Feb. 21, 1950 R. E. McLEAN 2,498,441

CAN OPENER

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FIG. 1.

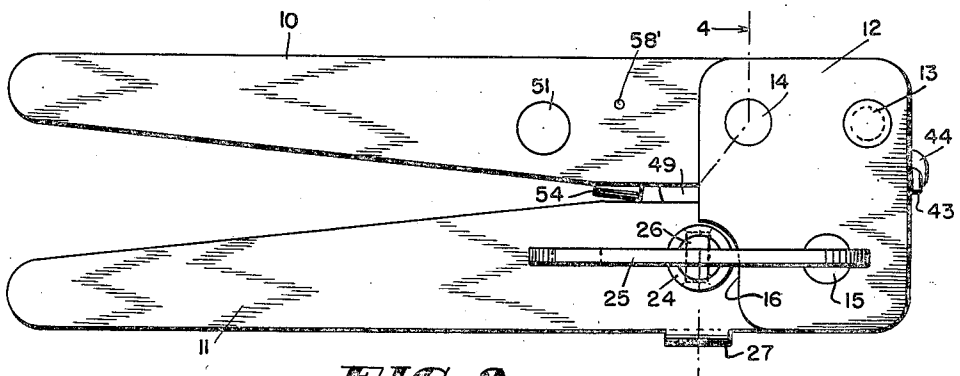


FIG. 2.

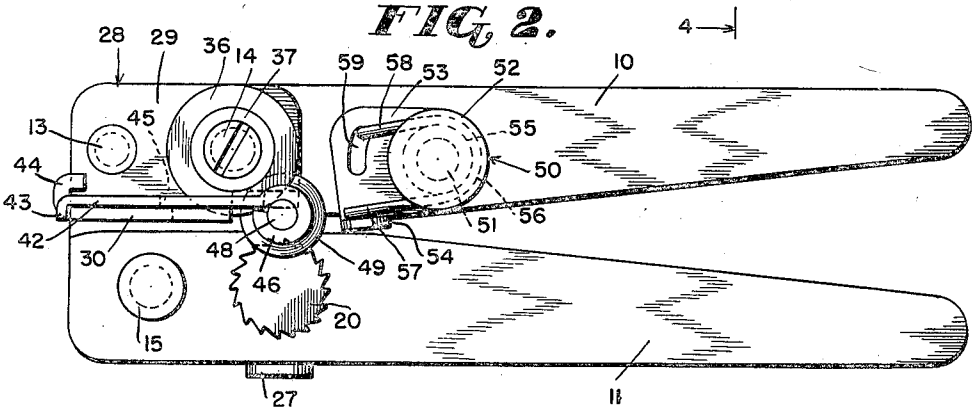
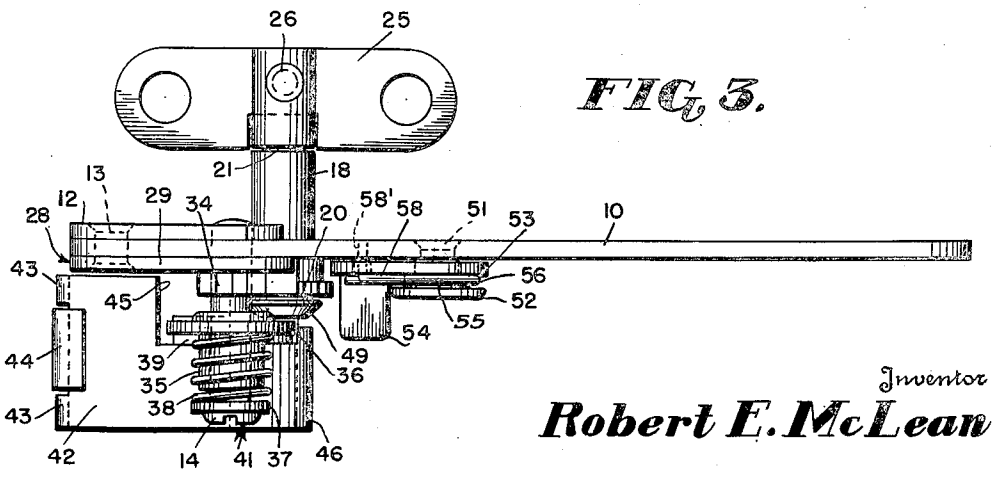


FIG. 3.



