

Dec. 11, 1956

V. A. VALENTI

2,773,529

HAND TOOL WITH ANGULARLY ADJUSTABLE BIT

Filed Dec. 29, 1954

FIG. 1.

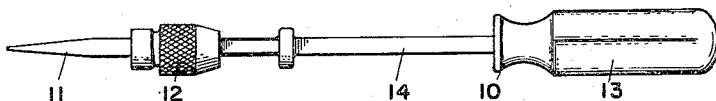


FIG. 2.

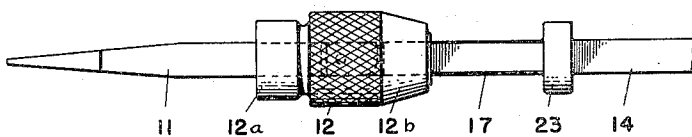


FIG. 3.

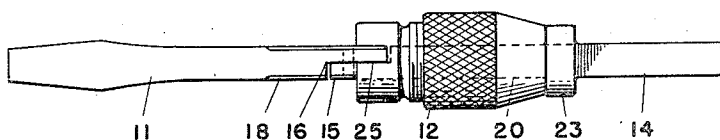


FIG. 5.

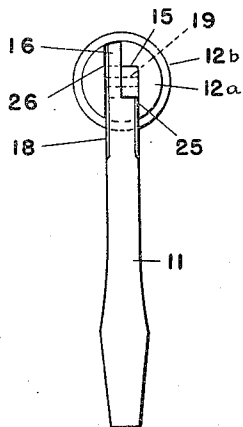


FIG. 4.

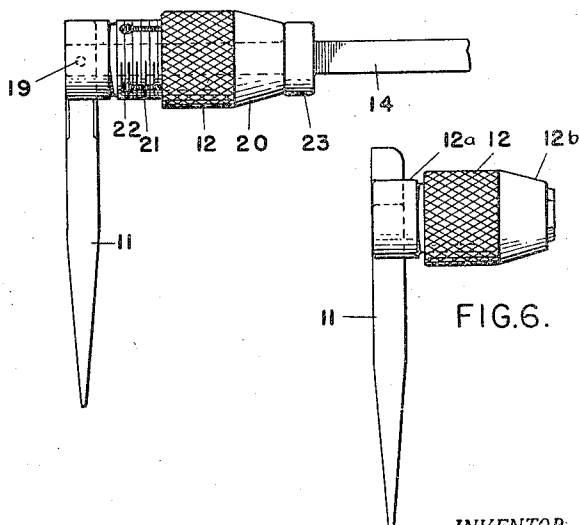


FIG. 6.

INVENTOR.
VICTOR A. VALENTI
BY
Harold F. Scribner
ATTORNEY

1

2,773,529

HAND TOOL WITH ANGULARLY ADJUSTABLE BIT

Victor A. Valenti, Winfield Park, N. J.

Application December 29, 1954, Serial No. 478,235

3 Claims. (Cl. 145—50)

The present invention relates to hand tools in general but more particularly to hand tools of the screw driver type in which provision is made for interchanging tool bits and for securely locking a selected bit in a position aligned with the handle or in a position at an angle to the handle.

A primary aim of the invention is to render available a mechanic's tool in which provision is made not only for a bit interchange but for the safe and firm locking of the selected special-purpose bit to the handle whereby to instill in the user a high degree of confidence in the reliability of the tool. Prior to this invention, detachable bit tools have been constructed that involved the use of springs, clips, and similar bit-holding arrangements that were apparently satisfactory for relatively light-duty operations but which owing to their delicate and often complex construction could not be relied upon to stand up under the more severe tasks or operations for which the tool was ostensibly designed. The present invention aims to provide a multi-purpose tool that is extremely rugged and reliable in character and which possesses, with any given tool bit in position, a degree of rigidity and sturdiness comparable to one-piece tools.

A further aim of the invention is the construction of a hand tool of the interchangeable bit type in which each of the several bits, i. e., screw-driver, socket-wrench, drill-bit or the like has one end fashioned to interfit a complementary constructed end of a holder so that when positioned in alignment therewith forms in effect a continuation thereof. The purpose of the interfitting and interlocking ends being primarily to secure proper positioning and registration rather than a driving relationship, the driving forces in the present invention being transmitted from the shank of the holder to the shank proper of the tool bit through a movable sleeve that is slidable on the shank of the holder from a position removed from the bit-fitting end to a position whereat it over-rides the point of juncture of the bit and holder and engages the shank proper of the tool bit. With such a construction the inserted tool bit whether in aligned position with the holder or angularly positioned relatively thereto may be positively driven through the intermediary of the movable sleeve without reliance upon or utilization of the strength of the joint made by the interfitted ends of the bit and the holder.

