March 10, 1953 R. MARTINES 2,631,213

MACHINE FOR ATTACHING METALLIC TERMINALS TO METALLIC WIRE

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Fig. 1.

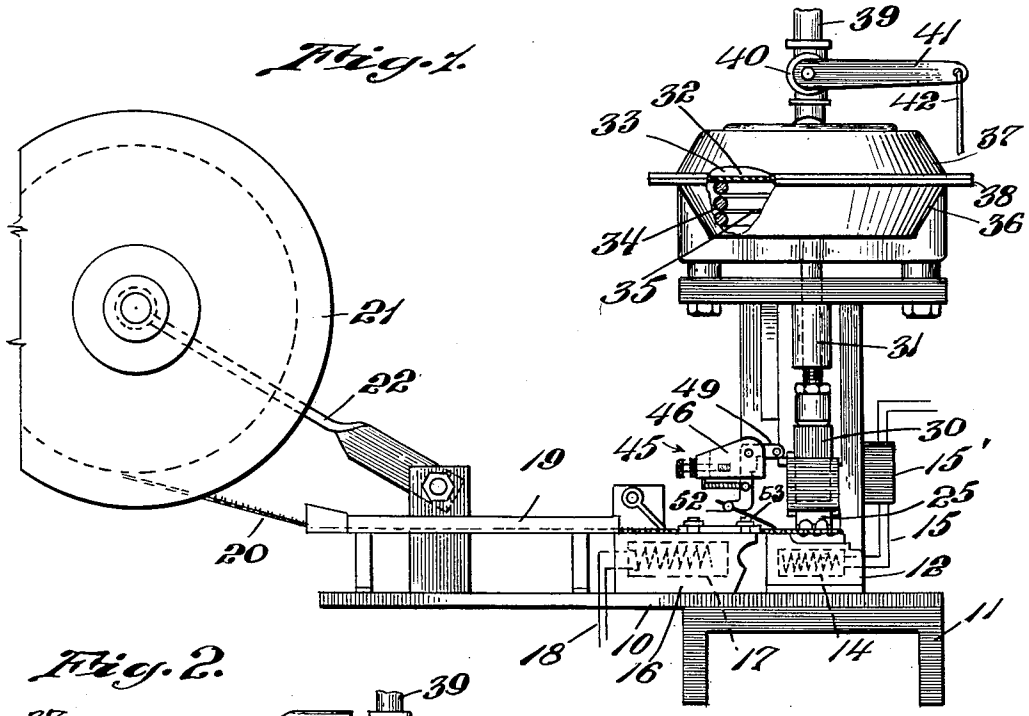


Fig. 2.

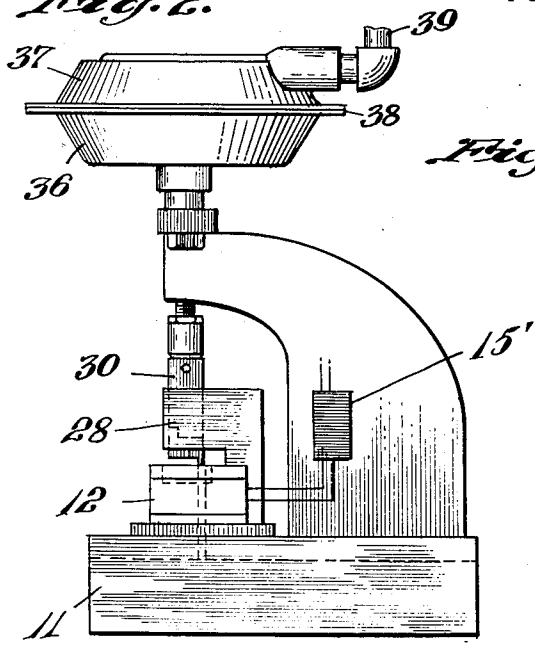
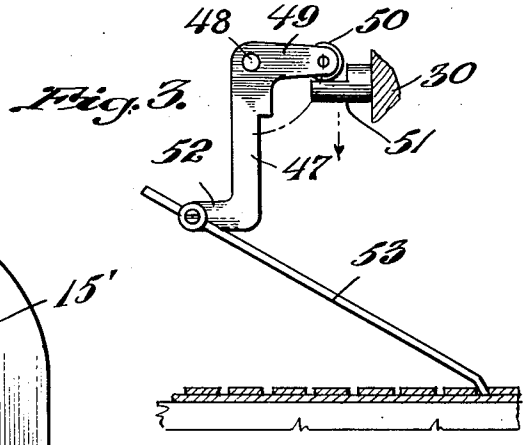


