Nov. 28, 1961 E. J. CROALL, JR., ET AL 3,010,193

ASSEMBLY TOOL

Filed Feb. 17, 1959

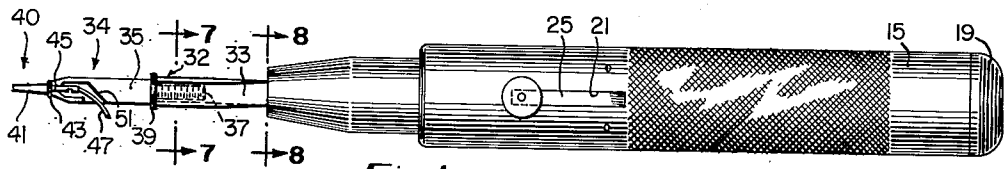


Fig. 1

Fig. 2

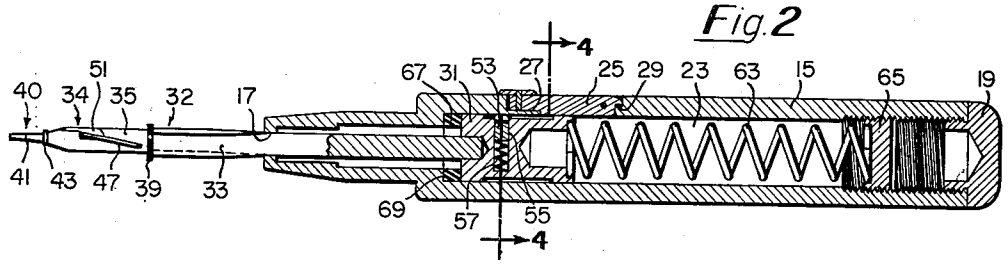
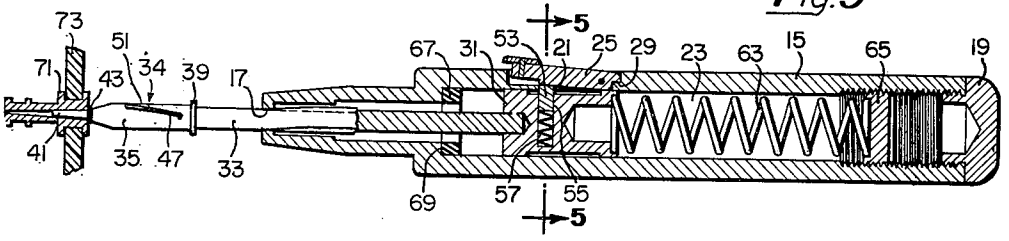


Fig. 3



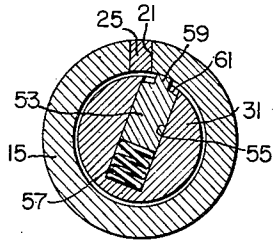


Fig. 4

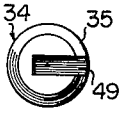


Fig. 10

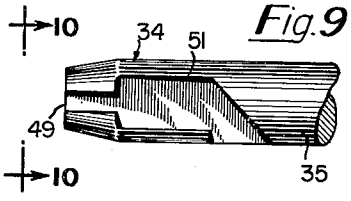


Fig. 9

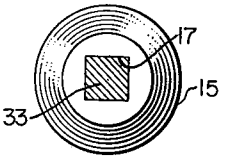


Fig. 8

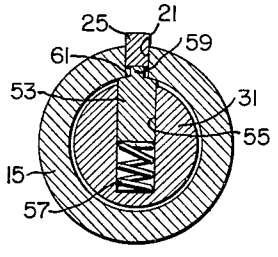


Fig. 5

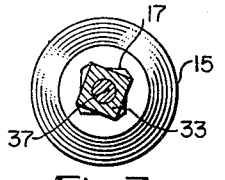
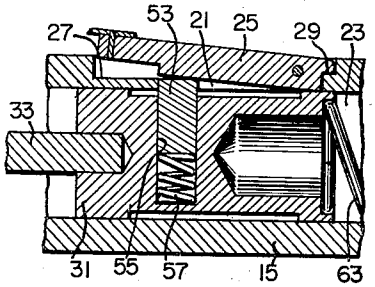


Fig. 7

Fig. 6



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ASSEMBLY TOOL

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This invention relates generally to improvements in tools and more particularly to tools for effecting frictional engagement of components of an assembly. While the invention is not limited thereto, it finds special application for inserting miniature taper pin terminal plugs into mating receptacle terminals to effect an electrical contact connection therebetween.

