Aug. 27, 1957 R. I. LAPPIN ET AL 2,803,873

POWER DRIVEN CAN OPENER

Filed May 17, 1955 2 Sheets-Sheet 1

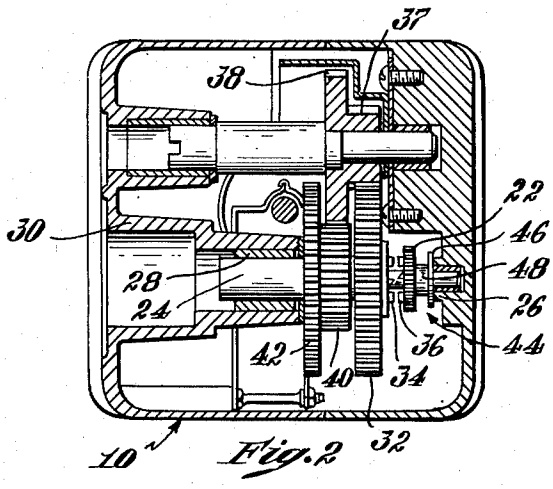


Fig. 2

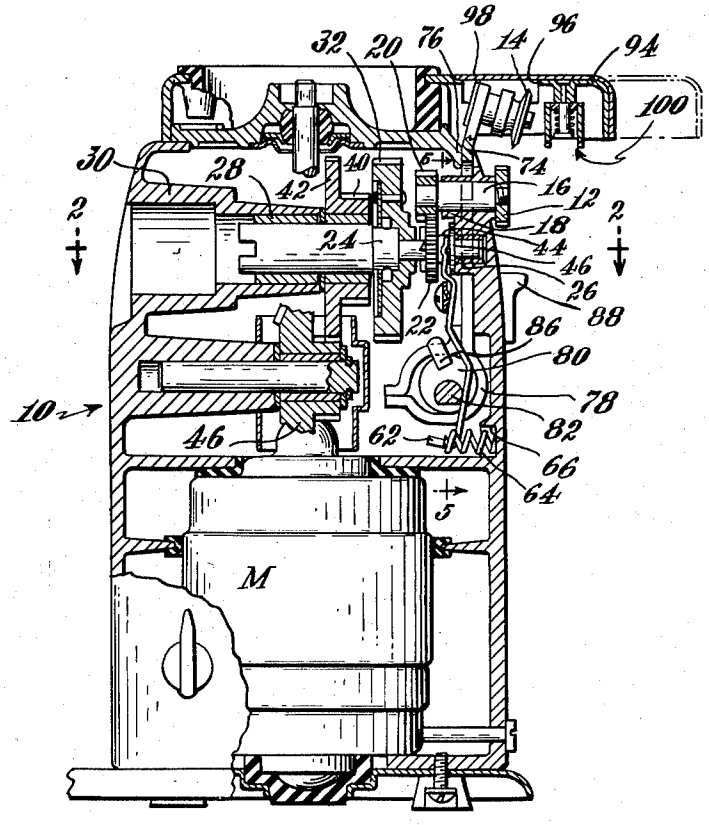


Fig. 1

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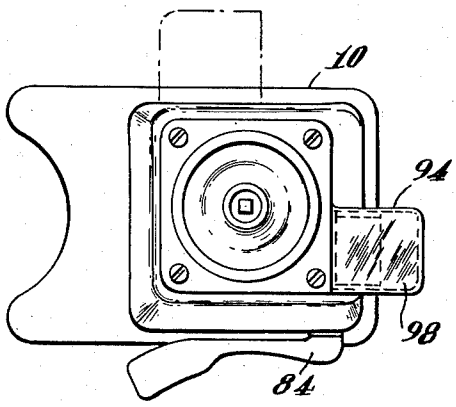


