Aug. 28, 1962 H. W. BATCHELLER 3,051,213

ADJUSTABLE CRIMPING PRESS FOR VARIOUS DIAMETERS OF WIRES AND INSULATION

Filed Dec. 11, 1959 3 Sheets-Sheet 1

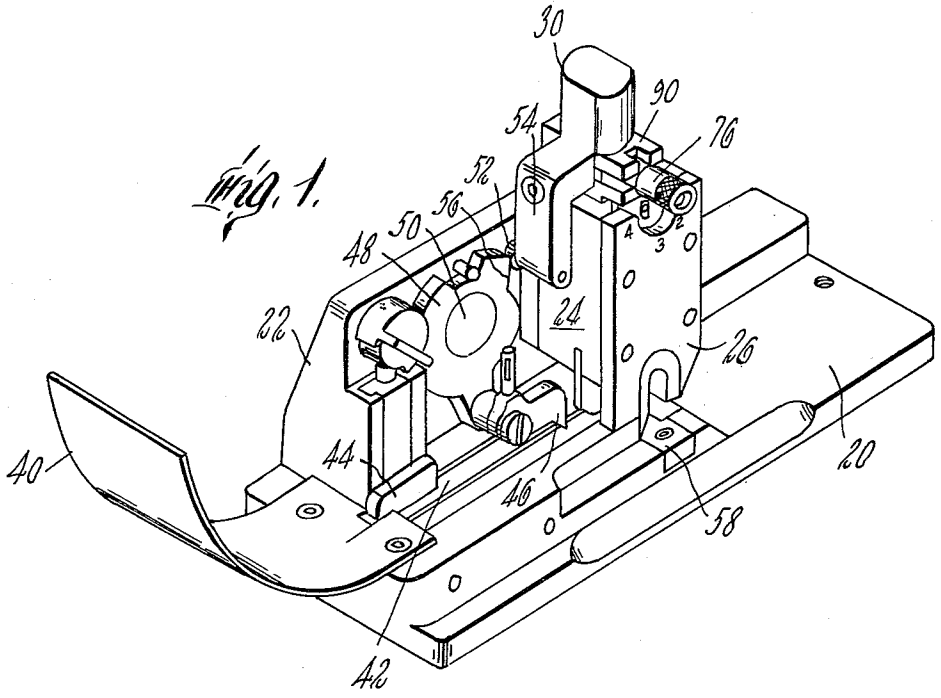


Fig. 1.

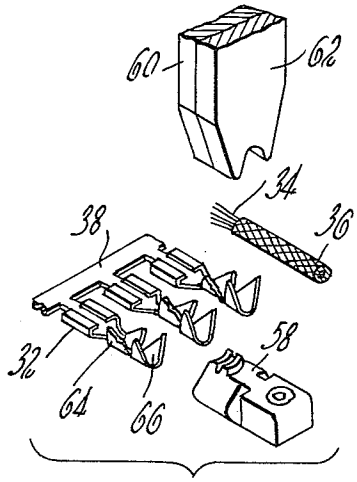


Fig. 2.

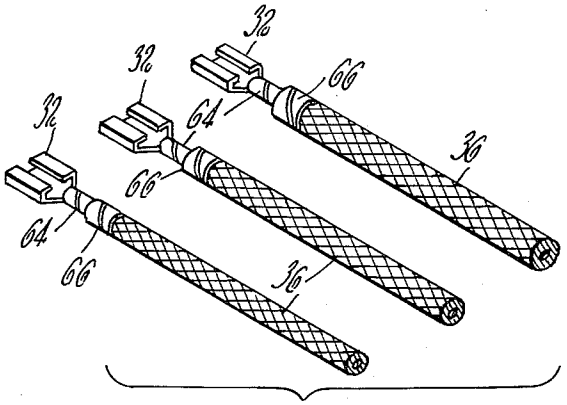


Fig. 3.

Inventor
Hugh W. Batcheller
by Morse & Altman
Attys.

