May 10, 1927. W. HERRMANN 1,628,144

SCREW DRIVER

Filed May 16, 1924

Fig. 1.

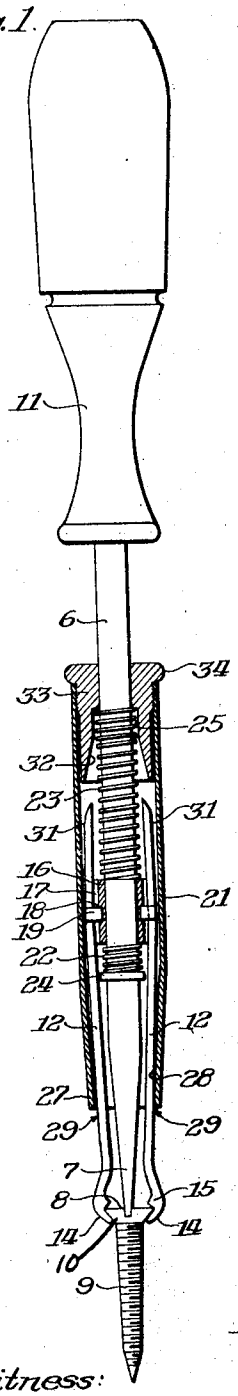


Fig. 2.

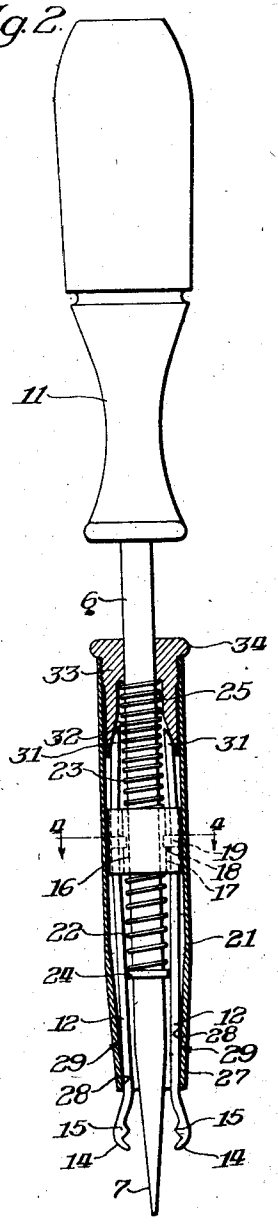


Fig. 5.

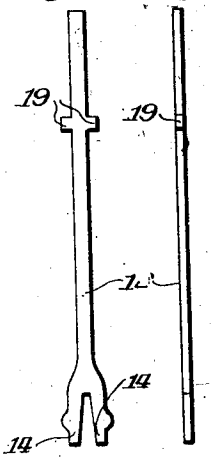


Fig. 6.

Fig. 3.

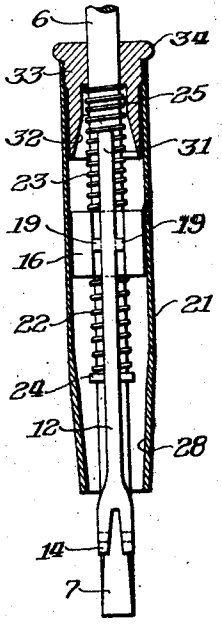
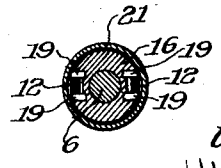


Fig. 4.



Witness:

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UNITED STATES PATENT OFFICE.

WILLIAM HERRMANN, OF CHICAGO, ILLINOIS.

SCREW DRIVER.

Application filed May 16, 1924. Serial No. 713,696.

My invention relates to screw drivers.

The fundamental object of the invention is to provide a screw driver embodying an improved and simplified construction of holding means for holding the screw to be driven. A screw driver of this type is advantageous and often a necessity for driving screws in overhead surfaces, in cramped corners and in other places difficult of access.

One of the particular objects of my invention is to provide improved means for giving a lateral movement to the screw holding jaws for opening and closing the same.

