Aug. 9, 1932. A. WYZENBEEK 1,871,020

RECIPROCATING TOOL

Filed Jan. 15, 1930

Fig. 1.

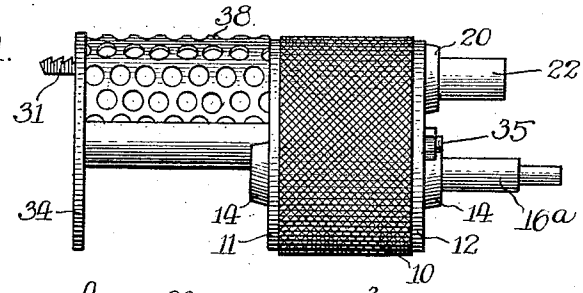


Fig. 2.

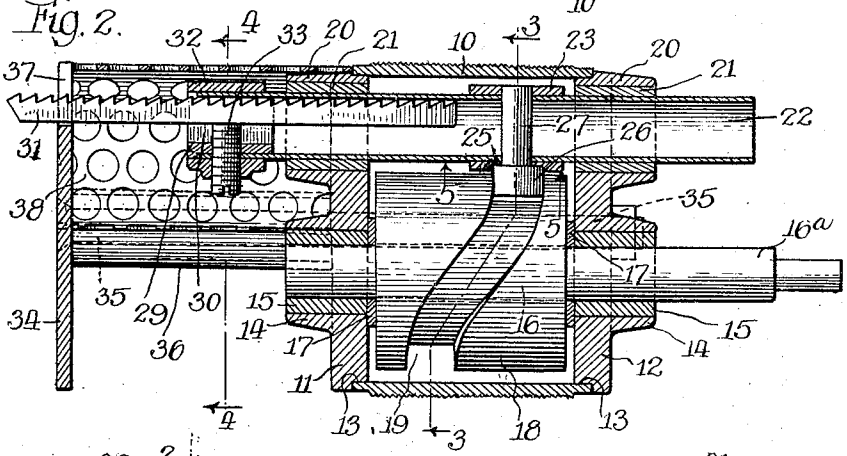


Fig. 3.

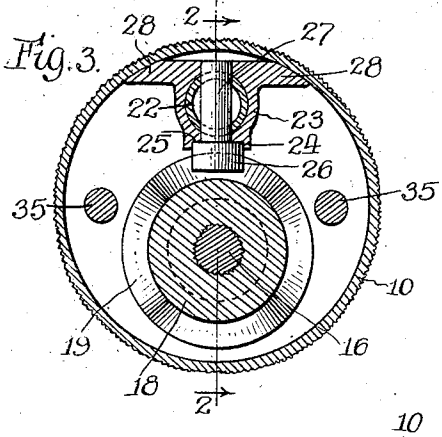


Fig. 4.

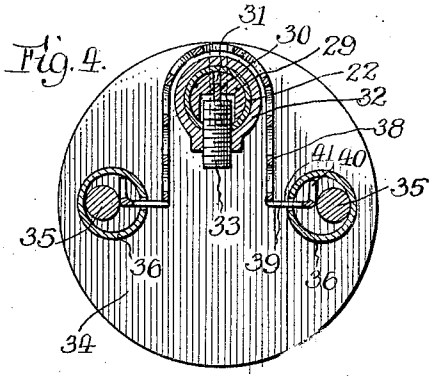
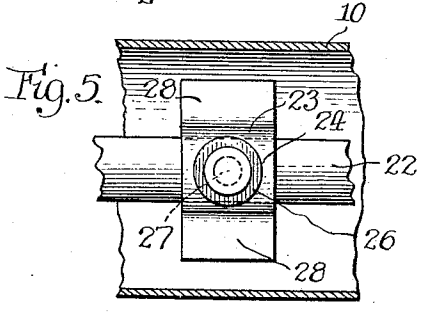


Fig. 5.



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UNITED STATES PATENT OFFICE

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RECIPROCATING TOOL

Application filed January 15, 1930. Serial No. 420,870.

The invention relates generally to reciprocating tools and more particularly to a tool of this character which is portable and is adapted to be power driven.

It is an object of the invention to provide a new and improved tool in which rotary motion derived from a driving means, which may be either temporarily or permanently associated therewith, is translated into reciprocatory motion for operating saws, files, or tools of like character.

Another object of the invention, in connection with the foregoing object, is to provide a novel tool of this character which may be cheaply manufactured, easily assembled or taken apart, and in which the vibration usually incident to the translation of rotary into reciprocatory movement is eliminated.

Other objects of the invention reside in the provision of an improved means for guiding the reciprocatory member; in the novel means for mounting the operative tool on the reciprocatory member, and in the safety guard.

Various other objects will become apparent in the following description and from the accompanying drawing, in which:

Figure 1 is a side elevation of a drill attachment embodying the invention.

Fig. 2 is a vertical central section of the device on an enlarged scale taken substantially on the line 2—2 of Fig. 3.

Figs. 3 and 4 are transverse sections taken on the lines 3—3 and 4—4 of Fig. 2 respectively.

