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L. GREER

2,775,283

CRIMPING PRESS

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FIG. 1.

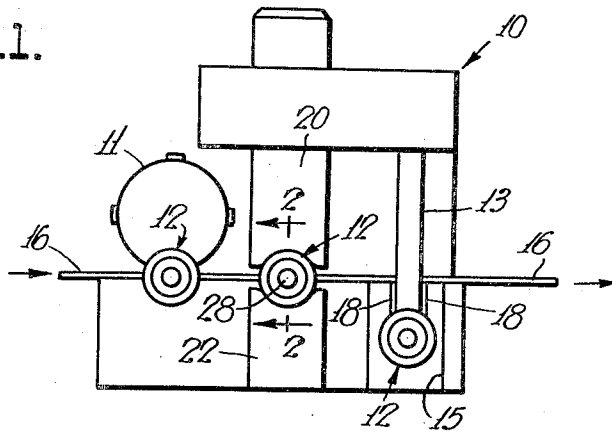


FIG. 2.

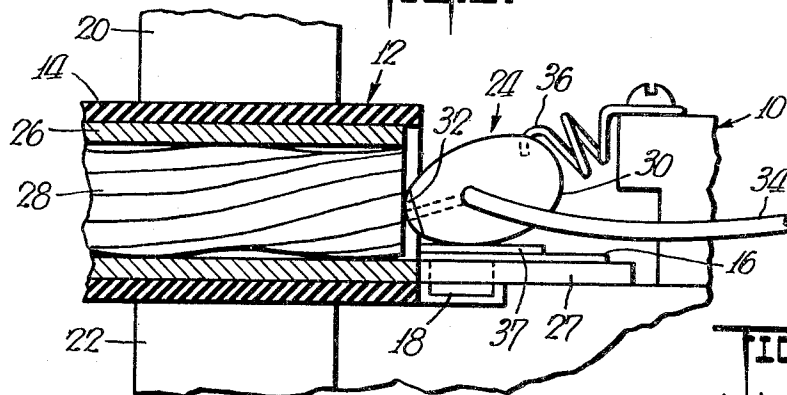


FIG. 3.

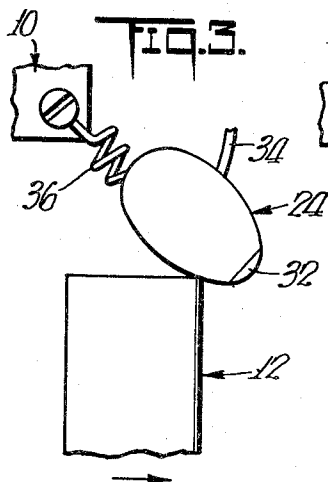


FIG. 4.

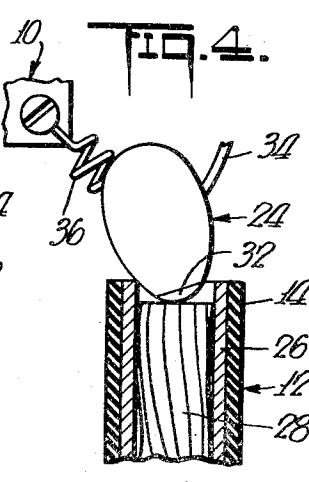
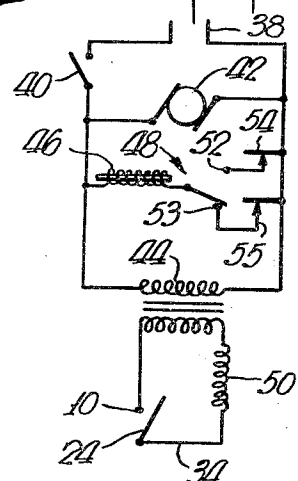


FIG. 5.



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2,775,283

CRIMPING PRESS

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Application January 24, 1956, Serial No. 561,024

6 Claims. (Cl. 153-1)

My invention relates to a crimping press, and more particularly to a press adapted to crimp an electrical connector automatically when a conductor has been fully inserted into the connector.