Another object is to provide improved mounting means for these screw holding jaws which will permit of a limited longitudinal movement thereof relative to the screw driver bit for enabling these jaws to retract from the end of the bit and clear the head of the screw when the screw is to be driven home.

Other objects will be apparent from the following description taken in connection with the accompanying drawings in which:

Figure 1 is a longitudinal sectional view through the operating parts of a preferred form of my invention, showing the jaws in the position of holding a screw.

Figure 2 is a similar view showing the jaws moved upwardly along the bit shank.

Figure 3 is a fragmentary sectional view showing the operating parts as viewed at right angles to Figure 2.

Figure 4 is a transverse sectional view taken approximately on the plane of the line 4—4 of Figure 2, and

Figures 5 and 6 are views of the sheet metal stamping from which each screw holding jaw is formed.

The device is assembled about a central shank 6 which is preferably of cylindrical form. At one end the shank is flattened out on opposite sides to form the tapered bit 7 adapted to engage in the kerf or slot 8 of the screw or bolt 9. At its opposite end the shank extends into a suitable handle 11 rigidly secured thereto.

The screw holding means comprises two fingers 12—12 supported on opposite sides of the shank 6. The outer ends of these fingers are curved inwardly to form gripping jaws 14 for engaging under the head 10 of the screw or bolt 9. These jaws 14 preferably have inclined jaw surfaces substantially as shown to grip the tapered under side of the head of a wood screw or the straight under side of the head of a machine screw. Directly above these jaws small abutment shoulders 15 project inwardly from each finger for engaging the top of the screw head.

These gripping fingers are adapted to be rocked into and out of gripping engagement with the screw head by pivoting the fingers at points intermediate their ends and having cam surfaces engage either the upper or lower ends thereof to rock the jaws 14 towards or away from the bit 7. This pivotal or rocking support occurs about a collar 16 loosely mounted on the shank 6. On diametrically opposite sides this collar is formed with two longitudinally extending slots 17 which laterally confine and guide the rocking motion of the gripping fingers 12. Intermediate their ends, these slots 17 are formed with inwardly extending recesses or holes 18 for receiving pivot lugs 19 which project inwardly from the gripping fingers 12 at points intermediate their ends.

The seating of these lugs 19 in the bottoms of these depressions 18 affords a simple and inexpensive rocking support for each gripping finger. When once assembled, the gripping fingers are positively confined in the slots 17 and in the pivotal depressions 18 by the outer sleeve 21 which embraces and houses the greater part of both fingers. The fingers are thus compelled to move with the linear movement of the collar 16.

The collar 16 is balanced on the shank 6 between two springs 22 and 23. The lower end of the lower spring 22 abuts a collar 24 rigidly secured to the shank, and the upper end of the other spring extends into the counterbore 25 in the sleeve closure cap 33, which I shall presently describe. The upper spring 23 is preferably of greater compression strength than the lower spring.

The enclosing sleeve 21 is preferably of brass tubing or other light stock and has its lower end swaged or reduced down to form the long tapered neck 27 forming an internal annular cam surface 28. This cam surface is adapted to co-operate with the long sloped cam surfaces 29 formed on the outer sides of the gripping fingers 12 directly above the jaws 14. When relative movement between the gripping fingers 12 and the sleeve 21 brings the finger cam surfaces 29 down into the constricted end of the tapered neck 27 the gripping jaws are

forced inwardly into firm gripping engagement with the screw head.

The other ends of said gripping fingers are formed with curved or tapered cam surfaces 31 which are adapted to co-operate with an internal annular cam surface 32 formed in the closure cap 33. This closure cap is threaded for screwing into the threaded upper end of the sleeve 21, this open end of the sleeve being slipped over the parts 12 and 16 in the assembly of the device. The cap may be provided with a knurled flange 34 for ease of gripping the cap and the sleeve. It will be apparent that when the sleeve 21 is thrust forwardly the movement of the internal cam surface 32 over the cam tails 31 on the fingers will rock these ends of the fingers together and separate the gripping jaws 14.

Normally, the pressures of the two springs 22 and 23, which are both reactive against the stop collar 24, hold the slidable pivot collar 16 with its gripping fingers raised and also hold the operating sleeve 21 in a raised position. In this position the jaws 14 are retracted back from the end of the bit 7 so that they will clear the head of any screw and not interfere with the ordinary operation of the screw driver where no screw gripping function is desired.

