April 13, 1965 K. J. BATCHELLER 3,177,693

CRIMPING TOOL

Filed Nov. 24, 1961 2 Sheets-Sheet 1

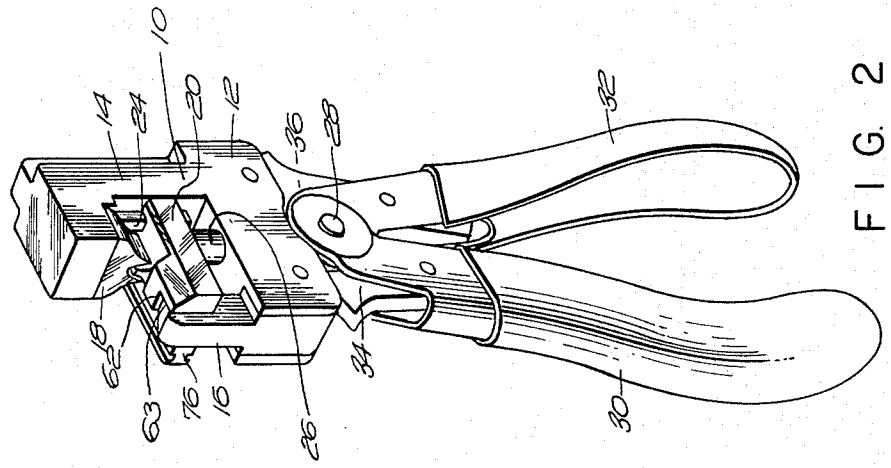


FIG. 2

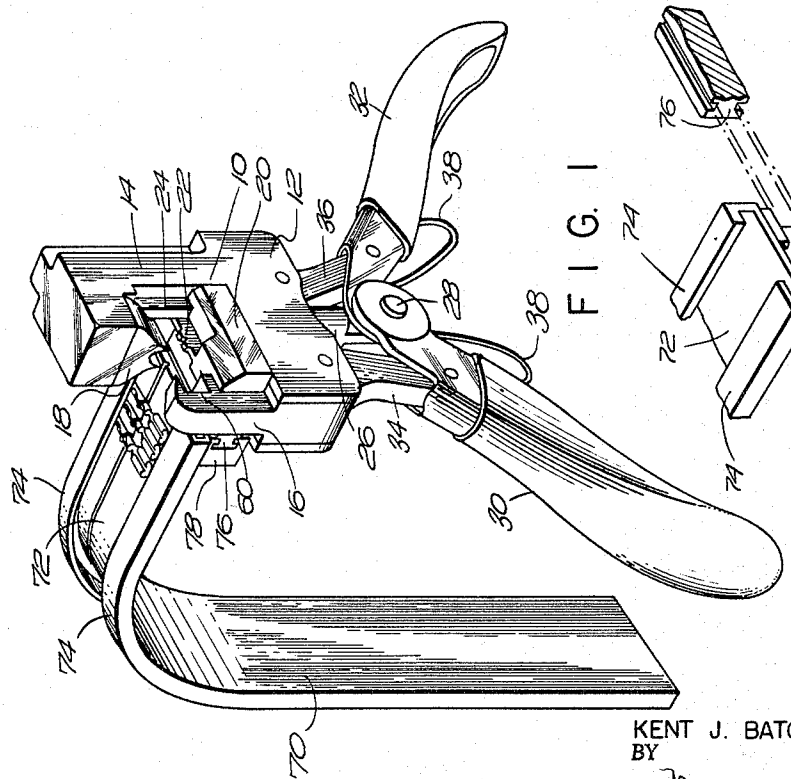


FIG. 1

FIG. 3

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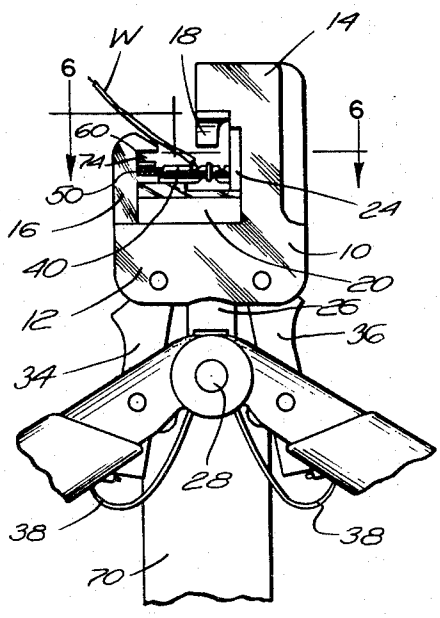


