

Sept. 20, 1960

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2,953,185

TERMINAL AND CABLE STOP

Filed Sept. 13, 1957

2 Sheets-Sheet 1

FIG. 1

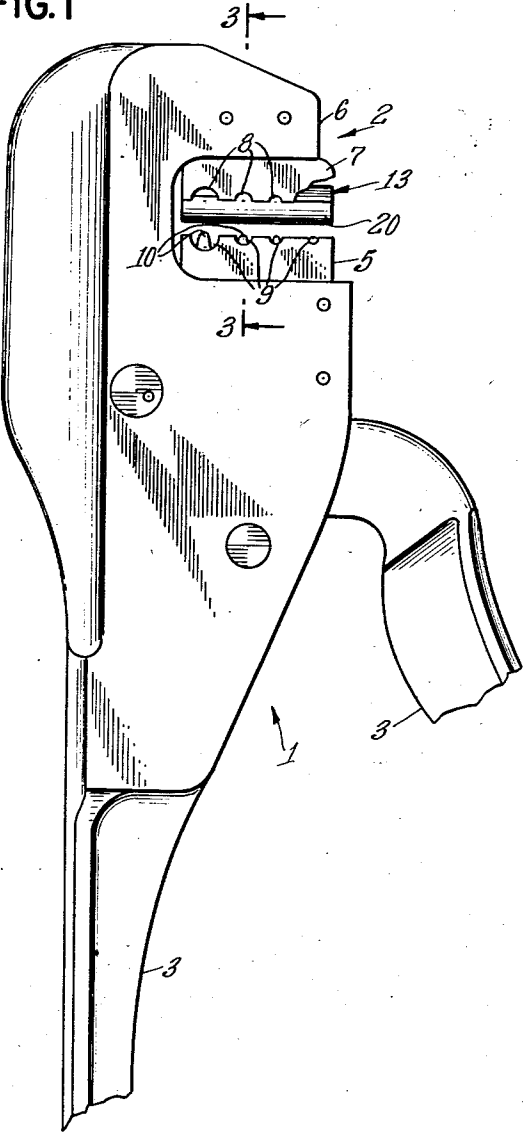
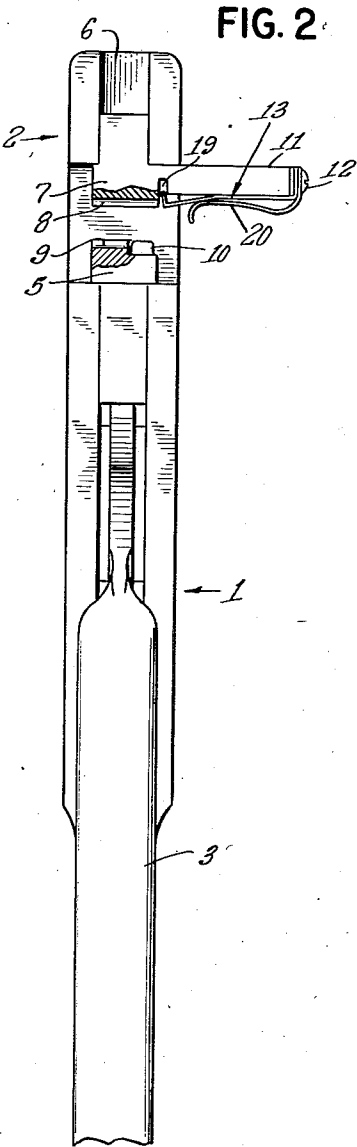


