May 23, 1961 R. E. McLEAN 2,984,904

CAN OPENER CUTTER WHEEL CARRIER ASSEMBLY

Filed Jan. 2, 1959 2 Sheets-Sheet 1

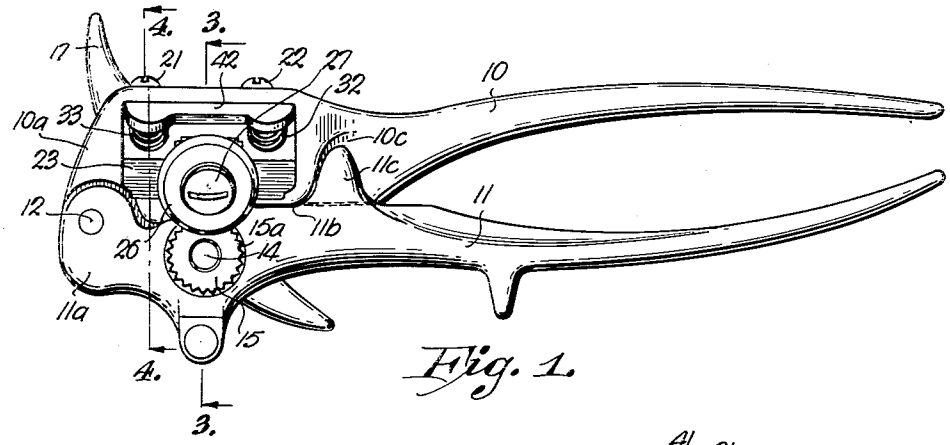

Fig. 1.

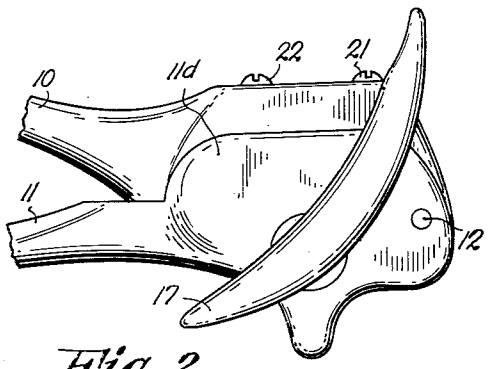

Fig. 2.

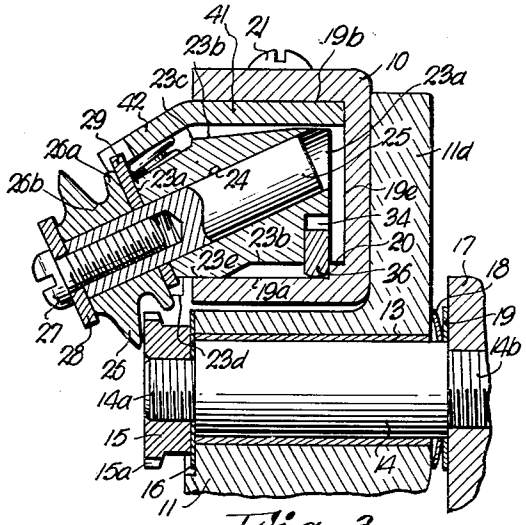

Fig. 3.

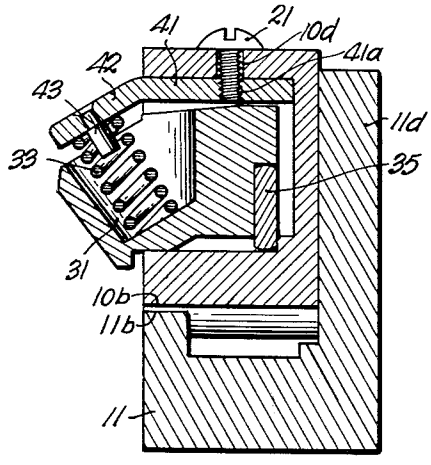

Fig. 4.

