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Mason

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[54] **TERMINATION TOOL**

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[73] Assignee: **Dracon Industries**, Chatsworth, Calif.

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[52] **U.S. Cl.** ..... **29/203 H**

[51] **Int. Cl.** **H01r 43/00**, H05k 13/04

[58] **Field of Search**.....29/203 H, 203 HC, 203 HM, 203 D, 29/203 R

[56] **References Cited**

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Primary Examiner—Thomas H. Eager

Attorney—Allan M. Shapiro

[57] **ABSTRACT**

Termination tool for making terminations of unskinned wires on 66-type telephone wire connecting blocks. The tool has an insertion stroke during which manual load on the tool compresses a spring and releases a hammer stroke, which completes termination and cuts wire end beyond termination.

10 Claims, 8 Drawing Figures

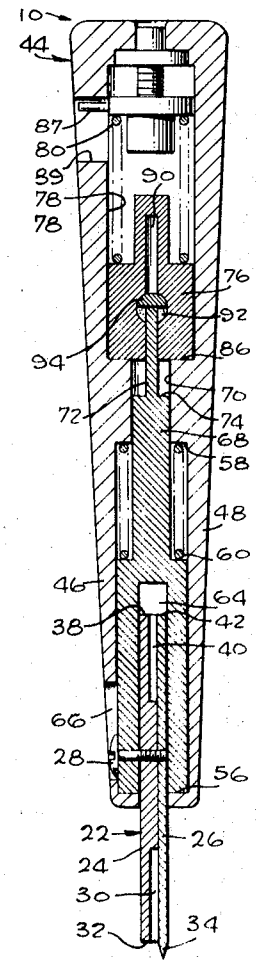


Fig. 1

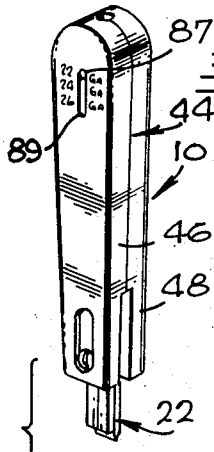


Fig. 2

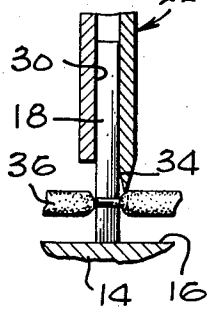


Fig. 5

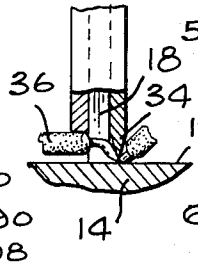


Fig. 6

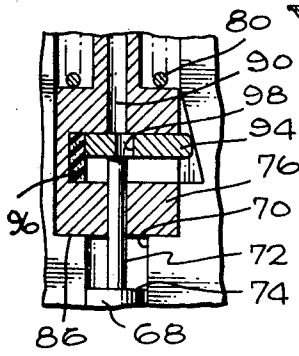


Fig. 8

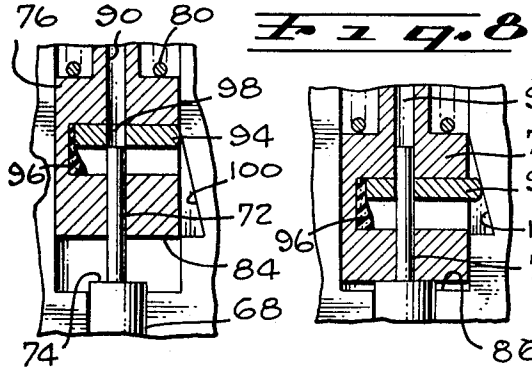


Fig. 7

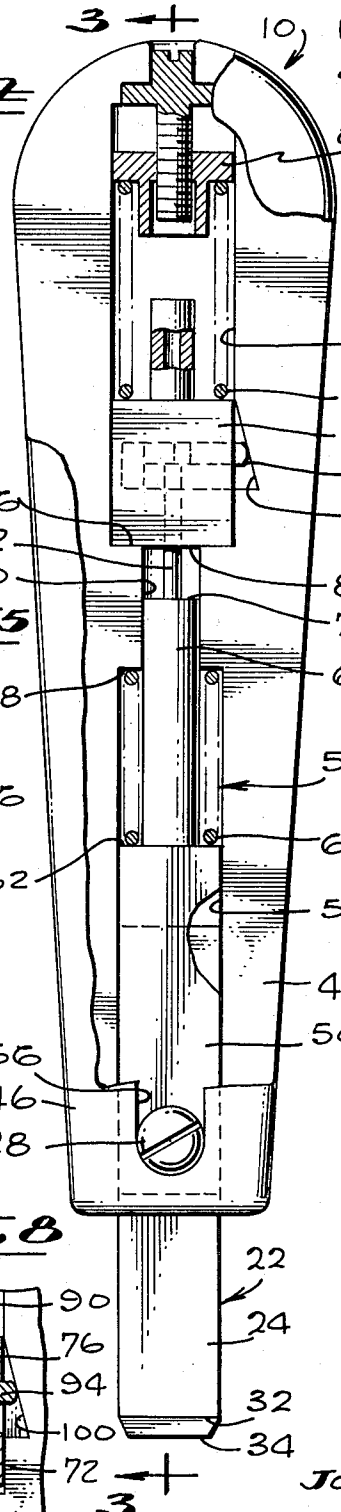
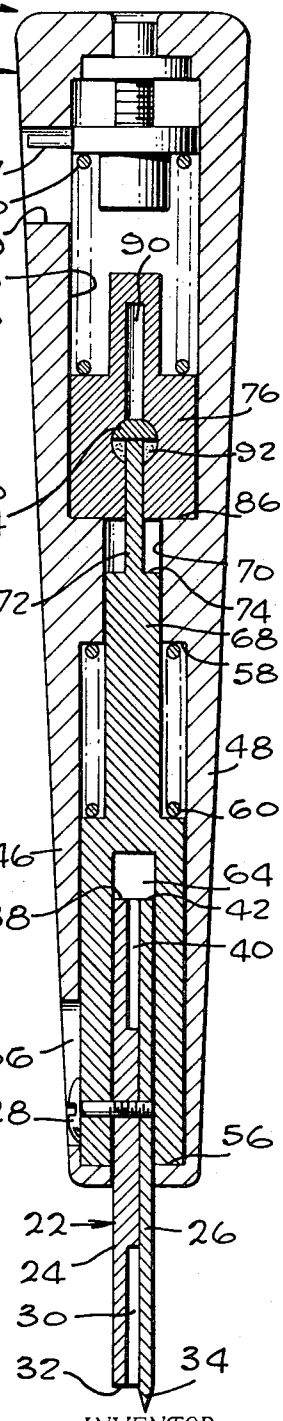


Fig. 3



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TERMINATION TOOL

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention is directed to a termination tool which causes insertion of an insulated wire into the fork of a bifurcated termination clip and employs impact to cut the wire beyond the termination.

2. Description of the Prior Art

