No. 650,970. Patented June 5, 1900.

H. E. GARNER.

SCREW DRIVER.

(Application filed Mar. 2, 1900.)

(No Model.)

FIG. 1.

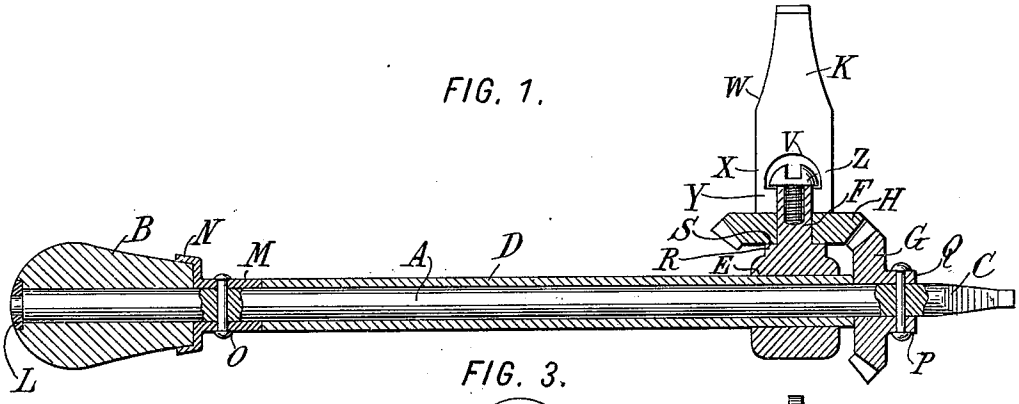


FIG. 2.

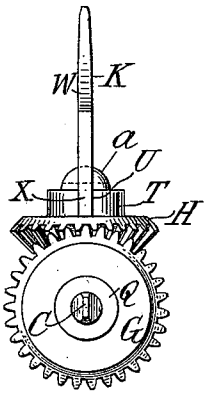


FIG. 3.

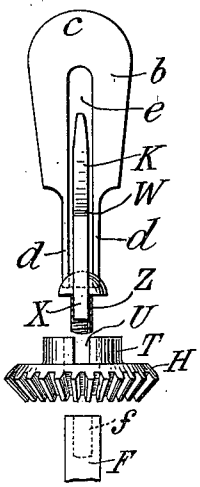


FIG. 4.

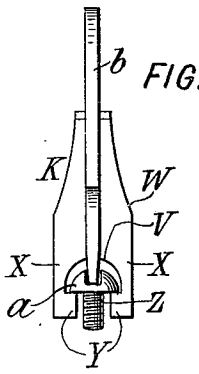
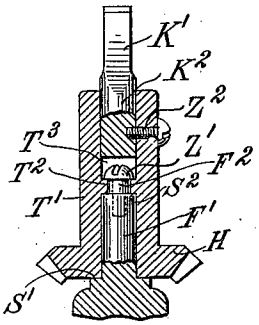


FIG. 5.



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HARRY ELMER GARNER, OF BALTIMORE, MARYLAND, ASSIGNOR OF ONE-HALF TO ROBERT S. WALKER, OF NEW YORK, N. Y.

SCREW-DRIVER.

SPECIFICATION forming part of Letters Patent No. 650,970, dated June 5, 1900.

Application filed March 2, 1900. Serial No. 7,088. (No model.)

To all whom it may concern:

Be it known that I, HARRY ELMER GARNER, a citizen of the United States, residing in the city of Baltimore, State of Maryland, have invented certain new and useful Improvements in Screw-Drivers, of which the following is a specification.

My invention provides an improved screw-driver adapted to be used in driving screws in inaccessible places—that is, where there is not sufficient room for the use of the ordinary screw-driver in a direction longitudinally of the screw-body, but where access may be had to the screw-head from a position at one side of the screw. It also provides other improvements in screw-drivers, which will be set forth in the following specification and claims.

In the accompanying drawings, which illustrate practical embodiments of my invention, Figure 1 is a longitudinal sectional view. Fig. 2 is an end view looking toward the point of one of the blades. Fig. 3 is a view of the position of the parts in the operation of uniting the side blade to its hub. Fig. 4 is a view of the side blade and screw for holding the same and showing the auxiliary screw-driver in position. Fig. 5 is a view of a modification.

