Jan. 9, 1940. W. H. CURTIS 2,186,668

CAN OPENER

Original Filed Jan. 26, 1937 2 Sheets-Sheet 1

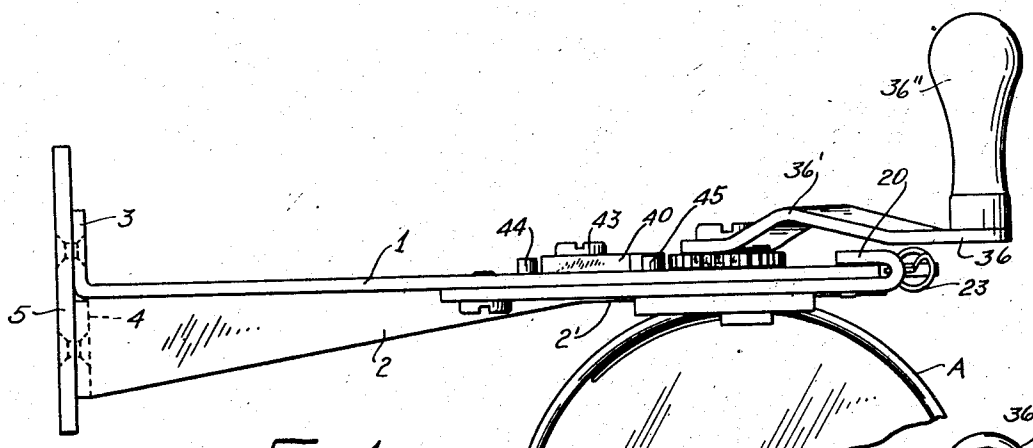


FIG. 1

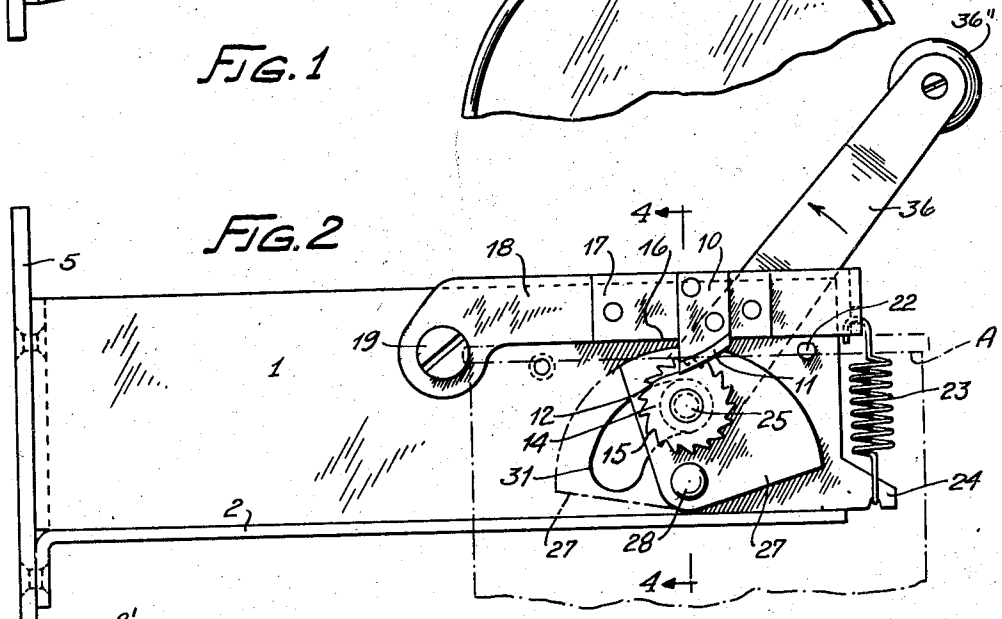


FIG. 2

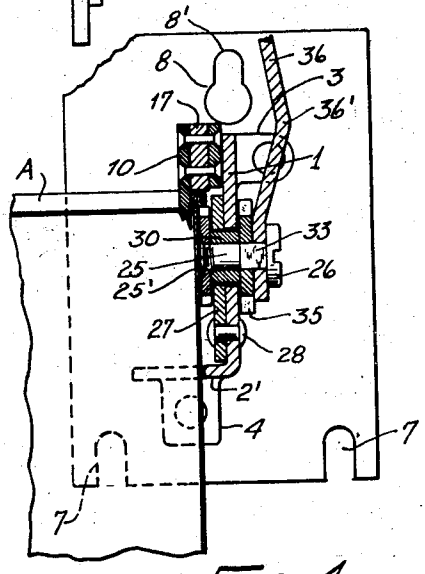


FIG. 4

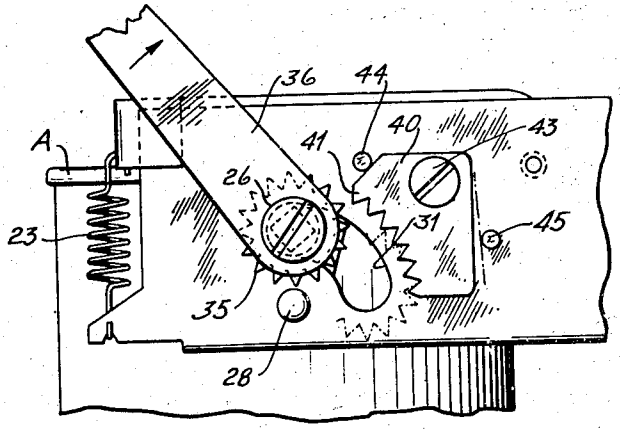


FIG. 3

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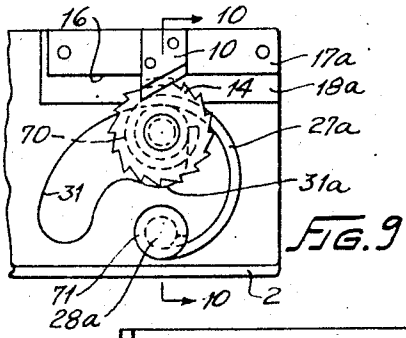


FIG. 9

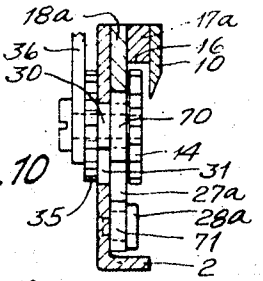


FIG. 10

FIG. 5

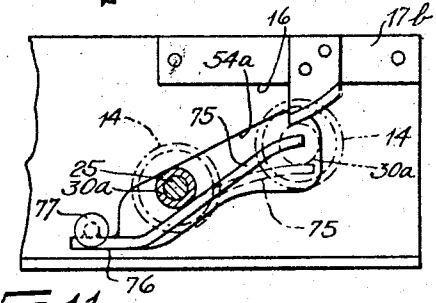


FIG. 11

FIG. 6

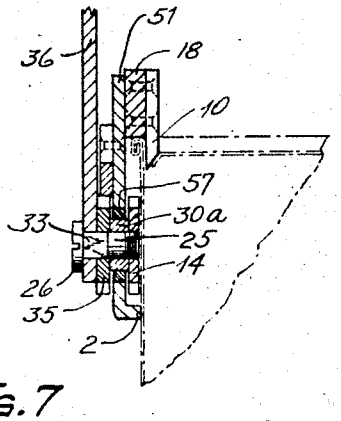


FIG. 7

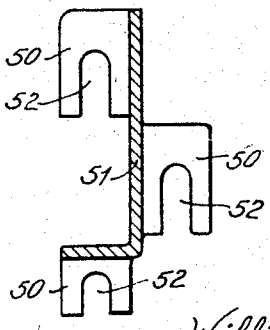


FIG. 8

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2,186,668

CAN OPENER

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Application January 26, 1937, Serial No. 122,390
Renewed November 30, 1939

2 Claims. (Cl. 30—15)

This invention relates to a simple and effective mechanism for opening rolled-rim-sealed cans, such as now commonly used for containing foods, oils, and many other commodities. The primary object is to provide an improved machine for the above and similar purposes.

Another object is to provide a can opener having improved means for automatically puncturing a can; and, more specifically, a means for such purpose which will not require auxiliary hand operated levers or complicated parts.

A further object is to provide an improved means for automatically ejecting the can and withdrawing the knife from contact therewith when the cutting operation has been completed.

Another object is to provide an improved means for guiding the can, which means will be automatically adjustable for rims of various widths (literally heights), and in case of irregularities on such rims.

A further object is to provide an improved supporting means for detachably securing a can opener mechanism to a wall or other suitable support.

Other objects and features of the invention will become apparent from the following description relating to the accompanying drawings, showing a preferred form. The essential characteristics are summarized in the claims:

Referring to the drawings, Fig. 1 is a plan view showing the can opener mechanism hereof, and a portion of the can being opened; Fig. 2 is a side elevation of the opener, showing the upper portion of such can in broken lines; Fig. 3 is a fragmentary view showing the side of the mechanism opposite that shown in Fig. 2; Fig. 4 is a sectional view of the mechanism and portions of the can adjacent the wall being cut, the section being taken substantially along the line 4—4 on Fig. 2; Figs. 5, 6, and 7, are views corresponding to Figs. 2, 3 and 4, but showing a modified form of machine; Fig. 8 is a sectional detail taken as indicated at 8—8 on Fig. 6; Figs. 9 and 10 are views corresponding to Figs. 5 and 7 of a further modified machine, and Fig. 11 is a fragmentary diagrammatic side view of still another form.

