June 2, 1959 D. DIBNER 2,889,422

SWITCH FOR A PRESS

Filed May 27, 1955

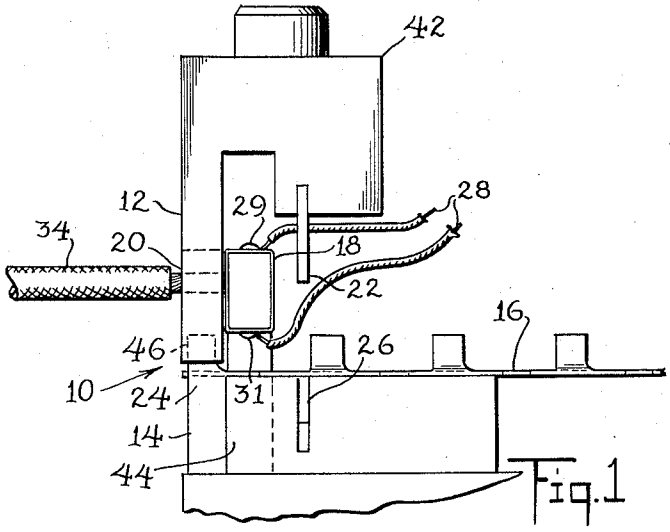


Fig. 1

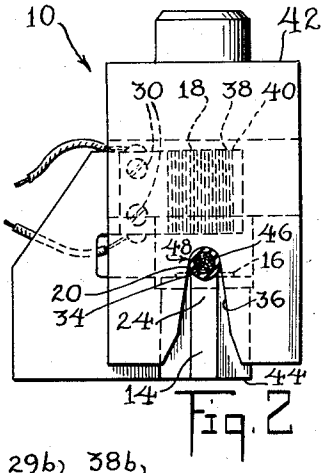


Fig. 2

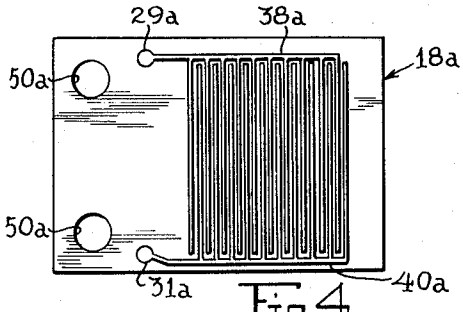


Fig. 4

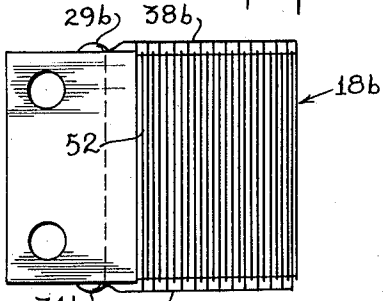


Fig. 5

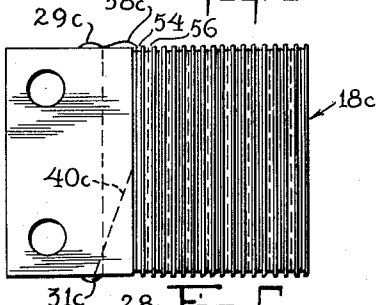


Fig. 6

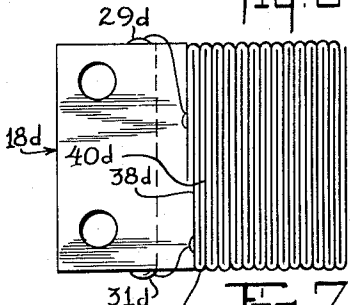


Fig. 7

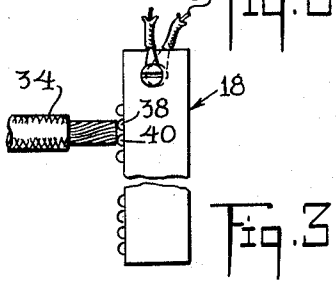


Fig. 3

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2,889,422

Patented June 2, 1959

2,889,422

SWITCH FOR A PRESS

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Application May 27, 1955, Serial No. 511,659

6 Claims. (Cl. 200—61.59)

My invention relates to a device for closing the electric circuit which controls the movement of the dies in a press.

