

April 12, 1932.

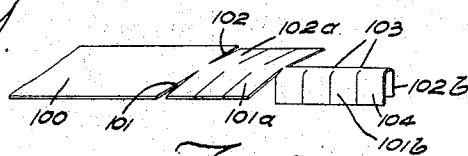
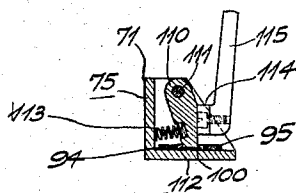
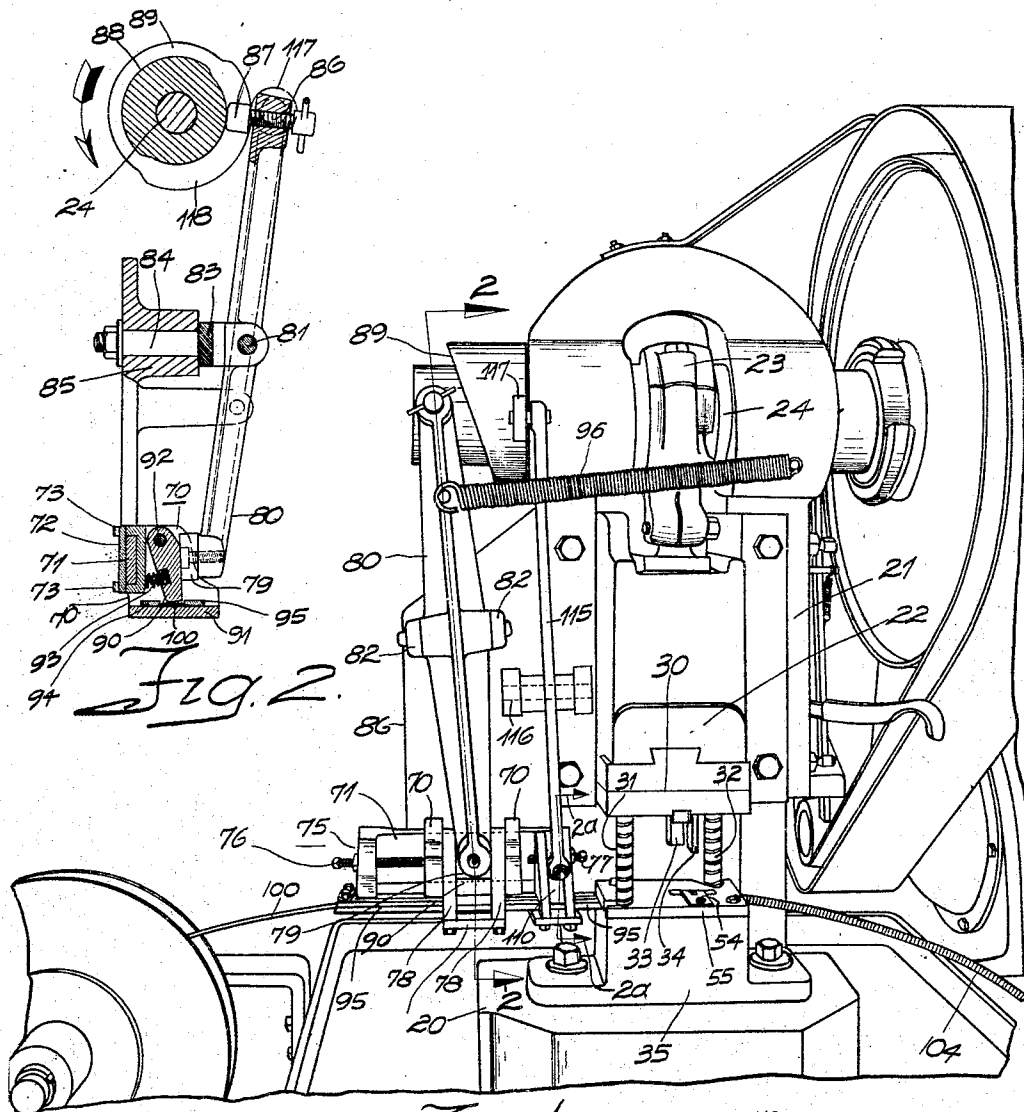
C. J. KELLER