Still a further aim of the invention is the provision of means for firmly clamping the movable sleeve to the shank of the holder in the position required firmly to hold the bit aligned therewith or in an angular position, and in either case to effect the transmission of driving forces through the sleeve member from the shank of the holder to the shank of the bit whilst relieving the interfitted ends of bit and holder from such forces.

In carrying forward the aims and purposes of the invention it is proposed to construct a holder member having a shank portion and a handle portion. Preferably the shank portion is constructed of square stock, though it may be flat or hexagonal or any sectional shape other than round, over which is slidably fitted a complementary

2

shaped two-part sleeve member. The sleeve member comprises an inner part that is split part way its length and exteriorly threaded to receive a knurled conical clamp piece. When the clamp piece is tightened on the inner part, the split ends of the latter grip the square shank of the holder and is held firmly thereto. The extreme end of the holder is halved and likewise the rear end of the tool bit so that they interfit and together form a joint of a sectional shape corresponding to the shank proper. When the two-part clamp member is slid over this joint and clamped, the joint is not only completely enclosed but is positively held by the surrounding inner member from collapsing or bending.

Endwise movement of the bit outwardly may be prevented by an endwise interlocking of bit and holder. Preferably and conveniently the endwise interlock may assume the form of a simple pivot pin anchored to one shank portion and received in a hole in the other shank portion in such manner that the clamp member may be slid freely over. As will hereinafter appear the outer end of the clamp member is also formed so as to grip the sides of the tool bit when the latter is positioned at an angle to the shank of the holder whereby again the joint of connection of the bit and holder including the pivot pin is relieved of torsional strains in situations where an angle drive is needed and/or where considerably increased leverage is required.

Other objects and advantages will be in part indicated in the following description and in part rendered apparent therefrom in connection with the annexed drawings.

To enable others skilled in the art so fully to apprehend the underlying features hereof that they may embody the same in the various ways contemplated by this invention, drawings depicting a preferred typical construction have been annexed as a part of this disclosure and, in such drawings, like characters of reference denote corresponding parts throughout all the views, of which:

Figure 1 of the drawings illustrates an assembled tool having a screw-driver type of bit mounted in position aligned with the axis of the holder.

Figure 2 is an enlarged view of the chuck end of the tool.

Figure 3 is an enlarged view of the chuck end of the tool illustrating the chuck in retracted position.

Figure 4 is an enlarged view of a portion of the tool illustrating the tool with a bit locked in an angled position.

Figure 5 is an end view of Figure 4.

Figure 6 is a view of a tool bit removed from the holder to which the clamp member is applied when it is desired to use the bit in confined regions where a stubby handle is more convenient.

Referring more particularly to Fig. 1 the tool illustrated consists essentially of three main elements, namely, a handle part 10, a removable tool-bit part 11 and a clamp member 12. The handle part 10 is provided with a hand grip portion 13 and a shank portion 14, the latter being constructed preferably from square stock. The outer end of the shank is formed with a cut-away portion 15 and a similar but opposite cut-away portion 16 is provided at the inner end of each of the tool bits 11, so that the two members interfit and together form a square corresponding in size to the shank of the holder. To facilitate assembling and to prevent relative endwise movement, one of the offset portions (15 or 16) carries a pin 19 that is received in a hole formed in the other, whereby the bit 11 may be pivotally connected to the shank of the handle in a manner as to be readily separable therefrom.

The clamp unit 12 comprises two parts, an inner part 12a and an outer part 12b. The inner part 12a is formed with an inner bore 20 corresponding in shape to the shape of the shank 14 and surrounds the shank. One end preferably the inner end of the clamp member is split as at

21 to form a plurality of clamp jaws designed to be clamped on the flats of the shank. The member 12a is also exteriorly threaded as at 22 to receive a female cone shaped element 12b. When the latter is screw threaded onto the piece 12a and tightened, the spring jaws of the inner part 12a are caused to clamp against the flat faces of the shank of the holder. When the sleeve part 12b is unscrewed the jaws are released and the chuck assembly may be slid along the square shank. Preferably the shank of the holder is provided with a stop collar 23 positioned inwardly from its end to limit the movement of the chuck assembly in a direction toward the handle part. In the absence of a tool bit the chuck assembly may be slid off the end of the shank. However, when a tool bit is in interlocked position with the shank of the holder outward movement of the chuck assembly may be limited by shouldering the tool bit as by relieving the corners thereof as at 18. Similarly the corners 17 of the shank part 14 may be relieved and complementary filleted corners formed in the bore of the clamp chuck.

