REMOVABLE HAND LEVER AND WEAR COMPENSATING CAN OPENER CONSTRUCTION

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ABSTRACT OF THE DISCLOSURE

An electrically powered can opener has a cutter wheel carrying hand lever pivotally attached to its forward upright frame by an elongate pin assembly. A pushbutton operated latch releasably locks the pin assembly (and hand lever) to the can opener frame. When in the locked or retained position, rise cams on the latch contact a portion of the frame and cause the pin assembly (and hand lever) to seat firmly in its attached position. Depressing the lever assembly is locked in the can opener casing or frame, causes the latch to release the pin assembly so that the hand lever may be removed from the can opener frame.

Brief description of the invention

As mentioned in the Robert J. Scott patent application entitled, "Removable Hand Lever Construction," which was filed on Jan. 15, 1968, and bears Ser. No. 697,977, and owned by the same assignee as the instant patent application, electrically powered can openers with permanently affixed cutter wheels are difficult to clean and maintain completely sanitary.

The invention disclosed herein utilizes a pushbutton operated latch which releasably engages and retains the hand lever elongate pin assembly in a pivotal position within the frame of the can opener. By depressing the pushbutton, the patch moves out of engagement with the elongate pin assembly, thereby facilitating withdrawal and removal of the hand lever from the can opener for cleaning purposes. Collaterally, the latch is supplied with rise cams which contact a portion of the can opener frame, thereby forcing the latch member against the pin assembly so that the same is seated firmly but pivotally within the frame for normal operation. In this manner, manufacturing tolerances or variances in the affected parts are absorbed and compensated for, thereby continuously assuring a firmly fitting yet easily removable can piercing hand lever assembly. Also, normal wear during repeated use of the can opener is compensated for by the cooperating effect of the rise cams and the can opener frame.

One of the principal objects of the invention is to provide, in a can opener of the type wherein the cutting element is carried by and moved into and out of a can cutting position by a hand lever assembly substantially pivoted to the body or frame of a can opener, a readily removable can piercing hand lever assembly which is retained in the can opener frame by a uniquely constructed latch. It is a feature of this invention that the latch operates both to retain the lever assembly as well as assuring the optimal fit of that portion of the lever assembly which is pivotally attached within the can opener frame.

Another object of the invention is to provide a can opener having a readily removable can piercing lever assembly and which is provided with a means for automatically compensating for normal wear and manufacturing tolerances. The can opener includes a lever retaining latch structure that is provided with suitable cams for causing the lever to firmly seat against the frame of the can opener upon which is mounted. The latch structure, including its associated cams, is spring biased upwardly in such a manner that the cams contact portions of the can opener frame thereby facilitating the optimal seating of the lever assembly in the frame regardless of certain dimensional variances.

Another object of the invention is to provide a readily removable can piercing lever assembly of the character described in which the longitudinal distance from the inner side of the can piercing lever to the locking or retaining latch may be readily adjusted to any selected dimension during manufacture and assembly or this distance may also be easily adjusted even after the assembly of the can opener to the desired dimension on individual can opener units. This adjustability feature cooperates with portions of the lever assembly retaining means or locking means so that the optimal fit may always be assured despite normal wear and/or manufacturing tolerances.

DETAILED DESCRIPTION

In the accompanying drawing which forms a part of the specification and are to be read in conjunction therewith, like reference numerals are employed to indicate like parts in the various views;

FIG. 1 is a front elevational view of a power operated can opener embodying the push button operated latching mechanism, the operating parts shown in a normal operating position;

FIG. 2 is an enlarged fragmentary sectional view taken generally along the line 2—2 of FIG. 1 in the direction of the arrows and showing the hand lever assembly in a retained or locked position;

FIG. 3 is a view similar to FIG. 2, however the latching mechanism is shown in the depressed or unlocked position; and

FIG. 4 is an enlarged rear fragmentary elevational view of the can opener front frame and showing the mounting of the latch member relative to same absent the protective casing and with certain parts broken away for purposes of illustration.

Referring now to the drawing, reference numeral 10 generally designates a body or frame of a typical electrically operated can opener. The principal portion of the frame shown in the various views is the vertical or upright front member 10a. In commercial practice, this front frame member 10a cooperates with an open front box-like casing and provides support for the various parts of the can opener.