The Western Electric Company and others supply "66-type" connecting blocks to the many Bell Telephone Companies and others involved in communications. These "66-type" connecting blocks are widely used in terminations, including cables, distribution frames and central office installations.

The Western Electric Company and others make and supply a tool known as the 714B tool which is an improvement on the 714A (MD) tool. Each of these tools includes a reversible steel blade attached by a single screw to a plastic handle. One end of the blade is for seating and cutting conductors or wires with respect to a 66-type connecting block. The other end is for seating only. In the 714B tool, the handle is plastic and carries a handshield. Furthermore, it carries indicia to more readily identify the cutting side of the blade.

In present use, a wire is placed in the bifurcated fork of the clip in the 66-type connecting block, and the tool is brought to the wire. The tool is manually forced down upon the wire to seat the wire into the clip. The blade of the tool has a slot therein which receives and accepts the clip, so that only the wire is pressed down. As the wire is pressed into the fork, the insulation is pressed aside to make the electrical connection. Further pressing improves the connection until the wire is seated and, finally, the sharp cutting edge cuts off the end of the wire beyond the seated termination.

The problem with this above-described tool is that it takes a considerable amount of manual effort in order to supply sufficient force to press the wire into the bifurcated fork and to accomplish the cutoff. Both of these functions must be accomplished by brute force. Thus, the making of a plurality of terminations in this manner causes excessive fatigue. Sometimes the palm of the hand is used to pound the tool down over the termination clip, and this results in bruises.

