April 13, 1965 J. A. DA SILVA 3,177,910

TOOL HANDLE WITH RETRACTABLE TOOL

Filed Oct. 4, 1962 2 Sheets-Sheet 1

Fig. 1

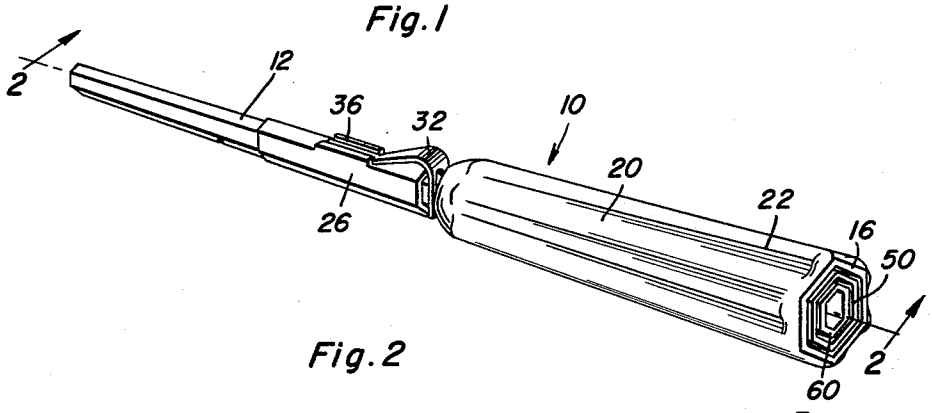


Fig. 2

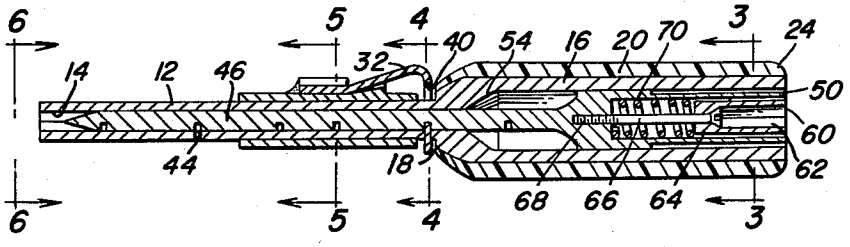


Fig. 7

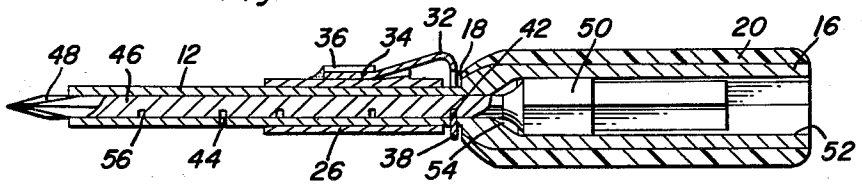


Fig. 3

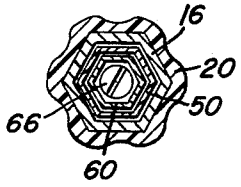


Fig. 4

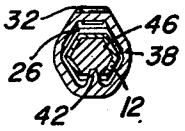


Fig. 5

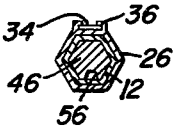
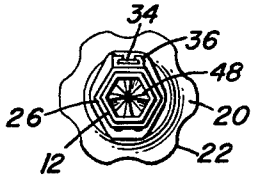