1,853,062

MACHINE FOR MAKING WIRE SPLICE CLIPS

Filed Dec. 13, 1929

2 Sheets-Sheet 1



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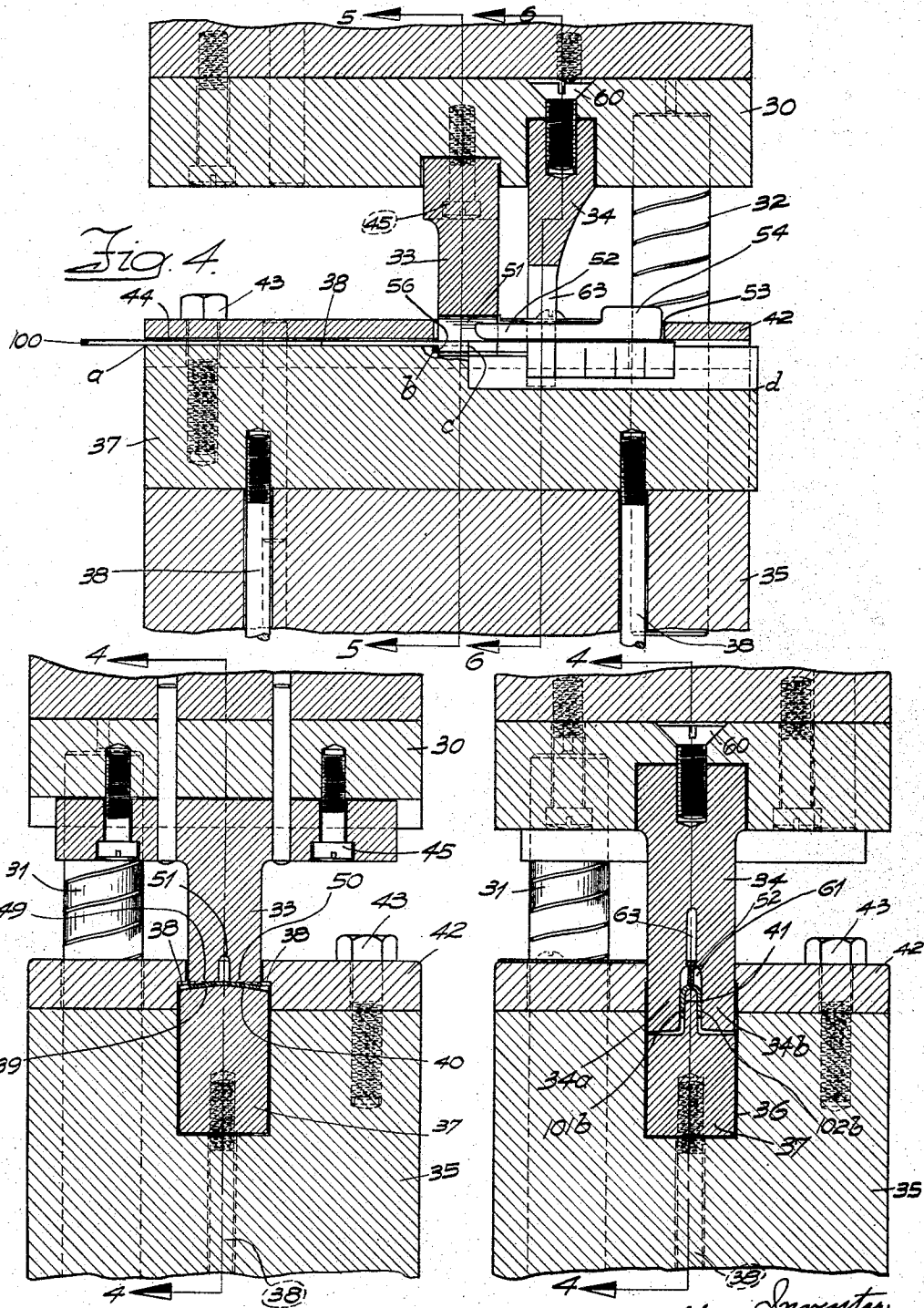


Fig. 5.

Fig. 6.
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UNITED STATES PATENT OFFICE

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MACHINE FOR MAKING WIRE SPLICE CLIPS

Application filed December 13, 1929. Serial No. 413,773.

This invention relates to apparatus for making splicing members for electrical conductors, and more particularly the type of splicing member which consists of a short piece of metal U-shaped in cross section and adapted to be bent around wires which are to be joined.

It is one of the objects of the present invention to provide a machine for manufacturing a continuous series of U-shaped clips which are only partially separated, the clips being joined together at their yokes, the branches being separated. The product of such a machine is particularly adapted for being automatically fed into a splicing machine having provisions for severing the clips one at a time from the supply strip and causing them to be bent around the wires to be spliced. One example of such machine is shown in the copending application of Alva W. Phelps and Clarence Keller, Serial No. 401,325, filed Oct. 21, 1929.