Fig. 5 is a detail of the guide means taken substantially on the line 5—5 of Fig. 2.

Generally, the objects of the invention are attained by providing a cam block arranged for rotation within a relatively small housing. The cam block effects reciprocatory movement of a shaft through an intermediate cam follower, which shaft extends through the housing and at its outer end supports a suitable tool. In the present instance the tool is in the nature of a saw device and the tool will hereinafter be referred to as a saw-blade. It should be understood, however, that it is not intended to confine the invention in this or any other manner, but to cover all modifications and alternative constructions falling within the scope of the appended claims.

More particularly describing the invention, 10 indicates generally a casing which preferably is tubular in form. Each open end of the casing is adapted to be closed by end plates 11 and 12, which are suitably rabbetted, as at 13, to receive the ends of the casing and form a snug connection therewith. The means by which the end plates are held in place will be hereinafter described. The end plates 11 and 12 have outwardly projecting tubular bosses 14 disposed in one diameter thereof and capable of being axially alined.

Bearings 15 are carried by each of the tubular bosses 14 and rotatably receive a shaft 16 which extends at one end, as at 16^a, beyond the end plate 12. The end 16^a of the shaft is arranged to be conected to a suitable source of driving power (not shown) which may be permanently associated therewith in any well-known manner. Or, as illustrated, the tool may be constructed for use as an attachment for electric drills or the like.

Within the casing 10 the shaft 16 carries a substantially cylindrical cam block 18, which, as may be seen in Figs. 2 and 3, is relatively massive in size and substantially fills one side of the casing. Preferably, thrust bearings 17 are interposed between the ends of the cam block and the adjacent end plates which act to cushion any shock incident to the operation of the cam and to reduce the noise produced thereby. The peripheral face of the cam block presents a cam surface in the nature of a cam groove 19. In forming the cam groove 19, it is preferred that the groove be of such character that the reciprocatory movement produced thereby be one which moves slowly at the start of a stroke, then accelerates rapidly to move at relatively high speed during the major portion of the stroke, and then decelerates to move rapidly at the end of a stroke. Hence the slope of that part of the cam which produces the transition of the reciprocating part is gentle, while the intermediate portion of the groove is relatively steep. The groove, however, is smooth so that the reciprocation is produced

without jar. By this arrangement, it is possible to actuate the reciprocating part with the utmost smoothness and lack of vibration or jar.

A second pair of tubular bosses 20 project outwardly from the end plates 11 and 12. These bosses are positioned in the opposite diameter of the end plates from the bosses 14 and are arranged to be axially alined when the bosses 14 are in alinement. The bosses 20 have bearings 21 suitably mounted therein, which slidably support a shaft 22. For purposes which will hereinafter become apparent the shaft 22 is tubular.

The shaft 22 carries a cam follower adapted to engage the cam groove 19 in the cam block whereby reciprocatory movement will be imparted to the shaft 22 upon rotation of the shaft 16. To this end a sleeve 23 is rigidly affixed upon a portion of the shaft 22 within the casing in any suitable manner, as by means of a driven fit. The relative disposition of the shafts 16 and 22 is such that when the sleeve 23 is mounted upon its shaft, one side of the sleeve is substantially adjacent the peripheral surface of the cam block 18. The intervening distance between the sleeve and the cam block is lessened by forming a shoulder 24 in the sleeve, which shoulder has a counter-sunk recess 25 therein adapted to receive an enlarged head 26 integrally formed on a pin 27, which extends laterally of the shaft 22 through suitably formed apertures in the sleeve and shaft.

The head 26 constitutes the cam follower and is adapted snugly to engage the cam groove 19 in the cam block 18. Thus, rotation of the shaft 16 effects a reciprocation of the shaft 22. It should be noted, in connection with this construction, that the parts may be conveniently assembled and disassembled. Moreover, by countersinking a portion of the head 26 into the sleeve, lateral support is provided which prevents shearing of the pin during the operation of the device.

A simple means is provided for preventing rotation of the shaft 22, during the reciprocation thereof, by which means the operative engagement of the cam follower with the cam groove is maintained. Thus, the sleeve 23 (Fig. 5) is provided with a pair of similar arms 28 extending laterally from opposite sides thereof into sliding engagement with the inner surface of the casing 10. Preferably, the casing engaging portions of the arms are arcuately formed to correspond to the contour of the inner surface of the casing thereby providing a large bearing surface which eliminates excessive wear and subsequent looseness of the parts.

Inasmuch as the end 17 of the shaft 16 is adapted for connection with the chuck of a drill, the end of the shaft 22 which extends from the opposite end plate 11 is provided with means by which the operative tool may be detachably secured thereto. While the mounting shown herein is particularly adapted to secure a blade in place, slight alterations thereof may be easily made to adapt the device for use in connection with any other tool of this nature.