Fig. 3.



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Fig. 4

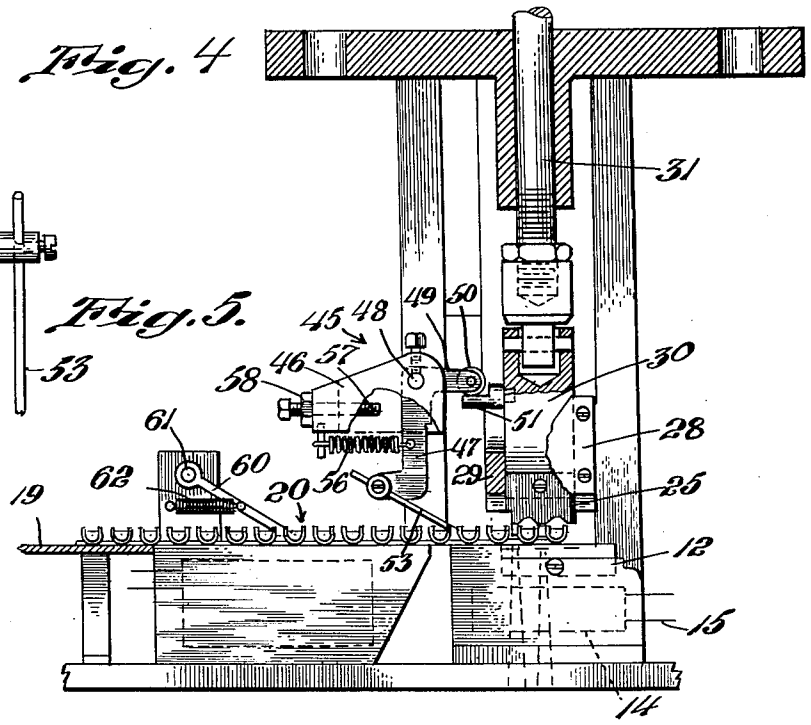


Fig. 5.

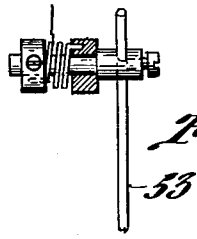


Fig. 6.

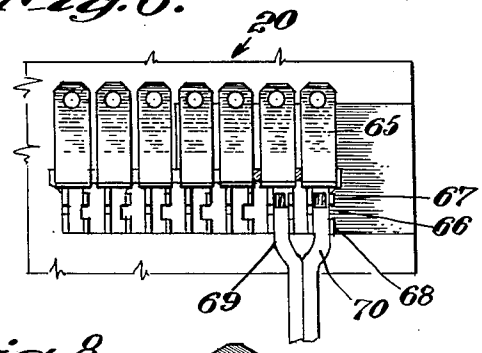


Fig. 7.

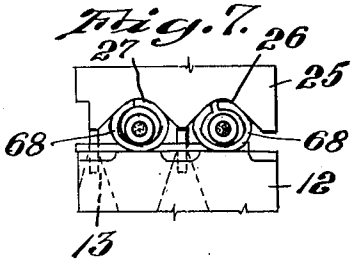
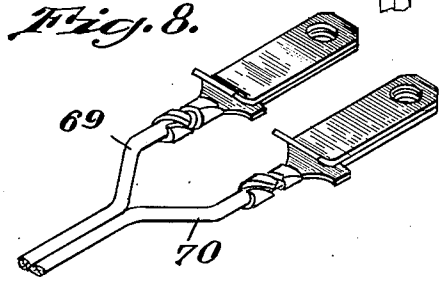


Fig. 8.



