

[54] COMBINATION STRAIGHT SLOTTED AND CROSS SLOTTED SCREW STARTER

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[22] Filed: July 21, 1971

[21] Appl. No.: 164,650

[52] U.S. Cl. 145/50 E

[51] Int. Cl. B25b 15/02

[58] Field of Search.... 145/50 R, 50 A, 50 B, 50 D, 145/50 DB, 50 E

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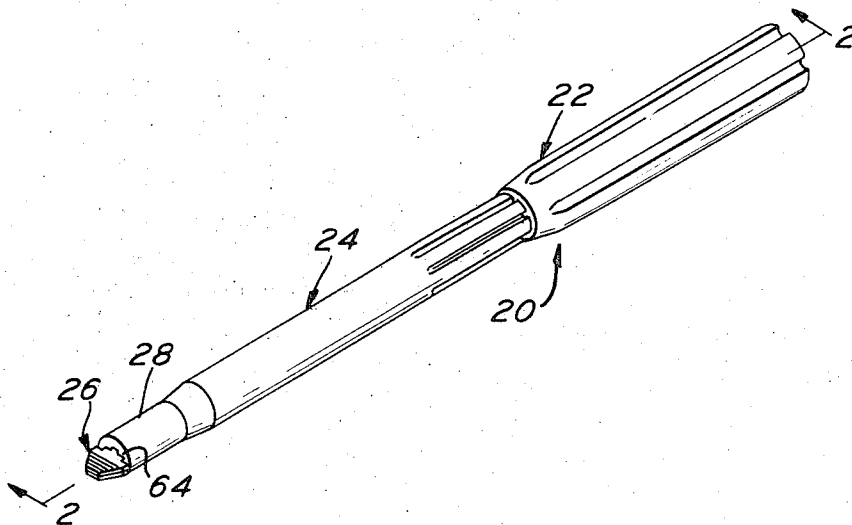
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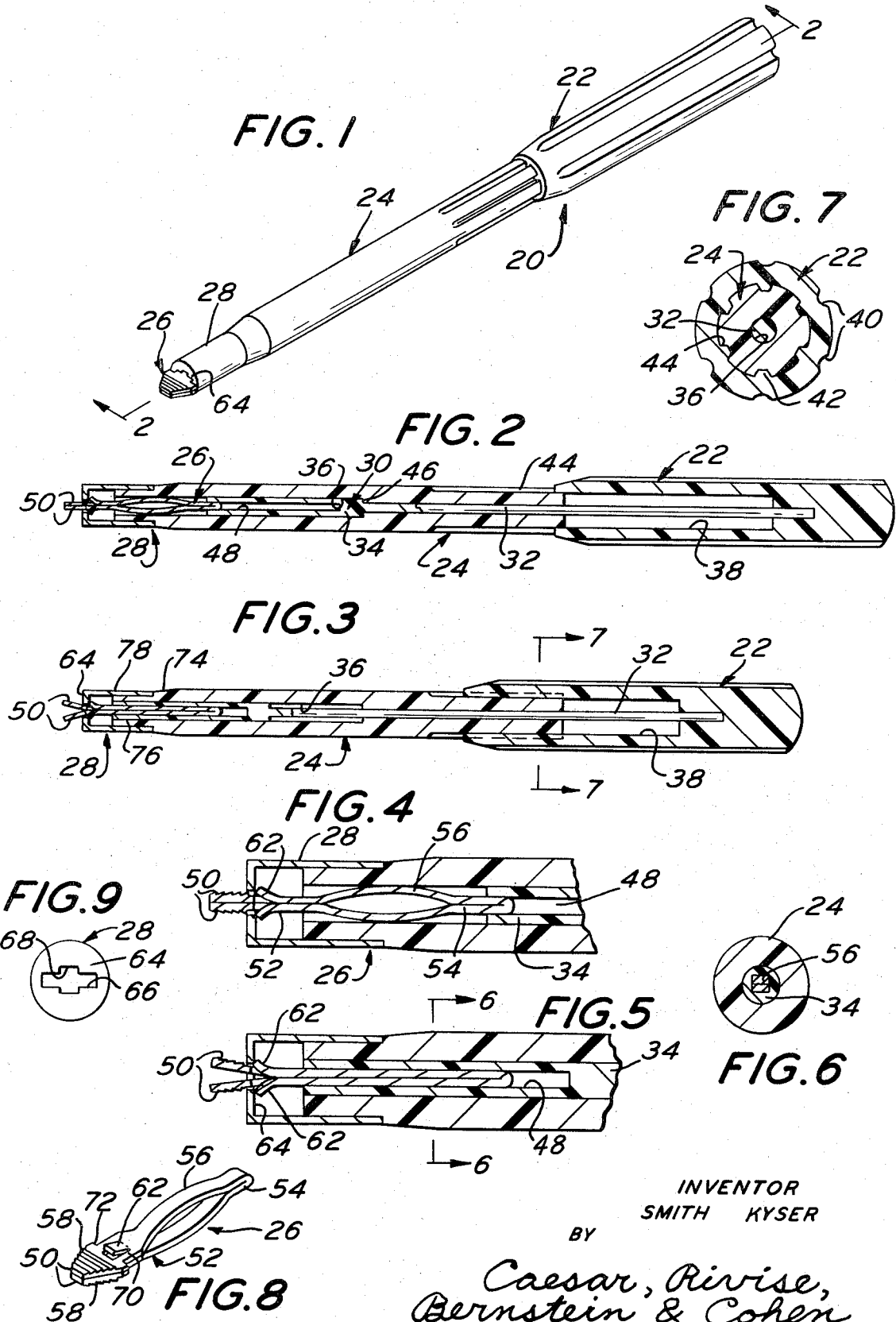
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[57] ABSTRACT

