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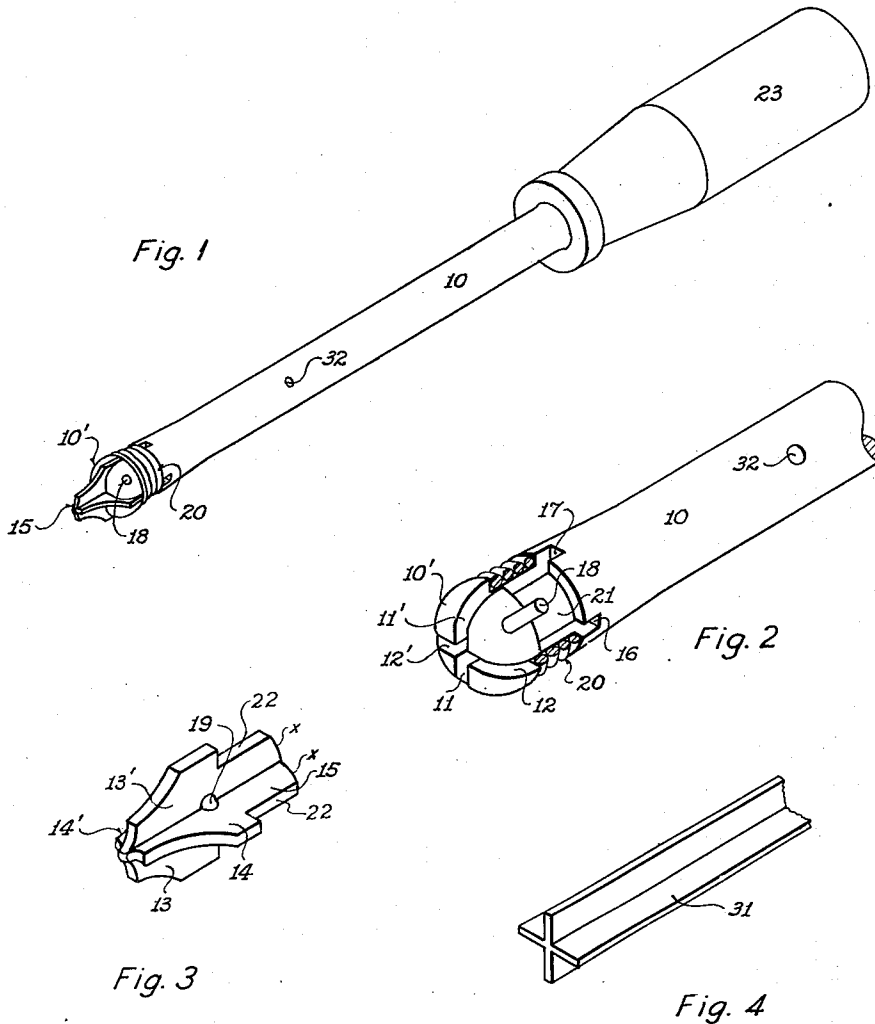
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2,218,631

SCREW DRIVER

Filed Aug. 1, 1939

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

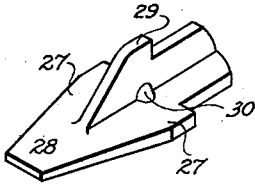


Fig. 7

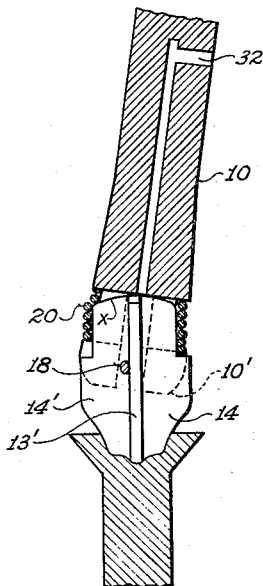


Fig. 6

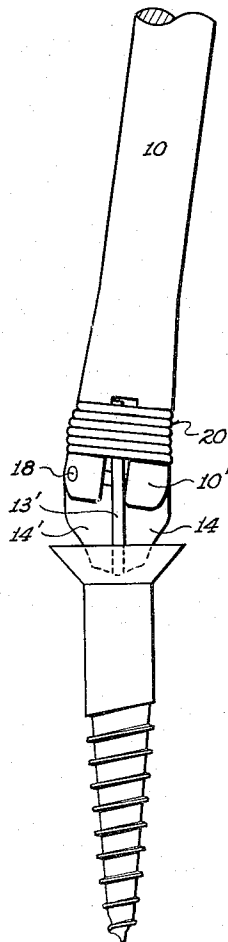


Fig. 5

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UNITED STATES PATENT OFFICE

2,218,631

SCREW DRIVER

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hundredths to W. H. Holmes and Philip C.
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Application August 1, 1939, Serial No. 287,773