Aug. 28, 1962 H. W. BATCHELLER 3,051,213

ADJUSTABLE CRIMPING PRESS FOR VARIOUS DIAMETERS OF WIRES AND INSULATION

Filed Dec. 11, 1959 3 Sheets-Sheet 2

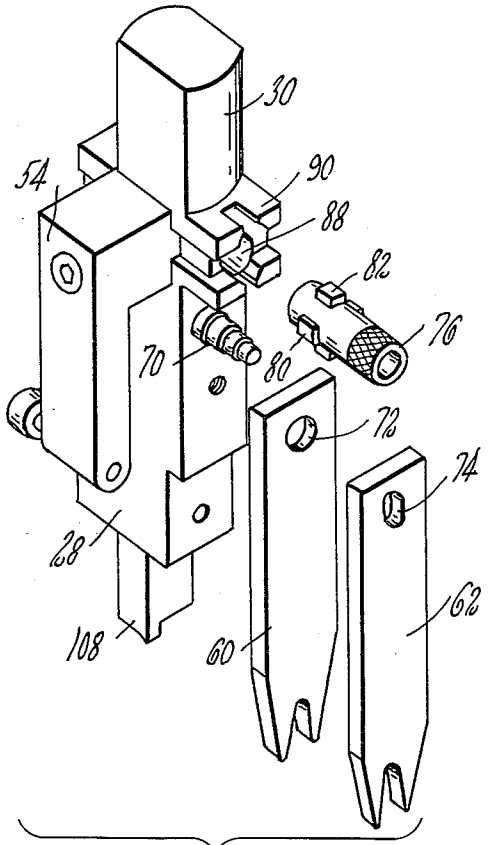


Fig. 4.

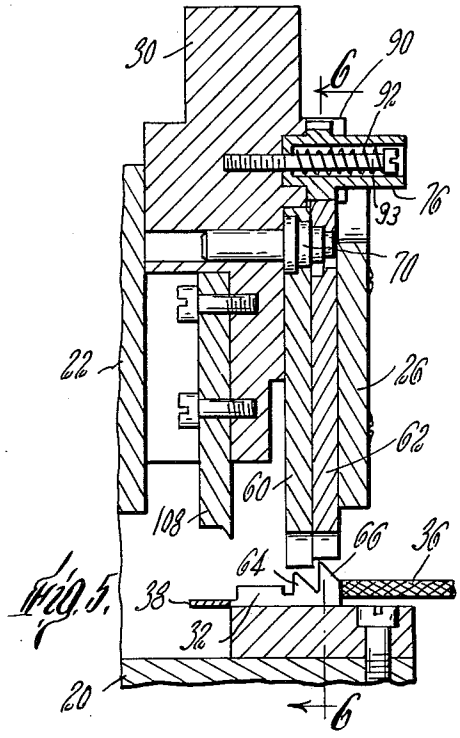


Fig. 5.

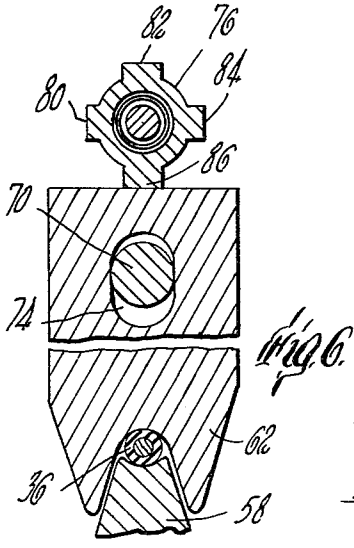


Fig. 6.

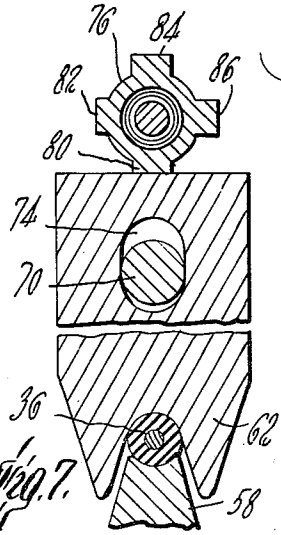


Fig. 7.