A simple, inexpensive and instantaneously operated automatic tripping device is required, for example, to operate a high speed, strip terminal installation machine. Today's requirements for low cost, high volume solderless terminals require automatic installation machines which accept solderless terminals in strip form and which crimp these terminals around pre-stripped wires when the wires are inserted in the crimping portion of the machine by the operator. Because these terminals are consumed in huge quantities, and because speed of installation is a prime factor in the acceptance of such terminals and installation tooling by high production manufacturers, it is of utmost importance that the installation machines perform the operation of assembling the terminal to the wire in a minimum amount of time. The most common type of terminal employed in high production, low cost applications are the so-called open barrel terminals, where the barrel of the terminal consists of a U-shaped piece which is curled and closed around the conductor by the installation die. As a method of increasing the speed of operation of installation machines used with open barrel terminals, the stripped wire is inserted inside the die and against a stop plate, after which the press is engaged and the movable section of the die carries the wire down into the barrel and closes the barrel around it. The fact that the operator doesn't have to insert the wire in the barrel initially, but can simply place the wire within a considerably larger area and have the die carry the wire into its proper location, means a considerable increase in the speed of operation of such installation machines.

One method of operating the dies employs a foot switch which requires the operator to step on the switch to trip the press as soon as he has inserted the wire into the terminal. In speeding production with this method, even skilled operators frequently close the switch before a wire is fully inserted into the terminal, thereby making a faulty connection difficult to detect.

A second method employs a pressure plate at the rear of the terminal which is attached to a micro switch. When the operator inserts the wire into the terminal and presses the plate, the switch is closed, tripping the press. This method avoids the limitations of the foot switch but has one of its own, namely that in view of small diameters, insufficient strength exists to permit the firm pressure against the plate required to operate the switch.

The third method requires an electric circuit between the terminal, the inserted wire, and a contact plate placed at the rear of the terminal. When the wire is inserted into the terminal, it closes the circuit between the terminal and the contact plate. Closing the circuit activates a relay which in turn closes the switch controlling the movement of the dies. This method is unsuited for some types of terminals.

The principal object of my invention is to provide a simple, inexpensive and instantaneously operated automatic tripping device for operating a high speed press, especially in the forming of terminal connections.

Other objects are to provide a tripping device which is sufficiently large to permit contact anywhere on the device rather than in a specific position, that is foolproof, that does not require firm pressure, and that will not operate before the wire is fully inserted.

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:

Fig. 1 shows diagrammatically a side elevation of a typical die installation incorporating my invention with the die parts opened to receive a conductor for indentation to a connector.

Fig. 2 is a front view thereof with the conductor shown in section.

Fig. 3 is a fragmentary side elevation of a form of contact plate.

Figs. 4, 5, 6 and 7 are front views of various types of contact plates forming my invention.

Fig. 1 shows a typical press **10** provided with crimping dies used to install open barrel strip terminals. The die consists of the top half **12** which performs the crimping and the bottom half **14** which supports the strip terminals **16** during crimping. An electrified contact pad **18** constructed in accordance with my invention is located just behind the crimping portion **20** and in front of the shear blade **22**. The specific terminal being crimped is located over the anvil **24**. Slot **26** receives the shear knife when the dies are closed.

Normally used and not shown is a clutch which activates the press operated by an electric solenoid whose circuit is closed by the electrified contact pad. Wires **28** carry the potential from the connections **29** and **31** of the electrified contact pad **18** to the solenoid. Screws **30** hold the electrified contact pad against the support bracket **32**.

In the normal, open position of the die, the wire **34** is inserted inside the die through the large opening **36** provided above the terminal and underneath the terminal crimping portion **20**. The operator places the wire against the electrified contact pad **18**. This pad, as shown in Figs. 2 and 3, consists of alternate spaced apart conductors **38** and **40**. The conductors **38** and **40** are positioned almost flush with the surface of the pad **18**, the representation in Fig. 3 being exaggerated. A smooth surface on the contact pad is desirable so as to provide the least resistance against the end of the conductor when it is carried by the crimping die down into the terminal.

As soon as the wire **34** touches electrified contact pad **18**, it closes the circuit between any two or more of the electrified strips, thereby closing the circuit and tripping the press. Therefore the operator need only to touch the wire to any portion of the contact pad in order to activate the press.

The position of the installation dies during the closed, or crimping, portion of the cycle is shown in Fig. 2. Here the crimping portion **20** has moved down with the ram **42** against the base **44** and anvil **24** carrying the wire **34** with it and forcing it into the open barrel terminal **16**. The crimping die portion **20** has folded the U-shaped barrel **46** around the conductor **34** forming the final, crimped connection **48**. Simultaneous with the crimping stroke of the die the shear blade **22** has severed the first terminal and has entered the groove in the base which received it and the portion of the terminal strip which has been sheared free. The circuit between wires **38** and **40** becomes open again. When the die returns to its original position, as shown in Fig. 1, the terminal which has been crimped around the wire is now free from the original strip and is removed with the

wire from the die. The strip is then automatically advanced by a mechanism, not shown, so that the next terminal is in position over the anvil 24 and is ready for another wire.

In another variation of this type of strip-terminal crimping die, the terminals may be positioned side-by-side instead of extending end-to-end in line as shown in Fig. 1. The same electrified contact pad can be applied with equal effectiveness with this type of arrangement.

