Oct. 11, 1949. O. H. HANBY 2,484,504

CAN OPENER

Filed July 26, 1948 2 Sheets-Sheet 1

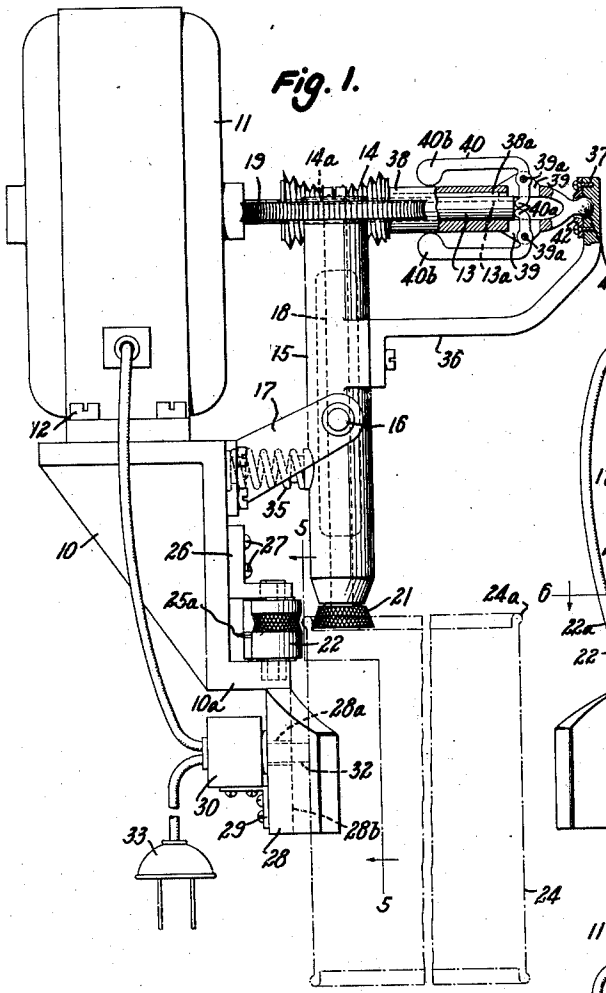


Fig. 1.

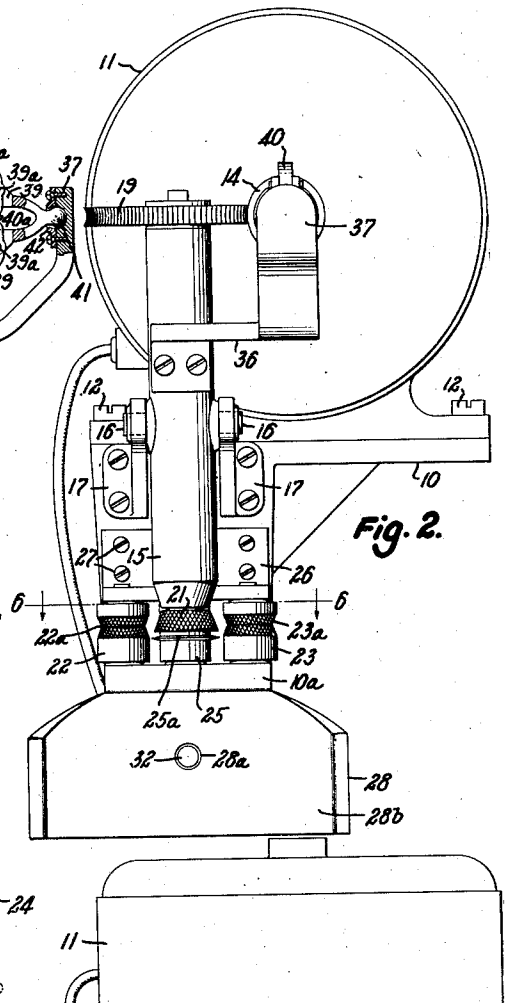


Fig. 2.

