clutch means between said drive and driven shaft for the transmission of torque and disengageable by axial movement of said block;

resilient means urging separation of said block from said housing;

means actuating said drive shaft activated by said handle being moved to its advanced working position;

resilient means urging said cutter means to move out of overlapping coaction with said feed wheel; and

releasable latch means securing said block in said housing to release said block from said housing, to release the clutch means, and to de-activate said actuating means in one operation.

17. In a can opener having a housing receiving a block in supported relation throughout a predetermined range of relative movement in an engaging direction;

a driven member journalled in said block including a feed wheel;

cutter means including a handle pivotally carried on said block for movement from a retracted can receiving position to a working position closing with the feed wheel for severing the wall of a can along its rim bead;

a motor and transmission including a drive member journalled in said housing;

releaseable clutch means between said drive member and driven member for the transmission of torque to drive the feed wheel, said clutch means being disengaged by movement of said block a predetermined distance less than that of said range of movement in a direction opposite to said engaging movement;

releaseable latch means to secure said block in supported relation with the clutch means in engagement; and

resilient means urging relative movement of said block and housing said predetermined distance in said opposite direction to release said clutch means when said latch means is released and including the time when said handle is in its working position;

said releaseable latch means having a manually actuatable control member in said housing at one side of said handle.

18. In a can opener comprising a housing having a recess in front face thereof:

a block slidably removable from said housing;

a driven shaft journalled in said block carrying a feed wheel;

cutter means including a handle pivotally carried on said block for movement to position above and closely overlapping the feed wheel;

a motor and transmission in said housing including a drive shaft;

releaseable clutch means between said drive and driven shaft for the transmission of torque and disengaged by axial movement of said block; and

releasable latch means securing said block in said housing to release the clutch means,

clutch means including an axially extending projection on one shaft and

means mating with said projection operating under torque effort between them to urge separation of the drive relationship.

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