Referring again to the drawings, 1 indicates the main supporting framework of the machine, which, as shown, comprises a one-piece generally rectangular plate having a flange 2, extending outwardly substantially at right angles from its bottom edge. End marginal portions of the plate and flange may be turned at right angles, as at 3 and 4, respectively, and secured, as by rivets or suitable welding, to an attachment plate 5; or the bent ends may serve directly to attach the machine to a wall, as will be hereinafter shown. The plate 5 is of substantial nature and adapted to detachably secure the frame rigidly to a building part or cabinet as by the provision of a pair of slots 7 at the bottom edge (see Fig. 4), and a keyhole-shaped slot 8, having a restricted portion 8' above the frame 1. This permits the frame to be detachably secured by three screws in such relative position that they contact simultaneously with the upper edges of both slots 7 and the restricted portion 8' of the keyhole-shaped opening 8. The heads and shanks of screws so positioned, prevent movement of the machine, except bodily vertically and then outwardly to detach it.

Referring to the can opener mechanism per se this includes a knife 10, having a sharpened edge 11, and point 12, adapted to pierce the can; a feed-wheel 14 having teeth 15 (preferably shaped similarly to those of a circular saw); a guide 16 for abutting the upper rolled rim of the can; and means to support the knife, feed-wheel and guide. Said means will now be described.

The knife 10 may be carried directly on a plate 17, which forms the guide 16, and the plate, in turn, secured to an arm 18, pivoted to the frame 1 as at 19. The plate 17 and arm 18 may be combined into one part, as will later be shown. The arm 18 extends flat against the upper margin of the frame 1, and its end is reversely turned, as at 20, so that the outer end of the frame 1 is slidably embraced between parallel portions of the arm, the arm being guided for movement in a plane parallel to the frame, while held securely against any other movement. The arm constitutes a movable mounting for the knife 10, and it is normally held against a fixed abutment, such as a pin 22, by a coil spring 23, having one end operatively engaging the bend end portion 20 of the arm 18, and the other suitably attached to the frame member 1, as at an outward projection 24 thereof.

The feed wheel 14 is mounted on an axle 25 which as shown in Fig. 4 is threaded at its outer end into the center of the wheel, the threads being slightly riveted over, at 25', to prevent detachment in service. Such riveting does not prevent detachment and replacement of the wheel, should the latter become worn or broken in service.

The axle is supported in a sector shaped plate 27 pivoted to the frame below the normal operating plane of the wheel 14 as at 28. Swinging of the plate 27 raises and lowers the wheel.

The axle 25 has a cylindrical enlargement adjacent the wheel, which comprises, as shown, a bushing 30 adapted to roll the entire length of a curved slot 31 in the frame 1, the longitudinal center line of which is concentric with the axis of the pivot 28; so that the plate 27, carrying the feed wheel and axle can move freely from the position shown in Fig. 2, to a position such that the wheel is disposed well below the point of the knife, as indicated by broken lines in Fig. 2.

On the opposite side of the frame 1, a non-circular (e. g., squared) portion 33 of the axle 25, adjacent the slotted head 26 carries a pinion or gear wheel 35 and a crank 36. The bushing 30 prevents the wheel 14 and pinion 35 from binding against the swinging plate 27 and the side of the frame, since the length of the bushing is slightly greater than the combined width of the plate and frame stock. When the wheel 14 is put on the bushing may be clamped between the wheel and pinion or may engage a shoulder on the axle so that the bushing is left to turn freely.

The pinion 35 has a pitch circle which is the same as the external periphery of the feed wheel, and its teeth are adapted to mesh with those of a circular rack member 40, having an appropriately arranged set of teeth 41. Preferably, the teeth of the pinion and rack are pointed, to facilitate meshing by radial engagement. The rack serves to carry the feed wheel 14 from the position indicated in broken lines, nearly into the operating position shown in Fig. 2, simply by turning the crank in a clockwise direction, as viewed in Fig. 3 (counter-clockwise, as viewed in Fig. 2), and causing the pinion to travel up the rack. The pinion 35 automatically disengages the rack teeth 41, but only after the feed wheel 14 has securely gripped the rolled rim of the can, and the top of the can has been punctured by the knife. The rack 40, which may comprise simply a flat metal plate, is pivoted as on a screw 43, so that it may rock slightly, as between a pair of abutment pins 44 and 45 on the frame. This slight movement is to facilitate reengagement of the pinion with the teeth in the event the teeth are relatively disposed point-to-point when the pinion is turned back as described, to effect such reengagement. The crank 36 may have an outwardly bent portion 36' in order to clear the rack 40, its attaching screw 43 and the abutment pins; and is provided with a suitable handle 36''.

