

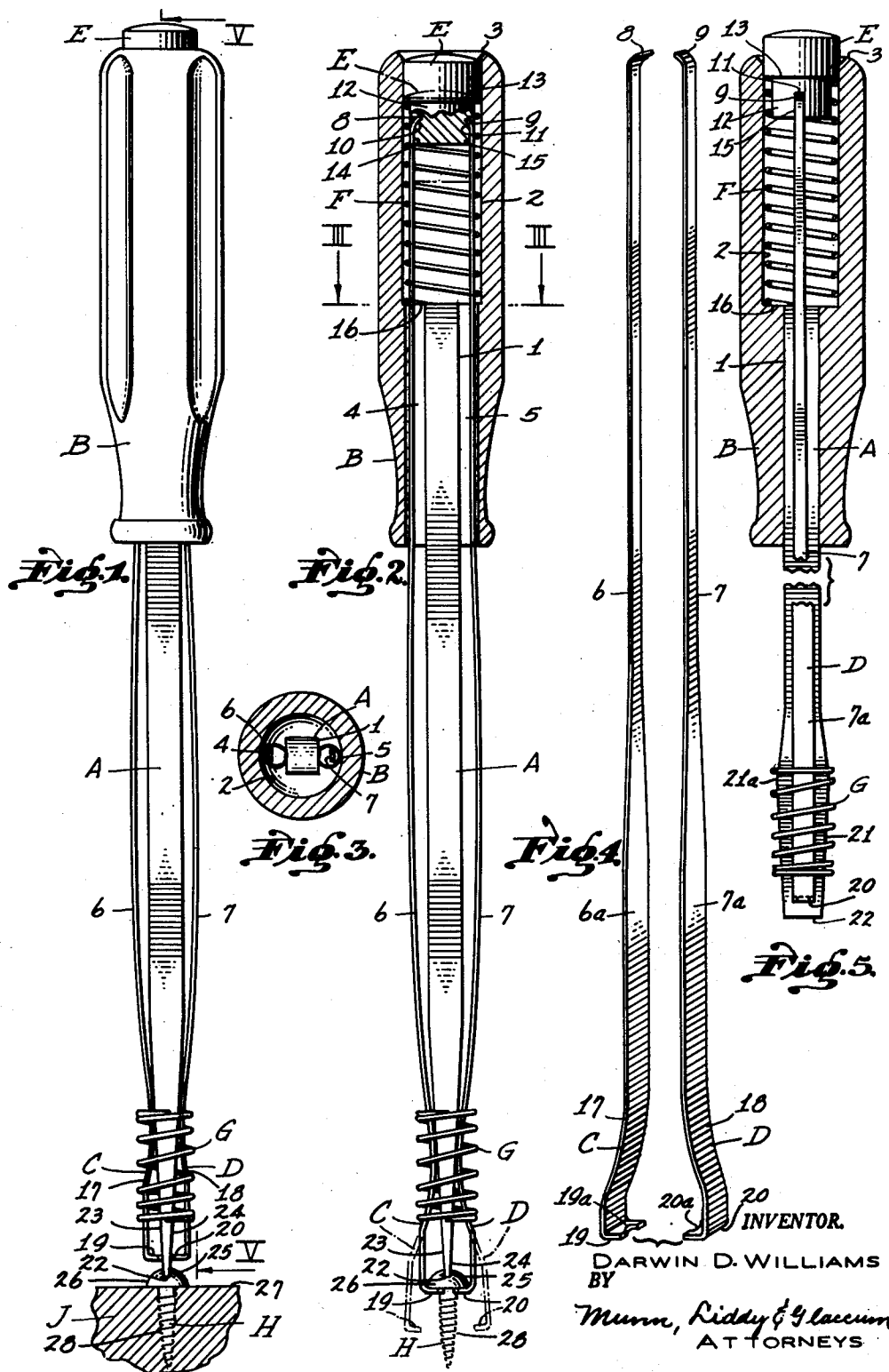
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SCREW DRIVER WITH ELEMENT-GRIPPING JAWS

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SCREW DRIVER WITH ELEMENT-GRIPPING JAWS

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An object of my invention is to provide a screw driver and holder which can be used in the usual way and has the additional advantage of rigidly holding the screw head or other object to the screw driver. The element held in engagement by the gripping jaws is not only forced against the wedge-shaped end of the screw driver shank, but is also held against lateral displacement. This permits screws or other fastening elements to be driven into the material in an angular direction with respect to the exterior surface.