SUMMARY OF THE INVENTION

In order to aid in the understanding of this invention, it can be stated in essentially summary form that it is directed to a termination tool. The terminal tool has a manually operable handle and a termination blade. The blade is movably mounted with respect to the handle. Resilient means such as a spring is engaged between the movable blade and the handle so that, upon increased manual loading of the handle, a hammer stroke from the handle onto the blade is produced to finalize and cut off the termination.

Accordingly, it is an object of this invention to provide a termination tool which has a blade movably mounted with respect to a handle so that handle motion causes a termination stroke of the blade. It is a further object to provide interconnection means between a termination blade and handle so that thrust on the handle causes a hammer blow on the blade. It is a further object to provide a termination tool which causes terminations in 66-type connecting blocks with ease of application of physical force to reduce fatigue. It is another object to provide a termination tool which selectively accomplishes either termination without cutting or termination with cutting, with a minimum of physical effort.

Still other objects, features and attendant advantages of the present invention, together with various modifications, will become apparent to those skilled in the art from a reading of the following detailed description of the preferred embodiment, constructed in accordance therewith, and taken in conjunction with the accompanying drawings wherein like numerals designate like parts in the several figures.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an isometric view of the termination tool of this invention, shown in conjunction with a portion of a 66-type connecting block.

FIG. 2 is an enlarged side elevational view of the termination tool, with part of the near handle half broken away to show internal construction, and partly taken in section.

FIG. 3 is a section taken generally along the line 3—3 of FIG. 2.

FIG. 4 is a partial section, similar to the lower end of FIG. 3, showing the blade of the termination tool beginning the insertion of a wire into the clip of a termination connecting block.

FIG. 5 is similar to FIG. 4, but showing the final position of the blade where the wire is finally terminated and cut.

FIG. 6 is a partial section through the interconnection means between the blade and handle in the central part of the termination tool at a beginning position.

FIG. 7 is similar to FIG. 6, showing the parts in an intermediate position.

FIG. 8 is a view similar to FIG. 6, showing the parts in the final position.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The termination tool is generally indicated at **10** in FIGS. **1**, **2** and **3**. It is used in association with a standard 66-type connecting block, a portion of which is indicated at **12** in FIG. **1**. The connecting block has a body **14** having a top surface **16**. A plurality of clips **18** extends upwardly above the top surface of body **14**. Each of the clips has a slot therein so that each clip represents a bifurcated fork. In FIG. **1**, the slot is indicated at **20**. Each of the slots **20** narrows as it extends into the clip. The size of the slot is related to the size of the wire, so that a wire can be thrust down into the fork provided by the slot so that the insulation is squeezed away and electrical contact is made between the metal of the clip and the metal of the wire.

As is seen in FIGS. **1** through **5**, termination tool **10** is provided with a reversible blade **22**. The blade **22** is made of blade halves **24** and **26**, which are secured together by means of screw **28**. The operative lower end of the blade **22**, as is best seen in FIG. **3**, includes a slot **30** into which can be received a clip **18**, as seen in FIGS. **4** and **5**. The slot **30** is formed in blade half **24** which is thicker than blade half **26**. Furthermore, blade half **24** terminates in a flat seating surface **32**, while the lower end of blade **26** extends past the seating surface

32 as cutting edge 34. As seen in FIGS. 4 and 5, as the blade moves down the clip, wire 36 is thrust into the narrow bifurcated fork of clip 18, while the clip is received in slot 30 of blade 22. Downward thrust of blade 22, particularly the seating surface 32, thus causes seating of the wire. Thereafter, the cutting edge 34 cuts off the wire 36 beyond the electrical connection which defines the termination.