It may be mentioned that all portions of the mechanism which are subject to wear, may be suitably hardened, or may be made of material such as will adequately resist expected wear. Preferably, the knife and feed wheel are of tool steel and the guide part 17, rack 40 and pinion 35 of suitably hardened steel.

Having in mind that the frame, in use, is slightly tipped counter-clockwise from the position shown in Fig. 4 (as is usual in can openers), the operation of the machine is as follows: With the plate 27 in the lowered position, as shown in broken lines in Fig. 2, the operator places the rolled rim A of the can over the teeth of the feed wheel, so that the surface portion of the rim, adjacent that engaged by the teeth, is stopped by the arcuate margin of the plate 27, which extends beyond the working radius of the teeth, in a direction away from the pivot 28, as clearly shown in Fig. 2. In the above described lowered position of the plate 27, the pinion 35 is in the broken line position shown in Fig. 3; and it will now be seen that by turning the crank clockwise, as shown in Fig. 3 (counter-clockwise, as shown in Fig. 2), the feed wheel assembly, including the axle and plate, are bodily elevated along the slot 31, by the intermeshing rack and pinion, thereby raising the can and causing the knife to puncture the top, as shown in Fig. 4; the upper rim of the can being brought tightly against the guiding surface 16 on the arm 18. The mechanism is so designed that the guiding surface 16 shall normally be maintained, by the spring 23, closer to the working radius of the feed wheel than the vertical width of any can rim, so that the rim of the can has to raise the arm 18 against the pressure of the spring 23 in the elevated position of the feed wheel. Thus the spring force will always be exerted in a manner tending to cause the teeth of the feed wheel to slightly puncture the rim of the can and grippingly engage it.

During the cutting operation, the side wall of the can rests against a portion 2' of the flange 2 on the frame, so that its side wall does not rub on the feed wheel. The severed portion of the rim is pressed tightly against the adjacent upper inner margin of the can, so that there are no rough edges resulting from cutting the top. The severed disc drops out freely if the can is inverted, or may be grasped when it bends upwardly out of the can (as happens when the disc is nearly severed), and then held out and finally removed when the cutting is complete. The can stays firmly in place without having to hold it at any stage after the top is first punctured, as described. When the top has been cut all around, the operator simply reverses the direction of rotation of the crank, and before the feed wheel has disengaged the rim of the can, the pinion teeth will have reengaged the rack teeth 41, whereupon continued reverse rotation of the crank results in the feed wheel conveying the rim of the can to a position well below the knife, so that the can may be removed from the machine by straight outward bodily movement of it.

The machine, according to Figs. 5 to 8, inclusive, operates similarly to the mechanism according to the preceding figures but is considerably simplified, with the view to marketing it at less cost for lighter duty.

The attachment for the frame may be as indicated in Figs. 5, 6 and 8, wherein alternately positioned oppositely bent ear portions 50 on the frame 51 are provided with downwardly facing slots 52 adapted to engage suitable headed pins or screws set into a wall in the proper position to seat simultaneously in the slots, as already described. Either form of machine may have this arrangement.

A further simplification resides in omitting the sector-shaped pivoted plate, which carries the feed wheel axle in the previously described form and omitting the separate attachment plate for the knife on the yieldable arm which carries it. In lieu of providing the pivoted plate for the axle and feed-wheel assembly, the frame 51 has a through slot 4, having a ramp portion 55 terminating upwardly in a horizontal portion 56. The wheel and axle assembly is arranged very similarly to that previously described, except that there is provided, externally of the spacer bushing 30a, another freely rotatable bushing or roller 57, which rolls in both portions of the slot 56. The bushing 30a holds the feed wheel 14 and pinion 35 slightly out of embracing contact with the intermediate body of the frame, so that the axle and wheel assembly cannot tilt, with respect to the frame.

The feed wheel and axle assembly is moved positively up into operating position, upon clockwise rotation of the crank (Fig. 6) by the intermeshing of the teeth of the pinion **35**, with a yieldingly mounted rack **60** carried on the frame. This rack may be perfectly straight and normally held parallel to the ramp portion of the slot **54** by any suitable spring means.