Fig. 4

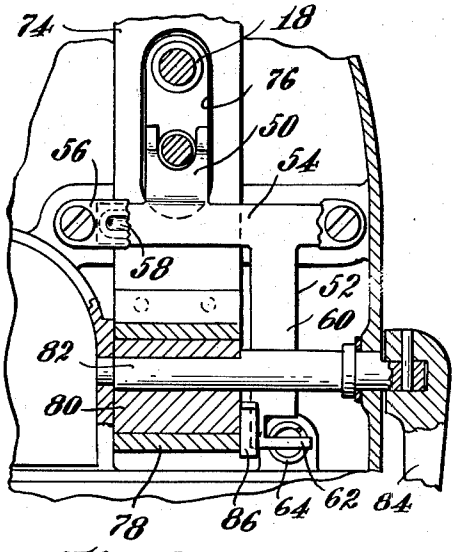


Fig. 5

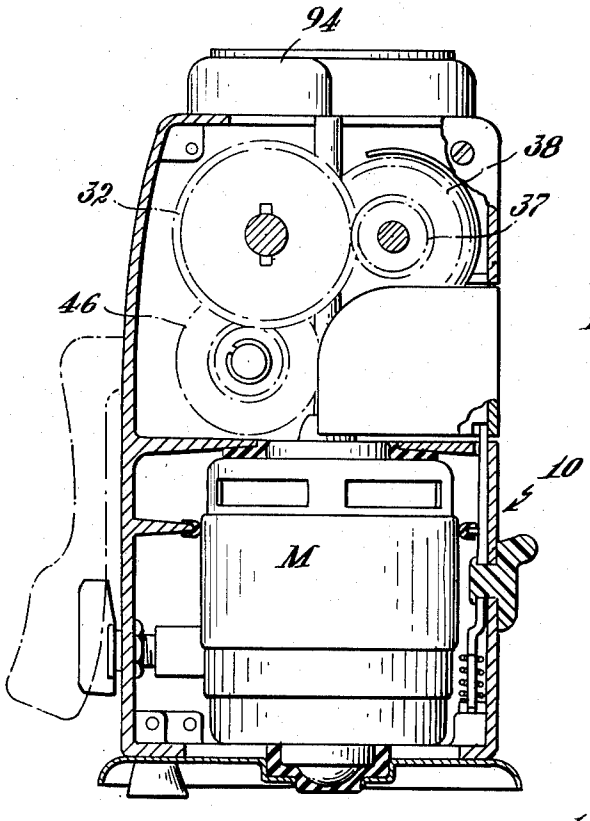


Fig. 3

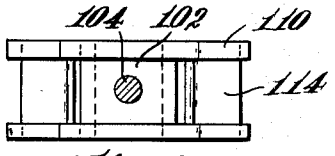


Fig. 8

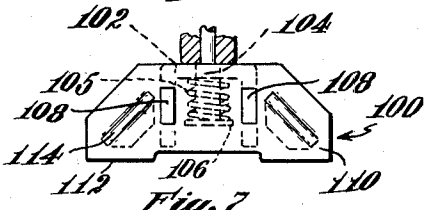


Fig. 7

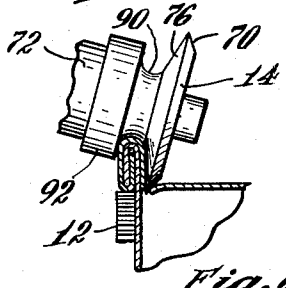


Fig. 6

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POWER DRIVEN CAN OPENER

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Application May 17, 1955, Serial No. 508,893

6 Claims. (Cl. 30—4)

This invention relates to can openers and more especially to power driven can openers of the kind illustrated in my pending application Serial No. 459,182, filed November 16, 1954.

As therein shown a pair of wheels, one of which is a feed wheel and the other a cutter wheel are supported for relative movement into cooperative position to grip the rim of a can, turn the can and sever the can top. The principal object of this invention is to provide a power driven can opener of the aforesaid type in which the wheels will normally be stationary so that there is no danger of cutting the fingers and the can may be engaged between the wheels prior to rotational movement thereof, thereby eliminating the danger of jamming at the moment of placing the can in position for cutting. Another object is to provide a power driven can opener in which the operating parts are not so exposed as to result in accidental injury during use and yet are easily accessible for cleaning. Another object of the invention is to provide mechanism in which the can is more securely gripped between the wheels, both during and after cutting so that the can is substantially self-feeding during the cutting operation and so that after cutting the can will not tilt or accidentally drop if not held by the operator. Another object is to provide a can opener in which the operating instrumentalities are accurately designed to make a clean cut close to the corner at the inside base of the rim and during cutting to press the cut edge downwardly into engagement with the wall of the can thereby to minimize the risk of cutting the fingers when handling the can after removal of the top. Another object is to provide a can opening apparatus which has improved can top retaining means for gripping the can top during cutting without interfering with rotation so that when it is completely severed it will not fall into the can. Other objects are to provide an apparatus which is efficient, durable and attractive in appearance.

