

PATENT SPECIFICATION

(11)

1 407 188

- (21) Application No. 27538/74 (22) Filed 21 June 1974
(31) Convention Application No. 6216/73 (32) Filed 13 July 1973 in
(33) Austria (OE)
(44) Complete Specification published 24 Sept. 1975
(51) INT. CL.² B23P 17/00
(52) Index at acceptance
B3A 49D1
B3Q 1G 2A13 2CX8 2F3X 2F5 2N 4
(72) Inventors KARL HEINZ WUSTINGER
KARL RORNER



(54) APPARATUS FOR CRIMPING ELECTRICAL TERMINALS TO WIRES

(71) We, AMP INCORPORATED, a corporation organised and existing under the laws of the State of New Jersey, United States of America, of Eisenhower Boulevard, Harrisburg, state of Pennsylvania, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:

This invention relates to apparatus for severing electrical terminals joined together by carrier strips in parallel side-by-side relationship to constitute a strip of terminals, from the carrier strips and for crimping the severed terminals to wires.

According to one aspect of the invention, apparatus for severing channel-shaped electrical terminals joined together by carrier strips in parallel side-by-side relationship to constitute a strip of terminals, from the carrier strips and for crimping the severed terminals to wires, comprises a crimping anvil, a rotatable conveyor wheel having projections arranged to extend between the terminals of the strip, for feeding the strip of terminals step-by-step towards the crimping anvil, terminal strip severing means for severing each terminal from the carrier strips prior to the terminal reaching the crimping anvil, a crimping die assembly co-operable with the anvil to crimp the terminals to the wires, and a wire severing blade arranged to enter a slot in the die assembly to trim the wires, prior to each crimping operation, the terminal strip severing means and the wire severing blade being mounted on a terminal guide member which partially surrounds the conveyor wheel.

According to another aspect of the invention, apparatus for severing channel-shaped electrical terminals joined together by carrier strips in parallel side-by-side

relationship to constitute a strip of terminals, from the carrier strips and for crimping the severed terminals to wires, comprises an exchangeable crimping die assembly and a crimping anvil co-operable to crimp the terminals to the wires, a conveyor for feeding the strip of terminals step-by-step towards the crimping anvil, terminal strip severing blades for severing each terminal from the carrier strips prior to the terminal reaching the crimping anvil and a wire severing blade arranged to enter a slot in the die assembly to trim the wires to which the terminals are to be crimped, prior to each crimping operation, the conveyor comprising a conveyor wheel having projections arranged to extend between the terminals of the strip, the terminal strip severing blades and the wire severing blade being mounted on an exchangeable guide block which partially surrounds the conveyor wheel and which co-operates with the conveyor for guiding the terminals towards the crimping anvil.

For a better understanding of the invention, an embodiment thereof will now be described by way of example with reference to the accompanying drawings, in which:—

Figure 1 is a diagrammatic perspective view of part of a strip of electrical terminals joined together by carrier strips in side-by-side parallel relationship.

Figure 2 is an enlarged perspective view of a terminal which has been severed from the strip, with part of the terminal removed to show the interior of the terminal;

Figure 3 is a perspective view illustrating the terminal after it has been crimped to wires;

Figure 4 is a side elevational view of apparatus for severing the terminals from the carrier strips and crimping the terminals to wires after trimming the wires;

[Price 33p]

Figure 5 is a top plan view of the apparatus and showing diagrammatically three wires operatively positioned in the apparatus;

5 Figure 6 is a sectional view taken on the lines VI-VI of Figure 5, and showing diagrammatically a strip of terminals operatively positioned in the apparatus.

Figure 7 is a sectional view taken on the 10 lines VII-VII of Figure 6;

Figure 8 is a front elevational view of a detail of the apparatus;

Figure 9 is a view taken on the lines IX-IX of Figure 6 with some parts, not shown; 15 and

Figure 10 is an enlarged elevational view shown partly in axial section, of a guide sheave of the apparatus, terminals on the guide sheave being shown in phantom 20 form.

Figure 1 shows part of a strip of essentially U-section electrical terminals 1 joined together in side-by-side parallel spaced relationship by carrier strips 2 and 25 3 formed integrally with the terminals 1. As shown in detail in Figure 2, each terminal comprises a metal crimping ferrule 4 which is of essentially U-shaped cross-section and has a base 5 and upstanding side walls 6. A pair of upstanding tongues 7, struck out from the base 5 are provided at either end of the ferrule base, each tongue 7 having a pair of parallel spaced notches 8. Each side wall 6 has a pair of ribs 9 30 formed by bending a portion of the side wall inwardly of the ferrule 4, a tongue 10 struck from each side wall extending obliquely beneath each rib 9.