A screw starter is provided for use with either straight slotted or cross slotted screws. The starter includes a handle, a barrel and an actuating rod secured to the handle extending in one end of the barrel. The handle has a longitudinally extending opening for receiving the barrel. The handle is slidable longitudinally but fixed rotationally with respect to the barrel. Screw gripping means are provided which comprise a pair of blades which are connected together by an elongated spring bent back upon itself to form an elliptical portion and a straight portion. The actuating rod has a longitudinally extending portion which extends into the barrel for receiving the spring. The blades are spaced apart to grip the sidewalls of the screw slot when the elliptical portion of the spring is received in the opening of the actuating rod by movement of the handle towards the blades. The blades are tapered towards the end thereof for use on either straight slotted or cross slotted screws and have serrated outer surfaces to enable a more secure gripping action of the screw.

6 Claims, 9 Drawing Figures





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COMBINATION STRAIGHT SLOTTED AND CROSS SLOTTED SCREW STARTER

This invention relates generally to screw starters and more particularly to a combination screw starter for straight slotted and cross slotted screws.

Various types of screw drivers have been provided with screw gripping means to enable starting of the screw in an inaccessible place. The disadvantages of the prior screw starters are that they are not flexible enough to handle the various type of screws that are utilized. For example, unless a screw starter is specifically designed for a Phillips head screw, it normally cannot grip a Phillips head screw. Where the screw starter is designed to grip a Phillips head screw, it cannot grip a straight slotted screw.

Moreover, the specific requirement for screw starters is that they be able to start screws in inaccessible places. However, many of the screw starters are not narrow enough to fit within the inaccessible places. Where the screw starters have, in the past, been narrow enough to extend into an inaccessible place, often the screw starter has not had sufficient structural strength to rotate the screw to start the same.

Another problem with prior screw starters is that unless the screw is gripped so that the axis thereof is coaxial with the axis of the screw starter, the screw would fall off of the screw starter. That is, a screw could not be gripped at an angle with respect to the screw starter.

Finally, the last disadvantage of the prior art screw starters is that the securement between the screw starter and the screw is often not sufficient to prevent inadvertent loosening of the screw from the screw starter. Where the gripping means did tightly secure the screw starter to the screw, it was often difficult to remove the screw starter from the screw after the screw had been started.

It is, therefore, an object of the invention to overcome the aforementioned disadvantages.

Another object of the invention is to provide a new and improved screw starter which can be used with either straight slotted or cross slotted screws.

Yet another object of the invention is to provide a new and improved screw starter having means for enabling a secure gripping of a screw.

Still another object of the invention is to provide a new and improved screw starter wherein a secure gripping of the screw is maintained yet removal of the screw starter from the screw after the screw has been started is facilitated.

Yet another object of the invention is to provide a new and improved screw starter which is inexpensive to manufacture.

Yet another object of the invention is to provide a new and improved screw starter which maintains a secure grip of a screw, is extremely narrow so that it can be inserted in inaccessible places and enables sufficient torque to be applied to a screw for starting the same in an inaccessible position.

These and other objects of the invention are achieved by providing a screw starter which includes a handle, a barrel and an actuating rod secured to the handle and extending in one end of the barrel. The handle has a longitudinally extending opening for receiving the barrel. The handle is slidable longitudinally but fixed rotationally with respect to the barrel. Screw gripping

means are provided which comprise a pair of blades which are connected together by an elongated spring bent back upon itself to form an elliptical portion and a straight portion. The actuating rod has a longitudinally extending opening at the end thereof which extends into the barrel for receiving the spring. The blades are spaced apart to grip the sidewalls of a screw slot when the elliptical portion of the spring is received in the opening of the actuating rod by movement of the handle towards the blades.