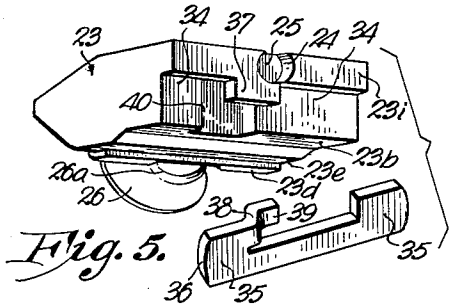

Fig. 5.

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CAN OPENER CUTTER WHEEL CARRIER ASSEMBLY

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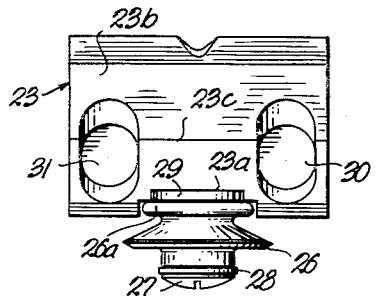

Fig. 6.

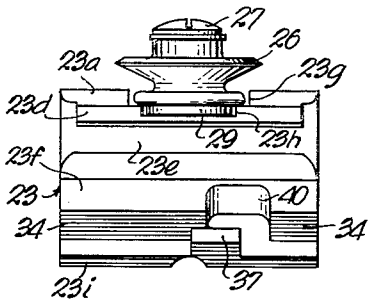

Fig. 7.

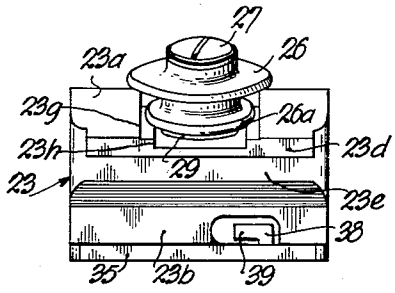

Fig. 8.

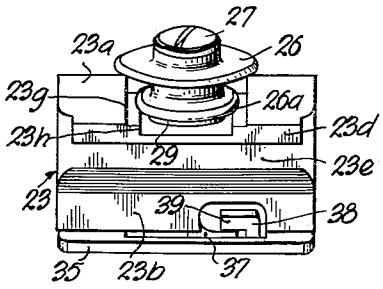

Fig. 9.

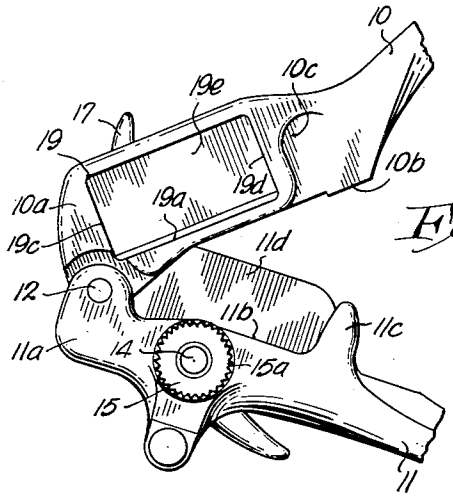

Fig. 10.

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CAN OPENER CUTTER WHEEL CARRIER ASSEMBLY

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Filed Jan. 2, 1959, Ser. No. 784,489

9 Claims. (Cl. 30—15.5)

This invention relates to can openers wherein a cutter wheel cooperates with a feed wheel to cut a can and refers more particularly to an improved cutter wheel carrier assembly for use in such type of can opener.

Conventional can openers are well known in which the cooperating feed wheel of the can opener is elevated toward the cutter wheel, to a fixed predetermined point, whereby to effect the piercing of the end of the can and to position the feed wheel vertically, with respect to the cutter wheel. Rotation of the feed wheel, after it is so elevated, effects the cutting of a can engaged by the cutter and feed wheels by the cutter wheel. Certain problems, however, arise in this construction or its variation in which a cutter wheel is raised or lowered relative a fixed rotatable feed wheel to engage and cut a can.