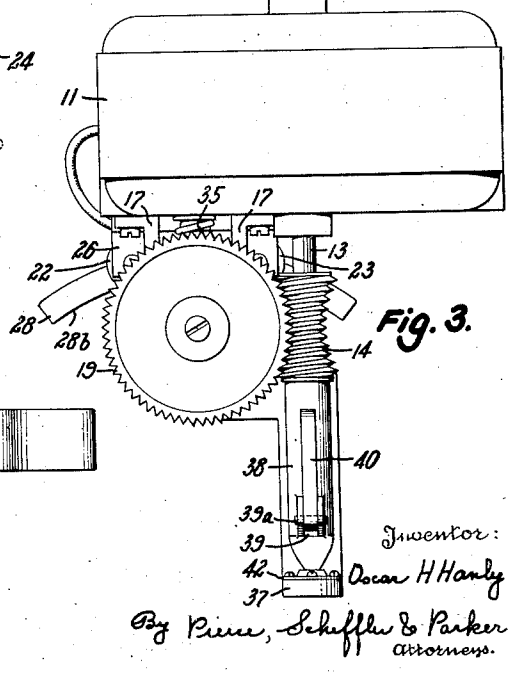


Fig. 3.

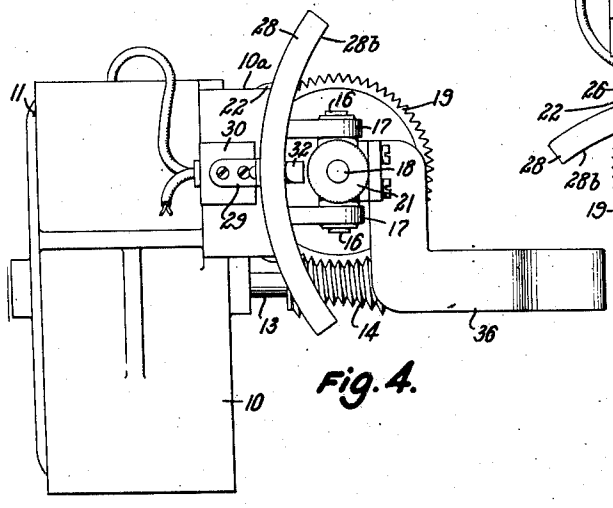


Fig. 4.

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Oct. 11, 1949. O. H. HANBY 2,484,504

CAN OPENER

Filed July 26, 1948 2 Sheets-Sheet 2

Fig. 5.

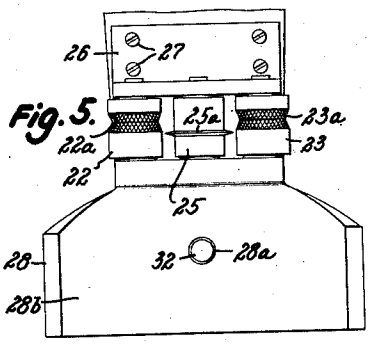


Fig. 6.

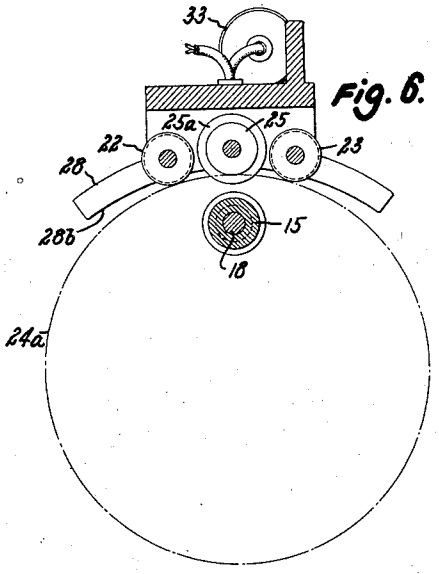


Fig. 7.