The rack may comprise a generally rectangular stamping of sheet-metal, pivoted as by a pin or rivet **61** to the frame, and having an arm **62** extending past the horizontal portion **66** of the slot. The arm portion **62** has no teeth on it. The rack may be held in about the position shown in Fig. 6, by a hairpin-type spring, having a circular (partially closed) loop clamped under the head **64** of an attaching rivet, and two free arms, which are biased toward respective surfaces of the rack. The longer arm **65** of the spring presses downwardly on the arm portion **62** of the rack, and the shorter arm **66**, presses toward the end surface of the rack near its pivot, the two arms having prearranged stress sufficient to normally hold the rack in the position shown. A stop pin **67** may be positioned so as to engage the arm **62** and prevent the premature unmeshing of the rack and pinion teeth, while the axle and feed wheel assembly is moving up the ramp.

It will be obvious, from Fig. 6, that the pinion teeth finally disengage the rack teeth after the work (e. g., top of a can), has been punctured and the feed wheel has taken hold of the rim of the can and is pressing it upward against the guide **16** on the undersurface of the arm **18**. When the can has been cut and the feed wheel and axle assembly is to be lowered, with reference to the knife, this is accomplished simply by reversing the rotation of the crank, causing the feed wheel to ride backward on the rim of the can, (still engaged with the yielding guide **16**), whereupon the rack and pinion teeth are again reengaged and the axle and feed-wheel assembly positively lowered by the rack. If the rack and pinion teeth have a tendency to engage on their points, then the rack is raised against the action of the spring **65** until the teeth move out of end-to-end contact, and mesh.

Referring to Figs. 9 and 10, these illustrate how the machine of Figs. 1 to 4 may be economically made yieldingly adjustable to compensate for variations in can rim widths and to accommodate irregularities without having to move the knife. The modifications shown comprise a fixed plate **18***a*, which carries a guide member **17***a* having the guiding surface **16** for the rim of the can; a C-shaped spring **27***a*, an upper loop **70** of which embraces the bushing **30** of the feed-wheel and axle assembly, and a lower loop **71** of which is pivoted to the frame as on a headed pin **28***a*; and a depression **31***a* in the slot **31** in which the bushing **30** moves or rolls. The depression or downward enlargement of the slot **31** affords clearance for the bushing when the axle and wheel assembly is pushed down by the can rim, one edge of which engages the feed-wheel and the opposite edge of the fixed guide surface **16**.

In Fig. 11 the modifications relate to yieldingly supporting the wheel and axle assembly when the same is driven up a ramp surface, as by the rack and pinion connection **35**, **60** of Fig. 6. In this case a leaf spring **75** partially occupies the slot **54***a* (corresponding to the slot **54** of Figs. 5 and 6); the spring being about as wide as the stock of the frame **51**, so that the spring does not project laterally from either side of the frame. One end of the spring is anchored to the frame, as by being clamped in place in a slot **76** in the frame by a rivet **77**. The free portion of the spring forms the actual ramp surface, and the wheel and axle assembly (bushing **30***a* to be exact) rides up the slot, in going to operating position, the free end being depressed by the bushing, as indicated by broken lines, so as yieldingly to urge the feed-wheel into engagement with the rim of the can and to compensate for variations in rim width, etc. In this construction the roller **57** (shown in Fig. 7) is omitted; and the plate **17***b*, which carries the knife and has the guide **16**, is secured directly and fixedly to the frame.

The machine may be power-driven without requiring essential modification. The cutting elements may be variously modified and transposed as to position. A rotary knife may be used instead of that shown. The relative terms; horizontal, vertical, top, etc., are for convenience only, since the machine may be operated in any position.

I claim:

1. In a can opener having a knife and feed-wheel, a resilient arm which forms a yielding pivotal support for the feed-wheel on which the wheel is journalled and which is adapted to carry the wheel toward and away from the knife, a pinion rigid with the feed-wheel and a rack mounted on the frame for limited movement in the plane of extent of its teeth and engageable by the pinion to carry the feed-wheel toward and away from the knife.

2. A can opener comprising a frame, a knife and bodily movable feeding wheel on the frame, means adapted to guide the movably mounted wheel in such manner that the knife and feeding wheel may relatively approach each other, a pinion connected with the movably mounted wheel, a toothed feed rack adapted to engage the pinion and pivoted to said frame, the feed rack being yieldably mounted so as to be movable away from the pinion, and a spring maintaining the rack in engagement with the pinion, the rack extending in the direction of movement of the feeding wheel.

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