Blade 22 is arranged so that, with removal of screw 28, the blade can be reversed so that the opposite end is in the downward, operative position. The opposite end is an end for seating the wire only, without cutting. The seating end has a seating surface 38 which corresponds to the seating surface 32. Blade half 24 also has a slot 40, corresponding to slot 30, to receive the clip into which the wire is terminated. Finally, blade half 26 has on its seating end a further seating surface 42. Thus, when the seating surfaces 38 and 42 are turned downwardly, the same kind of action as illustrated in FIGS. 4 and 5 occurs, except that cutting off is not accomplished. This type of termination, without cutting off, is sometimes employed for temporary connections. The screw 28 is employed to permit replacement of the blade 22, and reversal thereof is indicated. The structure and operation thus far described is known in the art.

Termination tool 10 has a handle 44 which is formed of handle halves 46 and 48. These handle halves are secured together to contain the operative mechanism and provide a structure for suitable manual engagement. The handle halves are secured together by any suitable means, such as screws or rivets interconnecting them. The handle halves are provided with a generally longitudinal central opening 50. Central opening 50 includes slide bore 52. The slide bore slidably receives slide 54 therein. The lower end of slide bore 52 terminates in slide stop 56, which limits downward motion of slide 54. The upper end of slide bore 52 terminates in spring stop 58 against which is positioned slide spring 60. The lower end of slide spring 60 engages against shoulder 62 on slide 54 to urge the slide downwardly against slide stop 56. This downward position, shown in FIGS. 2 and 3, is in normal at-rest position of the slide.

Slide 54 has blade slot 64 therein to receive the previously described blade 22. Screw 28 passes through the lower part of slide 54 to engage on the blade 22 and lock it in position. Furthermore, there is a slot 66 for the head of screw 28 to permit clearance around that screw head while the slide is in a riased position from the downward terminal position shown. The lower portion of slide 54, which contains the blade slot 64 and terminates in its upper end in shoulder 62, can either be square or round, depending on the configuration of the slide bore 52 in the handle halves. When the slide and slide bore are cylindrical in configuration, the screw head 28 in its slot 66 can prevent rotation of the slide in the handle. On the other hand, square or rectangular construction is conveniently obtained, especially when the handle halves are of molded construction. Cylindrical rod 68 forms an anvil which extends upward from the main body of slide 54 into guide bore 70. Pin 72 extends upwardly from shoulder 74 on the upper end of cylindrical rod 68.

Hammer 76 is slidably movable on guide surfaces 78 in central opening 50 in the upper part of the handle. The guide surfaces and the hammer are preferably square in cross section, but may be circular in cross section with appropriate design. Hammer spring 80 engages against hammer 76 on its lower end and against spring washer 82 at its upper end. Hammer spring 80 urges the hammer 76 downward so its lower surface 84 normally rests against the stop surface 86 formed in the handle. The spring washer 82 can be adjusted downwardly by means of adjustment screw 88 so that the load on spring 80 can be increased to increase the force by which the at-rest hammer 76 urges against the stop surface 86. The spring 80 has appreciable strength. At least sufficient hammer spring loading force is required to begin deflection of the spring to cause the hammer to move upward from its stop surface 86. Spring 60 is comparatively weak and need only have sufficient force to move the slide 54 downwardly against its stop 56. An indicator pin 87 extends outwardly from spring washer 82 and through handle slot 89 so as to provide visual indication of the adjusted condition of spring 80. Thus, pre-compression of spring 80 may be adjusted, as by location of indicator pin 87 with respect to the illustrated exterior indicia on the handle, to provide for suitable hammering force on differing gages of wire.

As seen in FIG. 6, hammer 76 has a bore 90 therethrough to receive pin 72. Cross bore 92 intersects bore 90. Sear 94 is contained in cross bore 92 and is urged to the right by means of a resilient structure, such as elastomeric pad 96. Sear 94 has release hole 98 therein which can become aligned with bore 90 by resilient deflection of elastomeric pad 96.

Cam surface 100 is formed on the side of guide surface 78, adjacent the hammer 76, and is positioned so that when the hammer is in its rest position, as shown in FIG. 6, the sear is permitted to move to the right with its release hole 98 out of alignment with bore 90 and out of alignment with pin 72.