Referring particularly to Figs. 2 and 4, the outer end of the tubular shaft 22 is closed by a cylindrical plug 29 having a longitudinal, radially extending groove 30 in one side thereof. The groove 30 permits one end of a saw-blade 31 to be inserted therethrough into the tubular shaft 22. A collar 32 fits relatively snugly about the outer end of the shaft 22 and plug 29. A set-screw 33 has threaded engagement with the collar for relative movement radially thereof and the inner end of the screw is arranged to pass through registering openings in the sleeve 22 and the rear side of the plug 29 into engagement with the rear edge of the saw-blade 31. Consequently, tightening of the screw binds the blade between the wall of the shaft 22 and the screw and rigidly secures the blade in operative position.

By constructing the device so that one end of the blade extends into and is concealed by the shaft 22, a reserve supply of blade is instantly available. Thus, when the workman finds that the outer end of the blade has become dulled by use, it is only necessary to break off the dulled portion and then loosen the set screw 33, thereby permitting the blade to be withdrawn to present a new portion in operative position after which the set screw may again be tightened.

A safety guard means is provided which encloses all of the exposed reciprocating parts, with the exception of the part of the tool which is to act upon the work. To this end a transversely extending guard plate 34 is supported in spaced relation from the outer end plate 11, and an intermediate, longitudinal guard 38 substantially encloses the reciprocating parts.

The safety guards may be secured on the device in any suitable manner but a simple arrangement is preferably utilized by which the end plates 11 and 12 may at the same time be secured to the casing 10. Thus, alined apertures are provided in the end plates 11 and 12 and in the guard plate 34 through which bolts 35 extend, two of such bolts being shown in the present instance. Intermediate the guard plate 34 and the outer end plate 11 are elongated spacing members 36 comprising tubular sleeves encircling the bolts 35. It will be seen, therefore, that when the bolts are tightened the end plates will be securely mounted on the casing and the guard plate rigidly supported at a distance from the adjacent end plate. The guard plate 34 has a slot 37 therein which permits the outer end of the saw-blade 31 to extend therethrough.

The longitudinally extending guard 38 is preferably of U-shaped cross section and the longitudinal margins thereof are bent laterally outward, as at 39, and thence backwardly, as at 40. The tubular spacing members 36 are longitudinally slotted, as at 41, and the disposition of the parts is such that the slots 41 receive the outwardly extending portions 39 of the guard plate 38 to support the guard on the device.

Preferably, the guard plate 38 is foraminous to decrease its weight and is formed of somewhat resilient material, such as sheet metal. Consequently, if the open end of the "U" is formed of such width that the sides of the guard must be sprung outwardly a short distance in order to effect an engagement of the guard with the slot 41 in the spacers, the rearwardly turned portions 40 of the guard will engage the inner surfaces of the spacers resiliently to hold the parts together.

In operation the projecting end 17 of the shaft 16 is secured to the spindle of an electric drill or the like. Rotation of the shaft 16 by the spindle effects a reciprocation of the tubular shaft 22 through the intermediate agency of the cam 18, cam slot 19, and cam follower 26. Consequently, the saw-blade 31 or other tool carried by the shaft 22 will be rapidly reciprocated. While the shaft 22 is held against rotation relative to the casing 10, the entire casing may be rotated relative to the shaft 16, thus permitting the saw-blade to be used on any type of work and in any position without hindering or interfering with the movements of the operator. Preferably, the outer surface of the casing is knurled or otherwise roughened to permit the operator to obtain a secure hold thereon.

It should be noted in connection with the operation of the device that the cam block 18 is massive and heavy in weight when compared to the weight of the tubular shaft 22 and the moving parts associated therewith. Consequently, the inertia of movement of the rotating parts is great when compared with the thrust force of the inertia of the reciprocating parts which substantially eliminates vibration in the device, and further increases the efficiency of power transmission from the drill to the tool.

From the foregoing it will be evident that a simple portable and power-driven reciprocatory tool has been provided, which is efficient in operation, may be easily assembled and disassembled, is noiseless and vibrationless in operation, and may be cheaply manufactured.

I claim as my invention:—

1. A device of the character described comprising, in combination, a casing, a shaft rotatably journaled in said casing, a cam block on said shaft having a cam groove therein, a second shaft supported in said casing for reciprocatory movement relative thereto and arranged with one end thereof extending from said casing, a sleeve carried by said second shaft having a bore provided with a countersink therein, a cam follower in the form of a headed pin seated in said bore with the head of said pin disposed in said countersink, said sleeve being disposed on said second shaft to permit engagement of said cam follower with said groove, and means carried by said sleeve for casing-enagement to prevent rotation of said second shaft relative to said casing.

2. A device of the character described comprising, in combination, a cylindrical casing, a rotary grooved cam eccentrcally journaled therein, a tubular shaft reciprocally mounted in said casing eccentrically thereof, means on one end of said shaft outside of said casing for clamping a tool extending into said shaft, a sleeve mounted on said shaft within the casing and having oppositely extending lateral wings engaging the internal surface of the casing, and a pin passing through said shaft and sleeve to secure them together, one end of the pin engaging in the cam groove in said cam.

In testimony whereof, I have hereunto affixed my signature.

ANDREW WYZENBEEK.