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FIG. 5.

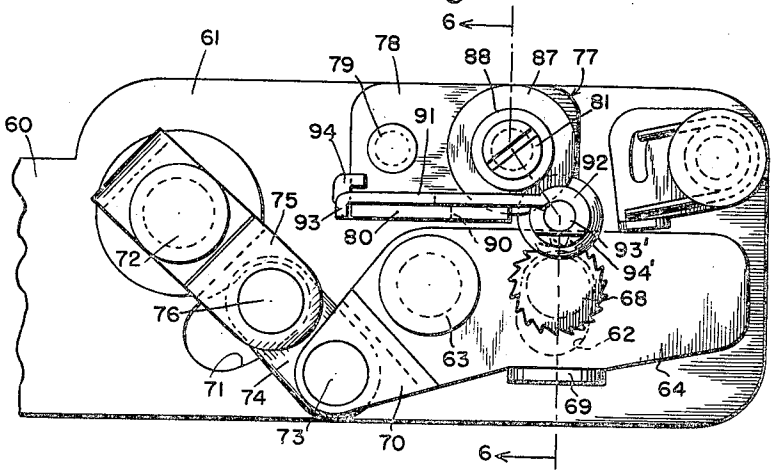


FIG. 4.

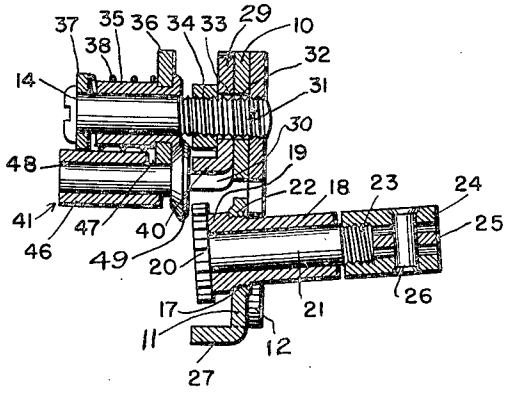
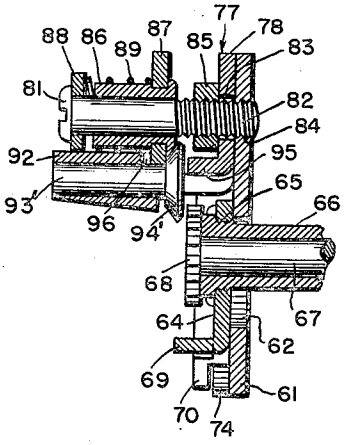


FIG. 6.



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CAN OPENER

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Application August 16, 1948, Serial No. 44,490

10 Claims. (Cl. 30—9)

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This invention relates generally to the class of can openers and is directed particularly to improvements in can openers of the rotary drive wheel type.

A principal object of the present invention is to provide in a can opener of the rotary drive wheel type employing a rotatable disk cutter, an improved anti-frictional thrust means for the cutter with novel resilient means to permit the disk cutter to be moved laterally a predetermined distance, away from the can driving wheel when necessary, such as when the cutter is passing the seam of a can.

Another object of the invention is to provide in a can opener of the character stated, a shaft supported rotary disk cutter with an oscillatable support guide or bearing for such shaft which positively maintains the disk cutter in desired alignment in relation to the can rim engaging driving wheel and an anti-frictional cooperating thrust means, but which is free to oscillate in such a manner that the shaft of the disk cutter is permitted to seat against the cooperating anti-frictional thrust means at all times during the operation of the device.