FIG. 4

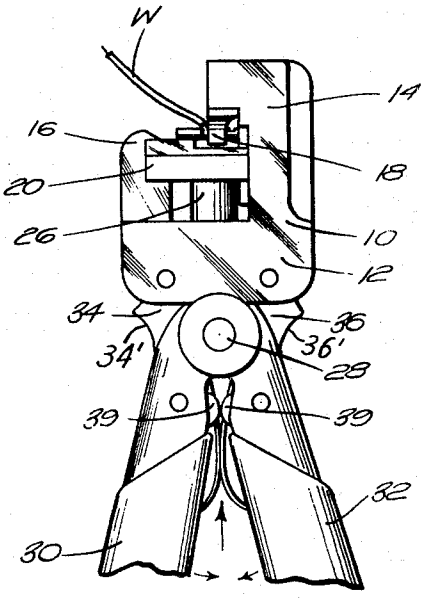


FIG. 5

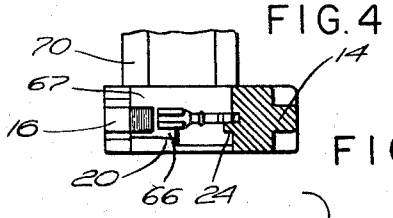


FIG. 6

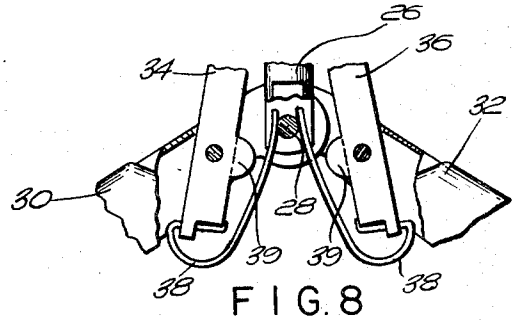


FIG. 8

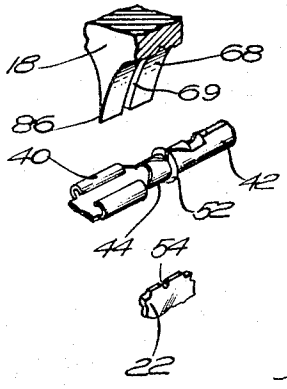


FIG. 7

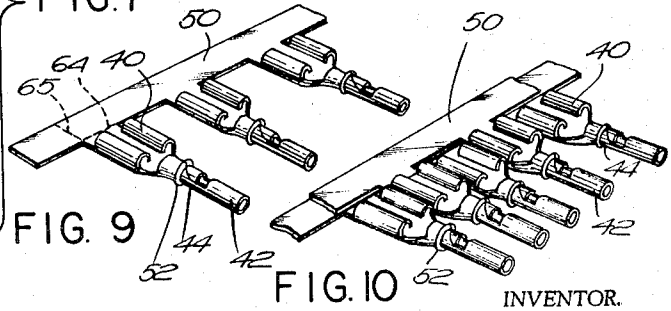


FIG. 9 FIG. 10

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CRIMPING TOOL

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Filed Nov. 24, 1961, Ser. No. 154,651
5 Claims. (Cl. 72—337)

This invention relates to a hand tool for crimping the wire-gripping portions of electric connectors or the like onto wires. It is an object of the invention to provide a tool which will perform the crimping operation on connector members supplied in connected series. Connectors of the male-and-female type are generally made from long strips of sheet brass which are cut and shaped progressively by a succession of steps to form connector members attached together in a continuous series by narrow bonds which can be severed when the leading member of a series is crimped by a machine made for that purpose. In such series of connector members, the successive members may be joined end to end or may be made side by side. In making series of some of the smaller sizes of connector members of the female type which includes a shallow channel with inturned overhanging flanges, the spaces between successive members in a series may be slightly greater than the width of the channel portion of an individual member. In such cases, two series may be superposed, the channel portions of the members of one series being in the spaces between the members of the other series. It is an object of the invention to provide a hand tool which can be operated to crimp single connectors on wires, and may also have a feed guide attached thereto which acts as a magazine to hold two superposed series of connectors together, to be pushed into position to be crimped. For a more complete understanding of the invention, reference may be had to the following description thereof and to the drawings, of which