Fig. 6



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Fig. 8

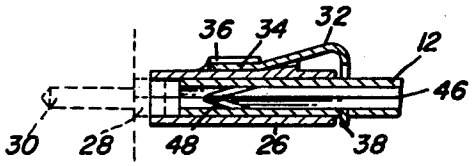


Fig. 13

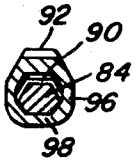


Fig. 9

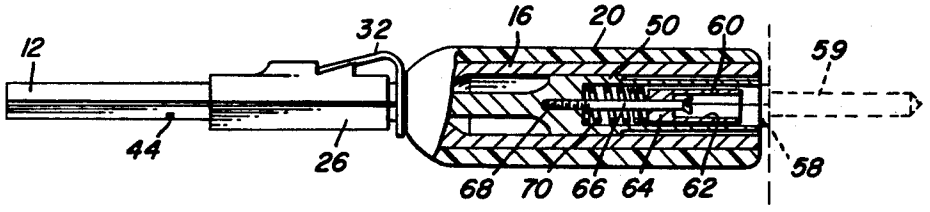


Fig. 12

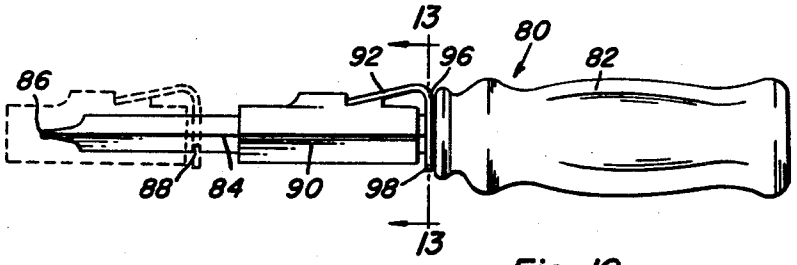


Fig. 10

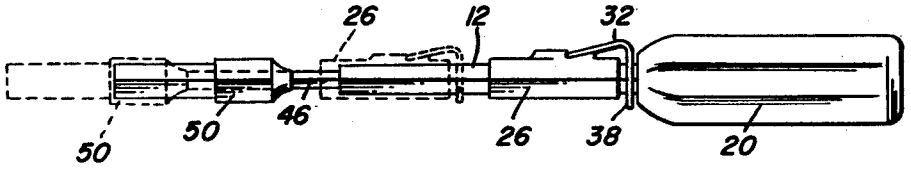
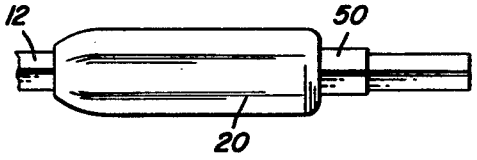


Fig. 11



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3,177,910

TOOL HANDLE WITH RETRACTABLE TOOL

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1 Claim. (Cl. 145—61)

The present invention generally relates to a tool capable of various uses and is primarily intended for use with fastening devices such as normally employed in electronic equipment such as television sets and the like although the invention is not intended to be limited exclusively to such use since the tool or the assembly of tools may be employed for various uses especially where a plurality of different types and sizes of fastener assemblies are employed.

An object of the present invention is to provide a multiple use tool assembly in which each tool has a plurality of selectively employed elements for engaging various types of fasteners such as screw heads, nuts, bolt heads, cap screw heads and the like.

Another object of the present invention is to provide a multiple use tool incorporating an extremely simple construction and yet one which is dependable, long lasting, foolproof, easy to handle in that it is well belanced and well adapted for its various uses.

A further object of the present invention is to provide a multiple use tool having a plurality of various size sockets and having constructional features which enable fastener bolts or nuts to be engaged by the socket even though they may be in substantially inaccessible places such as alongside of a transformer or other component or disposed forwardly in a television cabinet such as the retainer assemblies for a picture tube or the like thereby providing an assembly so that only the present invention need be carried in a tool box rather than a complete set of different size tools which are quite often subject to misplacement within the tool box or complete loss thereof thus rendering the job of a television repair man more difficult. The problems of carrying so many tools are completely eliminated with the tool assembly of the present invention which not only provides a regular screw driver for the various purposes needed but also provides various assemblies in one composite unit.

Yet another object of the present invention is to provide a multiple use tool asesmbly which may be easily converted for using the various tool components incorporated therein and which is yet rugged and strong in construction and balanced to allow easier turning of various types of fasteners such as those employed in conjunction with various electronic components.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part thereof, wherein like numerals refer to like parts throughout, and in which:

FIGURE 1 is a perspective view of one of the multiple use tools of the assembly of the present invention;

FIGURE 2 is a longitudinal, sectional view taken substantially upon a plane passing along section line 2—2 of FIGURE 1 illustrating the orientation of the components when in normal position and also when in their condition for using the socket at the end of the hollow shank that is rigidly affixed to the handle;

FIGURE 3 is a transverse sectional view taken substantially upon a plane passing along section line 3—3 of FIGURE 2 illustrating the multiple socket assembly incorporated into the handle;

FIGURE 4 is a detailed sectional view taken substantially upon a plane passing along section line 4—4 of FIGURE 2 illustrating the relationship of the spring catch mechanism 2, the tubular shank and the screw driver shank;

FIGURE 5 is a transverse, sectional view taken substantially on a plane passing along section line 5—5 of FIGURE 2 illustrating further structural details of the slidable member on the tubular shank and the relationship of the screw driver shank thereto;

FIGURE 6 is an end view taken substantially upon reference line 6—6 of FIGURE 2 illustrating further structural details of the tool;

