

[54] ELECTRICAL WIRE INSERTING TOOL 3,588,932 6/1971 Sedlacek 7/14.1 R
3,742,573 7/1973 Kaufman 29/203 H

[75] Inventors: Harry Kaufman, New Rochelle,
N.Y.; Myron K. Gordin, Oskaloosa,
Iowa

Primary Examiner—Carl E. Hall

[73] Assignee: O.K. Machine and Tool
Corporation, New York, N.Y.

[22] Filed: Dec. 16, 1974

[21] Appl. No.: 533,284

[57] ABSTRACT

[52] U.S. Cl. 29/203 HC; 7/14.1 R; 29/203 HT
[51] Int. Cl.² H01R 43/00
[58] Field of Search 29/203 H, 203 HC, 203 HT,
29/203 D, 203 DT, 628; 7/14.1 R

A tool for inserting an electrical wire into a clip type terminal is described. The tool uses an automatic impulse generator to apply a controlled impulse to a blade during insertion of the wire. The tool features a novel blade construction providing a removable and reversible tip.

[56] References Cited

UNITED STATES PATENTS

3,168,750 2/1965 Gattiker, Jr. 7/14.1 R

9 Claims, 9 Drawing Figures

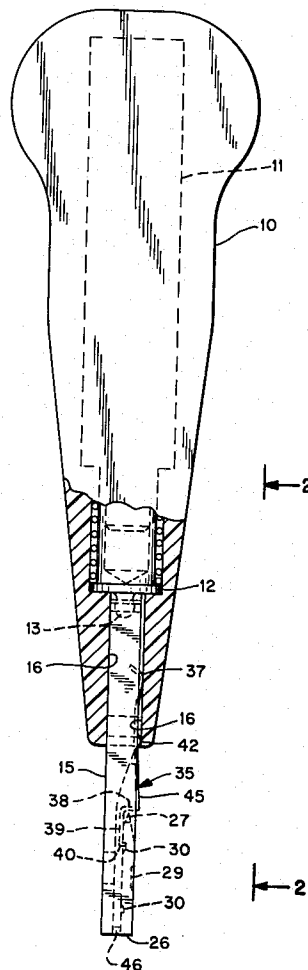


FIG. 1

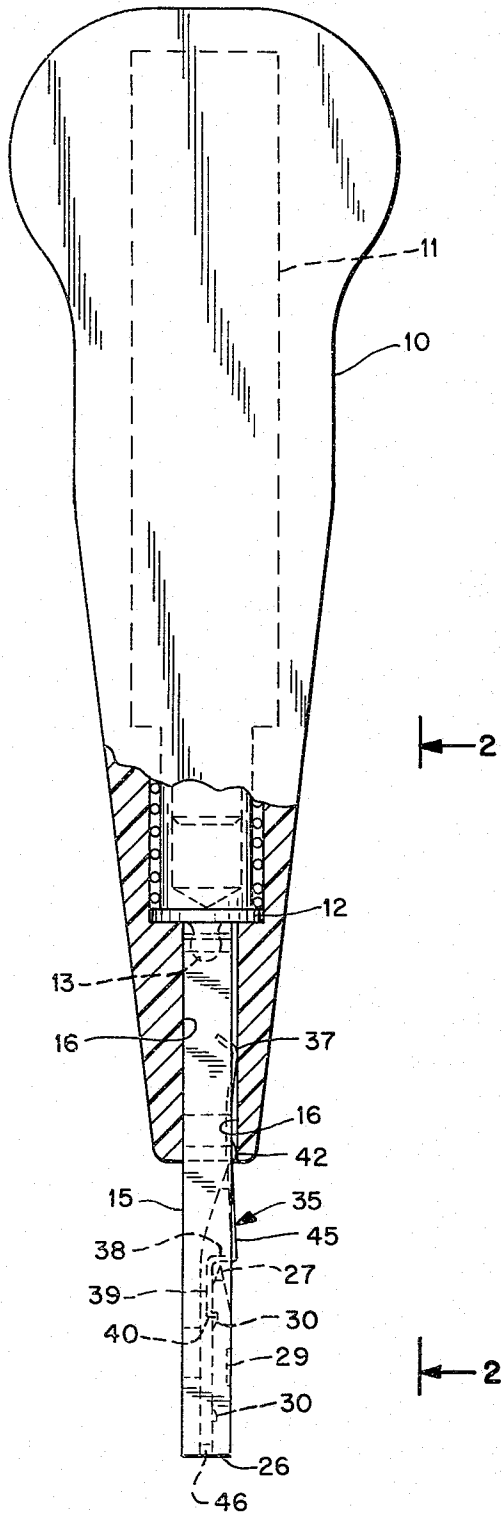


FIG. 2

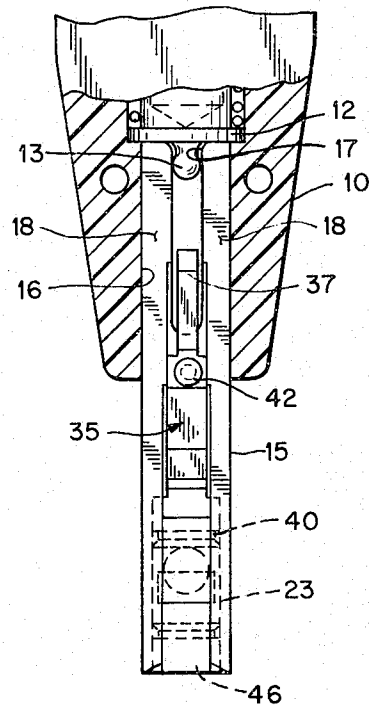


FIG. 9

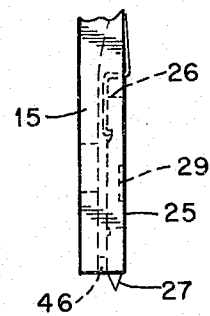


FIG. 4

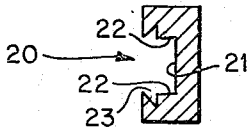


FIG. 3

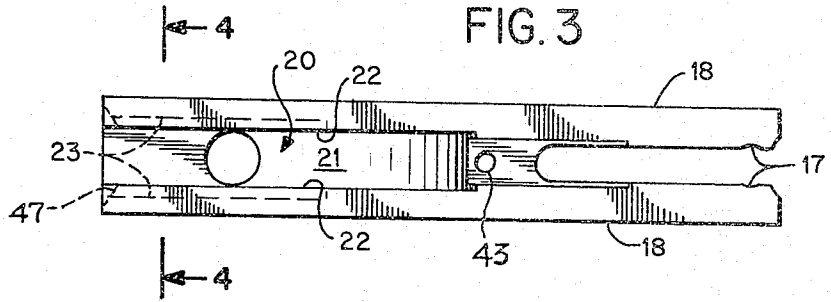


FIG. 5

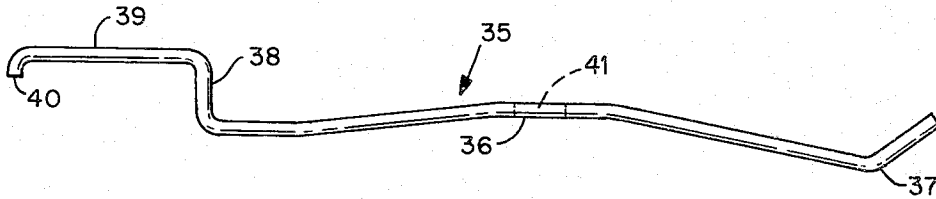


FIG. 6

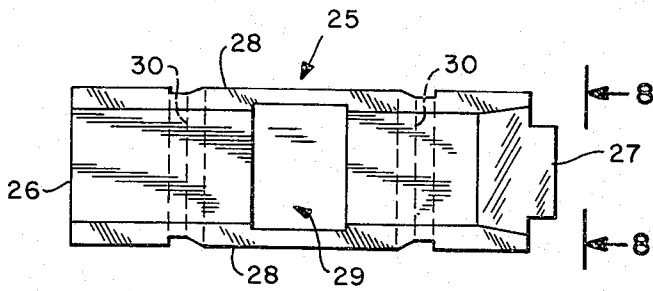


FIG. 8

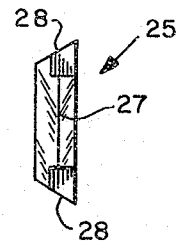
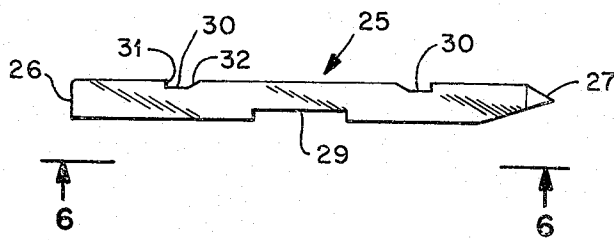


FIG. 7



ELECTRICAL WIRE INSERTING TOOL

This invention relates to a wire insertion tool, and in particular to a manual, insertion and wire clipping tool for inserting electrical wire into the slot of a clip type terminal of an electrical terminal block or connector.

Reference is made to U.S. Pat. No. 3,742,573 issued to one of us, whose contents are hereby incorporated into this specification. The present invention is directed to an improvement of the tool described in that patent, which in addition to possessing all the advantages of the patented tool, offers the additional advantage of being able to replace in a very simple manner the active part of the working blade should it become worn or damaged.

