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CONDUCTOR SPLICING MACHINE

Filed Oct. 21, 1929

2 Sheets-Sheet 1

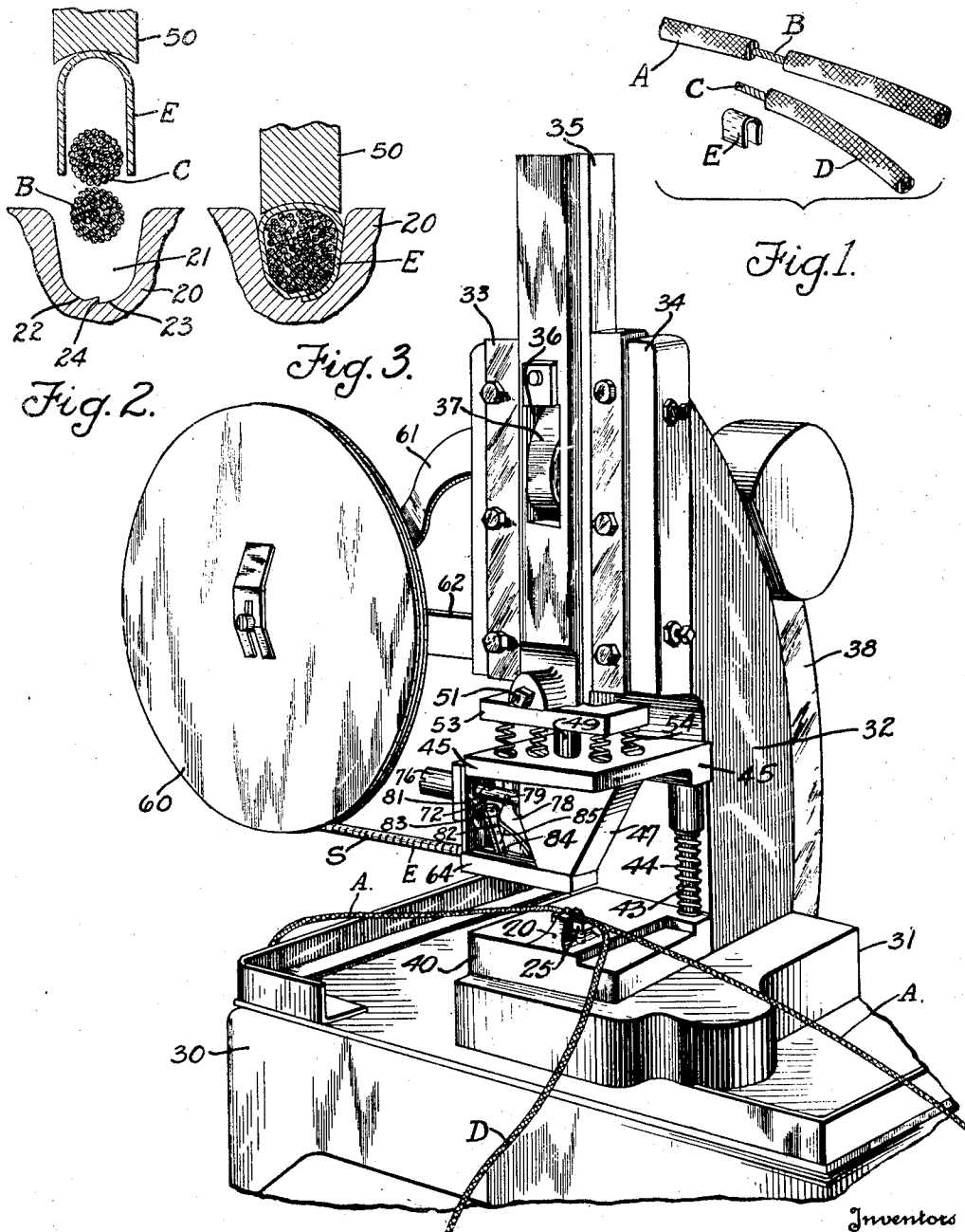


Fig. 4.