Machines have previously been designed that crimp the conductor ends to connectors mounted on a continuous strip. Such a machine is illustrated in the copending application of C. B. Pellier, Serial No. 346,008. This apparatus crimps the first connector on the strip; mechanically removes the crimped connector from the strip; and feeds and positions the next connector into the crimping area.

For the most part, these machines require an operator to insert and hold the conductor in the connector. The operator then steps on a foot pedal or depresses a button or lever with the free hand. In these cases, the actuating means is either mechanical, electro-mechanical, or pneumatic. However, high rates of connector installations are difficult to attain here. There is also no assurance that the operator has inserted the conductor fully into the connector barrel. This is necessary for a connection to be mechanically and electrically sound.

Similar strip-fed installation machines have been designed to incorporate an electro-mechanical actuating mechanism without the use of a foot pedal or button as described above. In these cases the conductor to be installed induces the machine to perform its duties. A lever is positioned near the back of the connector barrel. The end of the conductor, when inserted into the connector, pushes the lever. In turn the lever pushes a limit switch which closes an electrical circuit. This permits the machine to go through its cycle. The basic objection to this type of actuator is the difficulty encountered installing small conductor sizes. These conductors are not strong enough to push the lever and close the limit switch. The conductor usually bends without an installation occurring. Also, a small force on the operator's part is required to move the lever and limit switch contacts. This tends to produce low rates of installation and results in operator fatigue.

The object of this invention is to provide an efficient electrical actuating means for automatically controlling the operation of such a strip-fed connector installation machine that overcomes the foregoing difficulties.

In my actuating means, the end of the conductor is the controlling element. Another object is to provide such a control that eliminates the need for a firm pressure. Included in the control is the alternative operation of the machine by means of a foot pedal, if desired, through a selector switch. This switch can change the electrical circuits from automatic operation to foot pedal operation and vice versa.

I accomplish these and other objects and obtain my new results as will be apparent from the device described in the following specification, particularly pointed out in the claims, and illustrated in the accompanying drawing in which:

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Fig. 1 is a front elevation illustrating diagrammatically an indenting press incorporating my invention.

Fig. 2 is a fragmentary sectioned view taken in the plane 2-2 of Fig. 1.

Fig. 3 is a diagrammatic top plan representation of a connector moving into position.

Fig. 4 is a similar view of the connector in position for crimping.

Fig. 5 is a schematic electrical circuit which may be employed.

Fig. 1 shows diagrammatically a typical press 10 provided with crimping dies used to crimp wire conductors to connectors mounted in strip form. In the particular strip employed, the connectors 12 provided with insulating covers 14 (see Fig. 2), are individually clamped to a strip 16 by deformed prongs 18 extending from the strip. Further details are disclosed in the copending Pellier application. The strip is advanced by suitable means such as a sprocket wheel 11 which engages an aperture in the strip and places the mounted connectors successively between the open crimping dies. In this position, the bared end of the conductor is inserted into the barrel until it electrically engages a contact. This causes the mechanism to operate the press and crimp the connector, which is thereafter advanced to the next station, where a pin 13 pushes the crimped connection away from the strip through slot 15, opening the prongs which clamp the connector at the neck thereof. The crimped connections may alternatively be retained on the strip for other operations.

The crimping mechanism consists of the upper die 20 which performs the crimping operation against the connector supported on the bottom die 22. A spring biased contact 24 is positioned behind the barrel 26 of the connector to engage the conductor end 28 inserted into the connector barrel. The conductor-engaging contact 24 comprises a plastic shell 30 having an electrical contact tip 32 inset on an end thereof, which is connected to a flexible electrical lead 34. The contact is integrally secured to a pressure spring 36 mounted to the press. As shown in Figs. 1, 3 and 4, the strip is advanced in the press in the direction of the arrows. The connector barrel brushes against the contact body which is flexibly supported on the pressure spring, allowing the contact plate tip 32 to fall into position adjacent the mouth of the connector barrel 26, where it is engaged by the conductor end. A shield 37 may be positioned under the contact 24, as shown in Fig. 2, to prevent abrasion from the tongues 27 of the connectors as they move by on the strip.

The diagram shown in Fig. 4, illustrates the circuit which may be employed to provide the desired automatic tripping mechanism. The power supply may consist of a conventional 115 volt, 60 cycle source 38 leading to a main switch 40 for operating the press motor 42 used to drive the press. With switch 40 open, the entire circuit is inoperable.