In accordance with the present invention, the blade is provided with a replaceable and reversible tip member which affords easy replacement should the cutting end, formed of hardened tool steel, become damaged or worn during use. This is achieved, in accordance with one feature of this invention, by reconstructing the blade distal or working end to contain a channel into whose opposed side walls is provided grooves for receiving correspondingly shaped projections extending from opposed side walls of the tip member. In a preferred form, the grooves are V-shaped to form what can be described as a modified dovetail joint between the tip member and blade. Means are provided for removably locking the tip member to the blade.

In accordance with a further feature of this invention, an improved blade mounting adaptor is provided for removably securing the blade at its proximal or mounting end to the end of the impulse generator within the tool handle.

In accordance with still a further feature of this invention, the means for locking the replaceable tip member to the blade comprises a latching member in the form of a novelly configured flat spring member, which also functions to stabilize the position of the blade within the tool handle.

These and other features and advantages of the invention will be best understood from the following detailed description of one exemplary embodiment thereof taken in conjunction with the accompanying drawings wherein:

FIG. 1 is an elevational view of one form of tool in accordance with our invention, shown in its entirety with the handle lower end sectioned;

FIG. 2 is a side view of the lower end of the tool shown in FIG. 1;

FIG. 3 is a plan view of the blade as removed from the tool of FIG. 1;

FIG. 4 is a cross-sectional view of the blade taken along the line 4—4;

FIG. 5 is an enlarged side view of a latching spring incorporated in the blade;

FIG. 6 is a plan view of the replaceable tip member of the blade;

FIG. 7 is a side view of the tip member shown in FIG. 6;

FIG. 8 is an end view of the tip member shown in FIG. 6;

FIG. 9 is a view similar to FIG. 1 of the lower part of the blade with the tip member reversed.

Reference is made to U.S. Pat. No. 3,742,573, whose contents are incorporated herein, for a description of the prior art tool showing how such tools are operated

for inserting wires into clip terminals on, for example, a terminal block with the blade in one position, and how wire insertion and termination by clipping is effected by reversing the blade in the holder so that a cutting edge is exposed. The present tool performs the same functions as this patented tool. The present tool also incorporates in its handle an automatic impulse generator of known construction which operates similarly to that of the patented tool, in that after the projecting ram which is part of the impulse generator has been moved inward a preset distance, the impulse mechanism is actuated imparting a blow of uniform intensity, via the ram, to the blade seating the wire in the clip and severing the wire where that is desired in a controlled and uniform manner to prevent damage to the block. Also, if desired, the impulse generator may be provided with means for varying the impulse intensity. The impulse generator used in the present tool is not part of the present invention and thus is not shown in detail. U.S. Pat. No. 2,866,266; 2,907,241; and 3,029,512 are also referenced as illustrating various impulse generating constructions adaptable for use in the tool of the present invention.