A serrated or toothed rotary can feed wheel is indicated by numeral 11 and is operatively located on the forward side of frame 10a. A feed wheel drive shaft 12 extends through frame 10a and is rotatably supported in an appropriately beareding aperture in a thickened portion of frame 10a. An electric motor means (not shown) rotates shaft 12 and drives feed wheel 11 in a conventional manner.

A pivotal can piercing hand lever 13 is located forwardly of frame 10a so as to provide a movable support for cutter wheel 14 which is mounted for free rotation on the usual stud or arbor anchored in lever 13 and held on the arbor by screw 15.

Hand lever 13 is mounted on an elongate pin assembly which extends through a suitable threaded aperture in the lower left hand portion of the lever (see FIG. 1) and which is fixedly secured thereto. As clearly seen in FIGS. 2 and 3, the forwardly or outwardly extending portion of the assembly includes a cylindrical rod-like projection which functions as a can guide. The intermediate portion of the pin assembly includes an externally threaded section 16 which cooperates with the above-mentioned
threaded aperture in lever 13 to facilitate in the longitudinal location of same on section 16a. A jam nut 17 occupies the forward portion of the intermediate threaded area for fixedly positioning of the hand lever in an optional spaced relationship with the remainder as was suggested above. In actual practice, the distance from the can piercing lever to the rear side of annular groove 16c may be set to any selected uniform dimension before assembly of the can opener by screwing the intermediate section 16a into the threaded hole in the lever and then tightening the jam nut 17 thereon. Alternately, this dimensional distance can be selectively changed as desired by adjustment of the intermediate section 16a within the lever after assembly of the can opener and then fixedly securing the two elements by the tightening of the jam nut against the lever. It will be seen that it is generally desirable that the distance selected be such that the end extremity of the embossed or thickened portion of the frame 10b extends beyond the forward side of groove 16c. As seen in FIGS. 2, 3, and 4, the rear extremity 11b of boss 11 of the can opener circumscribes the forward portion of the grooved area in that it extends approximately one-third of the distance past the forward side of annular groove 16c. As suggested above, the relative diameters of the pin member 16b of the pin assembly and of the aperture frame boss 10b through which it extends are selected to allow the pin assembly to rotate with the pivotal movement of hand lever 13.

Turning now more particularly to a detailed description of the lever assembly and the releasable locking or retaining means associated therewith, a latch member 18 is mounted in a plane that is substantially parallel with the front frame member 10a. The latch member generally includes a pushbutton 18a which conveniently extends for reciprocating movement above the upper surface of the protective casing of the can opener (see FIG. 1). The latch itself, which depends from pushbutton 18a, is contoured or shaped to be accommodated within the can opener casing. FIGS. 2, 3 and 4 clearly show how this particular shaped latch operatively engages the hand lever pin assembly within the casing.

A short first vertical section 18b is attached directly to the pushbutton. The latch is then turned horizontally forward at horizontal section 18c. The remainder of the latch then extends downwardly from section 18c thereby forming a keyhole (identified as such because a keyhole shaped slot is cut therein) section 18d and an offset section 18e. Both sections 18d and 18e are substantially parallel to the vertical plane of frame 10a but are spaced rearwardly therefrom. The lower end portion of the offset vertical section has a rearward horizontal extension 18f that serves as an interconnecting surface for a tension spring which will be discussed later.

The keyhole section 18d of latch 18 has for a forwardly projecting rise cam on each side portion thereof. These cams 19 may be formed by a cold process and essentially present a surface that when viewed from above diverges forwardly and down from the vertical plane of section 18d to an apex and then slopes inwardly to join the keyhole section. The keyhole slot suggested above is indicated by the numeral 20 and is cut in section 18d above cams 19. The upper portion of the keyhole is suitably sized so that the rearwardly extending pin member 16b may reciprocally and freely move in a longitudinal direction within same. The lower more narrow portion of the slot is so sized that the sides of the section 18d adjacent thereto are engageable within the annular groove 16c when in proper alignment. The offset section 18e is also slotted, having an elongate slot 21 of a selected dimension therein so that the up and down movement of latch 18 has definite prescribed limits.