A film 11 of insulating material, for example polyethylene terephthalate, is bonded to the external surface of the ferrule 4 to extend beyond the ends of the ferrule 4 and also beyond the edges of the side walls 6. Each longitudinal marginal portion of 45 the film 11 has a longitudinally central notch 12 on either side of which is a terminal locating projection 13 on the ferrule 4. As shown in Figure 1, the film 11 is connected, at each end of each terminal, with one of the carrier strips 2 and 3, which are of the same material as the film 11, and through a slug 14 of such material.

Each terminal 1 is intended to be crimped (after being severed from the 55 strips 2 and 3) to up to four wires laid in the notches 8 prior to the crimping operation. The terminals are specifically intended for use in splicing the individual wires of telephone cable ends, where more 60 than two wires are to be connected together by each terminal, for example where a tap wire is to be connected to two through wires. A terminal which has been so crimped to wires W1 to W3 is shown in 65 Figure 3. Where only two wires are to be

spliced, as is more usually the case, a shorter terminal 1a (shown diagrammatically in Figure 10) may be used in the interest of economy, this terminal having only two notched tongues, one of 70 these being positioned at either end of the ferrule floor.

We have described in the specification of our British Patent No. 1,045,380, terminals of the kind described above and the manner 75 in which these terminals are crimped to wires.

Apparatus for severing the terminals from the carrier strips and crimping them to wires will now be described with reference to Figures 4 to 9. As explained below 80 the apparatus is intended for use, subject to the simple exchange of two parts of the apparatus, with either the terminals 1 or 1a.

The apparatus comprises parallel side plates 20 and 22 secured together through the agency of forward and rear spacer blocks 24, and 26 and 28, respectively, to 85 which the side plates 20 and 22 are secured. Between these plates a terminal strip guide and severing block 30 is releasably secured by means of bolts 42 and with the interposition of spacer plates 31. The block 30 comprises a concave terminal 90 guiding surface 32 having a central insert providing a terminal guiding rib 34 which merges with a wire cutting blade 36 projecting from the block 30, the inner surface of the blade 36 also acting as a terminal 95 guiding extension of the rib 34. On either side of the surface 32 is a terminal strip severing blade 38 (see Figures 6 and 8).

A shaft 44 rotatably mounted in an anvil 105 and terminal strip support block 45 secured between the plates 20 and 22 has keyed thereto a terminal strip feed wheel 46 having projections 48 equally spaced about its periphery and each comprising a 110 pair of opposed chamfered guide surfaces 49. The projections 48 are each dimensioned about its periphery and each comprising a pair of adjacent terminals 1. The block 45 has formed integrally therewith a crimping anvil 115 50 which extends axially of the wheel 46, as best seen in Figure 5, and between a pair of the projections 48. Mounted on the shaft 44 is knob 52, a ratchet wheel 54 being keyed to the shaft 44 between the 120 block 45 and knob 52, the teeth of the wheel 54 being engaged by a pawl 56 pivotally mounted on a pin 58 which is slidable along an arcuate slot 62 in the plate 20. The pawl 56 is urged into en- 125 gagement with the ratchet wheel 54 by a spring 55. A guide sheave 64 (Figures 6 and 10) is mounted for rotation about an axis extending parallel to the shaft 44.

A terminal strip guide plate 66 is 130

pivotally mounted at 68 for movement between a closed position in which the plate 66 extends around a part of the periphery of the guide sheave 64 and an open position in which the plate 66 is displaced angularly in an anticlockwise (as seen in Figure 6) sense to expose the guide sheave 64. The plate 66 is retained in its closed position by a latch device 67. A die carrier 60, to which the pin 58 is fixed, is pivoted between the plates 20 and 22 on a shaft 70, at one end of the die carrier 60, the die carrier having fixed to its other end a female crimping die assembly 72 carried by a support block 82 and comprising two parts each generally referenced 74 and defining between them a central slot 76 dimensioned snugly to receive the blade 46. We have described a similar die assembly in the specification of our British Patent No. 1,176,105. The parts 74 are secured to the block 82, releasably by fasteners 75. Each part 74 comprises a female die 78 in juxtaposed relationship with which is the wire holder 79 made of a resilient plastics material and having a wire receiving slot 80. Each die 76 has a die cavity with a base 77 having a central cusp defining two juxtaposed concave terminal deforming surfaces as we have described in the specification of our British Patent No. 1,045,380.