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2 Sheets-Sheet 2

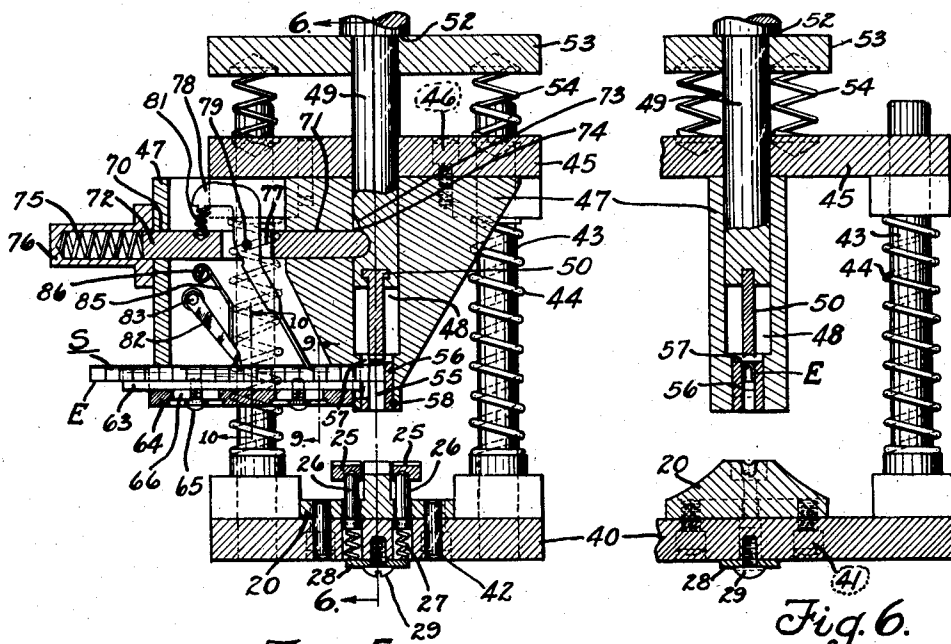


Fig. 5.

Fig. 6.

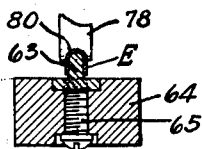


Fig. 9.

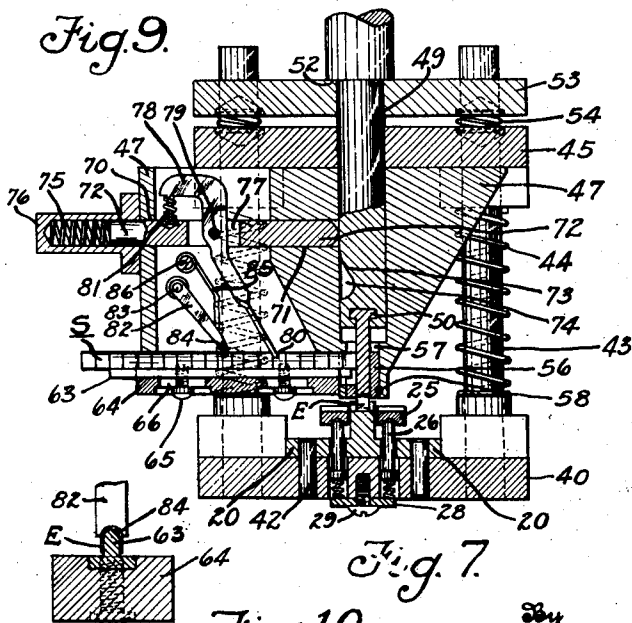


Fig. 7.

Fig. 10.

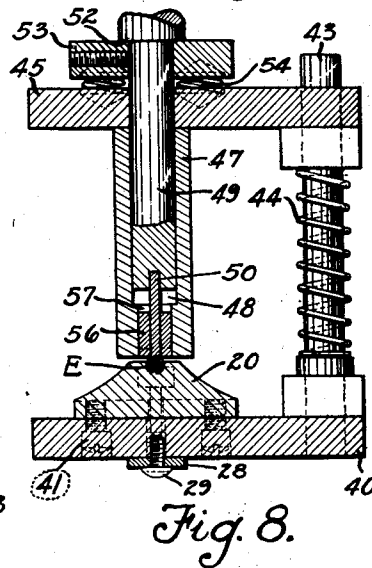


Fig. 8.