As herein illustrated the feed wheel is driven by a pair of meshing gears, one of which is fast to the feed wheel and the other of which is movable along a driven shaft in one direction to a position in which it is coupled to the shaft for rotation therewith and in the opposite direction to a position in which it is idle on the shaft. The feed and cutting wheels are relatively movable from inoperative to operative positions to grip the rim of a can therebetween while the wheels are motionless and there is means for effecting relative movement of the wheels to bring them together which is operable following gripping engagement of the wheels with the rim of the can to shift the gear on the drive shaft to its coupled position. The aforesaid means includes a vertically slidable carriage on which the cutting wheel is mounted in an inclined position so that its apex is supported at an accurately predetermined distance from the face of the feed wheel when in its operative position and a cam and lever operable to draw the carriage downwardly to bring the cutting wheel into operative position. To prevent idle turning of the gear with the drive shaft by reason of friction and hence the feed wheel there is included in the shifting means, means for yieldably and frictionally holding the gear while in its idle position against rotation. In accordance with a further aspect of the invention and for the purpose of securely gripping the can so that during cutting it will automatically turn without the aid of the operator and

after cutting it will not accidentally fall if not held the cutter wheel has back of its cutting edge a deep groove adapted to embrace the rim of a can and to press it firmly against the feed wheel. Although the cutting wheel is not rotating except when the can is gripped between the wheels it is not desirable to have a cutting wheel exposed at any time; hence a hood is mounted above the cutting wheel partially to enclose it, which has in its top wall an aperture through which access may be had to the cutting wheel for cleaning and a slidable cover for normally covering this aperture. It is also desirable to prevent the severed can top from dropping into the can; hence at the underside of the hood there is yieldably supported a magnet for engagement with the can top during cutting without interfering with rotation of the can, which magnet will hold the can top when it is severed.

The invention will now be described in greater detail with reference to the accompanying drawings wherein:

Fig. 1 is a front view of the unit partly in section;

Fig. 2 is a horizontal section taken on the line 2—2 of Fig. 1;

Fig. 3 is a side view as seen from the right-hand side of Fig. 1 partly in section;

Fig. 4 is a top view;

Fig. 5 is a vertical section taken on the line 5—5 of Fig. 1;

Fig. 6 is a fragmentary elevation of the cutting wheel and feed wheel to much larger scale shown in operative position;

Fig. 7 is an elevation of a can top retaining magnet; and

Fig. 8 is a top view of the magnet with the support.

Referring now to the drawings, the can opener which forms the subject matter of the present invention is mounted near the top of a pedestal 10 which is substantially like that shown in my pending application Serial No. 469,182, filed November 16, 1954. It is to be understood, however, that the particular pedestal support illustrated is not essential to the novel features of the invention and that any other suitable support may be substituted therefor. As herein illustrated the can opener consists of a feed wheel 12 and a cutter wheel 14 of conventional kind and of such proportions as to be universally applicable in cutting through a can presented thereto, whether the can be of circular, oval or rectangular cross section. The instrumentalities are located high enough on the side of the pedestal so that cans of maximum vertical dimensions ordinarily encountered for packaging food may be accommodated. The feed wheel 12 has knurled or toothed edges to afford a frictional grip and hence to assist in traversing the can peripherally and is fastened to a horizontal shaft 16 journaled in a bearing boss 18 formed on the wall of the pedestal internally thereof. The shaft 16 has fastened to its inner end a gear 20 which meshes with a gear 22. The gear 22 is slidably mounted on a horizontal shaft 24 which has a portion of small diameter journaled in a bearing boss 26 subjacent to the bearing boss 18 and a portion of larger diameter journaled in a bearing sleeve 28 carried by a boss 30 projecting inwardly from the opposite wall of the pedestal. A gear 32 is made fast to the shaft 24 and has on one face a plurality of teeth 34 (Figs. 1 and 2). The gear 22 has a corresponding set of teeth 36 for interengagement with the teeth 34 and in cooperation therewith to lock the gear 22 to the gear 32 by axially shifting of the gear 22 along the shaft 24. There is sufficient room between the toothed face of the gear 32 and the face of the bearing boss 26 to permit shifting the gear 22 from a position in which its teeth are engaged with the teeth on the gear 32 to a position retracted therefrom so that the teeth are disengaged and the gear 22 is idle on the shaft 24 and hence will not participate in its rotation.