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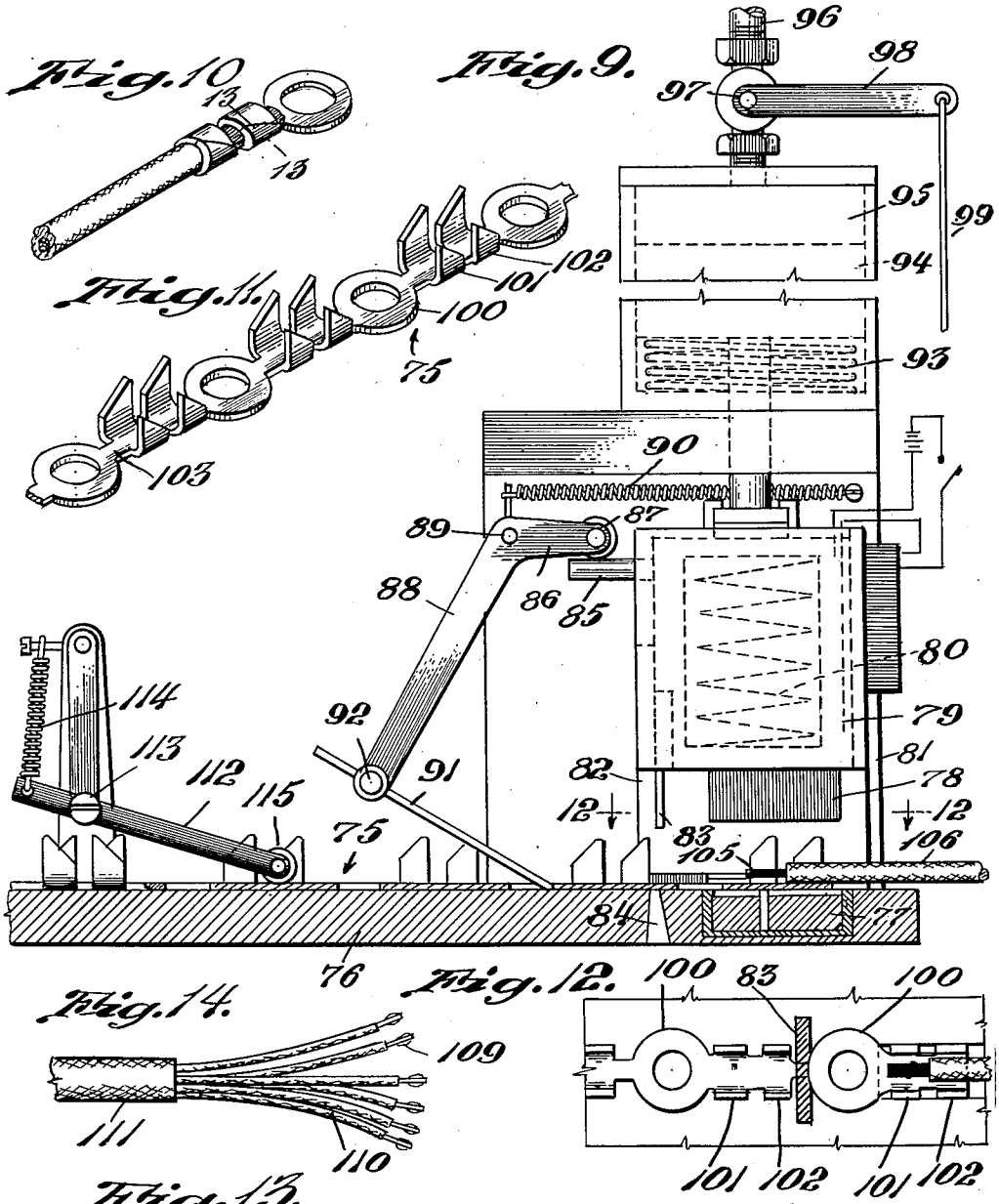
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MACHINE FOR ATTACHING METALLIC TERMINALS TO METALLIC WIRE