8 Claims. (Cl. 145—50)

This invention relates to screw drivers of various types, both manual and machine-operated, and including drivers for the common single-slotted screw. More particularly, however, this invention relates to drivers designed for recessed-head screws of the types which have, in more recent years, been introduced into the market in partial substitution of the common screw. Especially this invention relates to a driver for the improved screw described in our co-pending application, Serial No. 287,772.

When driving a screw into place, it is not always possible to keep the axis of the screw driver in alignment with the axis of the screw. In such cases, the tip or bit of the driver, or the chisel end of the ordinary screw driver, is liable to escape from the slot or recess in the head of the screw, marring the slot or reaming the screw-head recess. Furthermore, when it is desired to drive a screw in such a location that the axis of the screw driver is required to be held out of alignment with the proper axis of the screw, this is very often impossible when rigid drivers, now commonly in use, are employed.

An object of this invention is to provide a driver which will effectively drive a screw under the conditions above-mentioned. This object we accomplish by making our driver with a shank and a separate bit, so arranged that their axes will be permitted slight movement out of alignment with each other, but will nevertheless be normally held in alignment.

Another object of this invention is to provide a screw driver in which the bit, or driving tip may be moved out of such alignment with the main axis of the driver without requiring any sacrifice of strength in the driver.

A further object is to provide a driver in which the bit or point can be removed and replaced without difficulty.

A still further object of this invention is to provide such a driver which will be simple in construction and inexpensive to manufacture.

The manner in which we attain these and other objects in our improved screw driver will be brought out in the following description with reference to the accompanying drawings.

In the drawings:

Figure 1 is a perspective view of a preferred embodiment of our invention;

Figure 2 is an enlarged perspective view of the end of the shank with the screw driver bit removed and a portion of the coil spring broken away to reveal certain details of construction;

Figure 3 is a similar view of the driving bit;

Figure 4 is a perspective view of a section of milled bar stock from which the screw driver bits may be made;

Figure 5 is an enlarged elevation showing our improved screw driver in operable position in a screw;

Figure 6 is a corresponding vertical medial section of parts of the screw and driver with the bit shown in elevation;

Figure 7 is a perspective view of a modified bit.

Referring first to the preferred form of our invention illustrated in Figures 1 to 5, a metal rod or shank 10 is formed with a rounded nose 10', which is bifurcated by two slots, (Fig. 2). These slots intersect the axis of the shank 10 and intersect at right angles to each other thus providing two pairs of aligned slots 11 and 11' and 12 and 12' for receiving the wings 13, 13' and 14, 14', respectively of a screw driving attachment or "bit" such as that shown in Figure 3 and designated 15. The width of the slots 11, 11', 12 and 12' is made sufficiently in excess of the thickness of the wings of the bit to allow the wings to shift laterally, to a certain extent, in the slots, as illustrated in Figure 5.

The slots 11, 11', 12 and 12' extend a substantial distance along the shank 10, so as to afford ample bearing area between the bifurcated shank and the wings of the bit 15, and the pairs of slots 11, 11' and 12, 12' terminate in flat end walls 16 and 17 respectively, which lie in a plane perpendicular to the axis of the shank 10. These end walls 16 and 17 provide flat bearing surfaces for the inserted ends of the wings, 13, 13' and 14, 14', of the bit. These ends of the wings are curved downwardly, from their common point of intersection, as indicated at x in Fig. 3 and shown more clearly in Figure 6, so that the bit may be moved in the slots and the shank 10 will bear on the ends of the bit regardless of the relative alignment or misalignment of the shank and bit. In other words, the screw driving bit 15 may rock and slide on the end walls 16 and 17 of the slots when the shank 10 is swung out of alignment as illustrated in Figures 5 and 6. A removable dowel or pin 18 tightly fitted in a hole in the rounded nose 10' of the shank (Figures 1 and 2) and passed through a larger hole 19 in the bit, (Figure 3) retains the bit in the shank while at the same time permitting it to move laterally as explained.