Still another object of the invention is to provide in a can opener of the character stated, a fixed can rest rearwardly of the disk cutter and a novel resilient can rest forwardly of the disk cutter by means of which good alignment of the can in the device is assured as the device is operated to cut out the end of the can, and also to assure adequate traction of the teeth of the can rim engaging driving wheel with the under edge of the flange or rim of the can as the device is operated for the purpose stated.

Still another object of the invention is to provide, in a rotary drive wheel type can opener, support and alignment means for the disk cutter which permit the use of a disk cutter of relatively small diameter which not only permits the disk cutter to better conform to the flange or rim of round cans, but also provides satisfactory shearing of the end from the can without inclining the disk cutter substantially from the parallel in relation to the axis of the can.

Still another object of the invention is to provide in a can opener of the character stated, economical adjustment means whereby the serviceable life of the device can be extended by restoring the lateral spacing of the disk cutter from the can driving wheel to the original specifications.

The invention will be best understood from a consideration of the following detailed description taken in connection with the accompanying

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drawings forming a part of the specification, with the understanding, however, that the invention is not to be limited to the exact details of construction shown and described since obvious modifications will occur to a person skilled in the art.

In the drawings:

Figure 1 is a view in side elevation of the outer or right hand side of a can opener constructed in accordance with an embodiment of the present invention, the handles being in the relative positions which they assume when the device is applied to a can and is ready for operation to cut out the head of the can.

Figure 2 is a view in elevation of the opposite or inner side of the device.

Figure 3 is a view in top plan of the same.

Figure 4 is a vertical transverse section taken substantially on the line 4—4 of Figure 1.

Figure 5 is an illustration of the inner or left hand side of an opener of the type designed to be mounted upon a wall showing the present invention and further showing a toggle form of thrust means for elevating the can driving wheel and the can with respect to the cutter disk.

Figure 6 is a vertical transverse section taken substantially on the line 6—6 of Figure 5.

Referring now particularly to Figures 1 to 4 inclusive of the drawings the numerals 10 and 11 designate respectively the upper and lower handles of the present can opener structure. These handles, as shown, are tapered through the major portion of their length to the forward ends thereof while at their rearward ends the handles have their inner edges substantially parallel when the handles are in closed relation as, for example, when the device is applied to a can and is ready to be used to cut out the head of the can.

At the rearward ends of the handles is a connecting plate 12 which is fixed in perpendicular relation to the upper handle 10 by means of the rivet 13 and a journal bolt 14 which will be hereinafter more fully described.

At the lower end of the plate 12 a pivot rivet 15 pivotally couples the rearward end of the handle 11 to the plate. The forward bottom corner of this plate 12 is recessed or cut out as indicated at 16.

Formed through the lower handle 11 adjacent to the cut out portion 16 of the plate, is the threaded opening 17, in which is threadably mounted or secured an end of a sleeve bearing 18. The inner end of this bearing is enlarged to provide the collar 19 which bears against the adjacent or inner side of the handle and also bearing against this collar is the can rim engaging

driving wheel 20 which is secured to the shaft 21 which extends through the bearing 18 as is clearly shown in Figure 4.

As is also shown in Figure 4 the portion of the handle surrounding the threaded opening 17 is distorted slightly as indicated at 22 whereby to slightly cant or angle the bearing 18 and the shaft 21 so that the inner face of the wheel 20 which is positioned in opposed relation with the side of a can, when the opener is fixed to the can, is in a plane which is inclined slightly toward the inner or left hand side from the perpendicular.

The outer end of the shaft 21 is screw threaded as at 23 to receive an end of the hub 24 of the thumb and finger operating handle 25. As will be readily seen this handle has a portion extending through a slot of the hub 24 and it is secured to the hub by the rivet 26 which passes through the hub and the handle.

As shown in Figure 1 the bearing 18 lies within the recess 16 of the plate 12 and contacts the top portion of the recess when the handles are forced together, thereby limiting such relative movement of the handles.

Immediately beneath the bearing 18, the lower handle 11 has formed integrally therewith the angular, inwardly extending guard 27 against which the side of the can rests when the rim of the can is engaged over the top part of the periphery of the wheel 20.