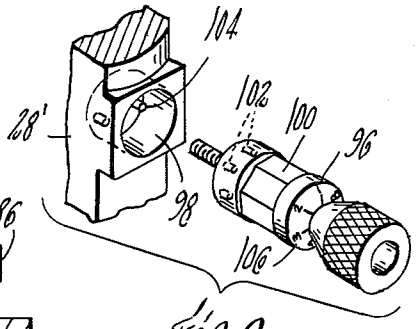


Fig. 8.

Inventor
Hugh W. Batcheller
by Monet Altman
Attys.

Aug. 28, 1962 H. W. BATCHELLER 3,051,213

ADJUSTABLE CRIMPING PRESS FOR VARIOUS DIAMETERS OF WIRES AND INSULATION

Filed Dec. 11, 1959 3 Sheets-Sheet 3

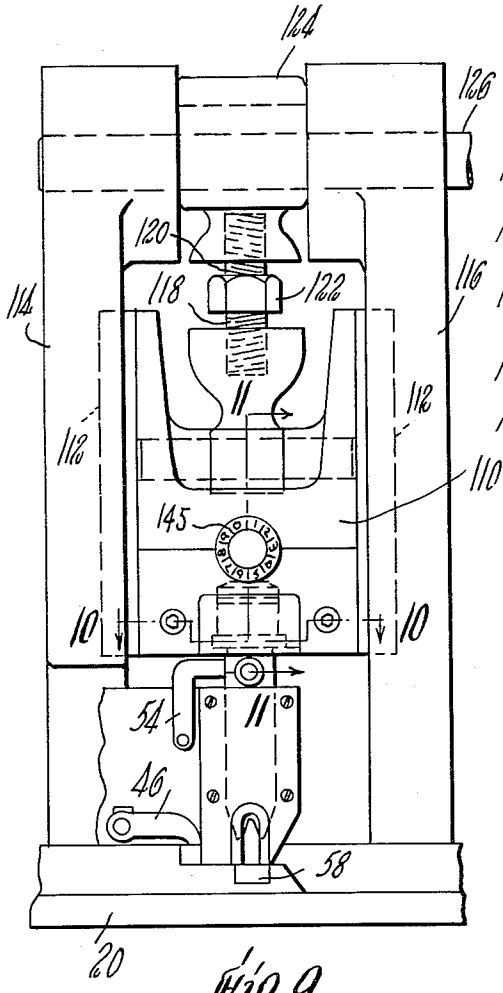


Fig. 9.

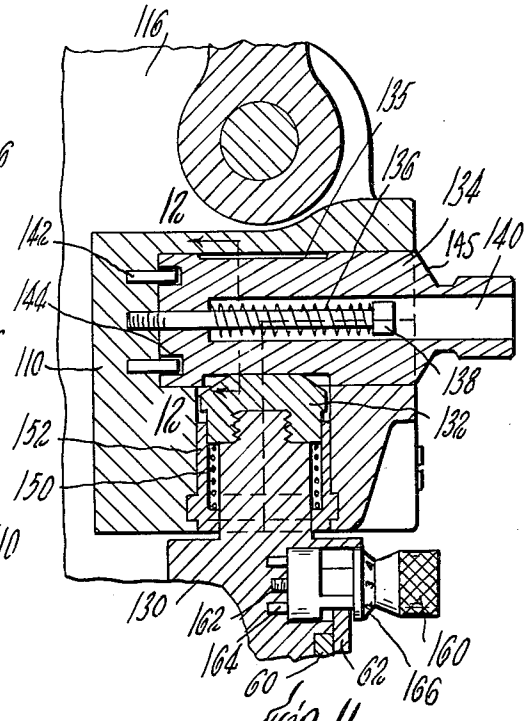


Fig. 11.

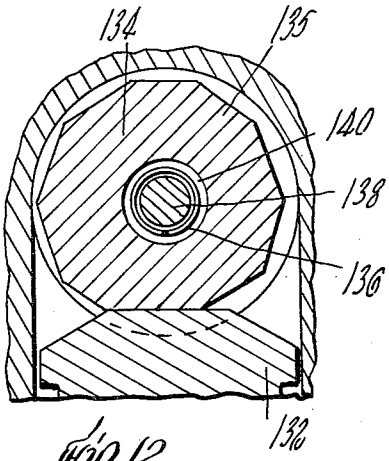


Fig. 12.