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CONDUCTOR SPLICING MACHINE

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This invention relates to apparatus for splicing electrical conductors, and its principal object is to fasten the conductors together by a metal band or clip which afterwards may be soldered to prevent corrosion at the spliced joint.

This object of the invention is accomplished in the disclosed embodiment thereof by providing an anvil for receiving superposed portions of wires to be joined, and means for forcing a U-shaped clip around the wires and against the sides of the anvil which has a recess so shaped as to cause the ends of the U-shaped clip to embrace the wires and firmly squeeze them together. The U-clips are automatically fed from a supply reel of clip material and are severed one at a time by a shearing punch which also forces the severed clip around the wires received by the anvil. The clip material preferably consists of a continuous series of short lengths of flexible metal U-shaped in cross section, these lengths being separated at the sides of the U, but all joined together at the bend of the U. Therefore, each U clip is severed from the supply strip as needed by shearing it at the bend of the U.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings wherein a preferred embodiment of one form of the present invention is clearly shown.

In the drawings:

Fig. 1 is a fragmentary perspective view of the wires to be spliced and one of the U clips.

Figs. 2 and 3 are diagrammatic views which respectively show in cross section the wires, clip, anvil and punch before and after forming the clip around the wires.

Fig. 4 is a perspective view of a machine embodying the present invention.

Fig. 5 is a vertical sectional view taken through the gear, punch and anvil on a plane which includes the front side edge of the supply strip A shown in Fig. 4. Fig. 5 shows the apparatus before the clip is attached to the wires.

Fig. 6 is a sectional view on line 6—6 of Fig. 5.

Figs. 7 and 8 are views similar to Figs. 5 and 6 respectively and show the apparatus after the clip has been attached to the wires.

Fig. 9 is a sectional view on the line 9—9 of Fig. 5.

Fig. 10 is a sectional view on the line 10—10 of Fig. 5.

Referring to Fig. 1, the end portions of conductors may be joined or the intermediate portion of wire may be joined to an end portion of another. In Fig. 1 an insulated wire A has a portion of its insulation cut away to expose a conducting portion B which is to be joined to the bared portion end C of an insulated wire D. E designates the U-shaped clip for attaching the parts B and C. By means to be described, the parts B, C and E are located as shown in Fig. 2 between an anvil 20 and a punch 50 which forces these parts into the cavity 21 of the anvil as shown in Fig. 3, thereby causing the clip E to be squeezed around the wires B and C.

The apparatus embodying the present invention is adapted to be applied to what is commonly known as a kick press or foot operated press which comprises a table 30 which supports a base block 31 integral with a bracket 32 which provides ways 33 and 34 which support and guide a vertically movable slide 35 having a recess 36 for receiving the end 37 of a kick press lever 38, the lower end of which carries a pedal (not shown), and the intermediate portion of which is pivotally supported by the table 30 on an axis substantially vertically below the slide 35. The pivotal support for the lever 38 is not shown as that detail of construction is familiar to those skilled in the art. To the base 31 is attached a plate 40 carrying an anvil 20 which, as shown more clearly in Fig. 2, has a work receiving recess 21, the bottom of which is defined by arcuate surfaces 22 and 23 which are substantially concentric but which have different radii, and which are joined by a shoulder 24. On each side of the anvil 20 as shown in Fig. 5 there is located a pad 25 attached to the upper end of a rod 26 which is urged upwardly

by a spring 27, the lower end of which bears against a plate 28 secured by a screw 29 to the plate 40. The anvil 20 is secured to the plate 40 by screws 41 and is located by dowels 42. The plate 40 carries pilot rods 43 surrounded by springs 44 which tend to maintain in normal, upper position a plate 45 to which there is attached by screws 46 a frame 47 having a cylindrical recess 48 for receiving a rod 49 to which the punch 50 is attached. The rod 49 is secured to the slide 35 by a set screw 51. The rod 49 provides a shoulder 52 for engaging the upper side of a plate 53 through which the rod 49 passes. The plate 45 is normally maintained separated from the plate 53 by four springs 54, the ends of which are received by suitable recesses in the plates 53 and 45. The punch 50 is in vertical alignment with an aperture 55 in a hard metal block 56 which is externally cylindrical and is received by a round hole 57 in the frame 47 and which is secured in position by pin 58. The strip S of connected U clips E is fed from a supply reel 60 supported by brackets 61 and 62 and is moved along a bar 63 supported by a plate 64 which is attached to the frame 47. The screws 65 which attach the bar 63 to the plate 64 pass through the elongated holes 66 in the plate 64 thereby permitting endwise adjustment of the bar 63 when the screws 65 are loosened in order that the bar 63 may be secured in the desired position with its right hand end in vertical alignment with the left hand side of punch 50 as viewed in Fig. 5. The bar 63 is made of hard metal and cooperates with the punch 50 to sever that clip E which is within the aperture 55 from the strip S.