The numeral 28 generally designates the fixed can rest. This can rest comprises a vertical plate portion 29 which is disposed against the inner or left hand side of the top handle 10, and a right angularly extending floor portion 30 which extends inwardly from the handle 10. The rivet 13 is fixed in the vertical plate portion 29 of this rest and assists in maintaining the same in the desired fixed position.

As clearly shown in Figure 4 the journal bolt 14 also assists in maintaining the fixed can rest in place, this bolt having the threaded end portion 31 which is secured in the top handle 10 and which passes through openings 32 and 33 formed respectively through the handle 10 and the plate 29 of the fixed rest. Upon the inner side of this bolt is threaded the lock nut 34 which is pressed tightly against the inner side of the plate 29 and thus serves to bind the handle 10 between the plate 29 and the plate 12.

The bolt 14 is of substantial length as shown in Figure 4 and inwardly of the threaded portion thereof it has rotatably mounted thereon the long hub 35 upon the outer end of which is fixed the anti-friction wheel 36. The inner end of this hub 35 of the anti-friction wheel, is in spaced relation with a thrust washer 37 which is interposed between the hub and the head of the journal bolt and encircling the hub and interposed between this washer and the roller 36 is the expansion spring 38 which constantly tends to urge the wheel and hub outwardly or toward the nut 34. However, such movement is limited by the cutter as is hereinafter described.

As shown in Figures 2 and 3 the floor 30 of the fixed can rest is recessed or notched in its forward edge as indicated at 39 to receive the lower portion of the periphery of the wheel 36 and forwardly of this notched edge of the can rest floor there is formed from the plate 29, the inwardly directed or inturned ear 40 which functions to limit the outward movement of the about to be described disk cutter.

The numeral 41 generally designates the disk cutter alignment support. This support comprises

a plate 42 which lies upon the top of the can rest floor 30 as shown in Figure 2 and extends lengthwise of the cutter.

At its rearward end the plate 42 has the two down turned ears 43 which engage across the adjacent edge of the floor 30 and in between these down turned ears 43 is the up turned ear 44 which is an integral part of the floor 30 and which overlies the plate 42 thereby functioning to prevent movement of the plate rearwardly and also upwardly from the floor 30.

The outer edge portion of the plate 42 is cut out as indicated at 45, Figure 3, whereby the plate may extend forwardly across the inner side of the anti-friction wheel 36. At this forward end of the plate 42, the plate is shaped to provide the bearing sleeve 46, the top part of the outer end of which is cut or notched out as indicated at 47 and as best seen in Figure 4.

The numeral 48 designates the shaft for the disk cutter 49. This shaft, as shown in Figure 4, is rotatably supported in the bearing sleeve 46 and the cutter 49 is positioned between the outer end of this sleeve and the inwardly directed end of the ear 40. Thus the outer end of the sleeve limits the movement of the cutter disk inwardly or to the left and the ear 40 limits its outward movement.

As is also clearly shown in Figure 4 the anti-friction wheel 36 bears at its periphery upon the shaft 48, engaging the shaft in the notched portion 47 of the bearing sleeve and upon the inner side of the cutter disk. It will now be apparent that the spring 38 in urging the wheel 36 outwardly also constantly urges the wheel into engagement with the inner side of the cutter disk. This spring yields, however, to allow the cutter disk, the wheel 36 and its hub to move inwardly if and when necessary as, for example, when the seam of a can is passing between the cutter disk and the can rim engaging driving wheel 20.

Cooperating with the fixed can rest and disposed at the forward side of the cutter, upon the upper handle 10, is the resilient can rest which is generally designated 50. This resilient can rest comprises a rivet 51 which is fixed in the handle 10 and which has upon its inner end the relatively large head 52. Oscillatably mounted upon the rivet is the plate 53 which is positioned against the inner side of the handle 10 and extends rearwardly as shown in Figure 2. This plate 53 has the laterally extending foot 54, the under face of which is disposed in a plane just below the plane of the axis for the cutter shaft 48 and is adapted to be contacted by the rim of the can as the latter is lifted or forced upwardly against the cutter by the driving wheel 20 in the process of closing the handles.