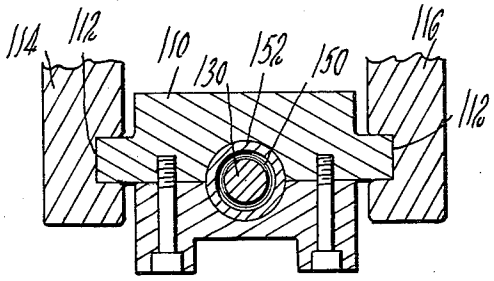


Fig. 10.

Inventor
Hugh W. Batcheller
by Morse & Altman
Attys.

United States Patent Office 3,051,213 Patented Aug. 28, 1962

3,051,213

ADJUSTABLE CRIMPING PRESS FOR VARIOUS DIAMETERS OF WIRES AND INSULATION

Hugh W. Batcheller, Newton Highlands, Mass. (188 Needham St., Newton Upper Falls, Mass.)

Filed Dec. 11, 1959, Ser. No. 858,879
3 Claims. (Cl. 153—1)

This invention relates to improved crimping presses of the type employed to crimp the wire-gripping portions of objects such as electric terminal members upon the ends of insulated wires.

In order to facilitate the installation of wiring in electrical appliances, the old binding posts have been almost entirely supplanted by complemental connector members, usually of the male-and-female type, which are attached to the bared end portions of pieces of insulated wire of suitable length. As such connector members are used in large numbers where electrical appliances are assembled, it is important to employ means for attaching the members to wire ends as quickly and firmly as possible. For this purpose, connector members are commonly formed in a continuous series stamped in a strip of brass and held together by a narrow bonding link which is severed when the leading connector member in a strip is attached to a wire by a crimping press to which the strip is fed. Each member is made with a wire-gripping portion which may consist of a U-shaped trough the sides of which are upstanding tongues adapted to be crimped and curled around a wire laid in the trough. If the wire is an insulated wire, an end portion is first stripped, then the crimping machine crimps on a pair of tongues around the bared end portion of the wire, and another pair of togues are crimped around the insulation next to the bared portion of the wire.

It is important that the crimping be precisely done so as to obtain a joint which is not only mechanically strong but also furnishes a good electrical connection between the wire and the connector member.

The crimping machine often employed for this purpose is provided with a small anvil shaped to support the trough of a connector member which is placed thereon. The end portion of a wire is laid in the trough, then a crimping tool is brought down to curl the tongues over the wire and the adjoining insulation.

For the wiring of electrical appliances wires of various sizes are employed, such wires also having insulation of various diameters. While a given anvil and a corresponding crimping tool can be employed to crimp wire-gripping tongues about wires of several sizes, the stroke of the tool must be accurately adjusted to make a firm joint between the connector member and a wire. Heretofore it has been necessary to make a time-consuming adjustment of the tool in the tool-carrying plunger of the press whenever there was a change in the size of wire provided for attachment to connector members. According to the present invention adjustments to accommodate wires of different diameters and insulation of different diameters are quickly and easily made without the use of any tool, and the settings are reliably accurate. For this purpose, in a crimping machine having two tools carried in a plunger for simultaneous crimping operations on the tongues to grip the bared wire and the insulation next thereto, provision can be made for adjustable spacing means between the plunger and the top of the tool carried thereby to crimp tongues about the insulation of a wire, or by a somewhat more elaborate structure, adjustment can be made for different wire diameters as well as different insulation diameters. The simpler machine accommodates wires of the same diameter having different thicknesses of insulation. The more elaborate machine accommodates wires of different diameters as well as insulation of different thicknesses.