Various methods for fabricating the contact pad are possible. A printed circuit contact pad 18*a* is shown in Fig. 4. The two circuits which comprise the electrified part of the contact pad are made up by printing patterns 38*a* and 40*a* which are interspaced strips of electro-deposited metal. Each two adjacent strips therefore have an electrical potential between them. Lead wires are attached to the contact pad at connections 29*a* and 31*a*. The screw holes 50*a* are for the attachment screws 30.

A sandwich or laminate contact pad 18*b* is shown in Fig. 5. Here the alternate contact strips are made by cementing or bonding alternate strips of metal 38*b* and 40*b* with plastic spacers 52 in between so that every succeeding metal strip protrudes from opposite sides of the laminate where the strips of the same electrical circuit are joined together and attached to the respective lead wire terminals 29*b* and 31*b*. The metal strips may be made of copper or brass and the spacer strips can be made of any suitable dielectric material.

The wire wound contact pad 18*c* shown in Fig. 6, is provided with sets of small parallel grooves 54 and 56 machined or molded on the front side and between the two lateral edges of the pad. Two separate wires 38*c* and 40*c* are then wound around the pad in alternate grooves in such a manner that the two wires provide the alternate potential contacts required. One end of each wire is attached to the lead wire contacts 29*c* and 31, respectiveiy, and the other ends are terminated separately at the right side of the contact pad.

In the folded laminant contact pad 18*d* of Fig. 7, potential strips are formed by folding and refolding a thin plastic strip 58 which has been coated with a metal film 38*d* and 40*d* on its two sides. The folded strip is then cemented together so as not to unfold. Thus by making contact to both of the two separated metallic surfaces of the strip, the two alternate potential strips can be attached to the lead wire contacts 29*d* and 31*d*.

The electrified contact pad forming my invention permits instantaneous electrical tripping of the press when the wire being installed in a terminal is placed anywhere on the large contact pad surface, thus permitting an operator far greater speed than if the wire had to be placed in one specific position before crimping.

In addition, the electrified contact pad permits instantaneous operation of the press involving the use of open barrel terminals and stop plates. The electrified contact pad permits fool-proof, instantaneous, automatic installation dies even when wires as fine as AWG #22 and 24 are used, where previously such fine wires would not perform satisfactorily with other methods of automatic tripping.

The electrified contact pad has no moving parts which can wear, go out of adjustment, or require maintenance.

With the electrified contact pad of my invention, perfect connections are assured in that the installed wires must be inserted to the proper distance before the press can be tripped.

I have thus described my invention, but I desire it 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 having upper and lower die parts for pressing a metal part thereto and operating means to cause the die parts to press the metal part, an electrical circuit connected to said operating means, a switch in said circuit positioned adjacent the die parts and supported thereto, comprising an insulating base member and a pair of electrical conductors having exposed surfaces projecting above the insulation of the base member, said conductors being positioned sufficiently apart to prevent contact with each other, whereby a metal part extending through the die parts may directly engage adjacent conductors and cause a flow of current in the circuit to operate the press.

2. The press of claim 1, wherein the pair of conductors in the switch extend over an area substantially larger than the end of the metal part to enable the metal part to close the circuit by striking any portion of the area.

3. A switch for closing a circuit comprising a supporting rigid base, a pair of electrical connections and a pair of printed electrical conductors mounted on said base and leading to said connections, said conductors having exposed surfaces and being positioned just sufficiently apart to prevent contact with each other and projected above the level of the base to permit direct contact therewith, whereby the circuit is closed by any metallic object touching the electrical conductors.

4. A switch for closing a circuit comprising a supporting rigid base, a pair of electrical connections and a pair of electrical conductors wound about said base and leading to said connections, said conductors having exposed surfaces and being positioned just sufficiently apart to prevent contact with each other and projected above the level of the base to permit direct contact therewith, whereby the circuit is closed by any metallic object touching the electrical conductors.

5. A switch for closing a circuit comprising a supporting rigid base, a pair of electrical connections and a pair of electrical conductors mounted on said base and leading to said connections, said conductors having exposed surfaces and being positioned just sufficiently apart, by a plurality of layers of insulating material, to prevent contact with each other and projected above the level of the base to permit direct contact therewith, whereby the circuit is closed by any metallic object touching the electrical conductors.

6. A switch for closing a circuit comprising a supporting rigid base, a pair of electrical connections and a pair of electrical conductors mounted on a sheet of flexible insulation material folded to produce a laminate structure with the electrical conductors extending therefrom and leading to said connections, said conductors substantially transversing said base a plurality of times and having exposed surfaces and being positioned just sufficiently apart to prevent contact with each other, projected above the level of the base to permit direct contact therewith, whereby the circuit is closed by any metallic object touching the electrical conductors.

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