The gear 32 derives its rotation from a motor M at the base of the pedestal through a series of gears which include a gear 37 meshing with the gear 32 and a gear 38 integral with the gear 37 which meshes with a gear 40 free to turn on the sleeve 28. The gear 40 in turn has fast to it a gear 42. The gear 42 meshes with a large worm gear 46 which is driven directly by a worm on the motor shaft, as shown in my pending application.

The gear 22 has a hub 44 (Fig. 2) with a large flange 46 at its end providing a groove 48 between it and the side of the gear in which the upper forked end 50 of a shift lever 52 is seated. The lever has below its fork a transversely extending rocker arm 54 held against the wall of the pedestal by a gib 56 having a rib 58 on its rear side which provides a fulcrum on which the rocker arm may be rocked. Near one end of the rocker arm there extends downwardly an arm 60 (Fig. 5) which has at its lower end a finger 62 engaged with an end of a coiled spring 64 seated in a socket 66 in the wall of the pedestal. The spring 64 normally biases the arm 60 in a direction to urge the forked end of the lever in a clockwise direction so as to hold the gear 22 with its flange 46 pressed against the face of the bearing boss 26. By pressing against the lower end of the arm 60 so as to compress the spring 64 the lever may be rocked in a counterclockwise direction thereby to shift the gear 22 to the left to its fast position, that is with its teeth 36 engaged with the teeth 34 on the face of the gear 32. The gear 20 is axially wide enough so that the gear 22 remains in mesh with it in either its fast or its loose position.

The cutter wheel 14 has a beveled cutting edge 70 of conventional design and is mounted to run freely on a stub shaft 72, the latter being fixed at its rear end to the upper end of a carrier plate 74 so as to incline downwardly toward the feed wheel. By inclining the stub shaft 72 downwardly toward the feed wheel the plane of the cutter wheel 14 is inclined downwardly and rearwardly toward the exposed side surface of the feed wheel. By carefully choosing the angle of inclination with respect to the angle of the cutting edge, the edge of the cutting wheel when lowered into cutting position may be brought to bear on the top of the can very close, if not exactly at the corner (Fig. 6) formed by the intersection of the inside surface of the rim, and the top surface of the can, so that the cut is made very close to the rim. As illustrated, when the cutting wheel is in operative position the apex of the beveled edge is spaced from the outwardly facing side surface of the feed wheel by an amount which approximates twice the thickness of the wall of the can and the inner side 76 of the cutting wheel lies substantially in the plane of the inner surface of the bead in a plane parallel to the outwardly facing side surface of the feed wheel and spaced thereby by approximately twice the thickness of the wall of the can. In order to attain clean precision cutting it is necessary to maintain the relation of the cutting wheel to the feed wheel accurately during cutting; hence precautions are taken not only to guide the wheel into operative position but also to maintain both the cutting wheel and the feeding wheel in the aforesaid relationship throughout the cutting operation. Accordingly, the shaft of the feed wheel 12 is accurately journaled and secured to prevent any possible axial movement thereof and the carrier for the cutting wheel is made stiff and rigid so that the pinching action produced by bringing the cutting wheel against the top of the can and pinching the wall between it and the exposed surface of the feed wheel will not result in spreading of the wheels. By maintaining this precision, as the cutter wheel severs the can top the inner side of its cutting edge bends the cut edge downwardly and outwardly against the inside of the can wall thereby minimizing danger of cutting oneself on the can after the cover is removed.

The cutting wheel 14 is brought into operative position by vertical movement of the carrier 74. To this end the carrier 74 is mounted against the inside wall of the pedestal (Fig. 5) and has an elongate slot 76 therein which closely and slidably embraces the bearing bosses 18 and 26. The lower end of the carrier has a yoke or strap 78 which embraces a cam 80 mounted on a horizontal shaft 82 journaled in suitable bearings in the walls of the pedestal. A crank handle 84 fast to the shaft 82 provides means for rotating the cam and hence drawing the carrier vertically downward so as to bring the cutting wheel into engagement with the top of the can, effect penetration of the can top, and to hold it in its operative position throughout the cutting operation.