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 machine including means for adjusting a tool for insulation of different diameters;

FIGURE 2 is an exploded perspective view of a series of electrical elements, a wire, an anvil and two crimping tools;

FIGURE 3 is a perspective view of three wires of the same size with insulation of different diameters, having electrical elements attached thereto;

FIGURE 4 is an exploded perspective view of the plunger portion of the machine shown in FIGURE 1, on a larger scale;

FIGURE 5 is a sectional view of the plunger, the parts of which are shown in FIGURE 4, and the anvil beneath it;

FIGURE 6 is a section on the line 6—6 of FIGURE 5, on a larger scale;

FIGURE 7 is a section similar to FIGURE 6 but showing a different adjustment;

FIGURE 8 is an exploded perspective view of a modified form of adjusting mechanism;

FIGURE 9 is an elevational view of a crimping press with means for adjusting the tools for operation on wires of different sizes as well as insulation of different diameters;

FIGURES 10 and 11 are sections, on a larger scale, taken on the lines 10—10 and 11—11 of FIGURE 9; and

FIGURE 12 is a section, on a larger scale, taken on the line 12—12 of FIGURE 11.

The crimping mechanism shown in FIGURE 1 is of the same general type as that illustrated in Patent No. 2,681,447, granted to Davis on June 22, 1954. It comprises a bed 20 with an integral wall 22 rising therefrom to support vertical ways 24 and a front cover plate 26. Slidable in the ways 24 is a plunger 28 which holds crimping tools and has at its upper end a tang 30 to be gripped in a conventional power press (not shown) for reciprocating vertical movements.

Connector members 32 which are to be attached to the bared ends 34 of wires having insulation 36 thereon are supplied in long series held together by a narrow joining strip 38 which is cut by the machine as the leading connector member is being crimped to attach it to a wire.

The mechanism shown in FIGURE 1 has a guide 40 to guide a series of connected connector members 32 from a supply reel (not shown) into a channel 42 in the bed 20. A spring-pressed presser foot 44 is slidably supported by the wall 22 to bear strongly on the connection strip 38 of the supply series so as to prevent any reverse movement of the series when a feeding pawl 46 is retracted. The pawl 46 is carried by a crank in the form of a disk 48 which rocks on an axis 50 mounted in the wall 20. The disk 48 is rocked by the reciprocation of a roller 52 which is carried by an arm 54 on the plunger 28 and which engages in a notch 56 in the periphery of the disk. Thus when the plunger descends to perform a crimping operation, the pawl 46 is retracted at the same time. When the plunger then rises, the pawl feeds the series of connector members 32 forward to place the next member in the series in position on the anvil 58 which is directly beneath a pair of crimping tools 60 and 62 carried by the plunger 28.

Each connector member 32 has a wire-gripping portion consisting of a trough the sides of which are a pair of upstanding tongues 64 to be crimped or curled about a bared wire 34 and a second pair of upstanding tongues 66 to be crimped or curled about the insulation 36 next to the bared end of the wire. Each of the crimping tools 60 and 62 has a V-shaped recess in its lower end the walls of which engage upstanding tongues and curl them about

the wire and insulation into the form of tubular ferrules. These ferrules should fit accurately and tightly. To achieve this result, the stroke of the tools 60 and 62 must be carefully regulated in accordance with the size of the wire 34 and the outside diameter of the insulation 36. One way of adjusting the mechanism to operate on wires of different sizes is to remove the front plate 26 and replace the tools 60 and 62 by similar tools which are slightly longer or shorter as required.

