Nov. 11, 1930. E. MUELLER 1,781,470

SCREW DRIVER

Filed April 11, 1930

Fig. 1.

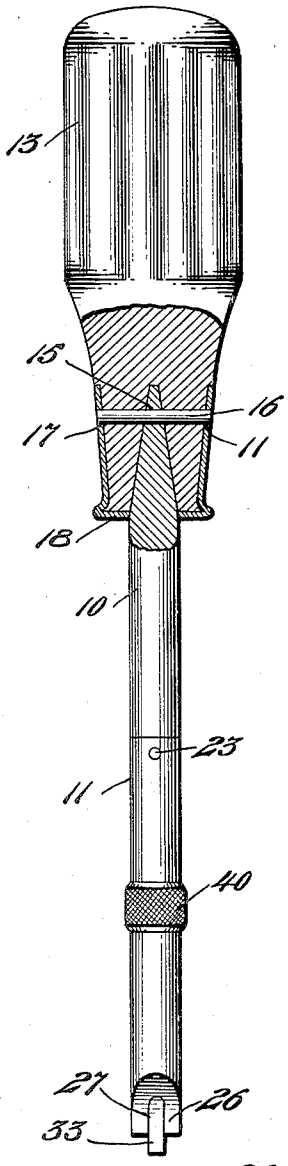


Fig. 2.

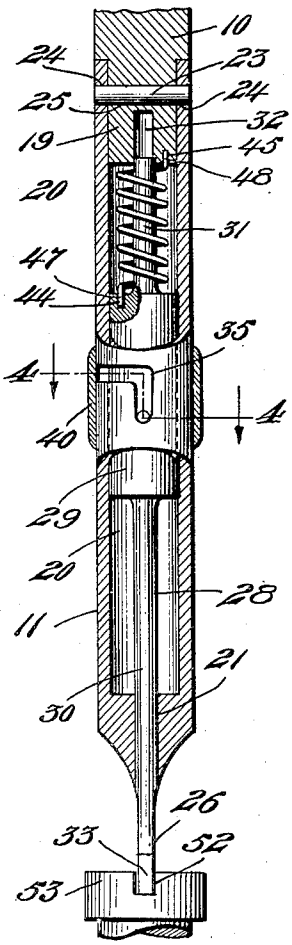


Fig. 3.

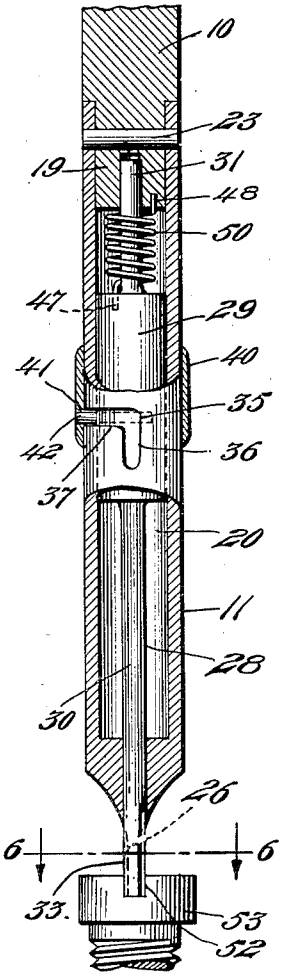


Fig. 5.

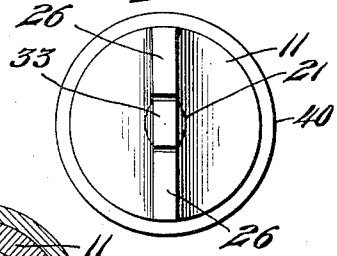


Fig. 6.

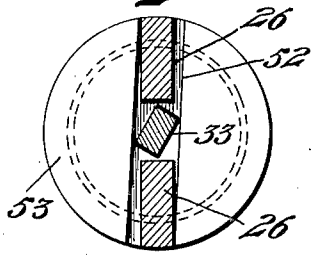
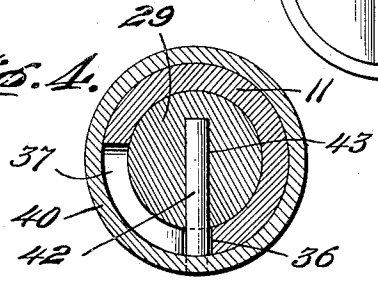


Fig. 4.



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UNITED STATES PATENT OFFICE

EMIL MUELLER, OF CRANSTON, RHODE ISLAND

SCREW DRIVER

Application filed April 11, 1930. Serial No. 443,377.

My invention relates to that type of screw drivers wherein a centrally disposed gripping member in the screw driver shank temporarily engages in the screw slot while the screw setting operation is in progress.