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 machine embodying the present invention.

Figs. 2 and 2a are fragmentary sectional views on lines 2—2 and 2a—2a of Fig. 1.

Fig. 3 is a fragmentary perspective view on a larger scale showing the product of the machine.

Fig. 4 is a vertical longitudinal sectional view of a portion of the machine and is taken on the line 4—4 of Figs. 5 and 6.

Figs. 5 and 6 are sectional views taken respectively on the lines 5—5 and 6—6 of Fig. 4.

The apparatus comprises punch and die members operated by a punch press having a bed 20, a vertically extending frame 21 which provides guides for a cross head 22 connected by a member 23 with a crank (not shown) integral with a crank shaft 24 supported by the frame 21.

The head 22 carries a punch block 30 to

which pilot rods 31 and 32, a shear punch 33 and a forming punch 34, are attached. The bed 20 supports a die block 35 having suitable apertures for receiving the pilot rods 31 and 32. The block 35 is provided centrally with a longitudinally extending groove 36 which receives a bar 37 secured in position by screws 38. Between points *a* and *b* the bar 37 is flat on top, its plane top surface being designated by numeral 38 in Fig. 5. Between point *b* and point *c* the bar is shorter in vertical cross sectional dimension than between *a* and *b* and is provided on its top with downwardly diverging plane surfaces 39 and 40. Between *c* and *d* at the right hand end of the bar 37, the bar has a cross sectional shape as shown in Fig. 6 and may be defined as generally rectangular and as having a relatively narrow rib 41 rounded over the top edge. The block 35 carries a cover plate 42 attached by screws 43 and cooperating with the block 37 to provide a channel 44 for the passage of a ribbon of sheet metal 100.

The punch 33 which is attached by screws 45 to the block 30 is provided at its lower end with downwardly diverging surfaces 49 and 50 corresponding respectively with the surfaces 39 and 40 of the bar 37. Surfaces 49 and 50 are separated by notch 51 which provides clearance for a stripper bar 52 located within an orifice 53 provided by the cover 42 and integral with a bracket 54 attached by screws 55 to the cover 42. The left hand edges 56 of the surfaces 49 and 50 of the punch 33 cooperate with the right hand edge of the plane surface 38 of the bar 37 in order to shear the strip 100 along the lines 101 and 102 as shown in Fig. 3 and the lower surfaces 49 and 50 of the punch cooperate with the upper surfaces 39 and 40 of the bar 37 in order to bend these severed portions slightly out of the plane of the strip 100 as clearly seen in Figs. 3 and 5. Thus the shear punch 33 forms pairs of oppositely disposed flaps, each pair comprising members 101a and 102a.

The forming punch 34 which is attached by screw 60 to the block 30 is provided with a notch 61 adapted to straddle the rib 41 and to bend the flaps 101a and 102a from the po-

sitions shown in Fig. 5 into the positions shown in Figs. 3 and 6 and designated as 101b and 102b respectively. In this manner there are formed continuous series of U-clips which are separated at their branch portions, but which are united at their yokes 103. The punch 34 is provided with a notch 63 continuing from the notch 61 for the purpose of providing clearance for the stripper bar 52 and also for the purpose of further dividing the punch 34 into the two parts 34a and 34b which respectively engage the branches or flaps 101a and 102a of the U-clips in order to bend them into the positions 101b and 102b against the forming rib 41. By providing a relatively deep notch between these portions a certain amount of resiliency is provided permitting the parts 34a and 34b to spring apart slightly as they form the flaps or branches of the U-clip around the ridge 41. Consequently, less power will be required to retract the punch from the work and a relatively small stripping device can be employed for retaining the work upon the forming rib 41 when the punch 34 is withdrawn.

The continuous strip of U-clips designated at 104 is intermittently fed toward the right and is caused to be wound upon a suitable reel as the ribbon or strip 100 is fed through the punch press operated punch and die mechanism.