One known type of tool used for effecting a connection between tapered components of the kind referred to utilizes means for delivering a high impact force to the taper pin terminal to seat it firmly in its tapered receptacle. This type of tool has not proved altogether satisfactory for connecting miniature components since the impact in many cases resulted in damage to the components and loosening of other components previously connected.

An object of the present invention therefore is to provide an improved tool which will avoid the above mentioned difficulties.

Another object of the invention is to provide a tool for effecting frictional engagement between parts of an assembly by the application of a force without impact.

A further object of the invention is to provide a force applying tool for effecting frictional engagement between components of an assembly with adjustable means for varying the magnitude of the force.

A more specific object of the invention is to provide an assembly tool for seating tapered components into mating sockets whereby there is provided a greater holding power between the tapered surfaces and a more secure connection than heretofore obtained.

These and other objectives will be more fully revealed in the following detailed description of a specific embodiment of the invention when read in conjunction with the accompanying drawings in which:

FIG. 1 is a plan view of one form of tool constructed in accordance with the invention;

FIG. 2 is a longitudinal sectional view showing the condition of the tool for performing an assembly operation;

FIG. 3 is a view similar to FIG. 2 showing the tool at the completion of an assembly operation with a work driving unit shown in locked position;

FIG. 4 is an enlarged sectional view taken along line 4—4 of FIG. 2 showing an unlocked condition of a latching device;

FIG. 5 is an enlarged sectional view taken along line 5—5 of FIG. 3 showing the latching device in locked position;

FIG. 6 is an enlarged fragmentary view of a portion of the tool as shown in FIG. 3;

FIGS. 7 and 8 are enlarged sectional views taken along lines 7—7 and 8—8 respectively of FIG. 1;

FIG. 9 is an enlarged fragmentary view of a work driving tip; and

FIG. 10 is an end view of the work driving tip taken in the direction of line 10—10 of FIG. 9.

Considered in its broad aspects, the invention contemplates the use of a body, a work driving unit telescopically associated with the body, and means to apply a force to the work driving unit.

The preferred form of the invention is illustrated in the drawings and comprises a hollow body or handle 15

(FIG. 2) having an opening 17 preferably of square or rectangular shape formed in its left hand end. The opposite end of handle 15 is closed by means of a removable cap 19 threadedly secured thereto. An elongated slot 21 (FIGS. 1 and 6) extends through the wall of handle 15 into a bore 23 and receives a trigger 25 pivotally secured to the handle for movement into and out of slot 21. At the ends of slot 21, the wall of handle 15 is formed with steps 27 and 29 which serve respectively to limit the movement of trigger 25 in both directions.

A work driving unit associated with handle 15 comprises a plunger 31 slidably received in bore 23 and a work driver 32 secured at its inner end to plunger 31 and comprising a shank 33 and a work driving tip 34. Shank 33 has a rectangular cross-section mating with the opening 17 (FIG. 8) and is constructed to operate as a screw thread, in this case by being twisted helically along its longitudinal axis (FIG. 7). Each of the mutually perpendicular side surfaces of the shank 33 are therefore regarded as being helical relative to the longitudinal axis of the shank. The work driving tip 34 includes a shank 35 and a threaded end 37 (FIG. 1) received in a tapped hole in the outer end of shank 33. The tip 34 is preferably locked to shank 33 by means of a lock washer 39.

Shank 35 is formed to suit the particular work application which in this case is the insertion of taper pin terminals into mating tapered receptacles or sockets. One such terminal 40 (FIG. 1) comprises a tapered pin portion 41, a flange 43 at the large end of the taper, and a flatted neck portion 45 extending from flange 43 and being secured to a lead wire 47 of an associated electrical apparatus, not shown. The shank 35 is accordingly formed with a central slot or wrench jaw 49 (FIG. 9) which acts as a rotary driver on the flatted neck 45, and which opens into an enlarged groove 51 in the side of shank 35.