The cam (Figs. 1 and 5) has on it a dog 86 which is brought into engagement with the finger 62 after the wheels are brought into engagement with the rim of the can to press the lower end of the arm 60 against the spring. The dog 86 is located so that as the crank arm 84 is swung downwardly the wheels may be brought into clamping engagement with the rim of the can and held there without rotation of the wheels. Thus the can can be safely inserted between the wheels and properly positioned without danger of being caught in the wheels. This itself removes a mental hazard for when the can is placed in position there are no rotating wheels, hence persons hesitant about wheels will not be alarmed. After the can is suitably gripped between the wheels further movement of the crank arm will shift the gear 22 to its fast position whereupon the feed wheel will begin to rotate.

To insure proper positioning of the can with reference to the cutting wheel when it is placed against the feed wheel and so as not to depend entirely upon the skill or care of the person presenting the can to the can opener, a positioning guide 88 is provided to hold the wall of the can substantially vertical. The guide 88 comprises a button or boss on the outside of the pedestal vertically below the feed wheel which projects outwardly therefrom and terminates substantially in the plane of the exposed side surface of the feed wheel. The surface of the button will bear against the wall of the can and hold the latter in a substantially vertical position.

There is a tendency for the upstanding bead or rim of the can to tilt when it is gripped between the wheels since the bead is seldom uniform and hence to spill the content of the can and sometimes to become dislodged from the wheels so that it may drop if not held at all times. To remedy this and also to provide for automatic feeding without holding it the cutting wheel has back of its rear side 75 (Fig. 6) a deep peripheral groove 90 formed between its rear side 76 and a rearwardly spaced shoulder 92. The groove is substantially vertically above the peripheral edge of the feed wheel so that the bottom of the groove exerts a pressure substantially perpendicular to the peripheral edge of the feed wheel and the opposite sides of the groove respectively, embrace the sides of the rim thus preventing lateral movement. Thus the rim is held squarely and firmly in contact with the peripheral edge of the feed wheel and cannot tilt one way or the other. Hence the can cannot become dislodged from the wheels either during the cutting operation or thereafter until the wheels are separated.

The operating elements of the can opener are in a rather exposed position and there is danger that some one may inadvertently touch the rotating cutting wheel 14. Accordingly, a hood 94 (Fig. 1) is provided which is fastened at one end to the top of the pedestal and extends horizontally therefrom over the top of the cutting wheel. The hood has a top, side and end walls which partially enclose the cutting wheel. In the top wall is an aperture 96 directly above the cutting wheel through which access may be had to the wheels to permit cleaning. A cover 98 is slidably mounted on the housing on guides for movement from a position covering the aperture to a position uncovering it.

Because of the tendency of the top of the can after it has been completely severed to drop into the can with the result that much trouble ensues in trying to dislodge it, frequently resulting in spilling the content and/or cutting the hands, a powerful magnet **100** is installed above the cutting wheel which will fasten to the top of the can so that when the top is completely severed and the can lowered from the cutting wheel the top will remain engaged with the magnet. Conveniently, the magnet **100** is yieldably suspended from the underside of the hood. As illustrated in Figs. 7 and 8 a U-shaped bracket **102** is mounted on the lower end of a bolt **104** screwed into the top wall of the hood with its shank extending downwardly therefrom. A spring **105** placed between the bracket and a flange **106** at the lower end of the bolt yieldably supports the bracket for vertical movement downwardly away from the housing. The bracket is non-magnetic and has extending from its opposite sides spaced shoulders **108**. A pair of magnetizable pole pieces **110** having spaced holes through them are mounted on the shoulders in spaced parallel relation and have spaced horizontally disposed lower edges **112** for engagement with the can top. The pole pieces have added spaced, angularly sloping slots for receiving the ends of magnet blocks **114** fastened between them at opposite sides of the yoke.

As thus constructed there is provided a power driven can opener which is ready for immediate use at all times; which securely grips the can during cutting so that it need not be held by the operator; which cuts cleanly and accurately through the can top without leaving a ragged edge; which eliminates the necessity of fishing the severed top out of the can; which will accommodate tall cans; which automatically positions the can for best cutting; which is safe against accidental injury to the hands and fingers; and which may be easily cleaned and which is durable and efficient in operation.