Thus, for example, it is desirable to provide means for continually urging the cutter wheel vertically toward the feed wheel in the can cutting process to vertically squeeze the rim or flange of the can between the conventional grooved hub portion of the cutter wheel and the teeth of the feed wheel in order to provide good traction of the teeth of the feed wheel with the under edge of the can rim or flange for efficient feeding of the can during the cutting of the end thereof by the cutter wheel. However, some vertical play is preferably permitted between the feed and cutter wheels to conform to can rim irregularities and varying heights of can rims. Additionally, it is eminently desirable at all times to continually urge the cutter wheel blade laterally toward the face of the feed wheel to cut the can as close to the can rim as possible and maintain the cutter wheel laterally spaced or positioned, with respect to the face of the feed wheel, at a predetermined spacing, at all times. Some lateral movement of either the feed wheel or the cutter wheel should be possible, however, relative the other wheel when the side seam portion of the can (which is of substantially additional thickness) is passing between the face of the feed wheel and the overlapping portion of the cutter wheel. Conventional can openers may accomplish none of these features or some of them, but rarely all of them in combination or to the degree and with the uniformity desired.

Therefore, an object of the instant invention is to provide a can opener cutter wheel carrier assembly which operates to effectively vertically squeeze the can rim between the cutter wheel hub and the feed wheel to obtain effective traction for the feed wheel in the feed wheel drive.

Another object of the invention is to provide an improved cutter wheel carrier assembly which operates to continually maintain the cutter blade accurately and precisely spaced relative the feed wheel face whereby to uniformly cut the can as close to the rim thereof as possible.

Another object of the invention is to provide an improved can opener cutter wheel carrier assembly which readily permits passing of the side seam between the feed and cutter wheels without losing traction or defeating the purpose of continuously positioning the cutter wheel face at a predetermined spacing relative to the feed wheel face.

Another object of the invention is to provide an improved cutter wheel carrier assembly and mounting which provides vertical gripping force between the cutter and feed wheels yet allows for can rim height irregularities and can rims of differing heights.

Yet another object of the invention is to provide an improved can opener cutter wheel carrier assembly which simultaneously and continuously operates to vertically squeeze the can rim between the cutter wheel hub and the feed wheel, force the cutter blade toward the feed wheel face and maintain a proper spacing therebetween and, also, permits passing of the side seam between the feed and cutter wheels without defeating the former two functions.

Another object of the instant invention is to provide an improved can opener cutter wheel carrier unit wherein the carrier unit is pivotally mounted in the can opener body yet wherein there is a minimum of friction between the cutter wheel carrier unit and the can opener body in which the carrier unit is positioned.

Another object of the invention is to provide an improved can opener cutter wheel carrier assembly which is relatively simple, relatively cheap, relatively easy to manufacture, rugged and has a long life under hard use, and wherein the parts thereof are readily accessible for cleaning, repair or replacement.

Still another object of the instant invention is to provide a can opener cutter wheel carrier improvement which may be readily employed in conventional types of can openers and can opener designs without substantial change in shape and size thereof.

Yet another object of the invention is to provide an improved can opener cutter wheel carrier construction which may be inserted or employed in either wall or hand operated type can openers.

Other and further objects of the invention will appear in the course of the following description thereof.

In the drawings, which form a part of the instant specification and are to be read in conjunction therewith, an embodiment of the invention is shown and, in the various views, like numerals are employed to indicate like parts.

Fig. 1 is a side view of a hand-operated can opener employing the inventive cutter wheel carrier unit.

Fig. 2 is a partial view of the opposite side of the can opener of Fig. 1.

Fig. 3 is a view taken along the lines 3—3 of Fig. 1 in the direction of the arrows.

Fig. 4 is a view taken along the lines 4—4 of Fig. 1 in the direction of the arrows.

Fig. 5 is an exploded perspective view showing two normally interengaged parts of the inventive cutter wheel carrier assembly or unit disengaged for the purposes of illustration.

Fig. 6 is a top view of the cutter wheel carrier block with the springs removed in the plane of the cutter blade.

Fig. 7 is a bottom view of the cutter wheel carrier block of Fig. 6 with the link removed in the plane of the cutter blade.

Fig. 8 is a bottom plan view of the cutter wheel carrier block with the link inserted and in a first extreme position.

Fig. 9 is a bottom plan view of the cutter wheel carrier block with the link inserted and in a second extreme position.

Fig. 10 is a side view of the hand operated can opener of Fig. 1 with the holding handles thereof opened beyond extreme operating position and the cutter wheel carrier block removed from the upper holding handle.