A rectangular latch 53 is slidably received in a transverse cavity 55 in plunger 31 and biased outwardly of the plunger by means of a compression spring 57. The outer end of latch 53 is reduced in width to form a bolt 59 (FIG. 4) slidably engageable in slot 21 and terminating in circular stop shoulders 61 the face of which is formed on a radius substantially the same as bore 23. A compression spring 63 disposed between the inner end of plunger 31 and an adjusting screw 65 biases the work driving unit outwardly of handle 15 to the limit of its movement at which point plunger 31 abuts a shock absorber 67 positioned on a shoulder 69 at the outer end of bore 23, the shock absorber being formed preferably of a resilient material such as rubber.

In the operation of the tool, a taper pin terminal 40 is placed in shank 35 of the work driving tip 34 with its neck 45 in the jaw 49, and lead wire 47 extending through groove 51. With the tool in the condition as shown in FIGS. 2 and 4, the taper pin portion 41 of the terminal is inserted into a tapered receptacle or socket 71 (FIG. 3) secured to an associated electrical panel 73. Handle 15 is then pressed manually toward panel 73 with a sufficent grip on the handle to prevent it from turning angularly. This movement compresses spring 63 with its force brought to bear against flange 43 of the pin and thus seats the terminal 40 securely in the receptacle 71. As the work driving unit telescopically recedes into handle 15, plunger 31 will be rotated as it slides along bore 23, by reason of the helical twist of shank 33 and the shape of opening 17, until latch bolt 59 snaps into slot 21 of handle 15 (FIGS. 3 and 5), thereby to lock the work driving unit to the handle at the end of the stroke. The tool is then slipped off the terminal 40 and trigger 25 depressed to release the work driving unit to the action of

spring 63 to condition the tool as shown in FIG. 2 for the next operation.

It is to be noted that the turning or twisting movement of shank 33 relative to handle 15 imparts to the taper pin terminal 40 and receptacle 71 a wringing fit which provides a more secure connection than previously obtained. Also, by means of the adjusting screw 65 the force of spring 63 may be varied to suit different work applications.

It can now be seen that the invention provides an impactless force applying tool for effecting frictional engagement between components of an assembly and with means for varying the magnitude of the force.

While there has been disclosed a specific embodiment of the invention, it will readily occur to those skilled in the art that the invention may be constructed in a variety of forms without departing from the true spirit and scope thereof. It is to be understood therefore that the disclosed structure is the preferred embodiment of the invention and that the invention is not to be limited thereby but only by the subjoined claims.

What is claimed is:

1. A terminal applying tool for effecting telescopic electrical contact connection between taper pin terminals and tapered receptacles comprising, an elongated hollow handle having an axial bore, a rectangular opening at one end communicating with said bore, and an open aperture extending transversely from said bore, a plunger slidably mounted in said bore, a rectangular shank slidably extending through said opening and being secured at its inner end to said plunger, said shank being formed helically along its longitudinal axis, a work driving tip removably secured to said shank and having a longitudinal terminal receiving jaw, an elongated latch member slidably received in a transverse cavity in said plunger and adapted for radial movement relative to said bore, said latch member being formed to engage in said aperture when the plunger has been depressed into the handle a predetermined distance, resilient means urging said latch member outwardly of said plunger, spring means biasing said plunger toward said rectangular opening, and trigger means to release the latch member from said aperture.

2. A terminal applying tool for effecting an electrical contact connection between taper pin terminals and tapered receptacles comprising, an elongated hollow handle having an axial bore, an opening at one end communicating with said bore, and an aperture extending transversely from said bore, a plunger slidably mounted in said bore, a shank slidably extending through said opening and being secured at its inner end to said plunger, said shank having a helical surface relative to its longitudinal axis mating with a surface in said opening, a work driving tip on the outer end of said shank and having a terminal receiving jaw, a latch member carried by the plunger and adapted for substantially radial movement relative to said bore, resilient means urging said latch member in said substantially radial direction against the surface of said bore so that it will engage in said aperture, when aligned therewith, when the plunger has been depressed into the handle a predetermined distance, spring means biasing said plunger toward said opening, and trigger means to release the latch member from said aperture.

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