To facilitate the mounting of latch 18, frame 10a has a plurality of thickened or embossed portions extending rearwardly from the stationary frame section 10b of the reciprocating spring mounting boss 22 is located near the upper portion of the can opener frame and extends rearwardly past the conventional can opener motor drive gear 23 for clearance purposes. The outer end portion of boss 22 is notched or beveled at 22a and generally lies in the same vertical plane as the rearward nodal 18e of lower horizontal extension 18f. Tension spring 24 is located between boss 22 and latch extension 18b by placing the looped spring ends in a corresponding notch 22a and 18g, respectively. With the spring in this position, an upward and forward bias is constantly exerted against latch member 18. A second boss 25 is substantially shorter in length than boss 22 but extends rearwardly to contact the left side (as seen in FIG. 4) of latch section 18b when same is in its down position, i.e., when annular groove 16c is not engaged by the latch. The feed wheel shaft 12 that is driven by the drive gear 23 is rotatably journaled in the frustoconical boss 26. As seen in FIG. 3, the right hand portion of boss 26 has been appropriately flattened but spaced away from latch 18 so that same may move up and down depending on the condition thereby without engaging or contacting the adjacent locally boss 26. The clearance between boss 25 and latch 18 also serves to facilitate the engaging of keyhole section 18d of the latch within annular groove 16c except, of course, when the lever assembly is removed from the can opener frame. Finally, a lower boss 27 extends rearwardly to the forward surface of the offset latch section 18e. This boss 27 operatively receives a truss head screw 28 therein so that the screw shoulder 28a extends through an elongate slot 21 in offset section 18e. The end extremity of boss 27 and the forward portion of the screw head locate latch section 18e therebetween. The dimensions of slot 21 are such that the up and down movements of latch 18 are positively limited by engagement of its ends with the screw shoulder portion 28a.

In operation, the structure described above accomplishes the dual functions of facilitating the ready removal of the can piercing lever 13 while at the same time it operates as a means for causing the lever assembly to seat firmly against the frame of the can opener. Considering again the structural elements of the pin assembly, it may be clearly seen in FIGS. 2 and 3 that the rearward end extension of boss 10b (hereinafter identified by the numeral 10c) is circumscribed over the forward portion of groove 16c. When latch 18 is in its lever releasing or down position (see FIGS. 3 and 4), the larger portion of keyhole slot 20 generally circumscribes the annular groove 16c on pin member 16b. Spring 24, being located rearwardly of latch 18, has a tendency to force keyhole section 18d forwardly (counter-clockwise as viewed in FIGS. 2 and 3) against the boss end 10c thereby keeping the latch in a substantially vertical plane even though the pushbutton is depressed. This position, as will be seen later, permits for the sleeve removal of lever 13 from frame 10a.

When the lower portion of keyhole slot 20 is in the upward or latch retaining position such as normally would occur due to the bias of tension spring 24, the rise cams 19 come in contact with rearward surface 10c of boss 10b. Since cams 19 are applied from the vertical plane of the latch sections 18d and 18e, the effect of the cams contacting surface 10c is to deflect the keyhole section 18d rearwardly against the rear surface of groove 16c, finally pulling the lever assembly tightly against frame 10a and 16a. In this manner, the latch cannot slide in assembly to seat firmly but rotationally within the aperture in boss 10b and draws lever 13 tightly against frame 10a. It is preferred that cams 19 do not engage the cooperating end surface 10c of boss 10b until the latch has moved upwardly sufficiently to establish full engage-
ment of the narrow portion of slot 20 in groove 10c. Also, to assure continued camming action for the anticipated life of the can opener, the upper vertical position of the latch is limited to the location well short of the uppermost possible positions as would be permitted by the narrow portion of slot 20.

Since normal manufacturing tolerances sometimes vary, the camming of the latch to the rear compensates and absorbs any disparity which might otherwise result in a loose fitting lever assembly structure. Also, normal wear and tear after prolonged use is compensated for due to the fact that the rise cams continually urge the latch rearwardly when same is engaged in the pin assembly groove 16c. Thus, if either boss end 10e or groove 16c substantially wear, the diverging or angle face of the cam causing the latch to deflect rearwardly would compensate for the increased dimensions and still maintain the firm seat so necessary for optimal lever operation.