Referring first to Figures 1, 2 and 10, therein is shown the invention embodied in a hand-operated can opener. It should be understood that the invention is not limited to application in this type of can opener and the showing in such manner is merely illustrative. The can opener shown in these figures has an upper grasping handle **10** and a lower grasping handle **11** which are hinged together at their front ends **10***a* and **11***a* by pin **12**. Upper handle **10** has an undersurface **10***b* (Fig. 10) which abuts the upper surface **11***b* of the lower handle and also has side recess **10***c* to receive guide **11***c* therein. The back side **11***d* of the lower handle fits behind the upper handle **10** when the holding handles are closed as in Fig. 2 whereby to also aid in precisely positioning the upper handle relative the lower handle.

Referring first to the lower handle **11**, wherein is carried a relatively conventional feed wheel operating mechanism, bushing **13** (Fig. 3) receives drive shaft **14** for the feed wheel **15**. Feed wheel **15** threads onto the outwardly threaded lesser diameter portion **14***a* of the drive shaft **14**. A thrust washer **16** is positioned on portion **14***a* of the drive shaft **14** between the inner face of the feed wheel **15** and the side face of handle **11**. Shim washers (not shown) and in the required number, can be inserted between the feed wheel **15** and the thrust washer **16** to obtain the desired lateral spacing between the face of the feed wheel **15** and the adjacent overlapping portion of the cutter wheel to be described. Feed wheel **15** has toothed portion **15***a* thereon. The opposite end **14***b* of drive shaft **14** extends from the handle **11**, is of lesser diameter and is threaded. This receives operating crank or handle **17**. Spring washer **18** and thrust washer **19** are positioned between the handle **11** and the feed wheel operating handle **17**. Spring washer **18** provides the desired frictional relationship between the feed wheel and the lower handle **11**.

Referring to the upper grasping handle **10**, a recess **19** (Fig. 10) of substantially rectangular form is provided therein having bottom wall **19***a*, upper wall **19***b*, side walls **19***c* and **19***d* and rear wall **19***e* therein. A portion of the upper holding handle **10** is provided as at **20** (Fig. 3) which extends slightly upwardly from the floor **19***a* of the recess **19** for a purpose to be later described. Two holes **10***d* are provided in the upper holding handle through which screws **21** and **22** are inserted to secure the inventive cutter carrier assembly within the handle.

Turning to the cutter carrier block **23**, hole **24** receives arbor or stud **25** for the cutter wheel **26**. Screw **27** threads into arbor **25** to secure cutter wheel **26** thereon. Washer **28** is inserted between the head of the screw **27** and the end of the cutter wheel arbor **25**. Washer **29** is positioned between the cutter wheel hub **26***a* and the face **23***a* of the cutter carrier block **23**.

Wells **30** and **31**, which are circular in cross section at the bottoms thereof and become more oval toward their upper ends whereby to provide a greater width in a single direction to permit tilting of springs **32** and **33** therein, are provided in the upper face of block **23**. The upper face **23***b* of the cutter carrier **23** is angled downwardly from the line **23***c* (Fig. 3). The under side of the cutter carrier block includes forward ledge **23***d*, secondary ledge **23***e* and under surface **23***b*. The angled front face **23***a* of the cutter carrier block is recessed twice as at **23***g* and **23***h* to receive washer **29** and cutter wheel hub **26***a*. A first recess **34** is provided across the rear face **23***i* (Fig. 5) of cutter carrier block **23** to receive the main body portion **35** of link **36**. Lug **37**, however, is left on block **23** to engage the innermost portion **39** of inwardly canted arm **38** of the link **36**. Secondary recess **40** is provided in the rear face of block **23** to receive the innermost portion **39** of the arm **38** of link **36**. The depth of the link **36** at its greatest height portion is greater than the depth of the recess **34**. The depth of the recess **40** is greater than the thickness of the innermost portion **39** of arm **38** on link **36** whereby to permit tilting movement of the link **36** as seen in Fig. 8 and Fig. 9.