FIG. 2



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FIG. 3

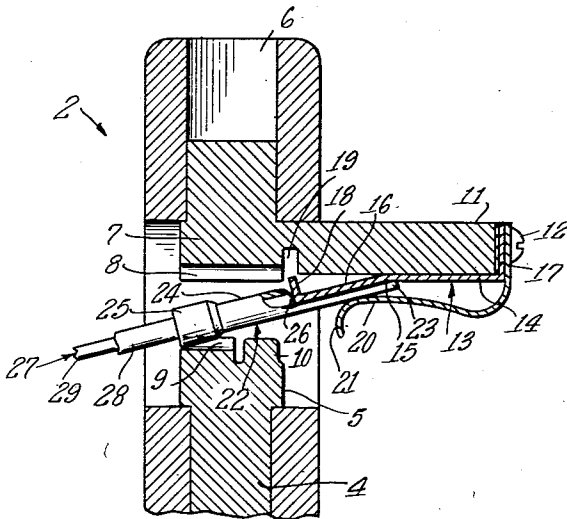


FIG. 5

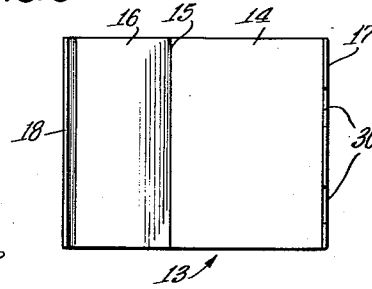


FIG. 6



FIG. 4

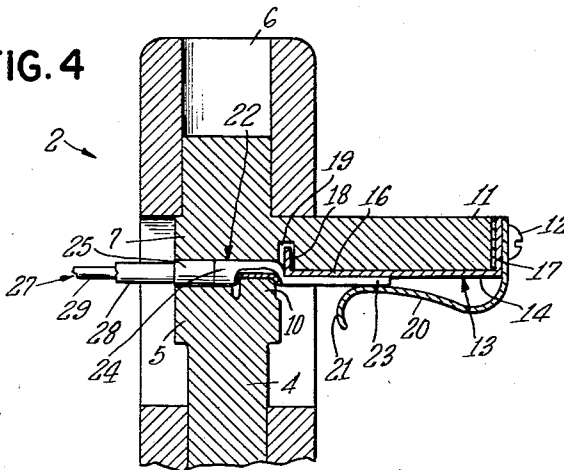
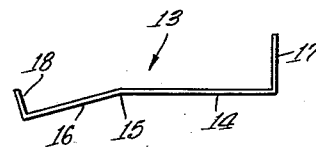


FIG. 7



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## TERMINAL AND CABLE STOP

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3 Claims. (Cl. 153—1)

My invention relates to tools for applying lugs or terminals to wires and cable and more particularly, it relates to a terminal and cable stop for indenting or crimping tools used in applying solderless connectors, whereby a wire or cable conductor may be inserted freely into a terminal or lug and a proper mechanical and electrical connection produced.

The simplicity of solderless electrical connectors has made their use universal. One usual type of solderless electrical connector comprises a lug or terminal portion connected to or integral with a barrel. The barrel may comprise a contacting section which is designed to make electrical and mechanical connection to the conductor wire and an insulation grip or shroud section. The wire to be connected to the terminal has a portion of its insulation stripped away, which is equal in length of the contact section of the barrel. The stripped wire is then inserted into the barrel and the connection is cold forged by indentation or crimping to form the mechanical and electrical connection between the wire and terminal or lug. Most solderless electrical connectors include a peephole or opening at one end of the barrel in order to provide visual means for insuring that the wire is inserted properly into the connector prior to the indenting or crimping operation.

In order to provide a satisfactory connection it is essential that the terminal be properly located within the cold forging tool and in addition, it is also essential that the wire be properly located within the terminal. The wire could be inserted within the terminal too far and the wire would then extend through the peephole or opening at the end of the terminal. This would be especially true when using wires which are small in diameter, and with a very thin layer of insulation. In this instance the insulation is so small that it does not abut the ridge formed by the insulation grip of the terminal. This allows a portion of the wire insulation to extend into the contacting section of the barrel, preventing an adequate connection from being accomplished. On the other hand, the wire at times would not be inserted far enough within the barrel and the insulation would not be gripped by the insulation shroud section of the barrel.

The prior art has long recognized a necessity for properly locating the terminal within the indenting or crimping tool die and as a result terminal or lug stops were incorporated into the tool to longitudinally locate the terminal. However, the prior art has not provided means to properly locate the wire within the terminal while simultaneously locating the terminal within the tool die.

One of the objects of the present invention is to provide a terminal and wire stop for a connection forming press which will accurately center the terminal in the press and which will simultaneously block the peephole, preventing the barred wire from entering the same with possible loss of electrical contact.

Further objects are to provide such a terminal and wire stop which may be attached to existing tools, which is made of bent spring steel so as to flex with the terminal

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as the connection is made and which may be made of one piece for ease of production and installation.