The principal parts of the driver are a main shank A, a handle B, attached to one end of said shank, and a blade C, attached to the other end either by being made integral therewith or in any other convenient manner, and D is a sleeve on the shank A, rotatable, but held against longitudinal movement.

E is a ring brazed onto the sleeve D, as shown, and carrying a secondary shank F. On the shanks A and F, respectively, are a pair of intermeshing beveled pinions G and H, and attached to the hub of the gear H is a blade K, extending at an angle to the shank A.

The handle B is attached to the shank A in any convenient manner, preferably by means of a nut L at the end thereof and a metal ring M, the latter embracing the shank A and the lower end of the handle B, as shown at N, and held in position on the shank A by the pin O.

The pinion G is attached to the shank A, near its opposite end, in any convenient manner, preferably by means of a pin P, passing through the hub Q of said pinion and through the shank A. The length of the sleeve D is just sufficient to prevent its having any longitudinal movement, it being restrained by the pinion G at one end and the ring M at the other. It fits with sufficient looseness on the shank A to allow the shank to turn therein without difficulty.

The ring E has a stud R at one side thereof, and the shank F forms a reduced extension of this stud, so as to leave a shoulder S for the support of the pinion H, which revolves on said shank.

The pinion H has a hub T, Figs. 2 and 3, in the opposite sides of which is a diametral slot U of a width equal to the thickness of the blade K. The bore of the pinion H and hub T is just sufficiently large to permit of their free rotation on the shank F, and the length of the shank F from the shoulder S to its end is very slightly in excess of the length of the bore in the pinion and hub. The shank F is screw-threaded internally at the end. The head of the blade K is bifurcated, as shown at V, being broadened, as shown at W, to enable this bifurcation to be accomplished without weakening the blade. The width of the bifurcations X is somewhat less than the radial thickness of the hub T; but the distance between the other edges of the bifurcations is approximately equal to the outer diameter of the hub. At the end of each of the bifurcations is an inwardly-projecting portion Y, the distance between the inner edges of the portions Y being equal to the internal diameter of the hub T, and the length of said projections is preferably equal to that of the hub. The opening between the bifurcations is of sufficient height to receive a screw Z of any convenient length and having a head *a* of sufficient breadth to lap over the upper ends of the projections Y.

b is an auxiliary screw-driver having at one end a wide portion *c* and two legs *d* of equal lengths and the ends of which are shaped like the end of an ordinary screw-driver. The slot *e*, between the legs D, is a little longer than the distance from the base of the slot in the head of the screw Z in the position shown in Fig. 1 to the end of the blade K. When the parts are in their final posi-

tion, as shown in Fig. 1, it is apparent that some difficulty would be had in getting at the head of the screw Z to withdraw it or, in fact, to screw it into place originally. For this purpose the auxiliary driver *b* is used, as shown in Fig. 3. The pinion H is set down on the shank F until it rests on the shoulder S, the shank F then projecting very slightly above the top of the hub T. The bifurcated ends X of the blade K are then forced into the slots U, the fit being purposely made very tight and considerable force being necessary to drive the blade into place, so that it fits very tightly after being once set in place. The screw Z is then inserted in a lateral direction into the space between the bifurcations (which is slightly wider than the head of the screw) and the end set in the end of the internal screw-thread *f* of the shank F. The auxiliary driver *b* is then set over the blade K, its plane making a right angle with the plane of the blade, and the ends *d* are set in the groove in the head of the screw. The driver *b* is then held stationary, and the sleeve D is revolved about the longitudinal axis of the shank F, carrying said shank with it, the pinion H being held stationary and the pinion G and connected parts revolving, or, the sleeve D being held stationary, the driver *b* is turned, carrying the screw into the end of the shank F' and at the same time rotating the pinions H and G and connected parts. The head of the screw Z now holds the pinion H on its shank F in position to engage with the pinion G and also holds the blade K, by means of the projections Y, down into the slots in the hub T. The slots in the hub T evidently hold the blade K against rotation relatively to said hub. All these parts are therefore very firmly and simply held together, so as to avoid any objectionable looseness or any possible slipping. The direction of the threads on the screw Z is such that if by any contact between the head of the screw and the hub T a tendency to turn said screw should result the tendency would be to turn it in a direction to screw it more firmly into the end of the shank F—that is, of course, the direction in which the blade K is turned in tightening up a screw, as this is the much more frequent use of the screw-driver.