Spring seat plate **41** having downwardly canted shelf portion **42** is provided with thread screw holes **41***a* therein to receive screws **21** and **22** on the top of top handle **10**. Spring guides **43**, secured in canted shelf portion **42** of the spring plate **41**, are provided to overlie the wells **30** and **31**, with the under face of the canted portion of the spring plate normally substantially parallel to the bottom of the wells **30** and **31**. If desired, these guides **43** may be extruded from the plate **41**. Coil compression springs **32** and **33** are received in wells **30** and **31**.

Shelf **23***e* seats downwardly on the floor **19***a* of the recess **19** in the upper holding handle **10** at all times except when a can is engaged in the can opener. The top portion **23***b* seats upwardly against the overlying spring seat plate **41** whenever an upward thrust greater than the resistance offered by the springs **32** and **33** is applied to cutter wheel **26**, such as might be had when piercing the end of a can by the cutter wheel **26**.

In operation of the embodiment of the invention illustrated in the drawings, the two holding handles **10** and **11** are first separated from each other to the extreme position. A nose portion of handle **10** will engage an underlying portion of handle **11** to limit opening of the handles to desired extent. The can opener is then placed on a can (not shown) with the periphery of the cutter wheel **26** resting on the end of the can. The two holding handles **10** and **11** are then squeezed together to the extreme position, in which position the underside **10***b* of upper holding handle **10** engages the upper side **11***b* of the lower holding handle **11** to limit the movement of the handles toward one another. As the two handles **10** and **11** are squeezed together, the cutter carrier block **23**, against the preselected pressure of the two coil compression springs **32** and **33**, will be rotated clockwise, as viewed in Fig. 3, taking its fulcrum at the bottom edge of the floating fulcrum link **36**. During this rotation, the floating fulcrum link **36** rocks with the cutter carrier block **23**. If the resistance offered by the springs **32** and **33** in inadequate to cause the cutter wheel **26** to pierce the end of the can, then the surface **23***b* of the cutter carrier block **23** will seat upwardly against the overlying spring seat plate **41** and squeezing of the two holding handles to the extreme closed position will then positively cause the cutter wheel **26** to penetrate the end of the can.

After the end of the can has been pierced by the cutter wheel **26**, pressure of the springs **32** and **33** is such as to cause the rim of the can to be vertically squeezed between the toothed periphery of the feed wheel **15** and the overlying grooved portion of the cutter wheel so that the teeth of the feed wheel will be sufficiently embedded in the under edge of the rim or flange of the can to provide efficient traction between the teeth of the feed wheel and the rim of the can for feeding of the can in respect to the cutter wheel to effect shearing of the end of the can by the said cutter wheel. The downward thrust or force imparted to the cutter wheel by the springs **32** and **33** is resilient and yieldable, so the vertical space existing between the periphery of the feed wheel and the grooved overlying portion **26***b* of the cutter wheel **26** will not only conform to any irregularities in the height of the rim of the can, but the space will vary as necessary to conform to the heights of rims of different cans.

Due to the canted position or alignment of springs **32** and **33**, said alignment being selective in manufacture, springs **32** and **33** not only exert a downward force on the cutter carrier block **23**, but also exert an inwardly directed force on the said cutter carrier block **23**. The selection of position of angularity or alignment in manufacture determines the ratio of the inwardly directed force to that of the downwardly directed force, the total force of the springs **32** and **33** being distributed downwardly and inwardly in said ratio. The amount of inwardly

directed force is sufficient to normally maintain the overlapping or blade portion **26** of the cutter wheel spaced laterally away from the face of the feed wheel **15** a preselected distance (such as will provide the most efficient operation of the can opener). This preferred spacing is attained in assembly of the can opener by insertion of required shim or shims, between the feed wheel **15** and the thrust washer **16**.