One of the features of this invention is the provision of a terminal and wire stop which locates the terminal in the proper longitudinal position so that the indent or crimp is properly located on the terminal barrel and in addition, assures that the wire or cable, either insulated or uninsulated, is in the proper position within the barrel of the terminal for proper electrical and mechanical connection thereto. This is accomplished by preventing or stopping the wire or cable from extending through the peephole of the terminal barrel. In this manner the remaining insulation of a piece of partially stripped wire is prevented from extending into the contacting portion of the terminal barrel and the conductor portion is prevented from extending through the peephole. The spring characteristics of the stop allow it to flex with the movement of the terminal while it is being crimped.

These and other features and objects of my invention will become more apparent by reference to the following description taken in conjunction with the accompanying drawing, in which:

Fig. 1 is a side view in elevation, partly broken away, of a connection forming press using the terminal and cable stop of my invention.

Fig. 2 is an end view in elevation, partly broken away, of the tool shown in Fig. 1.

Fig. 3 is a view in cross-section of the head portion of the tool taken along the lines 3—3 of Fig. 1, having a terminal inserted in the tool and a wire inserted in the terminal for connection thereto.

Fig. 4 is a view in cross-section of the head shown in Fig. 3 with the press closed indenting the connector and conductor wire into the final connection.

Fig. 5 is a top plan view of the terminal and cable stop of my invention.

Fig. 6 is an end view in elevation of the terminal and cable stop of Fig. 5.

Fig. 7 is a side view in elevation of the terminal and cable stop of my invention.

Referring to Figs. 1 and 2 of the drawing, a tool 1 for applying solderless electrical lugs or terminals to wires or cables is therein shown to comprise a head section and handle or levers 3. The head section 2 comprises a lower die seat 4 of Fig. 4 for carrying a lower die portion 5. An upper die seat 6 has mounted thereon an upper die 7. The upper die 7 is not movable and performs the function of an anvil. Each of the lower and upper dies 5 and 7 respectively, have a plurality of die shapes 8 and 9 to match and compliment each other. The lower die 5 carries a plurality of indentors 10, one associated with each of the die shapes 9. Coupled to the upper die 7 is an arm 11 which may be integral therewith, and coupled to the upper die arm 11 by mounting screws 12 is the flexible terminal and wire or cable stop of my invention, generally indicated at 13. The stop 13 comprises a long arm 14 separated by a bend 15 from a short arm 16 connected therewith. The long arm 14 is provided with a flange 17. The short arm 16 has a flange 18 made integral therewith. The arm 11 has a recess 19 into which flange 17 may extend during the crimping operation.

A second flexible or spring-like portion 20, which obviously may be an integral portion of the first flexible element, provides a holding action for the terminal. The spring 20 engages and secures terminal 22 to the stop 13 and prevents accidental displacement. The arcuate section 21 permits easy insertion of the terminal tongue for locating the terminal in the proper longitudinal position for crimping.

Referring to Fig. 3 it is seen that a terminal 22, either insulated or uninsulated, is positioned within the proper die opening 8 and 9. The tongue portion 23 of the

terminal is placed into the holding spring 20. The contacting portion 24 of the barrel is thus located above the indenter 10 and the shroud 25 is placed over the shroud crimping section of the die. A peephole 26 is provided in the terminal 22. A wire 27 has its insulation 28 stripped away from conductor 29 for a length equal to the length of the contacting section 24 of the terminal 22. Thus, as the conductor 29 is inserted into the contacting section 24 of terminal 22, its end reaches peephole 26 and simultaneously the end of the insulation 28 just reaches the end of the insulation shroud 25 of the terminal 22.

In the alternative, it is of course obvious that the wire may be first inserted within the terminal 22 and visual inspection may decide if conductor 29 has reached the end of the barrel contacting section 24. However, we have found it far more convenient to first insert the terminal 22 and hold it by the holding spring 20 and then insert the wire 27. As the wire 27 is inserted, it is prevented from going past the peephole 26 because the flange 18 of the flexible cable stop 13 abuts the peephole 26 and closes it off.