In a manner to be described, relative movement takes place between the rod 49 and the frame 47 and this relative movement is employed for the purpose of operating an automatic mechanism for feeding the strip S toward the right as viewed in Figs. 5 and 7. The frame 47 provides aligned apertures 70 and 71 for receiving and guiding a horizontally slidable rod 72 having its right hand end rounded off so as to cooperate with a camming surface 73 provided by the rod 49 and defining a notch 74 which receives the rod 72 when the rod 49 is in the upper position as shown in Fig. 5. A spring 75 retained by a spring retainer tube 76 attached to the frame 47, urges the rod 72 toward the right. The rod 72 is provided with an opening 77 for receiving a feed lever 78 pivoted upon a pin 79 and provided at its lower end with a sharp arcuate edge 80 which embraces the U or bend of the strip of U slips, said edge 80 being urged into engagement with the strip S by a spring 81 located between the rod 72 and the upper end of the lever 78. Movement of the strip S toward the left is prevented by a pawl 82 pivoted

at 83 upon the frame 47 and provided with an arcuate end edge 84 for embracing the U portion of the clips E. This end edge 84 is urged into engagement with the strip S by spring 85 bearing at its lower end against the pawl 82 and fixed at its upper end to a stud 86 attached to the frame 47.

The operation of the apparatus is as follows: The wires A and B to be joined are placed upon the pads 25 in the manner shown in Fig. 1, the bare portion C of the wire D resting upon the bare portion B of the wire A as indicated diagrammatically in Fig. 2. The lever 38 is moved by a pedal (not shown) in such direction as to cause the slide 35 to move downwardly carrying with it the rod 49 and the plate 53. During this downward movement of rod 49, the frame 47 moves downwardly until its lower side engages the work located upon the anvil 20 and pads 25. After motion of the frame 47 is arrested, the rod 49 continues to move the punch 50 downwardly in order to shear that clip E which is received by the aperture 55 and to force the severed clip through the aperture 55 and down upon the anvil 20. One of the branches of the clip will be forced along the surface 23 until it engages the shoulder 24 of the anvil and the left hand branch will be forced along the surface 22 so that the clip will be caused to tightly embrace the wire portions B and C, the ends of the clip overlapping as shown in Fig. 3.

During the downward movement of the rod 49 relative to the frame, the camming surface 73 of rod 49 pushes the rod 72 from the position shown in Fig. 5 to that shown in Fig. 7 in order to move the feed lever 78 toward the left, the strip S being restrained by the nonback-up pawl 82.

During the upward movement of the slide 35, the springs 54 (nearly collapsed in Fig. 7) are permitted to expand to normal state of compression in order to restore the normal relation between the rod 49 and frame 47. The rod 49 first moves upwardly relative to the frame 47 until the punch 50 is above the strip S on bar 63 and the notch 74 is in alignment with the rod 72. When this occurs the spring 75 will be permitted to move the rod 72 toward the right so that its end will be received in notch 74, thereby causing the finger or feed pawl 78 to push the strip S toward the right so that the next clip E will be located under the punch 50. Since frame 47 cannot be separated any further by springs 54 from slide 35, because notch 74 receives rod 72 and prevents downward movement of rod 72 relative to rod 49, frame 47 must move upwardly with rod 49 during the upward movement of rod 49 which takes place after the feeding operation. This upward movement of frame 47 is assisted by springs 44.

While the form of embodiment of the present invention as herein disclosed, constitutes

a preferred form, it is to be understood that other forms might be adopted, all coming within the scope of the claims which follow.