It should be understood that whenever a can is engaged in the can opener and the two holding handles are squeezed together to the extreme position, the surface **23***e* of the cutter carrier block **23** will not seat on the underlying portion **19***a* of the upper holding handle **10** and the surface **23***b* of the cutter carrier block **23** will not seat upwardly against the overlying portion of the spring seat plate **41**. However, the innermost portion **23***i* of the cutter carrier block and the underlying floating fulcrum link **36** on which it bears can have no appreciable up and down movement in the recess **19** of the upper holding handle **10**. When the side seam of the can is passing between the face of the feed wheel **15** and the overlapping portion **26** of the cutter wheel, cutter block **23**, against the inwardly directed and yieldable force of springs **32** and **33** is substantially frictionlessly free to move outwardly as required to permit the thick side seam of the can to pass between the said face of feed wheel **15** and the overlapping portion **26** of the cutter wheel but is immediately urged back to the illustrated position by the inwardly directed force of said springs **32** and **33** as soon as the side seam has passed between the face of the feed wheel and the overlapping portion of the cutter wheel.

Undesirable friction that otherwise would impede the free inward and outward movement of the cutter carrier block **23** is further minimized by use of the floating fulcrum link **36**. As block **23** moves inwardly or outwardly, it seats, for rocking movement, on the top edge of the floating fulcrum link **36**, link **36** seating, for rocking movement, on the floor **19***a* of the recess **19** of the upper holding handle **10**. Portion **20** of the upper holding handle **10** limits the movement of the link **36** toward the rear wall **19***e* and, in turn, block **23**, inasmuch as block **23** also normally seats inwardly against the said fulcrum link **36**. Lug portion **39** of the link **36** is positioned in the rear recess **40** of the block **23** and is maintained therein by the portion **37** of cutter carrier block **23**. Accordingly, the carrier block **23** is maintained in desired position, for rocking movement, on the top edge of the floating fulcrum link **36**. Floating fulcrum link **36** is preferably produced from stock having rounded edges to facilitate the rocking action.

Inwardly directed force of the springs **32** and **33** maintains the inner surface of the cutter carrier block **23** in longitudinal parallel alignment with the wall portion **19***e* of the upper holding handle **10**. Guides **43** of the spring seat plate **41** maintain the upper ends of the springs **32** and **33** in the desired position while the lower ends of the said springs are maintained in desired position by the bottoms of the spring wells **30** and **31** of the block **23**. In any operating position, only the bottom portions of the spring wells **30** and **31** of block **23** are in contact with the said springs **32** and **33**, therefore assuring unimpeded action of the two springs.

After the end has been severed from the can, the two holding handles **10** and **11** are then separated to the extreme position to permit removal of the can opener from the can. Limitation of separation of one of the two holding handles from the other is accomplished by engagement of front end **10***a* of upper handle **10** with front portion **11***a* of lower handle **11** at a point selected on the side of the axis of the hinge pin **12** opposite to the side on which the feed wheel is positioned.

Thumb and finger key-type handle **17** facilitates rotation of the feed wheel **15** to feed the can in respect to the cutter wheel **26** to effect the shearing of the end from the can.

Although the floating fulcrum link is illustrated in Figs. 3 and 4 with its bottom edge positioned vertically at a plane slightly above that of the uppermost point of the periphery of the feed wheel **15**, it is to be understood that the bottom edge of the floating fulcrum link **36** can be positioned in any other desired horizontal plane in respect to the uppermost point of the periphery of the feed wheel. Accordingly, to substantially maintain the desired lateral spacing between the end face of the feed wheel **15** and the overlapping portion of the cutter wheel **26** as the cutter carrier block **23** rocks from one extreme position to the other extreme position, a preferred vertical positioning of the bottom edge of the floating fulcrum link **36** would be in the same horizontal plane as that of the uppermost point of the periphery of said feed wheel **15**.

The invention comprises the provision of the floating cutter wheel block and its mounting assembly in the can opener frame. Thus the invention is not limited to a hand-operated type can opener having a pair of holding handles pivoted together as illustrated. In a can opener frame such as a wall type can opener, any means for (1) moving a feed wheel relative a fixed frame portion including the inventive cutter wheel assembly, or (2) movable member including the inventive cutter wheel assembly relative a fixed frame portion carrying a feed wheel could embody the invention.

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

It will be understood that certain features and subcombinations are of utility and may be employed without reference to other features and subcombinations. 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 hereinabove set forth or shown in the accompanying drawings is to be interpreted as illustrative and not in a limiting sense.