A further object of my invention is to provide a device of the type described in which the element gripping jaws have resilient extensions that are moved along the screw driver shank by manually depressing a push button that normally projects a slight distance beyond the rear end of the screw driver handle. The arrangement of the parts is such that when the screw driver is used in the usual manner for tightening a screw in place, hand pressure on the rear end of the handle to maintain the screw driver in the screw kerf will move the push button flush with the handle end. The resilient jaw extensions will flex laterally to permit this push button movement without causing the jaws to push the screw head or other object off from the wedge-shaped or driving bit end of the screw driver shank.

A still further object of my invention is to provide a device of the type described wherein the element gripping jaws are cam-shaped so that they will have a tendency to spread apart when they are moved toward and beyond the driving bit end of the screw driver. I provide a closure for the jaw cam portions that will cause the jaws to move toward each other when they are retracted. By this arrangement the object which is held in contact with the driving bit is prevented from lateral movement.

Other objects and advantages will appear in the following specification, and the novel features of the device will be particularly pointed out in the appended claims.

My invention is illustrated in the accompanying drawing forming a part of this application, in which:

Figure 1 is a front elevation of the screw driver showing the jaws retracted;

Figure 2 is a view similar to Figure 1, but shows the handle in vertical cross section and the jaws extended into gripping relation with a screw head;

Figure 3 is a transverse section taken along the line III—III of Figure 2;

Figure 4 is a perspective view of the two jaws; and

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Figure 5 is a vertical section taken along the line V—V of Figure 1, portions being shown in elevation.

While I have shown only the preferred form of my invention, it should be understood that various changes or modifications may be made within the scope of the appended claims without departing from the spirit and scope of the invention.

In carrying out my invention, I provide a screw driver shank indicated generally at A and this shank may be square in cross section as shown in Figure 3, or it may be cylindrical. A handle B has a square bore 1 for receiving the shank A and the handle is rigidly secured to the shank so as to prevent any relative movement therebetween. Figure 2 shows the handle as being provided with a central bore 2 that is cylindrical in cross section and extending from the bore 1 to the rear end of the handle. The bore 2 is larger in diameter than the bore 1 and has a conical-shaped entrance 3 for a purpose hereinafter described.

Reference to Figures 2 and 3 shows the handle B further provided with two longitudinally extending grooves 4 and 5 that communicate with the bore 1. It is not necessary that the grooves 4 and 5 communicate with the bore 1, because the grooves may themselves be in the shape of small diameter bores.

The grooves 4 and 5 receive the resilient arms or extensions 6 and 7 of jaws indicated generally at C and D, respectively. In Figure 5 the handle B is shown in longitudinal section with the shank A illustrated in elevation and also the arm 7 of the jaw D shown in elevation. The groove 5 is omitted in this view. Both jaws C and D are clearly shown in Figure 4 in perspective. The jaw extensions 6 and 7 have inwardly-turned upper ends 8 and 9 and Figure 2 illustrates how these ends are received in recesses 10 and 11 provided in a reduced portion 12 of a spring-pressed button E.

The button E is slidably received in the handle bore 2 and the reduced portion receives the convolutions of the outer end of a coil spring F. The outer end of the spring bears against a shoulder 13 provided on the button where the reduced portion merges into the head of the button. The reduced portion 12 also has longitudinal grooves 14 and 15 communicating with the recesses and these grooves receive the upper portions of the jaw arms 6 and 7. This arrangement is clearly shown in Figure 5. I do not wish to be confined to any particular manner of securing the jaw arms to the spring-pressed push button, because the tops of the arms could be T-shaped rather than in-

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wardly bent and received in T-shaped grooves provided in the reduced button portion 12. The coil spring F holds the jaw arms or extensions 6 and 7 in their recesses and grooves. The inner end of the coil spring F bears against a shoulder 16 provided between the bore 1 and the bore 2.