As manual force is applied to the top of the handle 44 in a direction to cause the wire 36 to be seated in the clip 18, both springs 60 and 80 are compressed. Upward movement of the slide 54 causes upward movement of hammer 76, because pin 72 engages with sear 94. The beginning of the upward stroke of the slide and hammer (or the relative downward stroke of the handle 44) is illustrated in FIG. 6. As the stroke continues, with compression of both springs, the sear 94 is thrust to the left by cam surface 100 causing resilient deflection of elastomeric pad 96 until release hole 98 aligns with bore 90. The structure is dimensioned so that shoulder 74 on slide 54 is above stop surface 86 when the sear 94 releases pin 72. Upon such release, the hammer is driven downwardly by the force of compressed hammer spring 80 so that the lower surface 84 of the hammer strikes the shoulder 74 on the slide. This hammer blow, which thus acts through the slide onto the blade 22, causes seating and cutoff.

By this means, full seating of the wire into the clip on the 66-type connection block is accomplished. When the blade is so positioned, the cutoff is easily accomplished. Thus, seating and cutoff are fully completed with a minimum of manual force. Since a hammer blow is involved to result in shock loading of the blade onto the wire, the force involved in loading the hammer spring to accomplish the full seating and cutoff of the

termination are much less than if direct force were applied.

While a particular embodiment of the present invention has been shown described, those skilled in the art will find that changes and modifications may be made without departing from the spirit of this invention, and therefore, the aim in the appended claims is to cover all such changes and modifications as fall within the true spirit and scope of this invention.

What is claimed is:

1. A termination tool comprising a manually engageable handle and a blade mounted on said handle for positioning and movement by said handle, said blade being dimensioned to insert a wire into a bifurcated clip to electrically connect the wire to the clip to electrically terminate the wire at the clip, the improvement comprising:

a slide mounted on said handle and movable with respect to said handle, said blade being mounted on said slide; and

hammer means in said handle for striking a hammer blow against said slide for aiding termination.

2. The termination tool of claim 1 wherein

said hammer means comprises a spring-loaded hammer.

3. The termination tool of claim 2 wherein

said hammer is movably mounted on said handle and a hammer spring is mounted between said handle and said hammer to urge said hammer toward said slide.

4. The termination tool of claim 3 wherein

said hammer spring is engaged on one end against said hammer and is engaged on its other end on a spring washer, said spring washer being selectively positionable with respect to said handle to select spring load on said hammer to select hammer blow strength.

5. The termination tool of claim 3 wherein

said hammer has a sear movably mounted thereon and said slide has a pin thereon and said slide has a pin thereon, a sear opening in said sear, said pin engaging said sear adjacent said opening so that movement of said slide causes movement of said hammer to compress said hammer spring, said sear being movable to align said sear opening with said pin to release said hammer to cause a blow against said slide.

6. The termination tool of claim 5 wherein

said handle has a cam surface therein and resilient means is engaged between said sear and said hammer to urge said sear against said cam surface, said cam surface being shaped so that, when said hammer moves to compress said hammer spring, said cam surface moves said sear in a direction toward alignment of said sear opening with said pin.

7. A termination tool comprising a manually engageable and operable handle and a termination blade mounted on said handle, said termination blade being dimensioned to terminate a wire on a bifurcated terminal clip, the improvement comprising:

a slide movably mounted upon said handle and a hammer movably mounted upon said handle, said hammer being resiliently urged in a direction toward engagement with said slide and in a direction of termination force of the blade with respect to the clip so that, upon manual force on said handle to cause termination of a wire in a clip, said slide moves with respect to said handle and moves said hammer with respect to said handle together with resilient deflection of said hammer spring;

release means to release said hammer so that said hammer spring causes said hammer to move toward said slide and strike said slide to cause a termination-aiding hammer blow against said slide.

8. The termination tool of claim 7 wherein

said slide and said hammer are slidably mounted in said handle, both said slide and said hammer being slidable in a direction substantially aligned with the direction of termination movement.

9. The termination tool of claim 8 wherein

a slide spring is positioned between said slide and said handle to urge said slide away from said hammer.

10. The termination tool of claim 8 wherein

said slide carries a pin thereon, and said release means is a sear with said pin engaging against said sear, a pin opening through said hammer so that, upon release of said pin by said sear, said hammer moves toward said slide with said pin opening in said hammer moving over said pin, a shoulder on said slide adjacent said pin, said hammer striking said shoulder to cause the hammer blow.

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