Filed Oct. 1, 1948

3 Sheets-Sheet 3



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Patented Mar. 10, 1953 2,631,213

UNITED STATES PATENT OFFICE

2,631,213

MACHINE FOR ATTACHING METALLIC TERMINALS TO METALLIC WIRE

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Application October 1, 1948, Serial No. 52,356

6 Claims. (Cl. 219—1)

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This invention relates to a machine for securing a metallic terminal on the end of metallic wire, which terminals may be used for making a connection of the wire to some contact for the transmission of electrical energy.

Heretofore, terminals have been formed either separately and attached to a metallic wire either by bending the stock of the terminal into a binding engagement with the wire or by soldering. In some cases where there has been an attachment of the terminal to the wire by bending into engagement with the wire and soldering was also desired, the soldering occurred as a separate and additional step.

One of the objects of this invention is to provide an apparatus in which a strip of terminals connected together may be fed into the apparatus to have the wires attached to the terminals in the apparatus.

Another object of this invention is to provide a means for attaching terminals to a wire in such a manner that a holding engagement will be provided by tightly bending the terminal into engagement with the wire to form a mechanical grip and simultaneously soldering to provide a better electrical connection between the wire and its terminal.

Another object of the invention is to provide a strip of terminals which may be fed into a crimping and soldering position where the wire may be attached by placing the same in the desired position and then tripping a lever to cause the bending and soldering to take place, and at the same time severing the one or more terminals which are attached to the wire from the strip and from each other if more than one terminal is attached.

Another object of the invention is to provide an apparatus for handling the terminals so that a person who operates the apparatus for attaching the terminal need not touch the terminal.

Another object of the invention is to provide an apparatus by which the attachment of terminals may be materially speeded up.

Another object of the invention is to provide an apparatus in which a package of spirally wound terminals may be loaded and fed to a position in which attachment to a wire may occur each time a foot pedal or other manual actuating device is actuated.

With these and other objects in view, the invention consists of certain novel features of construction, as will be more fully described and particularly pointed out in the appended claims.

In the accompanying drawings:

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Figure 1 is an elevation of the apparatus constructed in accordance with this invention;

Figure 2 is an end view of the structure shown in Figure 1;

Figure 3 is a detailed sectional view illustrating the feeding mechanism in greater detail than shown in Figure 1;

Figure 4 is a sectional view of a fragmental portion of the machine also showing the feeding and bending and soldering mechanism on a larger scale;

Figure 5 is a sectional view of details shown in Figure 4;

Figure 6 is a top plan view of a plurality of terminal units attached together in strip form at the point of severing of the units from the strip and showing the wires as located in the units;

Figure 7 is an end view of the two terminals being closed upon a wire as shown in Figure 5;

Figure 8 is a perspective view of a pair of terminals attached to a pair of wires;

Figure 9 is a view similar to Figure 4 illustrating a modified form of the machine;

Figure 10 is a perspective view of a terminal such as utilized in the machine shown in Figure 9 as attached to the end of a wire;

Figure 11 is a strip of terminals such as utilized in the machine of Figure 9;

Figure 12 is a sectional view on substantially line 12—12 of Figure 9 looking down on the machine;

Figure 13 shows a sectional view through the terminal as attached to the wire on substantially line 13—13 of Figure 10; and

Figure 14 is a plan view of a plurality of wires having solder attached to their ends prior to being positioned in the terminal for crimping and soldering.

In proceeding with this invention, I provide a pair of members which will move relatively toward each other to engage the arms of one or more terminals and bend these arms about the wire upon which the terminal is to be mounted. Some solder will be provided either by attachment to the terminal or to the wire to be present at the time of this bending and binding of the terminal on the wire. Within one or both of the members some sort of heating means will be provided so that as the members come together and dwell for a certain length of time, solder which is present will be melted simultaneously with the binding of the wire so that a soldered as well as a mechanical joint will be formed. For convenience in operation, a lever is provided for causing the relative movement of the members, and as the

movement of the members occurs, the terminals being in strip form will be fed by the movement of the members so as to advance after one terminal is completed so that another one will be presented in position for a similar operation. Any means may be provided for actuating the members to move toward each other, and such movement of the members toward each other will also serve to cut one or more of the terminals from the strip depending upon the number of terminals which are being operated upon.