An object of my invention is to cause the plunger to grip the lateral walls of the screw slot automatically, with extreme tightness, and by the forward thrust of the screw driver shaft into the shank.

Another object is to furnish a guide to direct the shaft point in the screw slot, an advantage particularly, but not exclusively, in use upon watch screws which are too small to be manually supported while applying the screw driver.

A further object is to leave one hand of the operator free for any other desired use while inserting the shaft point into the screw slot.

Further objects are to provide in a single helical structure means for both rectilineally advancing the plunger and circularly turning the same; and to maintain such a helical structure in a permanently tensioned and highly energized condition.

A still further object is to make unnecessary the usual independent preliminary energizing of a gripping rod spring and the rotation of the rod during every insertion of the latter into a screw slot.

Additional objects are facility of assemblage, a minimum of parts, strength and ease of manipulation.

To the above ends essentially my invention consists in such parts and in such combinations of parts as fall within the scope of the appended claims.

In the accompanying drawings which form a part of this invention

Figure 1 is a side elevation of a screw driver embodying my invention with the tip of the plunger shown in normal position, and a portion of the driver handle being shown broken away,

Figure 2, an enlarged, partially fragmentary, longitudinally central section of the same, and a fragmentary side elevation of a screw engaged only by the extended plunger tip,

Figure 3, a similar view of the same with the driver shaft advanced and the plunger tip in gripping engagement with the screw,

Figure 4, a transverse section taken on line 4—4 of Figure 2,

Figure 5, a front end elevation of the driver with the parts positioned as shown in Figures 1 and 2, and

Figure 6, a section taken on line 6—6 of Figure 3.

Like reference characters indicate like parts throughout the views.

The shaft of my screw driver as herein shown comprises an outer or upper solid section 10 and an inner or lower tubular section 11. The former carries the handle 13 into whose end extends the tapering outer extremity of the section 10 transversely perforated at 15 to receive a locking pin 16 traversing the handle and perforations 17 in a ferrule 18 thereon. The inner end portion 19 of the section 10 is of reduced diameter to form a plug which is a sliding fit in a socket formed by a longitudinal bore 20 extending centrally throughout the length of the tubular shaft section 11, and of reduced diameter adjacent its lower extremity as at 21. A locking pin 23 passes through perforations 24 in the section 11, and through a diametrical hole 25 in the plug 19. The lower end of the shaft section 11 is oppositely reduced to form a flat broad thin point 26 bifurcated as at 27 by the bore.

Mounted to slide circularly and longitudinally in the bore is a plunger 28 comprising a body or bearing portion 29 slidably engaging the inner face of the tubular shaft section 11, and a reduced inner end portion 30. Integral with the outer end of the body portion is a stem 31 slidable in an axial opening 32 in the plug 19. The plunger portion 30 which occupies the bifurcation of the point has its inner end oppositely reduced to form a flat tip portion 33. As will hereinafter become evident, in the normal position of the plunger, the flat faces of the tip 33 are disposed similarly to those of the point 26 but in advance of and below the latter. In the withdrawn position of the plunger the extremity of the tip is coincident with the end

of the point, but the flatsides of the tip are disposed at an angle to the corresponding sides of the point.

The shaft section 11 is provided with a bayonet slot 35 comprising a longitudinal portion 36 and a portion 37 extending transversely from the upper end of the portion 36. The slot is enclosed by a milled ring 40 loose on the shaft and provided with a perforation 41 in which is frictionally fixed the outer end of a pin 42 extending into a transverse hole 43 in the plunger portion 29. By this construction the ring and plunger are fixed relatively to each other and move in unison either longitudinally or transversely of the shaft in the bayonet slot.

Eccentrically or noncentrally disposed in the adjacent ends of the plunger portion 29 and of the reduced portion 19 of the shaft section 10, are cavities 44 and 45 respectively in which are respectively seated longitudinally disposed fingers 47 and 48 formed in the opposite end coils of a helical spring 50 surrounding the stem 31. It is essential that the spring act not only torsionally to impart rotation to the plunger but that it furnish propulsive rectilinear downward or inward movement thereto also, and that an adequate amount of energy of both torsional movement and rectilinear drive be initially and permanently stored up in the spring. This is attained thus in the initial assemblage of the parts. The spring 50 in uncompressed and nontorsional position and condition has its ends inserted in their respective cavities, the plug 19 being uninserted or but partially inserted in its socket, whereupon the plug is next manually twisted and simultaneously advanced into the bore 20 until torsional and direct energy is stored up in the spring, whereupon the parts are immovably fixed by the insertion of the locking pin 23 into the shaft perforations 24 and the hole 25 of the plug.