Referring to Fig. 4 the cold forging operation of connecting a terminal to a wire using the terminal and cable stop of my invention is therein illustrated. Under the action of operation of the handles 3 of the tool 1 shown in Fig. 1, the lower die 5 is carried upward toward the upper die and anvil 17. The lower die 5 has two functions; the first requires the indent portion 10 of the die 5 to make an indentation in the contacting section of the barrel of the terminal 22 by cold forging the barrel section to the conductor 29. The second function requires that simultaneously the shroud portion 25 be closed upon and grip the insulation 28 of the wire 27. As shown in Fig. 4 it is, of course, necessary for the flexible cable stop 13 of my invention to flex with the crimping action of the tool and thus, the recess 19 is provided in the supporting arm 11 for the flange 18 to enter as the terminal 22 is crimped to the wire 27. The holding spring 20 also flexes during this operation.

Thus, it is seen that the operation of the cable and wire stop of my invention is simple, comprising the steps of first stripping a portion of the insulation 28 away from the conductor 29, leaving a barred conductor portion having a length substantially equal to the length of the compact portion 24 of the barrel. The terminal 22 to be connected to the wire 27 is inserted within the tool 1 in such a manner that it is adjacent the correct die for the size of the terminal. The tongue 23 of the terminal 22 is inserted between the holding spring 20 and the flexible spring stop. The tongue 23 is positioned along the small arm 16 of the flexible spring until the bend 15 contacts the peephole portion of the terminal barrel at which time the further penetration of the wire 27 into the terminal 22 is prevented. When the terminal is held in this position, the previously stripped wire is inserted until the conductor is stopped by the flexible spring. In this position the insulation is properly positioned within the insulation shroud of the terminal barrel.

Referring to Figs. 5, 6, and 7, the construction of the terminal and wire stop of my invention is therein shown to comprise a flat piece of spring metal 30. It is, of course, obvious that the width of the spring metal 30 is dependent upon the opening of the dies, thus if the die is to accommodate a plurality of terminal sizes the width of the spring 30 is made greater so that the stop may operate with a plurality of die openings. It is, of course, also apparent that the spring stop and

the crimp holding springs could be made integral by forming from a single piece of spring metal. One end of the spring 13 is provided with slots 30 so that mounting screws 12 may be utilized to mount the spring 13 to the arm 11. Fig. 7 clearly illustrates that the terminal and cable stop of my invention has a long arm 14 separated by a bend 15 from the short arm 16, the long arm 14 being provided with a flange 17 containing the two mounting slots 31, and the short arm 16 being provided with a flange 18 which rests against the barrel of the terminal when the terminal is inserted properly.

Thus, it is clearly seen that the terminal and cable stop of my invention accordingly locates the terminal, whether insulated or preinsulated, at the proper longitudinal position to align the indent centrally on the barrel and assure a good connection. In addition, the stop positions the cable conductor, whether insulated or uninsulated, at a proper crimping position within the barrel by stopping the wire or cable and preventing it from extending beyond the end of the barrel through the peephole. Complete contact of the wire or cable with the inside of the barrel is always assured. Finally, the spring characteristic of the stop allows it to flex with the movement of these terminals during the crimping operation, and does not interfere with the proper operation of the cold forging press.

While I have described above the principles of my invention in connection with specific apparatus, it is to be clearly understood that this description is made only by way of example and not as a limitation to the scope of my invention as set forth in the objects thereof and in the accompanying claims.

#### I claim:

1. In combination with a tool for attaching a wire to a terminal having a barrel and a tongue portion attached to said barrel, said tool including a fixed jaw, a movable jaw in opposing relation to said fixed jaw and means for moving said movable jaw with sufficient force towards said fixed jaw to crimp said terminal to said wire; flexible support means disposed laterally to said jaws and adapted to grip, axially orientate, and retain said tongue portion with respect to said jaws.

2. In combination with a tool for attaching a wire to a terminal having a barrel and a tongue portion attached to said barrel, said tool including a fixed jaw, a movable jaw in opposing relation to said fixed jaw and means for moving said movable jaw with sufficient force towards said fixed jaw to crimp said terminal to said wire; resilient clamping means attached to one of said jaws, said clamping means including a first element having an end portion adapted to abut the end of said barrel adjacent said tongue portion and a second spring-like element in opposed relationship to said first element adapted to grip, axially orientate and retain said tongue portion with respect to said jaws.

3. The combination of claim 2, wherein said one of said jaws include a recess in opposed relationship to the end portion of said first element and adapted to receive said end portion therein during crimping.

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