FIGURE 1 is a perspective view of a crimping tool embodying the invention, the tool having a feed guide attached thereto;

FIGURE 2 is a similar view of the tool in the closed position and without the feed guide;

FIGURE 3 is a fragmentary exploded view of the parts forming the joint connecting the feed guide to the crimping tool;

FIGURES 4 and 5 are elevational views showing the crimping tool in two different positions of operation;

FIGURE 6 is a section on the line 6—6 of FIGURE 4;

FIGURE 7 is an exploded fragmentary view, on a larger scale, of the anvil, die and a connector shown in FIGURE 1;

FIGURE 8 is a fragmentary elevational view of the crimping tool, with part broken away to show interior members;

FIGURE 9 is a perspective view, on an enlarged scale, of a series of connected electrical connectors; and

FIGURE 10 is a perspective view, on an enlarged scale, of two series of connectors superposed.

The hand tool illustrated on the drawings comprises a head 10 which consists of a base 12 and two uprights 14 and 16, one of which carries a crimping die 18, the other being part of a cutter to sever the leading connector of a series as hereinafter described. Vertically slidable between the uprights is a block 20 on which is an anvil 22 located directly below the crimping die 18. The block 20 is guided by a vertical guide rib 24 on a face of the upright 14 and by the upright 16, the block 20 having vertical rectangular grooves in its end faces to receive the rib 24 and upright 16 in fitted engagement.

To move the block 20 up into crimping relation to the

die 18, the block is mounted on the end of a stem 26 which extends down through the base 12 and is pivotally connected as at 28 to two handles 30 and 32, these handles and the stem 26 having the common pivot axis 28. The handle 30 is connected to the base 12 by a toggle link 34, and the handle 32 is connected to the base 12 by a similar toggle link 36. When the handles 30 and 32 are spread apart as indicated in FIGURE 4, the block is in its lowered position. When the handles 30 and 32 are drawn toward each other as when gripped in a hand of the operator, the block is raised into crimping relationship with the die 18, the toggle connections serving to increase the mechanical advantage as the block rises so that a strong pressure on a work-piece between the anvil and die can be had from a manual gripping pressure exerted on the handles. When the handles are gripped by an operator, the gripping hand tends to slide upward because the handles converge upward even when in the closed position shown in FIGURES 2 and 5. To limit such upward slipping, the outer edges of the links 34, 36 are made to curve upward and outward as at 34', 36' to act as a guard to limit such upward slipping of the hand when gripping pressure is put on the handles 30, 32. To restore the handles to their spread-apart positions, springs 38 may be mounted on the lower ends of the toggle links 34, 36 with their free ends bearing against the pivot 28 to press the links and handles outward. Stop elements 39 are provided on the links to limit the upward travel of the block 20.

The hand tool illustrated on the drawings is particularly designed for operation on the type of electrical connector shown in FIGURES 9 and 10. These connectors consist of an engaging part 40 at one end, a wire-receiving ferrule 42 at the other end, and a second wire-receiving ferrule 44 between the engaging part 40 and the ferrule 42. The function of the tool is to crimp the mid ferrule 44 about the end portion of a wire W which has been thrust into it in the direction of the ferrule 42, as indicated in FIGURES 4 and 5.

Electric connectors of the type illustrated are customarily made of sheet brass, and for convenient feeding to a crimping machine are made in a series of connected units, as indicated in FIGURE 9, a marginal strip 50 serving to keep the connectors joined in a series. To stiffen the ferrule 44, it is preferably made with a radially projecting circumferential rib 52. To operate the tool, a wire W is thrust into the mid ferrule 44 of the end connector on a strip or series of such connectors; then this end connector is inserted between the uprights 14, 16 so that the mid ferrule 44 rests on the anvil 22, the latter being narrower at its top than the diameter of the ferrule. The anvil is also notched as at 54 to receive the rib 52, the top surface being slightly concaved to fit against a portion of the surface of the ferrule 44. The vertical rib 24 is located with reference to the die 18 to act as a stop for a connector to assist locating the connector properly under the die 18.