FIGURE 7 is a sectional view similar to FIGURE 2 but with the screw driver shank extended for using the screw driver tool portion;

FIGURE 8 is a fragmental sectional view of the tool of FIGURE 2 illustrating the slide mechanism disposed forwardly of the tubular shank illustrating the socket on the slide being used;

FIGURE 9 is a partial sectional view illustrating the manner in which the socket assembly disposed in the handle is used;

FIGURE 10 is a side elevational view of the assembly illustrating the screw driver shank removed and inserted into the tubular shank from the end thereof opposite from the handle thus enabling the socket assembly mounted on the screw driver shank to be employed in an inaccessible position such as for engaging and turning the fasteners normally disposed at the forward end of a television set or the like;

FIGURE 11 is a side elevational view illustrating the socket assembly at the end of a handle remote from the tubular shank being extended for enabling engagement with the fastener devices adjacent to obstructions;

FIGURE 12 is a side elevational view illustrating another tool forming the complete assembly and showing the slide socket mounted on a polygonal screw driver shank; and

FIGURE 13 is a transverse, sectional view taken substantially upon a plane passing along section line 13—13 of FIGURE 12 illustrating the construction of the latch spring for the slide element in FIGURE 12.

Referring now specifically to FIGURES 1–11 of the drawings, the numeral 10 generally designates the multiple use tool which forms a part of the assembly of group of tools of the present invention. The tool 10 includes an elongated hollow shank 12 of rigid metal construction and having a polygonal external and internal cross sectional configuration as illustrated clearly in FIGURES 1 and 6. The internal cross sectional area of the shank is defined by a longitudinal bore 14 capable of fitting over and receiving the head of a cap screw, bolt or the like or capable of fitting over a nut on a bolt assembly. Thus by engaging the end of the shank with a nut or bolt head and rotating the shank 12 about its longitudinal axis, the nut or bolt head may be easily spun toward a tightened or loosened position.

A rigid metallic tubular handle forming member 16 forms an integral extension on the end of the shank 12 and defines a shoulder 18 since the cross sectional area of the member 16 is greater than shank 12. The handle forming member 16 is of rigid metallic construction and is provided with a covering material forming a handle 20 of plastic or other suitable material used in tools of this type which has the exterior surface thereof roughened or corrugated as at 22 for facilitating the gripping thereof by a hand of the user thereby facilitating the rotation of the tool about its longitudinal axis. The ends of the handle insert member 16 and the handle covering member 20 are rounded as at 24 thus eliminating any sharp edges and enabling the tool to be more easily handled without discomfort.

A tubular slide 26 of polygonal configuration both interiorly and exteriorally is provided on the shank 12 for longitudinal reciprocation thereon. The slide 26 closely engages the external surface of the shank 12 and may be disposed in a position adjacent the handle 20 or disposed beyond the outer end of the shank 12 as illustrated in FIGURE 8 so that the head 28 of a cap screw 30 or the like may be engaged by the interior polygonal dimension of the slide 26. The interior dimensions of the slide 26 are larger than the interior dimensions of the shank 12 thus enabling the shank 12 to be used with one size of bolt head or nut and the slide 26 used with a larger size of head or nut when the slide mechanism is disposed forwardly as illustrated in FIGURE 8.

A bowed or arcuate spring 32 is provided for securing the slide member 26 in position. One end of the spring 32 is disposed along the top surface of the slide 26 and is designated by numeral 34. The end portion 34 of the spring 32 is received in a channel-shaped projection 36 on the top side of the slide 26 thus securing the spring in position. The opposite end of the spring 32 is provided with a transversely extending loop 38 which encircles the shank 12 as illustrated in FIGURE 4 and which is larger in transverse dimensions than the shank 12 so that the loop 38 may be moved laterally or transversely in relation to the shank 12. The opening defined by the loop is designated by reference numeral 40 as illustrated in FIGURE 2 and the upper edge thereof is normally disposed above the shank 12. The bottom of the loop 32 is provided with an inwardly extending tongue 42 as illustrated in FIGURE 4 for extending through one of a pair of openings 44 in the bottom of the shank 12 as illustrated in FIGURES 2 and 4 thus locking the slide 26 in one of two longitudinally adjusted positions on the shank 12.

Thus, by engaging the topmost portion of the arcuate or curved spring 32 and forcing it downwardly, the tongue 42 may be withdrawn out of the apertures 44 thus enabling the slide 26 to move longitudinally on the shank 12. Thus, the slide 26 may be disposed either in the position illustrated in FIGURE 2 or the position illustrated in FIGURE 8 and the spring in each instance will securely lock the slide 26 in its desired position.