The rivet 51 has a portion intermediate between the head and the portion passing through the plate 53, which is of slightly larger diameter than the portion extending through the plate 53 as indicated at 55 and encircling this intermediate portion 55 is a spring loop 56, one leg of which, designated 57, rests or bears against the top of the foot 54 while the other leg, designated 58, has an outwardly turned terminal portion which passes through the arcuate slot 59 formed in the plate 53 and is secured in an aperture 58', Figure 1, in the handle 10. This spring is biased to constantly exert a downward thrust upon the foot 54 so that when a can has the cutter applied thereto and the wheel 20 is forced upwardly with respect to the cutter 49, the top edge of the can rim will

bear against and have yielding resistance from the foot 54 of the resilient can rest.

Figures 5 and 6 illustrate the application of the present invention to a can opener of the type designated to be mounted upon a wall or other fixed support and also illustrates a toggle thrust means for elevating the can driving wheel with respect to the cutter disk.

In these two views the numeral 60 designates the supporting arm, the outer end of which is enlarged vertically to provide the body plate upon which the mechanism is mounted, the said enlarged portion being designated 61.

In this construction the body plate is provided with the short arcuate slot 62 struck from the center of a rivet member 63 which is secured to the plate rearwardly of the slot.

Oscillatably mounted upon this rivet 63 is the driving wheel supporting plate 64 which is relatively long and extends lengthwise of the inner or left hand side of the body plate across the slot 62.

Fixed in the threaded opening 65 formed through the plate 64, is an end of the bearing sleeve 66 in which is rotatably supported the shaft 67 carrying upon its inner end the can rim engaging driving wheel 68. This bearing 66, the shaft 67 and wheel 68 move vertically in the operation of the device to bring the wheel and the disk cutter into or move them out of working relation.

Directly below the driving wheel 68, the plate 64 has the inwardly directed can guard 69 which, like the guard 27, engages the side of the can when the same is applied to the cutter.

At its rearward end the plate 64 has the inwardly offset and downwardly directed terminal portion 70. Rearwardly and slightly above this terminal portion 70, the body plate has formed therein an arcuate slot 71 which is struck from the center of a pivot rivet 72 which is secured to the body plate at the opposite side of the slot from the inwardly offset portion 70 of the plate 64.

Pivotally connected with the portion 70 of the driving wheel carrying plate 64, by means of the rivet 73, is an end of a toggle link 74 and pivotally supported upon the rivet 72 is an end of a second toggle link 75. The other ends of these toggle links 74 and 75 are in overlapping relation across the slot 71 and are pivotally coupled together by the rivet 76 which extends through the slot 71 to the opposite or outer side of the body plate 61.

The driving wheel shaft 67 has connected with it a suitable operating crank, not shown, and the straightening or breaking of the toggle is effected by means of any one of the several operating mechanisms shown in my pending application Serial No. 744,393, filed April 28, 1947. Since the means for actuating the toggle link forms no part of the present invention but is shown in the prior application above referred to it is not believed necessary to illustrate or describe such mechanism in the present case. It will be understood that when the toggle connection consisting of the links 74 and 75, is straightened out as shown in Figure 5 it will effect the oscillation of the wheel carrying plate 64 and raise the driving wheel 68 into working relation with the can top cutter disk, about to be described and when the toggle is broken by the shifting of the pivot 76 rearwardly to the lower end of the slot 71 the plate 64 will be oscillated in a direction to lower the driving wheel from the illustrated position.

It will be readily seen that the anti-frictional thrust means for the disk cutter and the means permitting lateral movement of the cutter is substantially the same in the application shown in Figures 5 and 6 as in the type of cutter shown in Figures 1 to 4 inclusive. In the Figures 5 and 6 the fixed can rest is generally designated 77 and comprises the vertical plate 78 which is secured against the left side of the body plate 61 by the rivet 79, and the inwardly extending journal bolt 81.