To attach a tool bit, the chuck is unclamped and slid toward the collar 23 thus exposing the offset end 15 of the shank and whereby it becomes possible to place a tool bit on the pivot pin 19. With the bit and shank of the holder aligned, the clamp chuck is slid forward over the joint and clamped by screwing up the outer member 12b. The pivotal joint is thus completely telescoped by the chuck assembly and it is through the latter that the torsional forces are transmitted from the handle. In the instant construction the pivot pin 19 and the reduced sectional areas of the offset portions of the bit and the holder carry no appreciable torsional load.

When it is desired to position the tool bit at an angle to the shank of the holder, the clamp chuck is released and slid back toward the collar 23 to expose the pivotal joint. The bit may then be turned at right angles and the chuck assembly again slid forward. As illustrated more clearly in Fig. 5, the forward end of the clamp chuck is radially slotted as at 25 to receive the squared portion of the tool bit, and also radially slotted as at 26 to receive the reduced end portion 16 of the tool bit. Accordingly when a bit is angularly positioned, the clamp chuck may be slid forward to again overlie the joint and in this position the chuck may be clamped to the shank of the holder as before or the piece 12b unscrewed sufficiently to cause the inner end to abut the collar 23. The last mentioned operation is preferred for the reason that the unscrewing action elongates the parts 12a and 12b until the bottoms of the radial slots in the end of the chuck abut the transversely positioned bit and firmly clamps the bit against the pivot pin. With the bit angularly positioned the turning forces are again transmitted from the handle of the tool directly through the chuck assembly to the squared portion of the tool bit, the pivot pin 19 serving only as an interlock or locating means and not as a driver.

In extremely close or confined work areas the tool bit may be used apart from the handle. In such cases the chuck assembly may be slid over the squared end and used as a stubby handle or placed at an angle thereto and used as an open-ended wrench. In the latter position the radial slots 25 and 26 in the chuck end coast with the shoulder formed by holding the shank end of the tool bit (see Fig. 6) and prevent the chuck assembly from sliding down the shank of the tool bit.

Without further analysis, the foregoing will so fully

reveal the gist of this invention that others can, by applying current knowledge, readily adapt it for various utilizations by retaining one or more of the features that, from the standpoint of the prior art, fairly constitute essential characteristics of either the generic or specific aspects of this invention and, therefore, such adaptations should be, and are intended to be, comprehended within the meaning and range of equivalency of the following claims.

Having thus revealed this invention, I claim as new and desire to secure the following combinations and elements, or equivalents thereof, by Letters Patent of the United States:

1. A tool comprising a handle member having a shank portion at one end and a handle portion at its other end, the shank portion being of square sectional configuration and relieved at its extreme end to receive a tool bit, a tool bit removably fitted to the relieved end of the square shank portion, said bit having a corresponding square shank at its inner end and relieved complementary to the relieved end of the holder shank so that the two parts when they are assembled together in alignment form the full sectional configuration of the shank of the holder, interfitting means between said relieved end portions of the removable tool bit and the shank adapted to constrain the parts against separation longitudinally but normally permitting separation thereof laterally, a chuck assembly slidably mounted on the shank of the holder and completely surrounding same, said assembly comprising an inner part having an axial bore of the corresponding shape and size slidably to receive the squared shank of the holder and to telescope said interfitting means and the joint made thereby with an assembled tool bit, and an outer part threadably connected to the inner part, the said inner part being split a portion of its length to form clamp elements operative on relative rotation of the outer part in a clamping direction to clamp tightly upon the flattened faces of the square shank of the holder and effective to transmit torsional forces applied to the handle directly to the squared shank of the tool bit independently of the relieved portions at the juncture of the tool bit with the holder shank portion.

2. The combination of claim 1 in which the said interfitting means comprises a pivot pin in one of the relieved ends of the tool bit and the holder and the other having a hole provided therein to receive the pivot pin, said pin and hole functioning to provide interlocking means to facilitate registration of the bit and holder and restraining the bit against endwise movement when telescoped by the chuck assembly.

3. The combination of claim 2 in which the inner part of the chuck assembly is formed with a radial slot at its outer end operative to receive the sides of the tool bit when the tool bit is positioned perpendicular to the shank of the holder.

References Cited in the file of this patent

UNITED STATES PATENTS

796,154	Schulze	Aug. 1, 1905
1,348,476	Chan et al.	Aug. 3, 1920
1,560,834	McMenimen	Nov. 10, 1925
1,616,300	Bido	Feb. 1, 1927
2,399,138	Nygaard	Apr. 23, 1946
2,656,865	Bright	Oct. 27, 1953
2,657,603	Evans	Nov. 3, 1953
2,683,931	Fahlgren	July 20, 1954