It often happens that when wire of a certain size is specified for a wiring job, the spools of wire supplied may have insulation coatings of different thickness and hence of different outside diameter. According to the present invention, the tool 62 which crimps tongues 66 about the insulation 36 next to the bared end of the wire can be adjusted quickly and easily to operate on different sizes of insulation covers which may be on wires of uniform size. As shown in FIGURES 4 and 5, the tools 60 and 62 are mounted on a horizontal pin 70 fixed in the plunger 28, the projecting portion of the pin having stepped sections of progressively smaller diameters. Near the upper end of the tool 60 is a hole 72 which fits snugly on one section of the pin 70. The tool 62, however, has a vertically elongated hole 74 which receives a smaller section of the pin 70 but is vertically adjustable a limited distance. To vary the stroke of the tool 62, a spacer block 76 is interposed between the top of the tool and the plunger 28. As shown, this spacer block is in the form of a horizontal tube with a wall at its inner end. The block has a series of lugs projecting radially therefrom. In the example shown in FIGURES 1 to 7, four such lugs 80, 82, 84 and 86 are employed. These lugs are of different radial lengths, the lug 80 being the shortest, the lug 84 being the longest, and they present end faces at different radial distances from the axis of the block 76. The tube of the spacer block 76 fits slidably in a bore 88 in a front projection 90 on the plunger 28. This projection 90 has four notches in which the lugs of the spacer block fit and lock the block against rotation when it is in any one of four operative positions. A spring 92 is employed to hold the block 76 yieldingly against the inner end of the bore 88, as shown in FIGURE 5, this spring being compressed between the inner end wall of the block 76 and the head of a bolt 93 within the block which is anchored in the plunger body 110 and serves as a stop member to limit the outward movement of the block 76. When in this position the lowermost lug bears on the top of the tool 62. As the lugs are of different lengths, the stroke of the tool 62 can be adjusted by turning the spacer block 76 the number of quarter-turns necessary to put the lug of the desired length in the lowermost position. Thus the shortest lug 80 will be employed when the tool is used on insulation of relatively small diameter, as indicated in FIGURES 6 and 7. To make an adjustment, the spacer block 76 is pulled forward until the lugs clear the notches. The block is then turned as desired and is released to let the spring 92 pull it back into place.

A modified form of adjusting means is shown in FIGURE 8. A tubular spacer block 96 is yieldingly held in a bore 98 in a plunger 28'. The block 96 has a series of eight faces 100 arranged in succession around its axis and at progressively greater distances from the axis. A greater or lesser number of faces can be put on the block. When the block is in position the lowermost face bears on the top of the tool 62 and thus determines the stroke of the tool when the plunger descends. To hold the block in adjusted angular position, a series of small holes 102 is provided in its inner end to receive one or more pins 104 mounted within the bore 98. To adjust the block, it is pulled forward until the holes 102 are clear of the pins 104. The block is then turned and released for retraction in the same manner as the block 76. To assist in the selection of the proper face 100 for the operative position, a dial 106 with suitable indicia may be provided at a convenient place on the block 96.

When the plunger descends to perform a crimping operation, a cutter 108 severs the connecting strip 38 which has connected the leading member 32 to the rest of the series. The next member of the series then becomes the leading member and is moved into place on the anvil 58 when the plunger rises.

A more versatile mechanism is illustrated in FIGURES 9 to 12. It can quickly and easily be adjusted to operate on wires of different gauges as well as on insulation of different diameters. In performing assembling jobs requiring considerable wiring, it is often necessary to use wires of different gauges for different parts of the job, and insulation of different outside diameters must often be employed. According to the invention, crimping mechanism is provided that can be adjusted to operate on wires within a considerable range of gauges, and on various diameters of insulation, the adjustments being made by setting two dials.

As shown in FIGURE 9, a plunger having a body 110 slides vertically in ways 112 in frame members 114 and 116 and is connected to aligned bolts 118 and 120 which are threaded left and right so that the overall length of the two bolts can be adjusted by a common nut 122. The bolt 120 projects from a crank 124 which is reciprocated by a driven shaft 126 so as to move the plunger 110 up and down.

As shown in FIGURE 11, a tool-holder 130 is carried by the plunger body 110 and is a part of the plunger, said holder having a head 132 that extends up within the plunger from the bottom thereof to a horizontal bore within which is fitted a generally cylindrical spacer block 134. Spaced from both ends of the spacer block is a section 135 thereof having a series of faces which are variously distant from the axis of the block. The structure of the spacer block 134 is somewhat similar to the block 96 shown in FIGURE 8 except that it is provided with ten faces instead of eight. The block 134 is pushed inward to its operative position as shown in FIGURE 11 by a spring 136 on a headed bolt 138 disposed in a bore 140 in the block, the threaded end of the bolt being secured in the body of the plunger 110. The block 134 may be pulled out until its inner end is clear of a pair of pins 142 fixed in the body 110 of the plunger, then turned to put the desired face in the lowermost position, then released to let the spring retract the block so that the pins enter holes 144 in the block and thus lock it against rotative movement. A dial 145 with suitable indicia is provided on the block to indicate the angular adjustment of the block.