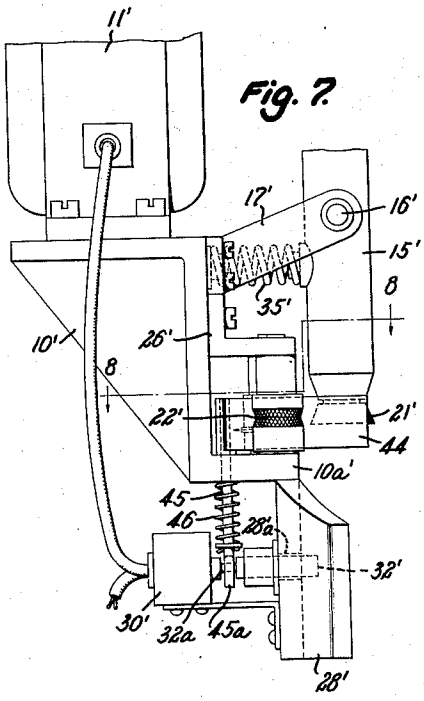
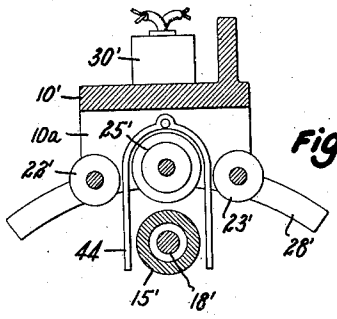


Fig. 8.



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Patented Oct. 11, 1949 2,484,504

UNITED STATES PATENT OFFICE

2,484,504

CAN OPENER

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Application July 26, 1948, Serial No. 40,689

7 Claims. (Cl. 30—4)

1

This invention relates generally to can openers and in particular to an improved construction for can openers of the type powered by an electric motor.

Objects of the invention are to provide a comparatively simple and yet highly efficient and durable can opener device which may be manufactured at low cost. Another object is to provide for automatically starting the motor which drives the can opening mechanism each time a can is placed in position to be opened and also automatically stopping the motor when the top of the can has been removed. Another object is to provide a can opener of the automatic type that can easily be operated with one hand leaving the other hand free to hold something else and this is often of the utmost convenience to the housewife for she may then hold a saucepan or other culinary utensil in one hand and open a can with the other.

These and other objects of the invention will become more apparent from the following detailed description of a preferred constructional embodiment of the invention when considered with the accompanying drawings in which:

Fig. 1 is a side elevation of the improved can opener; Fig. 2 is a view of the can opener in end elevation; Figs. 3 and 4 are top and bottom plan views respectively; Fig. 5 is a detail view taken on line 5—5 of Fig. 1; Fig. 6 is a transverse sectional detail taken on line 6—6 of Fig. 2; Fig. 7 is a fragmentary side elevation illustrating a modified embodiment of the invention which features a safety guard which prevents the motor component of the can opener from being turned on prematurely and Fig. 8 is a transverse sectional detail view taken on line 8—8 of Fig. 7.

Referring now to Figs. 1–6 of the drawings in particular, the improved, automatic can opener includes a support bracket or frame 10 which is adapted to be fastened in some convenient location to a wall of the kitchen or other location convenient to the user. A motor 11 is mounted at the top of bracket 10 by means of bolts 12, and the motor shaft 13 extending horizontally is provided with a worm gear 14. The latter is keyed to the motor shaft so as to be driven by it and the keying arrangement is such as will also permit a slight displacement of the worm along the axis of the motor shaft. A vertical tube 15 provided with horizontal trunnions 16 is supported by trunnion brackets 17 fastened to the side of bracket 10. Tube 15 functions as a sleeve bearing for drive shaft 18 which extends through the tube. The upper end of shaft 18 carries a worm wheel 19 suitably keyed to the shaft and meshes with worm gear 14 so the shaft 18 is driven by the latter when the motor 11 is turned on. To the lower end of shaft 18 is secured a frusto-conical knurled driving roller 21. Roller 21 occupies a position laterally of and between a pair of spaced guide rollers 22, 23 provided with peripheral knurled grooves 22a, 23a. As shown clearly in Fig. 1, the outer periphery of bead 24a at the top of the can 24 to be opened is adapted to fit against the knurled grooves 22a, 23a, and the lower edge of knurled roller 21 against the inner periphery of the can bead 24a.