Referring now to the drawings, FIG. 1 shows an elevational view of one form of manual wire insertion tool in accordance with our invention. It comprises, similarly to the patented tool, an elongated shaped handle or housing 10, made, for example, of suitable synthetic resin, containing in a cavity in its interior a standard impulse generating mechanism 11. The handle is conveniently made in two halves fastened together by conventional fastening means. The impulse generator 11 terminates in a ram assembly comprising a cylindrical member 12 fitted at its bottom with a ball retainer 13 used as an adaptor for securing the working blade to the impulse generator. The blade, designated 15, has a generally rectangular cross-section and reciprocates within a generally rectangular guideway 16 which prevents rotation of the blade. The blade has at its end proximate to the impulse generator a tapered retaining cavity 17 adapted to be pushed onto the ball retainer 13 for securing the blade to the ram 12.

The blade 15 is shown in greater detail in FIGS. 3 and 4. The retaining cavity 17, shown at the right hand end, is formed between opposed projecting arms 18 of the blade. This construction permits the arms to flex slightly simplifying assembly and disassembly of the blade to the ram, yet also provides a secure attachment. Extending from about the center of the blade 15 to the opposite end, distal with respect to the impulse generator, is a recessed elongated channel 20 having a bottom wall 21 and opposed side walls 22. Extending along each side wall is an elongated V-shaped groove 23. The grooves extend to the blade distal end.

The blade 15 is provided with a replaceable tip member 25, shown in greater detail in FIGS. 6 to 8. The tip 25 is a generally rectangular, flat member of hardened tool steel having at one end (left side of FIG. 6) a flat end 26, and at the opposite end a projecting cutting edge 27. The long edges of the tip form tapered projections 28 configured to mate with the V-grooves 23 of the blade. Thus, the thickness dimension of the tip corresponds to the horizontal dimension of the groove 23 as shown in FIG. 4. On the outer flat side of the tip is provided a cut-out section 29 used by the operator as a finger hold for assembling or disassembling the tip. On the opposite flat side are provided two, spaced,

latching crevices 30 which extend transversely to the long dimension of the tip. The latching crevices 30 are provided with one vertical wall 31 and one tapered wall 32.

The tip member 25 is locked in position by a latching, spring metal, clip member 35, which is illustrated in FIG. 5. It is constituted of flat spring metal stock configured to provide a generally flat middle portion 36 which curves downward to the right or proximal end (relative to the ram) and then upward to form a generally V-shaped end 37. At the left side it curves upward 38, runs horizontally 39 and terminates in a latching projecting end 40. The shape from the top can be seen in FIG. 2. At the midportion 36 is provided a hole 41 by which the spring 35 is secured by a suitable fastener 42 to a hole 43 located at a mid-point of the blade 15. When assembled to the blade, as shown in FIG. 1 and 2, the proximal end extends over the blade surface with V-projection 37 protruding outwardly from the plane of the blade. With the blade assembled, as shown in FIG. 1, the V-projection 37 is engaged by the facing guideway 16 wall, and the resulting spring tension urges the blade 15 against the opposed guideway wall and thus holds the blade firmly in the handle guideway and yet allows it to reciprocate freely within the guideway as required during use.

The distal end of the spring fits within the channel 20 with the portion 39 extending along the channel bottom 21, and with the latching end 40 projecting and being biased outwardly. The dimensioning is such that clearance exists between the bottomwall 21 and the clip horizontal portion 39, and by pressing the spring clip at 45 (FIG. 1), the latching end 40 is depressed.

When the tip member is inserted into the channel grooves 23, it is moved upwardly until spring latching end 40 engages the nearer latching crevice 30 in the tip side thereby locking the tip into position. The tip is readily removed by the user depressing the spring at 45 to release the latch.