Other objects and many of the attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings wherein:

FIG. 1 is a perspective view of a screw starter embodying the invention;

FIG. 2 is an enlarged vertical sectional view taken along the line 2—2 in FIG. 1 with the blades of the screw starter in a non-gripping position;

FIG. 3 is an enlarged vertical sectional view taken along the line 2—2 in FIG. 1 with the handle telescoped forwardly over the barrel so that the blades are urged into a gripping position;

FIG. 4 is an enlarged fragmentary view of the screw starter as seen in section in FIG. 2;

FIG. 5 is an enlarged fragmentary view of the end of the screw starter as seen in FIG. 3;

FIG. 6 is an enlarged sectional view taken along the line 6—6 in FIG. 5;

FIG. 7 is an enlarged sectional view taken along the line 7—7 in FIG. 3;

FIG. 8 is an enlarged perspective view of the screw gripping means per se; and

FIG. 9 is an enlarged end elevational view of the ferrule per se which acts as a housing for the screw gripping means.

Referring now in greater detail to the various figures of the drawing wherein like reference numerals refer to like parts, a screw starter embodying the invention is shown generally at 20 in FIG. 1.

The screw starter 20 basically comprises a handle 22, a barrel 24 and screw gripping means 26 which are mounted in a ferrule 28. As best seen in FIG. 2, secured to the handle 22 is an actuating rod 30 having an elongated rod-like portion 32 and an enlarged forward portion 34. The rod-like portion 32 is press fit into an elongated axially extending reduced portion of bore 38 within handle 22 and, as best seen in FIG. 2, extends co-axially with the handle into the bore 36 of barrel 24.

As best seen in FIG. 2, the bore 38 of handle 22 also includes an enlarged portion which acts to receive the end of barrel 24. As best seen in FIG. 7, the handle 22 includes longitudinally extending grooves 40 on the outer surface thereof which facilitate gripping of the handle. As also best seen in FIG. 7, the bore 38 of the handle includes longitudinally extending ridges 42 which extend parallel to the axis of the handle.

As also best seen in FIG. 7, the barrel 24 also includes longitudinally extending grooves 44 in which ridges 42 are received. As best seen in FIGS. 2 and 3, the grooves 44 extend from the rear of the barrel 24 to a point approximately one-third of the length of the barrel. Thus, the handle 22 is slidably mounted with respect to the barrel 24 with the handle being movable longitudinally of the barrel 24 with respect thereto.

However, the ridges 42 riding in grooves 44 prevent the rotation of the handle 22 with respect to the barrel 24. It should also be understood that the barrel 24 can also be made of a polygonal cross-section with the cross-section of the bore 38 of handle 22 being of the same cross-section so that slidability longitudinally is enabled without enabling rotation of the handle with respect to the barrel.

The bore 36 of the barrel 24 is enlarged at the forwardmost end thereof with respect to the rear end of the bore. That is, a shoulder 46 is formed at the junction between the narrow portion of the bore and the enlarged portion of the bore. The shoulder 46 of bore 36 acts to stop the rearmost longitudinal slidability of the actuating rod 30 with respect to the barrel 24. Thus, as seen in FIG. 2, the handle is at the rearmost extent of the barrel 24 since the rear of the enlarged portion 34 of the actuating rod 30 is bearing against shoulder 46 of bore 36 of the barrel. The enlarged portion of the actuating rod 30 includes an opening 48 of rectangular cross-section which is adapted to receive a portion of the screw gripping means.

As best seen in FIGS. 4 and 5, the screw gripping means 26 basically comprises a pair of blades 50 which are connected to each other via a one piece integral spring 52. Spring 52 is bent back upon itself and forms a straight portion 54 and an elliptical portion 56. The blades 50 are substantially flat and are tapered towards the forwardmost end thereof. The taper of both lateral edges 58 is approximately 45°. The outermost surface of each of the blades 50 is serrated at 60 so that teeth are formed which enable a tighter grip between the blades and the inner surface of a screw slot.

The taper 58 of the blades 50 facilitates the use of the screw starter in combination with either straight slotted or cross slotted screws. The blades 50 further include spring projections 62. Spring projections 62 extend out of the center of the blade and, as will hereinafter be seen, act to lock the screw gripping means within the ferrule 28.

As best seen in FIG. 1, ferrule 28 is basically cylindrical and includes a circular end 64. As best seen in FIG. 9, the circular end 64 includes a slotted opening 66 having a pair of notches 68 centrally located thereof.

The notches 68 extend radially from the center of the circular end 64. The gripping member 26 is mounted in the ferrule 28 by insertion of the spring 52 through the slot 66 of the end 64. The notches 68 enable the spring projection 62 to pass through the end 64 and are small enough so that the spring projections are urged inwardly or together and after they have passed through the notches 68, spring back outwardly and, thus, are urged against the rear surface of the end 64 to prevent removal of the spring 52 from the ferrule.