2

Between rollers 22, 23 a cutting tool is provided. The tool is preferably in the form of a roller 25 having a peripheral knife edge 25a so located with respect to rollers 21, 22 and 23 that when the upper can bead 24a has been gripped tightly between these rollers, the knife edge 25a will pierce the side wall of the can at a point just below bead 24a. All three rollers 22, 23 and 25 are journalled for rotation on a vertical axis, upper sleeve bearings being provided by drilled openings through the foot of an L-shaped plate 26 secured to bracket 10 by bolts 27 and lower sleeve bearings by drilled recesses in a horizontal offset portion 10a of the main support bracket 10.

Depending from the bracket offset 10a is an arcuate guide plate 28 which serves not only to generally guide the can bead into position between rollers 21—23, but also as a bearing in which the can turns while being opened. Secured to the rear face of plate 28 by bracket 29 is a switch unit 30, the contacts of which are actuated by a spring loaded push rod 32 that projects through an opening 28a in plate 28. As seen in Fig. 4, push rod 32 extends beyond the inner face 28b of the plate 28 and is adapted to be pressed in by the side wall of can 24 to a position substantially flush with inner face 28b. When the latter position is reached, the contacts of switch 30 will then have been closed thus completing the circuit between motor 11 and a power source via the conventional appliance plug connector 33. After the can top has been removed and the can removed from guide plate 28, the pressure upon push rod 32 is likewise released and the latter moves automatically under the restoring force of its loading spring (not shown) to open-circuit position thus cutting off the flow of current to motor 11.

At the instance depicted in Fig. 1, the bead

24a on can 24 has been inserted between rollers 21—23 but the push rod 32 has not yet been depressed. Under this condition, tube 15 occupies a vertical position and is resiliently held in such position by a compression spring 35 one end of which bears against a vertical face on support bracket 10 and the other end against tube 15 at a point below its trunnions 16.

At a point above the trunnions, an arm 36 extends in a generally lateral direction from tube 15, the outer end of the arm being turned upwardly to terminate in a socket portion 37 spaced from the outer end of and in alignment with the motor shaft 13. A sleeve 38 surrounds the outer end portion of motor shaft 13. This sleeve is mounted on the shaft in such manner as will permit it to undergo a displacement along the shaft axis but cannot rotate relative to it. To this end, the motor shaft 13 is provided with a keyway 13a and sleeve 38 the companion key 38a. This same keyway extends through the worm gear 14 and a companion key 14a secured to the latter permits the required slight axial displacement as previously mentioned.

Intermediate the ends of sleeve 38 two diametrically opposed slots 39 and pivot pins 39a are provided for pivotally mounting a pair of L-shaped weighted fly levers 40 intermediate their ends. The inner tips 40a of these levers extend through slots 39 and engage the end face of motor shaft 13 while the outer ends thereof terminate in flyweights 40b which lie against the outer surface of sleeve 38 when motor 11 is at rest. The outer end of sleeve 38 is necked down and terminates in a ball 41 which is received in and anchored to socket 37 by means of a lock plate 42. When motor 11 is running, however, the centrifugal force acting upon the weighted ends 40b of levers 40 causes these ends of the levers to move radially outward from sleeve 38. Thus as viewed in Fig. 1, the levers will turn outwardly about their pivots 39a causing the inner tips 40a to press against the end face of shaft 13. Since the latter is fixed insofar as any axial displacement is concerned, the reaction of the lever tips 40a with respect to the end face of the motor shaft will be such as to cause sleeve 38 to slide to the right. Such movement is of course transferred through the ball and socket joint (41—37) to arm 36 and causes tube 15 to tilt clockwise about its trunnions 16 thus compressing spring 35 and shifting drive roller 21 to the left. The result of this is that the can is forced by roller 21 into the guide rollers 22, 23 with the can bead gripped tightly between all three rollers. As tube 15 tilts, worm wheel 19 will also follow it shifting worm gear 14 slightly along the axis of motor shaft 13.