Extending in parallel from the motor, the circuit is connected to the primary of a transformer circuit 44 and to solenoid coil 46 mounted in series to the selector switch 48 hereinafter described. The secondary circuit of the transformer contains in series a relay coil 50 connected to the flexible lead 34 of the switch contact tip 32. The other end of the secondary is grounded to any non-moving metal part of the press 10.

The selector switch 48 comprises contacts 52 and 53 for setting the circuit for foot or automatic operation, respectively, as desired. Contact 54, normally open, is located in the foot pedal. Contact 55 is a normally open contact located on the relay operated by coil 50 used for automatic operation.

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The operation of the circuit for automatic operation of the press is as follows:

The continuous strip 16 on which are mounted the connectors 12, is fed into the press with the first connector being placed between the crimping dies 29 and 22. The switch 40 is then closed. This starts motor 42 and permits the tripping circuits to be operative, depending on the position of the selector switch. By closing the contact 53, the machine is in readiness for automatic operation. The transformer is also energized when switch 40 is closed.

The conductor end 28 to be installed is then inserted into the connector to be crimped. When the conductor is fully inserted in the barrel, the end of the bare conductor must necessarily touch the inside of the connector barrel. The connectors are in electrical contact with metal parts in contact with the metal frame of the press itself. This completes the circuit between the press and the contact 24, which circuit includes the transformer and relay coil 50. The relay coil is thereby energized and in turn closes contact 55. The circuit to the solenoid coil then closes and the solenoid is energized. The action of the energized solenoid trips the clutch of the punch press (not shown here), which action causes the dies to close. The connector is then crimped onto the conductor and ejected from the crimping area. It is then removed from the continuous strip while the next connector on the strip is moved into crimping position. The procedure can then be repeated.

To operate the machine by means of the foot pedal, the selector switch 48 must be turned to close contact 52. This removes relay contact 55 from the operating circuit and introduces contact 54 of the foot pedal into the circuit. Depressing the foot pedal closes contact 54 and energizes solenoid 46, to operate the clutch, as aforesaid.

In the foregoing I have described a crimping apparatus for installing connectors fully onto even very small conductors, quickly and easily without operator fatigue, and at a high rate of production. The connections so produced are mechanically and electrically satisfactory. Should an unstripped conductor be accidentally inserted into a connector, the insulation would prevent completion of the circuit and thus crimping of an insulated conductor end would be prevented.

I have thus described my invention, but I desire it

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understood that it is not confined to the particular forms or uses shown and described, the same being merely illustrative, and that the invention may be carried out in other ways without departing from the spirit of my invention, and, therefore, I claim broadly the right to employ all equivalent instrumentalities coming within the scope of the appended claims, and by means of which, objects of my invention are attained and new results accomplished, as it is obvious that the particular embodiments herein shown and described are only some of the many that can be employed to attain these objects and accomplish these results.

I claim:

1. A press for crimping an electrical connector to a conductor, which comprises a contact positioned adjacent the end of the electrical connector in the crimping position, operating means for controlling the motion of the press, connecting means from the contact to the operating means and connecting means from the operating means to the metal of the press whereby the circuit is closed to the operating means when a conductor inserted into a connector engages the contact.

2. The press of claim 1 wherein the contact is mounted on a spring holding the contact in normal operating position.

3. The press of claim 1 wherein the contact comprises a metal tip enclosed in an insulating housing having an opening for the metal tip to project therethrough.

4. The press of claim 1 wherein a selector switch is provided having alternate circuit controls for selecting manual or automatic operation.

5. The press of claim 2 wherein a protective shield is provided for the contact during movement thereof.

6. A circuit for operating a press which comprises a source of electricity, means for operating the press, a main switch, parallel circuits including a solenoid circuit and a transformer circuit, said solenoid circuit including a selector switch for controlling a foot operated contact and an automatically controlled contact, said transformer circuit including a relay coil for operating the automatically controlled contact, and a conductor engaging contact, whereby a connector into which the conductor is inserted may be crimped by the press.

No references cited.