Forwardly from the rivet 79 the relatively long journal bolt 81 has its threaded end portion 82 extended through an opening 83 in the plate 78 and threadably secured in the threaded opening 84 in the body plate. This threaded portion of the bolt also carries the binding nut 85 which bears against the inner side of the plate 78 as shown in Figure 6 and thus firmly secures the fixed can rest to the body plate.

Rotatably supported upon the bolt 81 is the hub portion 86 of the anti-friction wheel 87 and also mounted upon the bolt between the inner end of the hub and the head of the bolt is the washer 88 and interposed between this washer and the wheel 87, in surrounding relation with the hub 86, is the expansion spring 89, the function of which is the same as that described for the corresponding spring 38.

The floor 30 in its forward edge is notched or recessed as at 90 to receive the lower portion of the wheel 87 and resting upon the top of this floor is the disk cutter alignment support which includes the plate 91 which at its forward end is formed to provide the bearing sleeve 92 while at its rear end it has the down turned lugs 93, one only of which is shown, which coact with the up turned lug 94 forming an integral part of the floor 30 and turned forwardly over the plate 91 whereby to maintain the plate in position.

At its forward end the plate 91 carries in the bearing sleeve 92, the disk cutter supporting shaft 93'. Upon the outer end of this shaft, that is, the end nearest to the body plate 61, is mounted the disk cutter 94' and outward movement of the cutter is limited by the in turned ear 95, corresponding to the previously described ear 40 while inward movement is limited by the wheel 87 which, as shown in Figure 6, bears against the shaft 93, extending thereto through the notch 96 formed in the outer end of the bearing sleeve 92.

In the operation of the device as illustrated in Figures 1 to 4 inclusive the handles 10 and 11 are first separated to extreme position. The device is then placed on the cam with the disk cutter 49 resting on the end or head of the can adjacent to the rim thereof. This positions the periphery of the driving wheel 20 beneath the rim, the can guard 27 being in contact with the side of the can, as previously described and the resilient rest 54 being disposed over the top edge of the can. The handles 10 and 11 are then pressed together until further movement is prevented by reason of the bearing sleeve 18 engaging the seat formed by the edge of the recess 16 in the lower corner of the plate 12. The cutter will then be in the position illustrated in Figure 2 with respect to the wheel 20 and will have penetrated the head of the can.

As the handles are held in this closed position the thumb and finger operating handle or crank 25 is rotated clockwise thereby feeding the can around against the edge of the cutter until the

head of the can is cut out. Separation of the handles to the extreme position will effectively separate the cutter and the driving wheel as will be readily apparent so that the can can be removed from the device.

When the can is in the device and the handles are held together in the manner stated, the top of the rim or flange of the can will bear against the under surface of the floor portion 30 of the can rest 28 and prevent the can from tilting while the can driving wheel 20 is being rotated. The top of the rim or flange of the can will also bear against the under surface of the foot 54 of the can rest 50, raising the foot slightly, against the tension of the spring 56. The resilient pressure of the foot 54 on the top of the rim or flange of the can improves the traction of the teeth of the can driving wheel 20 with the under edge of the rim or flange of the can and also maintains the can in good alignment in the device while the end is being cut out of the can.

The disk cutter alignment support 41 has adequate pivotal action at its rearward end with the floor portion 30 of the can rest 28, to always permit the shaft 48 to seat against the periphery of the wheel 36. However, the support 41 is maintained in good alignment with the floor portion 30 by the lug 44 and the ears 43.

The ear 40 limits the outward movement of the disk cutter 49 as previously described to a predetermined position in relation to the can driving wheel 20.