Operation

It is believed that the operation of the form of the invention illustrated in Figs. 1–6 will by now have become quite obvious. Summarizing, however, can 24 is placed between rollers 21—23 and the side of the can is pressed against push rod 32, the lower end of the can being supported gently by the user. This starts motor 11, setting motor shaft 13 in rotation and causing fly levers 40 to move away from the sleeve 38 and thereby tilt tube 15 slightly clockwise. This in turn causes the bead 24a of the can to be gripped tightly between rollers 21—23 forcing the knife edge 25a on roller 25 through the can wall just below the bead. Roller 21 is of course driven by shaft 18 through worm 14 on motor shaft 13 and worm wheel 19 and hence causes the can to rotate at not too great a speed. When the can has completed one revolution, the top of the can will have been cut completely off at a line just below the end bead, and the opened can is then free to be removed, it having of course been held gently in the hand of the user during the cutting operation, for otherwise the can would fall when the cutting was finished. As soon as the can is removed, switch rod 32 is automatically released and the motor 11 stops whereupon all component parts reassume the positions depicted in Fig. 1 and the cut-off can top is released.

Successful operation of the form of the invention shown in Figs. 1–6 is of course predicated upon the premise that the user inserts the bead at the top of the can between rollers 21—23 before switch rod 32 is pressed to start the motor. To assure that this sequence will always be observed, it may be desirable to incorporate an interlock for the switch operator which will prevent the motor from being started before the can has been placed in its proper position. The modified construction illustrated in Figs. 7 and 8 discloses one practical arrangement for attaining the desired result.

Referring now to these views, it will be seen that the construction is identical in practically every respect with that shown in Figs. 1–6 and hence all corresponding components have been given the same but primed numerals which identify such parts in Figs. 1–6. The only change required is that rollers 22'—23' must be made longer and plate 26' raised for a reason that will soon become obvious. The interlock consists of a U-shaped shield 44 placed around the cutting roller 25' and the drive roller 21'. Depending vertically from the closed end of the shield is a lift rod 45 that extends through an aperture in the offset portion 10a' of bracket 10', the lower end of rod 45 terminating in a yoke 45a that embraces a short section 32a of reduced diameter on the shank of push rod 32'. Shield 44 and the lift rod 45 secured thereto are urged towards their lowermost position, the position shown in the drawing, by a spring 46 surrounding rod 45 and when in such position, it will be evident that yoke 45a prevents the switch rod 32' from being pushed inwardly as is necessary to start the motor. However, when a can is being placed in position, the top of the can will lift shield 44 and hence also rod 45 so that when the bead on the can has reached the proper position between rollers 21'—23', the yoke 45a will have been raised a sufficient distance to clear the shank of switch rod 32' thereby permitting the latter to be pushed in to start the motor. Operation of the modified construction is otherwise the same as before and hence need not be repeated.

While the foregoing construction is to be preferred, it by no means exhausts all design possibilities and hence various changes in the illustrated construction may be made by others without, however, departing from the spirit and scope of the invention as expressed in the appended claims.

I claim:

1. In a can opener the combination comprising a support, an upright drive shaft, means pivotally mounting said shaft intermediate the ends thereof on said support, a can driving roller secured to the lower end of said shaft, stationary guide rollers between which and said

driving roller the bead of the can is adapted to be placed, a cutter located between said guide rollers and adapted to puncture the side wall of the can just below the bead when gripped between said rollers, a motor on said support, gearing means coupling said motor to said drive shaft, a switch on said support for starting and stopping said motor, said switch including a switch operator actuated by pressure applied from the can to start said motor, and means actuated upon starting of said motor to tilt said drive shaft and hence said driving roller in the direction of said guide rollers to grip and rotate the can bead therebetween.