When it is desired to grip the screw to be driven, the sleeve 21 is thrust forwardly along the shank 6. This, acting through the spring 23 of greater compression, shifts the collar 16 outwardly along the shank 6 and brings the gripping jaws 14 out approximately as far as shown in Figure 1. The forward thrusting motion of the sleeve 21 exceeds that of the gripping fingers 12 so that the cam surface 32 overruns the ends 31 of the gripping fingers and separates the jaw ends. The screw is now placed between the jaws with the bit 7 engaging in the kerf 8. The operating sleeve is now permitted to come back under its own spring pressure, and during this return movement of the sleeve the gripping jaws 14 may be pinched inwardly by the fingers of the operator against the sides of the screw head to prevent return movement of the jaws with the sleeve; or the sleeve may be moved sharply backwards for automatically closing the jaws on the screw head. This brings the lower tapered cam surface 28 upwardly along the sloped surfaces 29 of the fingers 12 and cams these fingers inwardly against the screw head. An additional upward pull may be given the sleeve 21 relative to the handle 11 to wedge the cam surface 28 against the gripping fingers and firmly hold these fingers against the screw head. The screw is now held ready for driving.

When the screw head approaches the surface into which the screw is being driven and it is desired to retract the gripping fingers to permit the head to be driven down flush with or into the surface, the operating sleeve 21 is thrust forwardly along the shank 6. This first releases the wedge grip between the cam surface 28 and the gripping fingers 12 and continued motion thereafter brings the upper cam surface 32 down over the tail ends 31 of the fingers, forcibly separating the jaws from the screw head if they have not already released the screw head. Releasing of the sleeve 21 then permits the springs to thrust the sleeve backwardly along the shank and to raise the gripping jaws to a position where they entirely clear the screw head. The screw can now be driven home without any interference from the gripping fingers.

The sleeve 21 and fingers 12 are now in their normal positions first mentioned and the gripping of another screw is a repetition of the foregoing operation.

The gripping fingers 12 may be punched and shaped out of solid rod stock, or may be made up as sheet metal stampings. The latter process is shown in Figures 5 and 6. The finger is first blanked out of sheet metal stock as shown in Figure 5. The pivot lug or lugs 19 are formed as laterally projecting ears on the edges of the flat blank, and the gripping jaw 14 is blanked out as the flaring slotted end shown. The lugs 19 are then folded along the lateral edges of the blank to bring the two lugs 19 into parallelism, and the lower end is slightly curved to give a curved inner face to the gripping jaw 14. If desired the lugs 19 may be left projecting outwardly from the sides of the blank, and the shiftable block 16 be slotted transversely of the slots 17 for providing kerfs for receiving these lugs.

I claim:

1. In a screw driver of the class described, the combination of a shank, a pair of springs, one of which abuts against a flange on said shank, a collar slidable on said shank between said springs, gripping fingers connected to said collar, and an operating sleeve engaging the other spring slidable over said collar and said gripping fingers for rocking said fingers relative to said collar.

2. In a screw driver of the class described, the combination of a shank, a collar slidable on said shank, gripping fingers connected to said collar, a shoulder on said shank, a spring between said shoulder and said collar, a sleeve engaging over said collar and said fingers, a spring between said collar and one end of said sleeve, and cam surfaces on the upper and lower ends of said sleeve adapted to engage the ends of said fingers for camming said fingers into and out of engagement with the screw head.

3. In a screw driver of the class described, the combination of a shank having a bit at

one end and a handle at the other, a collar slidable on said shank, gripping fingers sliding with said collar, a shoulder on said shank, a spring between said shoulder and said collar, a reciprocable sleeve engaging over said collar and said fingers, a spring between said collar and one end of said sleeve, said sleeve having a surface adjacent one end adapted to engage the ends of said fingers for camming said fingers into and a surface adjacent its other end for camming said fingers out of engagement with the screw head.

In witness whereof, I hereunto subscribe my name this 6th day of May, 1924.

WILLIAM HERRMANN.