It will also be seen from Figure 4 that the jaw extensions 6 and 7 are narrow for a good portion of their lengths so as to be flexible and then widen out as at 6a and 7a. The jaws themselves have cam portions 17 and 18 and inwardly extending ends 19 and 20. The ends 19 and 20 have arcuate recesses 19a and 20a, as clearly shown in Figure 4.

I provide a closure or guide G for the cam ends 17 and 18 of the jaws. The closure is preferably cylindrical in shape and can be formed from a coil spring or a casing. The inner diameter of the spring is small enough to grip the wedge-shaped end or driving bit 21 of the screw driver shank at a point just above the widest portion 21a. The coil spring is enlarged slightly by contacting the widest portion 21a and sufficient friction is developed to hold the coil or closure G against longitudinal movement on the shank A. The closure G terminates above the end 22 of the driving bit 21 as illustrated in Figure 1.

The closure G and the spring-pressed push button E cooperate to cause the preformed jaws C and D to frictionally engage with opposite faces 23 and 24 of the driving bit end 21 at a point above the edge 22. The cam portions 17 and 18 will contact with the inner surface of the closure G and will cause the ends 19 and 20 of the gripping jaws to exert enough friction on the faces 23 and 24 to prevent the coil spring F from moving the push button E beyond the extended position shown in Figure 1. It will be seen from the same figure that the spring arms 6 and 7 of the jaws curve outwardly to a slight extent between the top of the closure G and the bottom of the handle B.

From the foregoing description of the various parts of the device, the operation thereof may be readily understood.

The screw driver shown in Figure 1 can be used in the usual way with the edge 22 of the shank A received in a kerf 25 of a screw H or other fastening element. If the screw is being driven into place in the material J and the palm of the operator's hand is depressing the button E, the jaw ends 19 and 20 will move down into contact with the screw head 26. A further downward movement of the push button to bring it flush with the end of the handle will cause the arms 6 and 7 to flex outwardly rather than force the end 22 of the shank A out of the kerf 25. This is a distinct and novel feature of applicant's invention because it permits the device to be used as an ordinary screw driver.

If the screw H is being removed from the material J, the device can be used in the manner shown in the Figure 1 until the screw head 26 is backed away from the surface 27 of the material. At this time the push button E may be moved by the operator's finger into the broken line position shown in Figure 2 and this will cause the jaws C and D to spread and to move below the edge 22. The conical portion 3 guides the finger into the bore. The jaws may now be placed on opposite sides of the screw shank 28 and then the button freed for permitting the spring F to retract the jaws. The cam portions 17 and 18 will coact with the closure G during this return movement to bring the jaws together into grip-

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ping relation with the screw shank 28 and against the under side of the screw head. The screw H is now gripped tightly by the jaws and when the screw driver has been rotated for freeing the screw from the material, the screw head will be held clamped to the shank A and cannot drop off from the screw driver.

When driving a screw into the material, the screw may be secured to the driving bit in the manner already explained and then the end of the handle B can be used for initially forcing the screw into the material. The push button E is depressed below the end of the handle due to the pressure of the hand against the handle end and therefore any pressure of the hand against the handle end will not free the screw from the screw driver, because the push button cannot be moved inwardly beyond its flush position. A hammer or other tool can be used for striking the handle end for driving the screw into the material.

After the screw has been forced into the material a sufficient distance, the push button E can be depressed further by using the finger for freeing the jaws from the screw, and then the push button can be permitted to return to normal position and will cause the jaws to retract and contact the faces 23 and 24. The screw driver can now be used in the usual way for securing the screw tightly in place.