The ribbon or strip feeding mechanism comprises a horizontally slidable feed frame 70 which slides along a horizontal bar 71 received by a channel-shaped groove in the frame 70 and retained by plate 72 attached to the frame 70 by screws 73. The bar 71 is a part of a stationary bracket 75 attached to the punch press frame and carrying adjustable stop screws 76 and 77 between which the feed frame 70 may be moved by a mechanism operated by the machine. The feed frame 70 includes a pair of parallel lugs 78 between which a block 79 is located. Block 79 is pivotally connected with the lower end of a lever 80, which is pivoted upon a pin 81, supported by a bifurcated member 82, the yoke 83 of which is attached to a rod 84 extending at right angles to the pivot pin 81. The rod 84 is pivotally supported in an apertured boss 85 provided by a bracket 86 which supports the stationary bracket 75. The lever 80 receives at its upper end, a screw 86 carrying a roller 87, the end of which bears against a cam 88 and the side of which may be engaged by a cam 89, shown more clearly in Fig. 1. The cam 88 operates to move the lever in a plane at right angles to the pivot pin 81 in order to cause the block 79 to bear against a movable gripper 90 and to cause it to clamp the strip 100 against a stationary gripper bar 91 attached to the feed frame 70. The gripper 90 is pivoted at 92. A spring 93 resists motion of the lever 80 in a clockwise direction and hence tends to separate the grip-

per 90 from the gripper 91 and to cause the roller 87 to bear against the cam 88. The lugs 78 of the feed frame 70 are provided with apertures for receiving two parallel bars 94 and 95 between which the strip 100 is located.

While the lobe of the cam 88 is engaging the roller 87 in order to cause the gripper 90 to clamp the strip against the bar 91, the cam 89 will engage the roller 87 in order to move the lever 80 about the axis of the pivot rod 84 in a counter-clockwise direction, in order to cause the block 79, and hence the feed frame 70, to move toward the right in order to feed the strip 100 into the punch and die device which has been described. When the cam 89 is free of the roller 87, a spring 96, connecting the frame of the punch press with the lever 80, will cause the slide frame 70 to move toward the left until it engages the stop screw 76. Obviously, the amount of feed of the strip is determined by the relative location of the roller 87 with respect to the cam 89. If greater feed is required, the screw 76 is threaded toward the left in order to permit the lever 80 to be turned clockwise by spring 96 about the pivot rod 84. This will bring the roller 87 in closer to the cam 89 so that the cooperation between the cam 89 and the roller 87 will continue for a longer period during the cycle of operation of the punch press.

In order to prevent the backing up of the strip 100 when the feed frame 70 moves toward the left, there is provided a similar gripping device shown in Fig. 2a. This gripping device comprises a gripping lever 110 pivoted at 111 and adapted to bear against the strip 100 and clamp it against a plate 112 which is a part of the stationary bracket 75. A spring 113 tends to urge the lever 110 away from the strip 100 and to cause the lever 110 to bear against the block 114 attached to the lower end of a lever 115, which is fulcrumed on a pivot 116, supported by the bracket 86 and which carries at its upper end, a roller 117 urged by the spring 113 against a cam 118. As shown in Fig. 2, when the lobe of the cam 118 engages the roller 117, the gripper lever 110 will grip the strip 100.

The cams 88, 89 and 118 are mounted on the crank shaft 24 and are so timed relative to the operation of the punch press head 22 that, when the head 22 is moving upwardly, the cam 88 will engage the end of the roller 87 in order to clamp the strip 100 between the gripping members 90 and 91. At some point during the upward movement of the head 22 the cam 89 will engage the roller 87 in order to feed the strip 100 toward the right. During the downward movement of the head 22 the roller 87 will be free of the lobes of the cams 88 and 89 in order that the spring 93 may operate to release the gripper 90 from the strip 100, and that the spring 96

may operate to move the feed frame 70 toward the left. Also during downward movement of the head 22, the lobe of the cam 118 engages the roller 117 in order to hold the strip stationary while the feed frame 70 is backing up.

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 claim which follows.

What is claimed is as follows:

Apparatus for forming a strip of U-clips united at their yokes, comprising in combination, means for feeding a flat strip of sheet material longitudinally, and a punch and die device for receiving the strip and comprising a bar having a horizontal plane surface along which the strip is movable and having downwardly diverging surfaces located below the plane of the horizontal surface of the bar, said horizontal surface being connected with the diverging surfaces by abrupt vertical shoulders which provide shearing members, said bar having a relatively narrow forming rib extending longitudinally and horizontally from the junction of said diverging surfaces, and comprising a shearing punch having shearing members co-operating with said shoulder portions to shear the strip along lines at right angles to and part way in from its longitudinal edges in order to provide pairs of flaps or branches of the U-clips, and comprising a forming punch shaped to straddle the forming rib and having forming members respectively engaging the flaps of the strip on each side of the forming rib in order to bend said flaps into approximate parallelism.

In testimony whereof I hereto affix my signature.

CLARENCE J. KELLER.