What is claimed is as follows:

1. Apparatus for splicing electrical conductors comprising, in combination, an anvil for receiving the conductor portions to be joined and having surfaces shaped for causing a splicing clip to be bent against the conductors when the clip is forced against the anvil, a punch for forcing the clip against the anvil, and means for feeding a supply strip of preformed clips between the punch and anvil.

2. Apparatus for splicing electrical conductors comprising, in combination, an anvil for receiving the conductor portions to be joined and having surfaces shaped for causing a splicing clip to be bent against the conductors when the clip is forced against the anvil, and means for severing a clip from a connected series of clips and for forcing the clip against the anvil and around the wire portions.

3. Apparatus for splicing electrical conductors comprising, in combination, an anvil for receiving the conductor portions to be joined and having surfaces shaped for causing a splicing clip to be bent against the conductors when the clip is forced against the anvil, means for severing a clip from a connected series of clips and including a shearing punch, and means including the punch for forcing the clip against the anvil and around the wire portions.

4. Apparatus for splicing electrical conductors comprising, in combination, an anvil for receiving the conductor portions to be joined and having surfaces shaped for causing a splicing clip to be bent against the conductors when the clip is forced against the anvil, means for feeding a strip of connected clips relative to the anvil so that an end clip of the strip is in alignment with the anvil, and means for severing the end clip and for forcing the same against the anvil and around the wire portions.

5. Apparatus for splicing electrical conductors comprising, in combination, an anvil for receiving the conductor portions to be joined and having surfaces shaped for causing a splicing clip to be bent against the conductors when the clip is forced against the anvil, means for feeding a strip of connected clips relative to the anvil so that an end clip of the strip is in alignment with the anvil, means for severing the end clip from the strip, said means including a shearing punch, and means including the punch for forcing the clip against the anvil and around the wire portions.

6. Apparatus for splicing electrical conductors comprising, in combination, a stationary anvil for receiving horizontally disposed conductor portions to be joined and

having surfaces adapted to cause the ends of a U-shaped clip to be bent around the conductor portions when the clip is forced against the anvil, a vertically movable slide, a rod attached thereto and carrying a shear punch in vertical alignment with the anvil, a frame, a shear bar mounted on the frame for receiving a strip of connected U-clips and cooperating with the shear punch to sever the end clip of the strip when said end clip is under the punch, and means carried by the frame and actuated when the punch moves relative to the frame for causing the strip of clips to be fed toward the punch.

7. Apparatus for splicing electrical conductors comprising, in combination, a stationary anvil for receiving horizontally disposed conductor portions to be joined and having surfaces adapted to cause the ends of a U-shaped clip to be bent around the conductor portions when the clip is forced against the anvil, a vertically movable slide, a rod attached thereto and carrying a shear punch in vertical alignment with the anvil, a vertically movable frame movable part-way with the punch toward the anvil, yielding means transmitting downward movement from the slide to the frame, a shear bar for supporting a strip of connected clips and cooperating with the shear punch to sever the end clip when under the punch, means carried by the frame for guiding the severed clip as it is moved by the punch toward the anvil after the downward movement of the frame is arrested, and means carried by the frame for feeding the strip of clips toward the punch, said means being actuated automatically during relative movement between the punch and frame.

8. Apparatus according to claim 7 in which the strip feeding means includes a feed pawl spring-urged against the strip, a rod carrying the pawl and movable parallel to the strip, a cam provided by the punch rod and engaged by the rod for backing up the rod when the punch moves down relative to the frame, and a spring for moving the rod in the opposite direction to feed the strip under the punch when punch has cleared the shear bar.

9. Apparatus for connecting the bared portions of a pair of insulated electrical conductors comprising, in combination, an anvil for supporting the bared portions of the conductors, pads adjacent the anvil for supporting contiguous portions of the work, a supply strip of preformed clips being fed to a position over the anvil, a punch for shearing a clip from the preformed strip and for forcing the clip against the anvil, said pads yielding upon descent of the punch to hold the work securely in place upon the anvil, said punch and anvil forcing the preformed clip to clinch about the bared portions of the work so held, a successive clip of the pre-

formed strip being fed into position over the
anvil upon full retraction of the punch.

In testimony whereof we hereto affix our
signatures.

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CLARENCE J. KELLER.

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