When a connector is crimped on a wire, it is desirable that it be severed from the tie strip 50. For this purpose, the upright 16 is notched as at 60 to receive the marginal strip 50 adjacent to the leading connector when the latter is put on the anvil 22. When the block 20 is raised to crimp the ferrule 44, one end of the block is guided by its fitted engagement with the upright 16. The notch is so placed that when the block reaches its uppermost position, its upper surface will have moved slightly above the upper edge of the notch 60 so that the horizontal edges of the upright at the top of the notch cooperate with the edges 62, 63 of the block to sever the leading connector which is then on the anvil and at the same time to cut off the bit of the strip 50 which projects

beyond the leading connector, these cuts being indicated at 64, 65 in FIGURE 9. These two cuts are the only ones made by one operation of the tool as the top face portion 66 of the block 20 which has the shearing edges 62, 63 is at a higher level than the top face portion 67 of the block on the approach side of the upright 16 so that the edges of the surface 67 do not rise high enough to have a shearing action with the notch 60. Meanwhile the upward movement of the block 20 and anvil 22 forces the ferrule 44 against the arched under surface 68 of the die 18, which surface is provided with a groove 69 to receive the rib 52 on the ferrule 44 so as not to crush the rib in crimping the ferrule. The narrow top surfaces of the anvil 22 indent the ferrule 44 from below to squeeze and grip the wire which is in the ferrule. When the block 20 descends, the crimped connector is removed and the next in the series is put in its place.

For convenience in manipulating the series of connectors, a feeding guide 70 may be attached to the approach side of the block 20. As shown, this guide consists of a shallow channel having a floor 72 just wide enough to accommodate a series of connected connectors. Overhanging flanges 74 are provided over the margins of the floor 72 to guide the connectors which may be conveniently pushed along by the operator's thumb each time the tool is operated to crimp and sever the leading connector. The guide 70 may extend straight out from the side of the block 20 or preferably may curve downward as indicated in FIGURE 1 for convenience. Each time the series is pushed along, the rib 24 acts as a stop to halt the series with the leading connector correctly placed for crimping.

To facilitate detachment of the guide 70 when it is desired to use or store the tool without the guide, a snap-on connection is provided. To this end a horizontal T-rail 76 is provided on a side of the block 20, and a block 78 with a corresponding T-groove 80 is fixed to the guide 70 below an end thereof as indicated in FIGURE 3. In the groove 80 is a slight recess or dimple 82 to receive a small portion of a spring-pressed ball (not shown) mounted in the rail 76. The guide 70 is attached to the tool by sliding the block 78 along the T-rail 76 until the ball in the rail enters the recess 82. This holds the guide releasably in position for feeding connectors therein to the tool.

If the spaces between the engaging portions 40 of successive connectors in a series are as wide as the portions 40 themselves, two series of connectors can be superposed as indicated in FIGURE 10 so that the guide 70, which acts as a magazine for connectors, will hold twice as many. Since in such case, the engaging portions 40 of successive connectors may be in contact laterally, the walls of the die 18 are narrowed down to a thin edge 86 to enter between the engaging portion 40 of the leading connector and that of the next connector.

I claim:

1. A manually operable tool for crimping electric connectors, said tool comprising a head consisting of a base and two spaced uprights, one said upright having a crimping die overhanging said base, the other said upright having a notch in a side thereof, and a block above said base vertically slidable between said uprights, said block having an anvil thereon beneath said crimping die, said block also having edges movable along side faces of said other upright into shearing relation to edges of said notch.

2. A tool as described in claim 1, and a feeder guide for a series of joined connectors attached to said block and vertically movable therewith.

3. A manually operable tool for crimping electric connectors comprising a head consisting of a base, two spaced uprights, and a crimping die on one of said uprights, said one upright having a vertical guide rib, the other said upright having a notch in a side thereof, a block vertically slidable between said guide rib and said other upright, said block having an anvil thereon directly beneath said crimping die and end grooves fitting respectively on the notched upright and the guide rib, and means for moving said block up to elevate said anvil into crimping relation with said die, said block and notched upright having edges cooperating to have a shearing action when said block is moved up, said guide rib being offset laterally from said anvil just sufficiently to stop a work-piece directly beneath said die.

4. A tool as described in claim 3, said block-moving means comprising a stem extending from the block, a pair of handles pivotally connected to said stem and to each other at a common pivot, and toggle links joining said handles to said head, the outer edges of the toggle links being curved outwardly and upwardly between the handles and the head to limit upward slip of the operator's hand gripping the handles.

5. A tool as described in claim 3, and a feeder guide consisting of a shallow channel member detachably secured to said block in a position to feed successive connectors to said tool, said guide rib being located with reference to the crimping die to serve as a stop for the leading connector fed to the tool.

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