2. A can opener as defined in claim 1 and which further includes a locking device preventing said switch operator from being actuated, and means actuated by the can for releasing said locking means when the can bead reaches a position between said rollers.

3. In a can opener the combination comprising a support, an upright drive shaft, means pivotally mounting said shaft intermediate the ends thereof on said support, a can driving roller secured to the lower end of said shaft, stationary guide rollers between which and said driving roller the bead of the can is adapted to be placed, a cutter located between said rollers and adapted to puncture the side wall of the can just below the bead when gripped between said rollers, spring means urging said drive shaft and driving roller in a direction away from said guide rollers, a motor on said support, gearing means coupling said motor to said drive shaft, a switch on said support for starting and stopping said motor, said switch including a pressure responsive contact actuator adapted to be pressed upon by the can to start said motor, a fly lever rotated by the shaft of said motor, and means actuated by said fly lever upon starting of said motor for tilting said drive shaft and hence said driving roller against the action of said spring in the direction of said guide rollers to grip and rotate the can bead therebetween.

4. In a can opener the combination comprising a support, an upright drive shaft, means pivotally mounting said shaft intermediate the ends thereof on said support, a can driving roller secured to the lower end of said shaft, stationary guide rollers between which and said driving roller the bead of the can is adapted to be placed, a cutter located between said guide rollers and adapted to puncture the side wall of the can just below the bead when gripped between said rollers, a motor on said support, gearing means coupling said motor to said drive shaft, an arcuate guide plate secured to said support and located beneath said rollers, a switch for starting and stopping said motor, said switch including a pressure responsive contact actuator rod extending through said guide plate and adapted to be pressed upon by the can to start the motor, and means actuated upon starting of said motor to tilt said drive shaft and hence said driving roller in the direction of said guide rollers to grip and rotate the can bead therebetween.

5. A can opener as defined in claim 4 and which further includes a lock member engaging said switch actuator rod and locking the latter against displacement, and means actuated by the can for releasing said lock member from said rod when the can bead reaches a position between said rollers.

6. In a can opener the combination comprising a support, an upright drive shaft, means pivotally mounting said shaft intermediate the ends thereof on said support, a can driving roller secured to the lower end of said shaft, stationary guide rollers between which and said driving rollers the bead of the can is adapted to be placed, a cutter located between said guide rollers and adapted to puncture the side wall of the can just below the bead when gripped between said rollers, spring means urging said drive shaft and driving roller in a direction away from said guide rollers, a motor on said support, the shaft of said motor extending horizontally, a drive gear and sleeve secured upon said motor shaft and movable axially thereof, a driven gear secured to the upper end of said driving shaft and meshed with said drive gear, a switch on said support for starting and stopping said motor, said switch including a pressure responsive contact actuator adapted to be pressed upon by the can to start said motor, a fly lever pivotally mounted intermediate the ends thereof on said sleeve adjacent the end of said motor shaft, one end of said lever being weighted and the other end adapted to bear against the end face of said motor shaft and cause said sleeve to be axially displaced when said weighted lever end moves radially outward upon starting said motor, and means actuated by said sleeve upon axial displacement thereof for tilting said drive shaft and hence said driving roller against the action of said spring means in the direction of said guide rollers to grip and rotate the can bead therebetween.

7. A can opener as defined in claim 6 wherein the mounting means for said drive shaft is constituted by a tube within which said drive shaft is journalled, said tube being pivotally secured intermediate its ends to said support, and said means for tilting said drive shaft is constituted by an arm secured to said tube above the pivot axis and which is actuated by said sleeve.

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No references cited.