As suggested above, the subject construction allows the user of the can opener to remove the lever assembly at any time by simply depressing pushbutton 18a. Normally, tension spring 24 urges latch 18 upwardly so that the lower portion of keyhole slot 20 is engaged within an annular groove 16c thereby retaining or locking the pin assembly within frame 10a. When it is desired to remove the lever assembly from the can opener frame, pushbutton 18a is depressed. This action causes latch 18 to move downwardly against the tension of spring 24. The limit of this downward movement is determined by the length of slot 21 and the position of the screw shoulder 25a. When pushbutton 18a is fully depressed, the larger portion of keyhole slot 20 is in aligned registration with the rear portion of the pin assembly so that the keyhole section of the latch 18d is no longer engaged within annular groove 16c. In this position, the lever assembly may be slidably removed from the aperture within boss 10b.

The hand lever assembly 13 may now be completely submerged in a cleaning solution and thoroughly washed or otherwise cleaned. Replacing the lever assembly simply requires a reversal of steps, in that the pushbutton 18a is once again depressed and the pin member 16b (along with its associated groove 16c) is inserted within the aperture in boss 10b. Once appropriately positioned, the downward pressure is removed from pushbutton 18a, allowing tension spring 24 to return the latch to its groove engaging position and also with rise cams 15 firmly seating the lever assembly against frame 10a and the pin assembly within boss 10b.

It should be noted that the location of spring 24 provides another function in addition to urging latch 18 upwardly at all times to firmly wedge cams 19 between the rearward end 10e of boss 10b and the grooved portion 16c of the pin assembly 16. This spring 24 also, at times, urges keyhole latch section 18d against the end 10c of boss 10b even while pushbutton 18a is depressed by the user. This second function of spring 24 assures and facilitates re-engagement of the latch in groove 16c when ever re-installing the lever assembly on the can opener.

From the foregoing, it will be seen that this invention is one well adapted to attain all the ends and objects hereinabove set forth, together with other advantages which are obvious and which are inherent to the structure.

It will be understood that certain features and sub-combinations are of utility and may be employed without reference to other features and sub-combinations. This is contemplated by and is within the scope of the claims.

As many possible embodiments may be made of the invention without departing from the scope thereof, it is to be understood that all matter herein set forth or shown in the accompanying drawing is to be interpreted as illustrative and not in a limiting sense.

Having thus described our invention, we claim:

1. In a can opener having an upright frame, rotary feed wheel and a means of rotating said feed wheel, the combination therewith of a hand lever movably supported on the frame of said can opener and carrying a cutting element thereon, releasable locking means holding said lever to preclude detachment of same from said frame, said locking means being operatively accessible exteriorly of said frame and movable between a latching position and a release position wherein said lever respectively is locked to or may be detached from said frame, and

cam means located on said locking means and operable upon movement of said locking means into said latching position to urge said lever toward a pre-selected spatial position relative to said frame thereby maintaining operable spacing between said feed wheel and said cutting element.

2. The invention as in claim 1 wherein said hand lever is operable to swing said cutting element toward and away from said feed wheel, said lever being connected to said frame by means of an opening in either of said frame or said lever and a pin member secured and projecting from the other of said frame or said lever, said opening receiving said pin member therein to permit relative rotative movement therebetween and selective axial separation thereof, said locking means including a latch, said latch supported for movement transversely toward and away from the axis of said pin member between said latching position and a release position, said cam means located on said latching, and including at least one camming surface, said camming surface operable to contact at least a portion of said frame when said latch is in said latching position and to maintain said latch in engagement with said pin member.

3. The invention as in claim 2 wherein said frame cooperates with a casing structure to enclose at least a portion of said latch and wherein said latch has a push button operatively associated therewith and at least partially located exteriorly of said can opener frame and casing, said pushbutton operatively to move said latch to said release position when same is depressed.

4. The invention as in claim 2 wherein said pin member has an annular groove defined in at least one end portion thereof, a spring connected to said latch, said spring urging said latch into an engaging relationship with said groove when in said latching position and causing said cam surface to contact at least a portion of said frame, said cam surface resiliently urging said latch in a direction to maintain said operable spacing.

5. The invention as in claim 1 wherein said can opener includes a means for resiliently urging said cam means into contact with a surface fixedly located relative to said locking means with said locking means in said latching position, said locking means thereby urging said lever to said preselected spatial position.

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