It should be noted that the blades 50 include a narrow portion 70 which fits within the slots 66. However, the main portion of the blades cannot fit through the slots 66. That is, the main portion of the blades 50 and the portions 70 are joined by a shoulder 72 which abuts the forwardmost surface of the end 64 to prevent entry of the end portion of the blades 50 into the ferrule 28. The gripping member 26 is, thus, locked in the ferrule 28 with the projection 62 abutting the rear surface of the end 64 and the shoulder 72 abutting the forwardmost surface of the end 64 after the spring projections 62 have been urged through the opening 66.

As best seen in FIG. 3, the forwardmost end of the barrel 24 is tapered at 74 and is reduced in diameter at the forwardmost end 76 thereof. The cylindrical skirt 78 of ferrule 28 is telescoped over end 76 and is secured thereto by a press fit.

In operation, the blades 50 of the gripping member 26 are normally in the position shown in FIG. 2 with the handle member 22 at its rearmost extent with respect to the barrel 24. As best seen in FIG. 3, when the handle 22 is slid forward along the barrel 24, the enlarged forward portion 34 of the actuating rod 30 is moved forward and thereby causes the opening 48 thereof to receive the spring 26.

As best seen in FIG. 6, the opening 48 in the enlarged portion 34 is substantially square so that it can receive the straight and elliptical portions of the spring 56. Accordingly, the opening 48, since it is substantially the thickness of the spring 56 overlapped, causes the elliptical portion of the spring to be drawn together and thereby causes a pivoting action of the blades 40 about the junction between the spring 52 and the portions 70 of the blades since the blades are bent outwardly with respect to the spring at this junction. Accordingly, as seen in FIG. 3, the blades 50 are spaced apart and are thereby enabled to grip the inside surface of a screw. The serrations 60 cause a secure gripping with the inside surface of the slot of the screw and prevent the inadvertent removal of the screw until the handle 22 is drawn back to the position shown in FIG. 2.

It can, therefore, be seen that a new and improved screw starter embodying the invention has been provided. The screw starter has a narrow barrel which facilitates insertion of the screw into inaccessible positions. The shape of the blades enables the screw starter to be used with both straight slotted and Phillips or cross slotted screws.

Moreover, the serrations on the blades provide a more secure gripping of the slot of the screw and, in combination with the shape of the blades, enable gripping of a screw from an angle with respect to the axis of the screw. Finally, the location of the handle and the fixed securement rotationally with respect to the barrel enable the handle and the barrel to impart direct rotational force to the blades for rotating the screw when inserting the same into an inaccessible hole so that self-threading screws as well as other types of screws can be used with the screw starter embodying the invention.

Without further elaboration, the foregoing will so fully illustrate my invention that others may, by applying current or future knowledge, readily adapt the same for use under various conditions of service.

What is claimed as the invention is:

1. A screw starter comprising a handle, a barrel, an actuating rod secured to said handle and extending in one end of said barrel, said handle having a longitudinally extending opening for receiving said barrel, said handle being slidable longitudinally but fixed rotationally with respect to said barrel, and screw gripping means secured in a cylindrical ferrule secured to the end of said barrel, said ferrule including an end having a diametrically extending slot, said screw gripping means comprising a pair of blades which are connected together by an elongated spring bent back upon itself to form an elliptical portion and a straight portion, said actuating rod having a longitudinally extending opening at the end thereof extending into said barrel for receiving said spring, said blades being secured in said

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slot so that said blades are pivotable with respect to each other therein, said blades being spaced apart to grip the sidewalls of a screw slot when said elliptical portion of said spring is received in the opening of said actuating rod by movement of said handle towards said blades.

2. The screw starter of claim 1 wherein said blades have a reduced rear portion which is connected to the main portions thereof by shoulders, said reduced portions having outwardly extending resilient projections, said slot of said ferrule including radially extending notches to facilitate insertion of the reduced portions of said blades, said projections being slid through said notches and diverging after passing therethrough so that said blades are locked in said ferrule with said shoulders and said projections abutting opposite sides of said circular end of said ferrule.

3. The screw starter of claim 1 wherein said blades

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are tapered towards the ends thereof so that said starter can be used with both straight slotted and cross slotted screws.

4. The screw starter of claim 1 wherein said blades have serrated outer surfaces to enable a more secure gripping of a screw.

5. The screw starter of claim 1 wherein said barrel includes longitudinally extending grooves and said handle includes longitudinally extending ridges in said opening therein, said ridges being longitudinally slidable in said grooves to prevent rotation of said handle with respect to said barrel.

6. The screw starter of claim 1 wherein said blades are drawn together when said handle is slid to its rearmost position so that removal of said blades from a screw slot is facilitated after a screw is started.

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