When placing a screw in an opening that is inclined with respect to the face of the material, the lateral gripping force exerted by the jaws on the screw, due to the cam portions 17 and 18 contacting the closure G, will cause the jaws to hold the screw in a vise-like grip, which will prevent the screw from slipping laterally off from the driving bit. The screw driver can be used for securing nuts on bolts because the jaws can grip the nut. Furthermore, the screw driver can be used for fastening a toggle screw in position where the screw head must be pulled toward the operator while the device is rotated. Threaded cylindrical sleeves provided with kerfs or not so provided, can be gripped by the jaws and inserted in places that are inaccessible with the normal screw driver. The jaws can also be used for retrieving small objects from places where the operator cannot otherwise reach.

The special cam portions 17 and 18 cooperate with the closure G for bringing the jaws toward each other at the proper angle during the retraction of the jaws, so that the inwardly extending portions 19 and 20 will bear against the faces 23 and 24 of the shank A. The friction developed by the jaws bearing against the shank is sufficient to limit the outward movement of the plunger E, so that it will be brought to a stop when it reaches the extended position shown in Figure 1. The arrangement of parts also permits the ready assembly of the jaws in place without the necessity of any screws or other fastening means being used. The closure G can be slipped into position or removed as desired. The device is simple in construction and is efficient for the purpose intended.

I claim:

1. A screw driver with element-gripping jaws comprising a shank having a wedge-shaped end, a tubular handle mounted on the shank, a pair of jaws positioned on opposite sides of the wedge-shaped end, a guide encircling the shank and retained against longitudinal movement relative to the latter, the guide normally holding the jaws in contact with opposite sides of the wedge-

shaped end above a kerf-receiving edge of the wedge-shaped end so that this edge can enter a screw kerf or the like, the jaws having resilient arms that are slidably received by the handle, a push button normally projecting beyond the rear of the handle and movable into a position at least flush with the latter and connected to the arms for moving the jaws beyond the wedge-shaped end when the button is depressed, the resilient arms having an unobstructed central portion whereby the arms will become bowed apart laterally when the wedge-shaped end is received in a screw head kerf and the push button is depressed so as to lie flush with the handle end, whereby the wedge-shaped end will remain in the kerf.

2. In a screw driver with element-gripping jaws, a shank having a wedge-shaped end, a handle secured to the shank, a pair of gripping jaws disposed on opposite sides of the shank and having elongated arms slidably received in the handle, said arms having a portion thereof laterally unobstructed to permit bowing and a spring-pressed button connected to the arms and normally projecting beyond the rear end of the handle, said handle having a bore for slidably receiving the push button, the push button being depressible into the bore to a position in which the button is disposed entirely within the handle, whereby the operator's hand can bear against the rear end of the handle without obstruction by the push button and the end of the screw driver will remain in engagement with the screw due to bowing of said arms.

3. In a screw driver with element-gripping jaws, a shank having a wedge-shaped end, a handle secured to the shank and having a bore extending inwardly from its rear end, a pair of gripping jaws disposed on opposite sides of the shank and having elongated arms slidably received in the handle, a push button normally projecting beyond the rear end of the handle and slidably received in the bore and having a reduced portion with recesses therein for receiving abutments on the arms, and a coil spring concealed in the bore and encircling the reduced

button portion for securing the jaw arms to the button, the spring serving the additional function of yieldingly urging the button in a direction for retracting the jaws, the push button being depressible into the bore to a position in which the button is disposed entirely within the handle, whereby the operator's hand can bear against the rear end of the handle without obstruction by the push button.

4. In a screw driver with element-gripping jaws, a shank having a wedge-shaped driving bit, the edges of the bit flaring outwardly from its lower end to define a wider portion thereabove and then tapering inwardly above the wider portion to the shank, a pair of resilient jaws placed on opposite sides of the bit and having inwardly-extending gripping members normally contacting opposite faces of the wedge-shaped bit, each jaw also having a cam portion that bears against the shank and tends to yieldingly urge the jaws from contact with the wedge-shaped bit, a spiral spring having a convolution engaging with the wider portion of the driving bit and anchoring the spring directly to the bit against longitudinal slippage therealong, the spring encircling the jaws for holding the gripping members in contact with the bit when the jaws are retracted, the cam portions and spring cooperating to permit the resilient jaws to spread apart as they are advanced, and means for advancing and retracting the jaws along the bit.

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