While as previously stated the disk cutter 49 is permitted slight inward movement against the resistance of the spring 38, when necessary for the cutter to pass the seam of a can or to compensate for variations in thickness of the can wall, however, the tension of the spring 38 is such as to maintain the rim or flange of the can in such a position that the can driving wheel 20 cannot escape from under the edge of the rim or flange of the can. If, after extensive use, wear increases the predetermined spacing between the can driving wheel 20 and the disk cutter 49 to the extent that operation of the device is impaired, such spacing can be restored to original specification by merely loosening the lock nut 34, screwing the journal bolt 14 the required amount further into the plate 12 and then tightening the lock nut 34.

In the operation of the device, essentially all thrust, both radial and lateral or longitudinal, on the disk cutter 49, is taken by the thrust wheel 36, the support 41 serving only as an alignment guide or bearing for the shaft 48 of the disk cutter. Inasmuch as the thrust wheel 36 is of much greater size than the shaft 48 and the bearing of the thrust wheel is of approximately the same size as would normally be used for the shaft of the disk cutter were the device not provided with the anti-frictional thrust wheel 36, longitudinal and radial friction are materially reduced.

It is also pointed out that since no portion of the disk cutter, its shaft or the journal bolt extends over the rim or flange of the can, a disk cutter of relatively small diameter can obviously be used. In view of this fact the outer end surface of the disk cutter can be relatively flat in order to maintain the device in better alignment on the can and also to assure that the edge of the disk cutter engages the end of the can at such predetermined point inside the rim or flange of the can that shearing of the end from the can is accomplished most efficiently with minimum effort on the part of the operator.

The can guard 27 maintains the wall of the can a predetermined distance from the lower end surface of the can driving wheel 20.

The slot 59 limits the clockwise and counterclockwise oscillation of the can rest 57 on its pivot rivet 51.

Operation of the modified embodiment of the device as illustrated in Figures 5 and 6 is essentially the same as that of the first embodiment. As previously set forth the operation of the can puncturing thrust means here illustrated is fully set forth in my co-pending application hereinbefore referred to and forms no part of the present invention.

It will be obvious that the fixed can rest, the resilient can rest, the disk cutter, the oscillatable disk cutter alignment support, the anti-frictional thrust wheel, the resilient means for the anti-frictional thrust wheel and the adjustable journal bolt for the anti-frictional thrust wheel here illustrated can be adapted to any other can opener employing a body plate of the type here shown and having a can puncturing thrust means in which the can driving wheel is raised toward the cutter to effect the puncturing of the end of the can, and lowered from the cutter to release the can from the device.

It will also be obvious that the bearing 66 can be inclined slightly from the horizontal in the same manner as the bearing 18, if desired in which case the need for chamfering or bevelling the under portion of the bearing 92 would be eliminated.

I claim:

1. A can opener of the rotary drive wheel type comprising a supporting body, a second body connected with the supporting body for movement relative thereto, a can rim engaging driving wheel rotatably supported by the second body upon one side thereof, means for rotating the wheel, a fixed can rest secured to the supporting body on the same side as the wheel, a relatively long bearing carried by said rest with one end directed toward but spaced from the supporting body, a shaft rotatably supported in said bearing and extending at one end beyond the said one end of the bearing toward the adjacent supporting body, a disk cutter carried upon the said extending end of said shaft and in position for coaction with the driving wheel, resilient means constantly urging axial movement of the shaft toward the supporting body, and a stop member interposed between the disk cutter and the supporting body.

2. A can opener of the rotary drive wheel type as described in claim 1, wherein the said fixed can rest is positioned rearwardly of the disk cutter supporting shaft, and a yieldable can rest supported by said supporting body upon the same side as the fixed rest and positioned forwardly of said disk cutter supporting shaft.

3. A can opener of the rotary drive wheel type as set forth in claim 1, with a wheel rotatably supported above and on an axis paralleling the axis of the cutter disk supporting shaft, said wheel having peripheral bearing upon the top of the underlying cutter disk supporting shaft to oppose upward thrust against the cutter disk and shaft.