Disposed within the shank 12 is an elongated screw driver shank 46 of polygonal transverse cross sectional configuration for close sliding relationship with the interior polygonal bore 14 of the shank 12. At one end of the screw driver shank 46 there is provided a radial blade arrangement 48 forming a screw driver for Phillips head screws. The configuration of the Phillips screw driver head 48 is conventional for engaging a wide range of sizes of Phillips head screws. The other end of the screw driver shank 46 is provided with a polygonal socket forming tubular member 50 which is integral with the screw driver shank 46 and which is received slidable within a polygonal bore 52 in the handle insert 16 which forms a continuation of the bore 14 but which is larger in cross sectional area and forms a shoulder or abutment 54 at the inner end thereof where it communicates with the bore 14. The shank 46 is provided with a plurality of longitudinally spaced sockets or recesses 56 therein disposed against the surface of the shank 12 having the apertures 44 therein for selective alignment with the apertures 44 and selectively receiving the inner end of the tongue 42 which is provided with converging side edges for extending through the apertures 44 into selective of the recesses 56 disposed in the screw driver shank 46. Thus, the screw driver shank 46 may be securely retained in retracted position as illustrated in FIGURE 2 when the slide mechanism 26 is in its retracted position or when the slide mechanism is in its extended position as illustrated in FIGURE 8. Normally, the screw driver shank 46 will be extended when the slide mechanism is in its retracted position and the screw driver shank 46 will be held in its extended position by the tongue 42 as illustrated in FIGURE 7 thus forming a screw driver for use in a conventional manner. The close sliding relationship between the shank 46 and the interior of the bore 14 provides a stable screw driver and the engagement of the tongue 42 through the aperture 44 into the innermost recess 56 will rigidly secure the screw driver shank and the tubular shank 12 in adjusted positions thereby securing the screw driver blade 48 in extended position for use as a screw driver in a conventional manner.

The polygonal bore 52 in the handle insert 16 may be used to engage a bolt or nut when the screw driver shank 46 is disposed in the extended position as illustrated in FIGURE 7. When the screw driver shank 46 is disposed in the retracted position as illustrated in FIGURES 2 and 9, the socket extension 50 may be employed for engaging the head 58 of a fastener 60 as illustrated in FIGURE 9. As illustrated, the external surface of the socket extension 50 is reduced towards its outer end but this may be of constant cross sectional area if desired, the reduction being merely for the purpose of enabling the socket to slide easier in the bore 52.

A movable polygonal socket 60 is slidably disposed in the socket extension 50 and includes both a polygonal external and internal configuration with the internal bore 62 being of a particular size for receiving a particular size of nut or bolt head. The inner end of the socket 60 is provided with a closed end portion 64 through which a screw threaded fastener 66 extends. The screw threaded fastener is threaded into a screw threaded bore 68 in the inner end of the socket extension 50. A coil compression spring 70 is disposed in encircling relation to the screw 66 and normally retains the socket 60 outwardly in flush engagement with the end of the socket extension 50 and with the end of the screw driver handle insert 16. However, when a fastener head 58 larger than the socket 60 is engaged and which will be received within the socket extension 50, the spring 70 will be compressed by inward pressure being exerted on the handle 20 thus enabling the socket 60 to move inwardly so that the socket extension 50 will engage the bolt head or nut 58. If the bolt head or nut 58 is sufficiently small to enter the bore 62, of course, it will be engaged and turned by the socket 60 which by virtue of its polygonal exterior configuration is rotationally locked to the socket extension 50 which by virtue of its polygonal internal configuration and external configuration is rotationally locked to the bore 52 in the handle insert 16.

When it is desired to gain access to a fastener which is so spaced in close relation to an obstruction that the handle 20 cannot be disposed in adjacent relation to the fastener, the socket extension 50 may be projected outwardly beyond the terminal end of the handle 20 by depressing the spring 32 and sliding the screw driver shank 46 longitudinally to bring other of the recesses 56 into registry with the innermost aperture 44 so that the tongue 42 may then lock the socket extension 50 in extending relation to the handle 20 as illustrated in FIGURE 11 thus enabling the socket extension 50 to engage a fastener or enabling the socket 60 to engage a fastener in the usual manner with the handle 20 spaced longitudinally from the free end thereof thereby enabling access to be had to fastener bolt heads or nuts which are disposed closely adjacent to an obstruction such as a transformer housing or the like in a television set.