It should be understood that the present disclosure is for the purpose of illustration only and that this invention includes all modifications and equivalents which fall within the scope of the appended claims.

We claim:

1. In a power driven can opener, a feed wheel, a feed wheel shaft supporting the feed wheel for rotation, a driven shaft, a pair of meshing gears, one of which is fixed to the feed wheel shaft and the other of which is shiftable while in mesh with the one gear from a position drivably engaged with the driven shaft to a disengaged idle position, means normally holding said other gear in its idle position, a cutter wheel mounted next to the feed wheel for movement into cooperative position therewith to grip the rim of a can between it and the feed wheel, means including a lever for effecting movement of the cutter wheel into operative position, and means carried by the last-named means for shifting the first-named means in a direction to engage said other gear with the driven shaft.

2. In a power driven can opener, a feed wheel, a feed wheel shaft supporting it for rotation, a driven shaft parallel to the feed wheel shaft, a pair of meshing gears on the feed wheel shaft and driven shaft respectively, the gear on the driven shaft being axially movable while in mesh with the gear on the feed wheel shaft between a position in which it is idle on the drive shaft to a position in which it is coupled thereto for rotation therewith, a shift lever normally holding the gear on the driven shaft in its idle position, a cutter wheel movable from an inoperative position to a position in cooperation with the feed wheel to grip the rim of a can, and means for drawing the cutter wheel into operative position and for thereafter moving the shift lever in a direction to move the gear on the driven shaft to the position in which it becomes coupled to the shaft.

3. In a power driven can opener, a feed wheel, a feed wheel shaft supporting it for rotation, a driven shaft parallel to the feed wheel shaft, a pair of meshing gears on the feed wheel shaft and driven shaft respectively, the gear on the driven shaft being axially movable while in mesh with the gear on the feed wheel shaft between coupled and idle positions, a shift lever normally holding the gear on the driven shaft in its idle position, a cutter wheel, a carrier movably supporting the cutter for movement from an inoperative position to an operative position for gripping the rim of a can between it and the feed wheel, a cam operably associated with the carrier for moving the latter into a position to bring the wheels together and an arm carried by the cam movable into engagement with the shift lever following engagement of the wheels with the rim of a can to shift the gear on the driven shaft to its coupled position.

4. In a power driven can opener, feed and cutting wheels mounted for movement into and out of operative position, a feed wheel shaft for the feed wheel, a power driven shaft, a pair of meshing gears mounted respectively on the feed wheel shaft and the power driven shaft, said gear on the power driven shaft being movable thereon from a coupled to an idle position while constantly in mesh with the gear on the feed wheel shaft, means for shifting the gear on the power driven shaft to its coupled position only after the feed wheel and cutting wheel have been brought into operative position, and means carried by the shift means to brake the gear on the driven shaft while in its idle position to prevent idle rotation thereof.

5. In a power driven can opener, feed and cutting wheels mounted for movement into and out of operative position, a feed wheel shaft for the feed wheel, a power driven shaft, spaced bearings supporting the power driven shaft parallel to the feed wheel shaft, meshing gears on the shafts, the one of said gears on the power driven shaft being movable thereon between its bearings from a coupled to an idle position, a spring pressed lever normally holding said one gear at its idle position on the driven shaft frictionally engaged with the shaft bearing at the end so that frictional rotation is not imparted to said one gear by rotation of the driven shaft, and means operable for bringing the feed and cutting wheels into operative position and thereafter to shift said one gear to its coupled position.

6. In a power driven can opener, feed and cutting wheels mounted for movement into and out of operative position, a feed wheel shaft for the feed wheel, a power driven shaft, spaced bearings supporting the power driven shaft parallel to the feed wheel shaft, a driving element fast to the drive shaft having a diametrical face on which is a plurality of teeth, a pair of meshing gears mounted respectively on the feed wheel shaft and the power driven shaft, the one of the gears on the power driven shaft having on one side face a plurality of teeth and on its other face a grooved hub, a lever operable to shift said one gear along the driven shaft from an idle position in which its hub bears against the bearings at that end of the shaft to a position in which the teeth carried by its side face interlockably engages with the teeth on the driving element, means yieldably holding the lever in a position frictionally to press the hub of the gear against the bearing while in its idle position and means operable to shift the lever in a direction to engage the teeth.

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