4. A can opener of the rotary drive wheel type as set forth in claim 1, with a wheel rotatably supported above and on an axis paralleling the axis of the cutter disk supporting shaft, said

wheel having peripheral bearing upon the top of the underlying cutter disk supporting shaft to oppose upward thrust against the cutter disk and shaft, said wheel having its outer face bearing against the face of the cutter disk which is remote from the stop member and said resilient means exerting thrust against the opposite side face of the wheel and through the wheel urging the said axial movement of the cutter disk shaft toward the supporting body.

5. A can opener of the rotary drive wheel type, comprising a supporting body, a second body connected to the supporting body for movement relative thereto, a cam rim engaging driving wheel rotatably supported by the second body upon one side thereof, means for rotating the wheel, a fixed can rest secured to the supporting body on the same side as the wheel, a relatively long bearing supported by said rest with one end directed toward but spaced from the supporting body, a shaft rotatably supported in said bearing and extending at one end beyond the said one end of the bearing toward the adjacent supporting body, a disk cutter carried upon the said extending end of said shaft and in position for coaction with the driving wheel, the side face of the disk cutter opposite from the bearing and shaft being smooth and spaced from the said one side of the supporting body, a stop member interposed between the said smooth face of the disk cutter and the adjacent side of the supporting body, the cutter and shaft having axial movement relative to the stop member, and spring means supported adjacent to the cutter and having a cooperative relation therewith to resist axial movement of the cutter away from the stop member.

6. A can opener of the rotary drive wheel type as set forth in claim 5 including a journal bolt secured at one end to the supporting body in spaced parallel relation with the cutter supporting shaft, and a wheel member carried by and rotatably supported on said journal bolt and having peripheral contact with the shaft adjacent to the disk cutter, said spring means being in the form of a coil encircling the journal bolt and bearing against the wheel member and tending to maintain the wheel member in predetermined position relative to the disk cutter.

7. A can opener of the rotary drive wheel type, comprising a supporting body, a second body connected with the supporting body for movement relative thereto, a can rim engaging driving wheel rotatably supported by the second body upon one side thereof, means for rotating the wheel, a fixed can rest disposed at the side of the supporting body adjacent to the driving wheel and comprising an angle member having a vertical flange and a horizontal flange, said vertical flange being disposed against said side of the supporting body and the horizontal flange extending laterally inwardly therefrom, a plate disposed upon said horizontal flange, means forming a bearing sleeve across an end of the plate with its axis perpendicular to the said side of the supporting body, means forming an interlocking pivotal connection between the other end of the plate and said horizontal flange, a shaft rotatably supported in the bearing sleeve and adapted to have axial movement therein, a cutter wheel supported upon the end of the shaft adjacent to the supporting body and in position for cooperative action with the can rim engaging driving wheel, means interposed between the cutter disk and the adjacent supporting body for limiting movement of the disk toward the supporting body, a journal secured at one end to said supporting body in spaced parallel relation with the shaft, an anti-friction wheel rotatably supported on the journal and having peripheral contact with said shaft adjacent to the side of the disk remote from the supporting body, and spring means encircling said journal and bearing at one end against said anti-friction wheel and resisting axial movement of the wheel and the cutter disk away from the adjacent supporting body.

8. A can opener of the character stated in claim 7, wherein the anti-friction wheel supporting journal is in the form of a bolt having axial adjustment for facilitating changing the spacial relation of the wheel and the adjacent side of the supporting body, and a relatively long hub connected with the wheel and having said journal bolt extending therethrough, said spring being in the form of a coil and encircling said hub.

9. A can opener of the character stated in claim 7 wherein the axial centers of the can rim engaging driving wheel and of the cutter disk supporting shaft are in a common plane and the axial center of the journal for said wheel is in a rearwardly offset plane parallel to the first mentioned plane.

10. A can opener of the character described in claim 7 wherein the said stop comprises an integral right angularly turned portion of the vertical flange of said angle member and is disposed directly above the axial center of the can rim engaging driving wheel and is directed toward the outer side face of the rotary disk cutter.

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No references cited.