The hole 19 is made of sufficient size to permit the top of the bit always to bear against the ends of the slots of the shank when the shank is pressed down on the bit, when driving a screw, for ex-

ample as shown in Figure 6, thereby preventing any strain to be borne by the pin 18. This is an important feature in our invention.

In order to cause the bit to normally be positioned in the shank in alignment with the shank axis and to cause the bit to return to such alignment immediately upon being released from a misaligned screw, we provide a coiled spring 20 in a peripheral groove 21 (Figure 2) in the shank in such manner that the coiled spring 20 encompasses a substantial portion of the slots 11, 11', 12 and 12' and bears on the driver wings of the inserted bit, the wings being cut away as at 22 (Figure 3) so as to allow the wings to enter the interior of the coiled spring. Thus, the lateral movement in any direction of the bit with respect to the shank will thrust the edges of the wings against the coiled spring and stretch the engaged coils in the manner shown in the sectional view Fig. 6, and, when the force causing such misalignment is relieved, the displaced coils will resume their normal position and thus bring the bit back into axial alignment with the shank. This is another important feature of our invention. It will be apparent from Figs. 1, 2, 3 and 5, that the bit 15 can easily be removed from the shank 10 by merely withdrawing the pin 18. Thus, should the bit become damaged or the tip worn, or should a bit with a differently-shaped tip be required, the bit can readily be changed.

The detachable bit 15, illustrated in Figures 1, 3, 5 and 6 has the tip and driving wings formed similarly to the special driver intended for use with the improved recessed-head screw shown in our co-pending application, Serial No. 287,772, such screw being shown in Figures 5 and 6, and the wings 13 and 13' are adapted to fit into the main slot of the screw and the narrower and slightly thinner wings, 14 and 14' engage the "spine" slots of the screw recess as described in our said co-pending application. Bits with differently shaped tips, suitable for other types of screw recesses, can of course be used in the same way.

It is characteristic of all slotted or recessed screws that the more nearly the driver can be held to co-axial alignment with the screw, the less will be the tendency toward fracture of the screw head and abrasion of the driving tool, and the greater will be the efficiency of the driver. From Figures 5 and 6 it will be apparent how the operative end or bit of our improved driver, with the joint near the end, compensates for misalignment between the driver and screw, or, in other words, allows the bit to be properly seated in the screw recess, even though the shank of the driver occupies a misaligned position. This important feature of our invention would apply to either a manually operated driver, in which case the shank 10 is securely set in a handle 23 (Fig. 1), or to a power driver, the shank 10 being then held in the chuck of the rotary machine. The fact that the bit may be readily removed from the shank by simply withdrawing the pin 18, is of particular importance in connection with the efficiency of power drivers because of the more or less frequent replacement because of wear of the driver or because of changes in size of screws to be driven.

As previously indicated, that portion of the bit which projects from the driver shank may be made in any desired form to coincide with the particular type of screw to be driven. Thus, if the driver is to be used for ordinary single-slotted screws the bit may be made in the form illus-

trated in Figure 7 with one pair of aligned wings 27, tapered to a wedge point 28, similar to that of a conventional screw driver, and the other pair of wings, as 29, merged into this wedge point substantially as shown. The driving bit for slotted screws thus formed may be provided with an enlarged hole 30 for receiving the retaining pin 18.

Various types of detachable bits with two pairs of wings, such as those illustrated, we have found can be manufactured very economically in the following manner. A long bar of metal, such as that shown in part in Figure 4 and designated 31, is machined or otherwise formed to the exact widths and thicknesses of the bits required, then shaped at uniform intervals to make the curved edges of the wings. The bar is then cut into individual driver bits. By this method, the separate machining operations usually required are substantially reduced.

Since, in the operation of driving almost any type of screw, considerable pressure is required to be exerted on the head thereof resulting in a certain amount of friction in the joint between the bit and shank in our driver, we provide an oil hole 32 in the shank 10 which hole leads to the bearing surfaces between the shank and bit, as shown in Figure 6.

While we consider it preferable to make the bit in our driver with two pairs of wings and to make the shank correspondingly with slots intersecting on the shank axis and arranged at right angles to each other, it would, nevertheless, be possible to carry out our invention by using a bit formed from a single straight piece of metal, thus without any "spines," and, similarly, to have only a single slot in the shank, such slot preferably extending through the axis of the shank.