With reference to the drawings, 10 designates the framework of a machine supported by legs 11 which will have an anvil block 12 supported thereon. This block will be recessed as at 13 (see Figure 7) to provide a shearing edge for a cutter for severing the terminals from the strip. Some electrical heating means 14 will be formed in this block for causing the same to rise to the desired temperature for melting solder which is present on the wire or the terminal to be secured to the wire. A thermostat 15' will control electric resistance circuit 15 for maintaining the desired temperature of the block which is a function of the dwell time of the die member 25. A second platform 16 is also provided with a heating means 17 for preheating the terminals as they are advanced into working position. A circuit 18 also thermostatically controlled is provided for control of the heat therein.

A trough or guide 19 serves to direct the strip of terminals designated generally 20 and shown in greater detail in Figure 6 along the guideway 19 to working position on the block 12. These strips may be suitably packaged upon a reel 21 in spiral form, which reel is supported by a bracket 22 from the frame 10 of the machine.

A member 25 in the form of a die serves to cooperate with the block 12 and is shaped as perhaps better shown in Figure 7 with recesses 26 and 27 so as to engage the arms of the terminal and bend these toward each other tightly into engagement with the wire as the member 25 descends, this member 25 attached to the plunger 30 which is guided as at 28 and 29 in its vertical movement. This plunger is attached to a rod 31 which is moved downwardly by a diaphragm 32 actuated by air pressure in the chamber 33 above it, the diaphragm being returned to neutral position by a spring 34 beneath it located in the chamber 35 all of which is located inside of the casing 36, 37 meeting as at flange 38. Air pressure is supplied to the air chamber 33 through the conduit 39 controlled by valve 40 and which may be actuated by lever 41 and control rod 42 which may extend to a position for either hand or foot operation.

Feeding mechanism designated generally 45 for the strip of terminals 20 comprises a bracket 46 in which a generally S-shaped lever 47 is pivoted as at 48 to have one arm 49 with roller 50 engaging a pin 51 projecting from the plunger 30, while the arm 52 at the other end of this lever 47 mounts a pawl 53. A spring 54 tends to swing the pawl 53 downwardly as shown in Figure 5. A spring 56 tends to swing the lever 47 about its pivot 48 so as to cause engagement of the roll 50 with the pin 51. A screw 57 serves as an abutment for the lever 47 to limit its swinging movement. A check nut 58 holds this screw 57 in position. As the plunger 30 moves upwardly, the pawl 53 will move another set of terminals into position beneath the member 25, the amount of stroke being adjusted by the stop 57. In order that the pawl may drag over the terminals without sliding them rearwardly, a second pawl 60 pivoted as at 61 and held in engagement with the terminals by a spring 62.

The terminals which are fed forward are in this particular instance designed for a plug for a base socket (see Figure 6) and comprises blades 65 with shanks 66 having pairs of arms 67 and 68 extending upwardly therefrom. The wires to be attached are usually in pairs and will be spread apart as at 69 and 70 (see Figure 6) so that these wires may be positioned in a pair of contiguous terminals which are at the end of the strip 20. These terminals will have some solder present between the arms, or the wires will have some solder on their ends. The terminals when in the position beneath the member 25 are ready for the member 25 to descend upon them and bend the arms 68 about the wires for attachment thereto. At the same time the heat which is present as at 14 will serve to melt the solder and cause a soldered as well as a mechanically-connected joint. However, the terminals only dwell at this station for a time sufficient to melt the solder and not scorch the insulation.