FIG. 1 shows the blade with the tip in its wire insertion position. The spacing between the channel wall 21 and tip surface, and between the channel side wells 22 forms a recess or slot 46 dimensioned to receive the clip terminal. The recess opening is tapered shown at 47 (FIG. 3) to aid in receiving the terminal. As the tool is pushed down the blade 15 secured to the ram of the impulse generator moves inward along its guideway until the impulse generator delivers an impulse to the blade via the ram to complete seating of the wire. For wire clipping, in addition to seating, the tip 25 is removed and reversed, end-to-end, into the position shown in FIG. 9 so that the cutting edge 27 projects downwardly. Again, a recess 46 is formed for accommodating the terminal. During use, application of the impulse not only seats the wire but also severs its end.

The tool of the invention offers the following advantages over the known tools. Replacement costs for the cutting edge are reduced, since only the tip member need be replaced when the cutting edge 27 wears or becomes damaged, rather than the entire blade. Manufacturing costs are lowered since only the flat tip member need be made of costly, hardened tool steel. Despite the replaceable tip feature, nevertheless the tool is very sturdy with the blade and tip firmly fitted together and to the impulse generator with no resultant looseness or play in the blade during operation. Yet, the tip is easily assembled and disassembled to the blade. These fea-

tures are obtained as a result of the V-grooves provided in the channel mating with the tapered projections on the tip forming a tight, sturdy dovetail-type joint between the two, in cooperation with the easily operated spring latch for locking the tip in its two operative positions. Moreover, the blade is easily assembled and disassembled from the handle by means of the ball retainer construction. Further, the proximal end of the spring also serves to hold the blade firmly within the guideway during operation. Both functions combined in the single spring lowers manufacturing costs.

While the embodiment shown and described is preferred, the invention is not limited thereto. For example, the channel grooves and mating tip projections could have other configurations instead of a V, such as a U or a true mortise and tenon dovetail. The tip could be provided with recesses instead of slots for receiving the latching end of the spring. If desired, the spring proximal end could be further extended up the guideway.

While our invention has been described in connection with specific embodiments thereof, those skilled in the art will recognize that various modifications are possible within the principles enunciated herein and thus the present invention is not to be limited to the specific embodiments disclosed.

What is claimed is:

1. In a wire inserting tool comprising a housing, an impulse generator within the housing, and a working blade having one end proximal to the impulse generator to receive an impulse and an opposite end distal from the impulse generator and projecting from the housing and having a recess for accommodating a wire-receiving terminal which blade serves for severing and seating the wire in the terminal, the improvement comprising the blade distal end having a channel, a separable tip member having at one end a cutting edge, and means for removably mounting the tip member to the blade at the channel to form between the channel and the tip the terminal-accommodating recess.

2. A tool as claimed in claim 1 wherein the blade channel is defined by a bottom wall and opposed side walls, and the tip member mounting means comprises grooves in the channel side walls, the tip member having along opposed edges projections shaped to mate with and engage the channel side-wall grooves.

3. A tool as claimed in claim 2 wherein the channel side-wall grooves are V-shaped.

4. A tool as claimed in claim 2 wherein the channel side-wall grooves and tip member edge projections form a dovetail-type joint.

5. A tool as claimed in claim 2 and further comprising means for locking the tip member to the blade.

6. A tool as claimed in claim 5 wherein the tip locking means comprises a flat spring member secured to the blade and having a distal end configured to extend within the blade channel and latching-engage a recess in the tip member surface.

7. A tool as claimed in claim 6 wherein the tip member has at its opposite end a flattened edge, and at its surface two transverse crevices each for engaging the spring distal end when the tip member is mounted in one of two reversed positions on the blade, a portion of the spring member extending outwardly of the blade for unlatching of the tip member.

8. A tool as claimed in claim 7 wherein the blade extends within a guideway in the housing, the impulse

5

generator is provided with an adaptor having a ball re-
tainer end, and the blade proximal end is configured to
resiliently engage and connect to the ball retainer of
the adaptor.

9. A tool as claimed in claim 8 wherein a portion of 5

6

the spring member extends outwardly from the blade
within the guideway and bears against the guideway
wall to firmly hold the blade within the guideway.

* * * * *

10

15

20

25

30

35

40

45

50

55

60

65