Other modifications in the form, shape, and construction of the bit with corresponding modifications in the shank will be possible without departing from the principle of our invention.

We claim:

1. A screw driver comprising, a shank secured at one end to a handle, a pair of intersecting slots in the other end of said shank extending a short distance longitudinally in said shank, a groove extending around said shank crossing the edges of said slots, a bit adapted to be inserted in said slots, the inserted end of said bit having ribs corresponding to said slots, but the thickness of said ribs being less than the width of said slots to permit the axis of said bit to be moved out of alignment with the axis of said shank, means for holding said bit in said shank, said means including a transversely extending pin in said shank extending through a hole in the inserted portion of said bit, said hole being of a diameter larger than that of said pin and a spring located in said groove, engaging the edges of said ribs.

2. A screw driver comprising, a shank secured at one end to a handle, a pair of intersecting slots in the other end of said shank extending a short distance longitudinally in said shank, said slots intersecting each other at right angles, a recess extending around said shank crossing the edges of said slots and in a plane perpendicular to the planes of said slots, a bit adapted to be inserted in said slots, the inserted end of said bit having ribs corresponding to said slots, but the thickness of said ribs being less than the width of said slots to permit the axis of said bit to be moved out of alignment with the axis of said

shank, means for holding said bit in said shank, and means for normally holding said bit in alinement with the axis of said shank, said latter mentioned means comprising a spring on said shank in said recess engaging the edges of the inserted portion of said bit.

3. The combination described in claim 2 with the top of the inserted end of said bit being curved to permit said bit to rock and slide freely on the ends of said slots in said shank.

4. In a screw driver, a shank, a pair of intersecting slots in the end of said shank extending a short distance longitudinally in said shank, said slots intersecting each other at right angles, a recess extending around said shank crossing the edges of said slots, a bit adapted to be inserted in said slots, the inserted end of said bit having ribs corresponding to said slots, but the thickness of said ribs being less than the width of said slots to permit the axis of said bit to be moved out of alinement with the axis of said shank, means for holding said bit in said slots, said means including a transversely extending pin in said shank extending through an enlarged hole in the inserted portion of said bit, and means for normally holding said bit in alinement with the axis of said shank, said latter mentioned means including a spring in said recess of said shank engaging the edges of the inserted portion of said bit.

5. The combination described in claim 4, with the top of the inserted end of said bit being curved to permit said bit to rock and slide freely on the ends of said slots in said shank.

6. In a screw driver, a shank, a slot in the end of said shank extending a short distance longitudinally in said shank, a recess extending around said shank crossing the edges of said slot, a bit adapted to be inserted in said slot, the inserted portion of said bit being of less thickness than the width of said slot to permit the axis of said bit to be moved out of alinement with the axis of said shank, means for holding said

bit in said shank, said means including a transversely extending pin in said shank extending through an enlarged hole in the inserted portion of said bit, and means for normally holding said bit in alinement with the axis of said shank, said latter mentioned means comprising a spring in said recess of said shank engaging the edges of the inserted portion of said bit, the top of the inserted end of said bit being curved to permit said bit to rock and slide freely on the end of said slot in said shank.

7. In a screw driver, a shank, a pair of intersecting slots in the end of said shank extending a short distance longitudinally in said shank, a bit adapted to be inserted in said slots, the inserted end of said bit having ribs corresponding to said slots, but the thickness of said ribs being less than the width of said slots to permit the axis of said bit to be moved out of alinement with the axis of said shank, means for holding said bit in said shank, said means including a transversely extending pin in said shank extending through an enlarged hole in the inserted portion of said bit.

8. In a screw driver, a shank, a pair of longitudinal intersecting slots in the end of said shank, a bit inserted in said slots, the inserted end of said bit having longitudinally extending radial ribs corresponding to said slots, the thickness of said ribs being less than the width of said slots to permit the axis of said bit to be moved out of alinement with the axis of said shank but the walls of said slots limiting such movement out of alinement, the top of the inserted end of said bit being curved to permit said bit to rock and slide freely on the ends of said slots in said shank, an enlarged hole in the inserted portion of said bit, and a transversely-extending pin in said shank extending through said hole in said bit for retaining said bit in said shank.

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