In some cases instead of the apparatus being arranged for taking terminals which are in parallel relation, the terminals may be in tandem relation as designated at 75 in Figure 11. This requires a narrow guideway such as 19 for these terminals and an entrance for the wire at the end of the machine. The machine may be otherwise somewhat modified as shown in Figure 9 where a table 76 is provided over which the strip of terminals 75 may be advanced into a position above a block 77 beneath the folding member 78. In this case the folding member is mounted upon a plunger 79 having a heating element 80 therein slidable in the guideways 81 and 82. Severing may occur by reason of a knife 83 which passes through the openings 84 in the table 76. The feeding of the terminals is by means of a pin 85 extending from the plunger 79 and engaging the arm 86 having roller 87 of the lever 88 pivoted as at 89 and swung clockwise about the pivot by spring 90. A pawl 91 pivoted as at 92 on the end of the arm 88 engages the strip of terminals 75 to feed them forward each time the plunger moves upwardly.

The plunger is moved upwardly by spring 93 beneath the piston 94 while there is an air chamber 95 for the receiving of air through conduit 96 controlled by valve 97 with lever 98 and actuating rod 99 which may extend to be actuated either by hand or by foot. The terminals in this case each comprise a head 100 and two sets of arms 101 and 102. Solder may be carried between these arms, if so desired. A neck 103 connects the head at one end with the shank of another unit, which neck is severed by the cutter 83 as the bending or crimping of the arms about the wire and soldering occurs.

As the link 99 and valve 97 are actuated, the plunger will descend and bend the arms about the wire end 105 and its insulation 106, and this die will dwell or stay in contact with the terminals a sufficient length of time to transmit heat enough to the terminal to melt the solder therein but not scorch the insulation 106 and provide a soldered connection, as well as a crimp connection of the terminal on the wire. The block 77 may also have a projection which extends upwardly so as to indent the bent portion around the terminal as at 108, as shown in Figure 13.

In some cases the solder may be attached to

the ends of the wire before inserting in the terminal as 109 shown in Figure 14, in which case this may be by dipping the plurality of ends 110 which are assembled in a conduit 111. In order that there may be no sliding rearwardly of the strip terminals, an arm 112 is provided, pivoted as at 113 and swung downwardly into firm engagement with the terminals by spring 114 where its roller 115 engages these terminals in strip form.

I claim:

1. A machine for attaching an electrical connector having two pairs of ears extending laterally from the body to an electrical conductor having a bare end and an insulating covering adjacent said end comprising a stationary die and a movable die, said dies being so shaped as to bend a first pair of ears of the electrical connector inwardly and around said bare end and the other pair inwardly and around the insulating covering, a platform adjacent to and on the same level as said stationary die, means for advancing a strip of electrical connectors toward said dies over said platform and means for heating one of said dies to a temperature sufficient to melt solder yet insufficient to cause scorching of the insulation, said means being thermostatically controlled as a function of time.

2. A machine as in claim 1 wherein means are provided to heat said platform ahead of said dies to raise the temperature of the connectors to less than that required to melt solder and wherein solder is between said first pair of ears.

3. A machine as in claim 1 wherein means are provided to sever an electrical connector from the strip as the dies move toward each other, said means comprising one or more knives attached to said movable die.

4. A machine for attaching electrical conductors having a bare end and an insulating covering adjacent said end to an electrical connector having two pairs of ears extending laterally from the body comprising a stationary die and a movable die, said dies being so shaped as to bend a first pair of ears of the electrical connector inwardly and around said bare end and the other pair inwardly and around the insulating covering, a platform immediately adjacent said stationary die and on a level therewith, said platform formed with means for guiding electrical connectors to said dies, a pawl for feeding said connectors to said dies, said pawl being responsive to the movement of said dies, and means for heating one of said dies to a temperature sufficient to melt solder.

5. A machine as in claim 4 wherein means are provided to heat said platform ahead of said dies to raise the temperature of the connectors to less than that required to melt solder and wherein solder is between said first pair of ears.

6. A machine as in claim 4 wherein means are provided to sever an electrical connector from a strip as the dies move toward each other, said means comprising one or more knives attached to said movable die.

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