If a longer tool is needed to gain access to an inaccessible fastener such as the fasteners which hold a picture tube to the front end of a television cabinet, the screw driver shank 46 may be removed along with the socket extension 50 by depressing the spring 32 and letting the screw driver shank fall out of the rear end of the handle 20. The screw driver shank may then be inserted with the pointed end thereof extending into the end of the shank 12 remote from the handle as illustrated in FIGURE 10 thus providing an extension with the length of the shank 46 projecting from the end of the shank 12 being variable by varying the position of the slide mech-

anism 26 and by varying the position of the shank 46 in relation to the shank 12 for aligning various of the recesses 56 with either the outer or inner aperture 44. Thus, a relatively long extension is provided for the socket extension 50 and the socket 60 thus enabling these two elements to engage fasteners in a very inaccessible position.

FIGURES 12 and 13 designate another tool generally designated by the numeral 80 which includes a handle 82 of substantially the same configuration as the handle 20 and which is provided with a rigid shank 84 connected thereto and which is of polygonal construction and which is provided with a blade type screw driver head 86 at the outer end thereof. The shank 84 is provided with a pair of transverse notches 88 spaced longitudinally thereon and the shank 84 may be of solid construction and of any suitable material normally employed for the construction of a screw driver for engaging conventional screw heads having a kerf or slot therein. A tubular slide 90 of polygonal construction is slidably mounted on the shank 84 and is provided with a retaining spring 92 secured thereon and provided with a loop 96 encircling the shank 84 and having a transverse dimension greater than the shank 84 so that it may move laterally in relation thereto. The bottom end of the shank 96 is provided with a straight cross portion 98 forming a latch for engaging selective of the notches 88 thus locking the slide 90 in retracted or extended position. In the retracted position, the screw driver head 86 is exposed for use while the extended position of the slide 90 as illustrated in FIGURE 12 will conceal the screw driver head 86 and enable the polygonal interior of the slide 90 to engage a fastener head or nut in a conventional manner. Thus, this tool enables the screw driver head 86 to be employed in a conventional manner or enables the socket defined by the slide mechanism when extended to be employed in a conventional manner for spinning a fastener head or nut. The handle 82 may be provided with a socket assembly on the other end thereof similar to the socket assembly illustrated, as the socket extension 50 and the socket 60 in FIGURE 2, that is, there would be one stationary socket and one movable socket if desired.

For a number of years, I have been in the television and radio repair business and this invention solves a number of problems which have been encountered. By constructing the shank 12 with the bore 14 to fit a ¼ inch nut, the slide 26 to fit a $1\frac{1}{32}$ inch nut, extension 50 to fit a $\frac{7}{16}$ inch nut and socket 60 to $\frac{5}{16}$ inch nut, the wall thickness of the sockets are thick enough to withstand the forces encountered while at the same time being compact. The slide 90 will fit a $\frac{9}{16}$ inch nut and a conventional screw head. Thus, it is only necessary to have two tools rather than seven different tools formerly required to perform the same fuction. Additionally, the various components are readily available for use thereby reducing the time normally wasted in seeking a desired

tool. The particular sizes selected not only receive the normal fastener assemblies but also provide adequate wall thickness for the sockets.

By using conventional materials employed in tools such as tool steel, the present invention will be extremely rugged and long lasting and highly utilitarian in that it will be employed for engaging various types, shapes and sizes of fasteners such as conventional screw heads, socket type heads, slotted type heads and any other type of fastener head normally encountered. When the components are in their normally stored position, the components cooperate to balance the tool for effectiveness of use and ease of use.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed as new is as follows:

A hand tool comprising an elongated rigid tubular shank having a longitudinal bore therein, an enlarged longitudinal extension on one end of said shank, said extension having a longitudinal bore therein of larger cross-sectional area than and communicating with the tubular shank bore, an elongated rigid screw-driver shank slidably disposed in the longitudinal bore of the tubular shank and selectively projectable beyond the end of the tubular shank opposite from the end having the longitudinal extension, an enlarged extension on said screwdriver shank located within the bore of the tubular shank extension and having a blind bore therein, said screwdriver shank extension being selectively retractable into the tubular shank extension, alignable therewith, and projectable therebeyond, said screwdriver shank and extension thereon being of a length so as to preclude the simultaneous projection of both the screwdriver shank at one end and the screwdriver shank extension at the other end, and means for fixedly though releasably securing the screwdriver shank and its extension in any of its adjusted positions.

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