The lowermost face on the spacer block 134 bears on the top of the head 132 of the tool-holder 130. Since the faces are variously spaced from the axis of the block 134, the stroke of the tool holder can thus be accurately varied by turning the block to put another face in the lowermost position. The tool holder 130 is resiliently pressed upward by a spring 150 which is compressed between a shoulder on the head 132 and a shoulder on a liner 152 which surrounds the spring. The head 132 is thus kept in contact with the lowermost face of the spacer block 134.

The body of the tool-holder 130 supports two tools 60 and 62 in the manner shown in FIGURE 4, the tool 60 being arranged to crimp the tongues which surround and grip the insulation next to the bared end portion of the wire. The tool 60 is not vertically adjustable relatively to the tool holder 130, but the tool 62 is thus adjustable within the limits set by its elongated hole 74.

By way of example, the radial distances of the ten faces of the block 134 from the axis thereof are:

.410"	.460"
.420"	.465"
.430"	.470"
.440"	.475"
.450"	.480"

The smaller of the above figures apply to settings of the

block for operation on wires of the larger sizes. The increments in such distances are .010". For smaller wires the larger values from the table are used, the increments being .005". Thus a finer adjustment is possible for operations in wires of the smaller sizes.

Extending horizontally into the body of the tool-holder 130 is a spacer block 160 which is similar in structure to the spacer block 96 shown in FIGURE 8, having an axial bore in which is disposed a bolt 162 the threaded end of which is secured in the body of the toolholder. A spring similar to the spring 92 in the block 76 holds the block 160 yieldingly in the position shown in FIGURE 11, in which position it is locked against rotation by two pins 164 in the manner hereinbefore described. The spacer block 160 is provided with eight faces, by way of example, and a dial 166 with suitable indicia is supplied on the block to indicate which of the faces is lowermost, that being the face which engages on the top of the tool 62. The spacer block 160 can thus be used to adjust the stroke of the tool 62 with reference to the tool-holder 130. The spacer block 134 can be used to adjust the stroke of both tools together with reference to the plunger body 110. In practice, the correct settings of the dials on the two spacer blocks are empirically determined and are entered on a chart so that thereafter the proper settings for any given combination of wire size and insulation diameter can be read from the chart, and the desired settings be made at once. The chart can be made to indicate the dial settings not only for attaching a connector member to a single insulated wire of any size within the range of the apparatus, but also the settings for attaching a connector member to two or more wires of any given size or combination of sizes.

I claim:

1. In a crimping machine having a base, an anvil on said base to support an object to be crimped, and a plunger body reciprocable toward and from said anvil; a tool carrier mounted on said plunger body and adjustably movable relatively thereto toward or from said anvil, means adjusting said tool holder comprising a spacer block carried by said plunger body and rotatable about a horizontal axis, said block having a series of plane surfaces variously spaced from said axis and selectively engageable with said tool holder, two crimping tools mounted on said holder, one said tool being adjustably movable relatively to the tool holder toward or from said anvil, and means for adjusting said movable tool relatively to said tool holder, the last named means comprising a second spacer block carried by said tool holder and rotatable about a horizontal axis, said second block having a series of plane surfaces variously spaced from the axis of said second block and selectively engageable with said movable tool.

2. Mechanism as described in claim 1, said spacer blocks each having a dial thereon with indicia to indicate its angular position of adjustment.

3. Mechanism as described in claim 1, each said spacer block having locking means associated therewith to prevent rotation thereof when in normal position for operation, each said block being axially movable outward to clear its locking means, a stop element for each block to limit its outward movement, and a spring associated with each stop element to press the corresponding block toward its normal locked position.

References Cited in the file of this patent

UNITED STATES PATENTS

978,506	Stimpson	Dec. 13, 1910
1,506,535	Kotzick	Aug. 26, 1924
2,024,287	Hazelton	Dec. 17, 1935
2,088,202	Gray	July 27, 1937
2,182,544	Murrian et al.	Dec. 5, 1939
2,800,042	Demler	July 23, 1957

FOREIGN PATENTS

746,378	Great Britain	Mar. 14, 1956