The operation of my device is as follows. With the parts normally disposed, as shown in Figures 1 and 2, whereby the end of the projecting plunger tip 33 is initially abutting against the base of the slot 52 of a screw 53, the operator grasps the handle 13 and forwardly thrusts the driver and thereby instantly forces the tip 33 inwardly until it is co-terminal with the shaft point 26. This thrust partially rotates the plunger and brought the corners of the tip 33 into gripping contact with the side walls of the screw slot 52, as shown in Figure 6, whereupon the pin 42 which has reached the top of the bayonet slot portion 36, automatically, by the torsional action of the spring 50, snaps into the horizontal portion 37 of the bayonet slot, and thus locks the plunger in gripping position. The position of the plunger and of the locking pin 42 at this locked stage is shown in Figure 3. Contemporaneously with the gripping and locking action of the plunger the operator turns the handle 13 to advance the screw 53. The driver is released from the screw by manually turning the ring 40 until its pin 42 enters the upper end of the longitudinal portion 36 of the bayonet slot whereupon the propulsive action of the spring 50 forces the plunger to its original advanced position, where it remains checked against excessive advance by the pin 42 in the lower extremity of the slot.

It will be observed that the plunger retreats and locks automatically without any manual manipulation of the bayonet slot pin 20, ring 40, or other auxiliary device, and that the only manipulation of the pin or ring for any purpose whatever, is the slight turn of the latter transversely of the shaft only, to expose the plunger to the propulsive action of the spring 10 for the return of the plunger to original projecting position.

The operator is not required to manually, either directly or indirectly, independently manipulate the gripping member during the insertion of the screw driver into the screw slot, therefore he has one hand free for other purposes prior and while inserting the screw.

It will be noted that the sectional character of the shaft and the means for interengaging the sections gives access to the spring 50, and assists in the winding up of the latter, and in the retention thereof in wound position. The great energy created by thus tensioning the spring, and permanently maintaining the tension, intensifies the torsional, rotary, or gripping action of the plunger, as well as furnishes the power necessary to forcefully propel the plunger rectilineally.

I claim:—

1. In a screw driver of the character described, a shaft including a broad point and provided with an axial bore bifurcating the point, and with a lateral bayonet slot, a handle upon the end of the shaft opposite the tip, an oscillatory plunger slidably mounted in the bore including a tip normally in advance of the point, a compressible torsional spring in the bore engaging and abutting the end of the plunger, and a locking pin in the plunger slidable in the slot.

2. In a screw driver of the character described, a shaft including a broad point and provided with a central longitudinal bore extending through the point, and with a lateral bayonet slot, a handle fast to the shaft, a longitudinally movable and transversely oscillatory plunger slidably mounted in the bore including a portion movable in advance of the point and provided with a tip registerable with the point, a spring in the bore both projecting the plunger and in one position bringing the plunger under torsional strain, a ring loose on the shaft, and a locking pin slidable in the slot and fast in the plunger and ring.

3. In a screw driver of the character described, a handle, a shaft comprising a section provided with a central longitudinal bore, an intermediate bayonet slot, and with perforations near one end, and a section fixed at one end to the handle and including a terminal reduced portion loose in the bore provided with a transverse hole and with an eccentrically positioned cavity in its end, an oscillatory yielding gripping plunger slidably mounted in the bore and provided in one end with an eccentrically disposed cavity, a torsional helical spring in the bore including ends seated in the cavities, a pin seated in the hole and perforations, and a locking pin loose in the slot and fixed in the plunger.

4. In a screw driver of the character described, a handle, a shaft comprising a section having a point and provided with a central longitudinal bore bifurcating the point, a lateral bayonet slot, and with lateral perforations, and a section fixed at one end to the handle, and including a terminal reduced portion in the bore provided with a central longitudinal opening in its end, a transverse hole, and with a cavity in the end disposed eccentrically to the opening, an oscillatory gripping plunger comprising a body portion slidably mounted in the bore and provided at one end with an eccentrically disposed cavity, and a reduced forward end portion terminating in a tip movable in the bifurcation of the point of the first section, a stem upon the rear end of the plunger body slidable in said opening, a torsional helical spring in the bore surrounding the stem including ends in the cavities, a pin in the hole and perforations, and a locking pin in the body portion of the plunger slidable in the slot.

5. In a screw driver of the character described, a handle, a shaft fixed in the handle including a broad point and provided with an axial bore bifurcating the point, and with a bayonet slot intermediate its length comprising a longitudinal and a transverse portion, a longitudinally yielding oscillatory plunger slidably mounted in the bore and normally projecting beyond the point, and coterminal with the point when in rearmost position, a locking pin in the plunger slidable in both portions of the slot and means actuated by the retreat of the plunger for automatically impelling the locking pin into the transverse portion of the slot when the tip reaches a position coterminal with the point.

In testimony whereof I have affixed my signature.

EMIL MUELLER.