Having thus described my invention, I claim:

1. In a can opener having a frame, a cutter wheel rotatably mounted on said frame, a feed wheel rotatably mounted on said frame, means for rotating said feed wheel mounted on said frame, and means for moving at least one of said cutter and feed wheels to and from the other said wheel also mounted on said frame, the improvement in mounting said cutter wheel on said frame which comprises a block fitting into and substantially filling a first recess in said frame, pivot means cooperating with said block in said recess to permit limited in and out movement of said block in said recess and also limited up and down movement of at least the outer portion of said block relative said frame, resilient means tending to resist both outward movement of said block relative said frame and upward movement of the outer portion of said block relative said frame, means for rotatably mounting said cutter wheel on the outer face of said block, and means for supporting said resilient means on said frame relative said block.

2. Apparatus as in claim 1 wherein the pivot means comprises a link pivotally engaged with the lower inner portion of said block.

3. Apparatus as in claim 1 wherein said resilient means is received in the outer portion of said block and the means for supporting same relative said frame comprises a shelf fixed to said frame over said outer portion of said block.

4. Apparatus as in claim 1 including means in said recess spacing the inner wall of the block from the inner wall of the recess.

5. In a can opener frame having a first portion thereof having a first recess therein, a block fitting into, substan-

tially filling, yet pivotally movable in said first recess, a cutter wheel, means for rotatably mounting said cutter wheel on the outer face of said block, at least one recess in said block, the base and body of said block recess angled upwardly and outwardly relative to the base of the first recess, at least one flange extending outwardly and downwardly from said can opener frame over said first recess, resilient means retained between and by said overlying flange and block recess base, means mounting said block for pivotal movement in said first recess against said resilient means, a feed wheel rotatably mounted on a second portion of the can opener frame, and means for moving at least one of said cutter and feed wheels to and from the other said wheel.

6. Apparatus as in claim 5 wherein the means mounting said block for pivotal movement in said recess against said resilient means also mounts said block for in and out movement in said recess relative said frame against said resilient means.

7. A can opener frame, a first portion of the frame with a first recess therein, a second portion of the frame with a feed wheel rotatably mounted thereon, a cutter block mounted in said first recess, substantially filling said first recess yet pivotally movable therein, a cutter wheel rotatably mounted on a portion of said block outside of said first recess, at least one recess in said block, at least one flange extending outwardly and downwardly from said can opener frame over said first recess, resilient means cooperating between said flange and the base of said block recess tending to maintain said block in said first recess in a first position against pivotal movement of said block in said first recess, means for moving at least one of said cutter and feed wheels to and from the other said wheel, and means mounting said block for pivotal movement in said first recess against said resilient means.

8. In a can opener having a frame, a cutter wheel rotatably mounted on said frame, a feed wheel rotatably mounted on said frame, means for rotating said feel wheel mounted on said frame, and means for moving at least one of said cutter and feed wheels to and from the other said wheel also mounted on said frame, the improvement in mounting said cutter wheel on said frame

which comprises a block fitting into, substantially filling yet pivotally movable in a first recess in said frame, means mounting said block for pivotal movement in first recess, means for rotatably mounting said cutter wheel on the outer face of said block, at least one recess in said block, the base and body of said block recess angled upwardly and outwardly relative the base of the first recess, at least one flange extending outwardly and downwardly from said can opener frame over said first recess, and resilient means retained between and by said overlying flange and block recess base operable to resist said pivotal movement of said block in said first recess.

9. In a can opener having a frame with a first recess therein, a block having a first portion thereof fitting into and substantially filling said recess, a second portion of said block extending from said recess, the first portion of said block formed relative to said recess whereby to permit limited pivotal up and down movement of the second portion of said block relative said frame, a cutter wheel, means for rotatably mounting said cutter wheel on the second portion of said block, pivot means cooperating with said block in said recess to permit limited in and out movement of said block in said recess and also limited up and down movement of at least the second portion of said block, resilient means tending to resist both outward movement of said block from said recess and upward movement of the second portion of said block relative said frame, means for supporting the resilient means on said frame relative the second portion of said block, a feed wheel rotatably mounted on a second portion of the can opener frame, and means for moving at least one of said cutter and feed wheels to and from the other said wheel.

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