In operation the sleeve D forms a convenient means for grasping the tool and pressing the end of the blade K or of the blade C into the head of the screw with the left hand while turning said blade by means of the handle B, the sleeve D remaining stationary in the hand. This sleeve is evidently capable of use with the ordinary straight screw-driver, as well as with angled screw-drivers.

The use of the tool is believed to be clear without any further description. The blade C enables one to use the driver in ordinary cases, where there is plenty of room in all directions, but may be omitted without affecting the operation of the remaining parts. The shank A would then end at the end of the hub Q.

As a modified means of fastening the angled blade to its shank I have shown in Fig. 5 a blade K', mounted on a shank F' in the following manner: The shank F' has a reduced portion F^2, into the end of which a screw Z' fits. The hub T' of the pinion H is extended beyond the length of the shank F' and has at a point coinciding with the base of the reduced portion F^2 an inner ring T^2, which is held between the shoulder S^2 and the head of the screw Z'. The end of said sleeve T' has a cylindrical or polygonal interior T^3, and the end of the blade K' is shaped to fit the same, as shown at K^2. At a convenient point in said extended portion of the hub a screw Z^2 passes through said hub and into the end K^2 of the blade or may simply bear against said end, as an ordinary set-screw. The mode of fastening these parts together is obvious and needs no detailed explanation.

Although I have described my invention with great particularity of detail, I am not to be understood as limiting myself specifically to the detailed structure described, as it is obvious that many modifications are possible without departing from the spirit of the invention.

The lateral screw-driver K may be secured in the pinion H by tinning the bifurcated ends of the blade before inserting them in the notch U in the pinion, so that after these ends, together with the screw, have been inserted in position in the pinion the parts can be soldered together by raising their temperature to a soldering heat, which will cause the solder between the blade and pinion to adhere, thus fixing these parts firmly together.

The end of the auxiliary screw-driver *b* is preferably made small enough to enter the socket f^3 in the pinion shown in Fig. 5, so that when this pinion is used the auxiliary screw-driver *b* can be used to manipulate its screw.

What I claim, therefore, and desire to secure by Letters Patent, are the following-defined novel elements each substantially as described:

1. In combination in a screw-driver, a shank, a rotatable member thereon, a blade, recesses in said member and projections on said blade adapted to fit into said recesses, and means on said shank for holding said member and blade together.

2. In combination in a screw-driver, a shank, a rotatable member thereon, a blade, recesses in said member and projections on said blade adapted to fit into said recesses, and means on said shank for holding said member and said blade together and said member on said shank.

3. In a screw-driver, in combination, a shank, a rotatable member thereon, a blade having a bifurcated head, an inward projection from one of said bifurcations, said rotatable member having recesses adapted to receive said bifurcations, and means attached

to said shank and bearing against said projection so as to prevent the withdrawal of the blade.

4. In combination in a screw-driver, a shank, a sleeve extending lengthwise of said shank and adapted to be grasped by the hand to hold said driver in position, said shank being rotatable in said sleeve and having a handle at one end, a second shank on said sleeve, a blade rotatable on said second shank, and connections whereby the rotation of said first shank rotates said blade.

5. In combination in a screw-driver, a main shank, a handle and a pinion fixed at opposite ends thereof, a rotatable sleeve held against endwise movement by said handle and pinion and adapted to be grasped by the hand of the user, a secondary shank fixed on said sleeve, a pinion held rotatably on said secondary shank, said pinions intermeshing with each other, and a blade on said second pinion.

6. In combination, in a screw-driver, a main shank, a handle and a pinion fixed on said shank, a sleeve rotatable thereon, a secondary shank fixed on said sleeve, a pinion rotatable on said secondary shank and intermeshing with said first pinion, a hub on said second pinion, a blade, and means connected to said secondary shank for holding said blade on said hub and said hub and pinion on said secondary shank.

In witness whereof I have hereunto signed my name in the presence of subscribing witnesses.

HARRY ELMER GARNER.

Witnesses:
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FELIX R. SULLIVAN.