The travel of the die carrier 60 about its shaft 70 is limited in an anti-clockwise (as seen in Figure 6) sense by the abutment of the pin 58 against an abutment plate 86 screwed releasably to the block 26. One end of a link 88 is pivotally connected at 61 to the die carrier 60 at a position adjacent to the block 82, the other end of the link 88 being pivotally connected to a link block 90 by a pin 92, the block 90 being in turn pivoted between the plates 20 and 22 on the shaft 91.

Parallel links 98 are each pivoted at one end to the pin 92, the other end of each link 98 being pivotally connected by a pin 99 to one end of a link 94, the other end of which is pivotally connected by a pin 95 to the block 26. A driving link 96 has one end pivotally connected to the parallel links 98, intermediate the pins 92 and 99 by a pin 97, the other end of the link 96 being pivotally connected by a pin 103 to an operating lever 100 which is in turn pivotally connected by a shaft 101 to flanges 102 formed integrally with the blocks 26 and 28. A full-stroke ratchet mechanism 104 of the kind that we have described in our British Patent No. 661,192, is pivotally connected between the lower (as seen in Figures 4 and 5) end of the lever 100 and a lug 106 formed integrally with the block 28. The lever 100 has a rotatably mounted operating knob

110.

As best seen in Figure 4, the lever 100 comprises a pair of side plates 108 and 111 which are rigidly connected by struts 112, 114, the strut 114 carrying a lug 116 by means of which the link 96 is connected to the lever 100.

The pin 91 by which the block 90 is connected to the plates 20 and 22, is eccentrically mounted so that the throw of the block 90 can be accurately adjusted by rotation of the pin 91. Toothed wheels 118, each rigidly connected to one end of the pin 91 are provided on the plates 20 and 22. Each wheel 118 can be secured in a desired angular position by means of a removable screw 120 which is engageable in a chosen indentation between the teeth of the wheel 118.

The plate 20 carries a stub shaft 122 by means of which the apparatus can be secured to a clamp (not shown) for supporting the apparatus adjacent to a pair of cable ends (not shown) the individual wires of which are to be spliced with the aid of the apparatus.

For loading the apparatus with a strip of terminals as described above with reference to Figures 1 and 2, the guide plate 66 is rotated in an anti-clockwise (as shown in Figure 6) sense to expose the sheave 64. The end of the strip of terminals is then fed around the sheave 64, with the terminals projecting towards the sheave axis as shown in Figure 6. The strip of terminals is then led around the block 45 by rotating the knob 52 and thus the wheel 46 which has previously been freed for rotation by raising the pawl 56 from the ratchet wheel 54, against the action of its spring 55. A first one, 48a (see Figure 6), of the projections 48 of the wheel 46 passes between the leading, and the next following terminal of the strip and the wheel 46 is rotated in a clockwise (as seen in Figure 6) sense, by turning the knob 52, until the projection 48a is positioned as indicated by the reference 48a' in Figure 6 in such a way that the base of the leading terminal of the strip lies on the anvil 50. As the terminals traverse the arcuate surface of the block 30 as the wheel 46 is rotated, the terminals are guided and located by virtue of the engagement of the rib 34 in the notches 12 of the terminals, between the projections 13. As the terminal passes the blades 38, these sever the terminal from the carrier strips 2 and 3 by cutting through the slugs 14 (Figure 1) between the strips 2 and 3 and the ends of the terminal. Thus those terminals that have passed the blades 38, i.e. the terminal on the anvil 50 and the next adjacent terminal have been completely separated from the carrier strips 2 and 3. The pawl 56 is

then released so that it re-engages the ratchet wheel 54 under the action of the spring 55 and the guide plate 66 is returned to the position in which it is shown in Figure 6, so that the apparatus is now ready for operation.

As mentioned above, the terminals 1 described with reference to Figures 1 to 3, are intended to be used with up to four wires, three wires being used according to the present example. Thus to load the apparatus with wires, a pair of wires W2 and W3 is inserted as indicated by the broken lines in Figure 5 from one side of the die assembly 72, a single wire W1 being inserted from the other side of the assembly 72. The wires are forced into the wire guides 80 so that two wires extend through the die cavity of one die part 78 and one wire through the die cavity of the other die part 78, the end portion of each wire depending from the slot 76. The wires are firmly held in position by the resilient wire guides 80. Each wire guide preferably has a central post upon either side of which one wire can be located. Such a wire loading operation is described in detail in the specification of our British Patent No. 1,176,105.

The operator now pushes the knob 110 in a direction to move the lever 100 in an anti-clockwise (as seen in Figure 5) sense of rotation so as to drive the link 96 upwards (as seen in Figure 6) so as to break the knee joint formed by the block 90 and link 98 thus driving the link 88 also upwards (as seen in Figure 6) whereby the die carrier 60 is driven in a clockwise (as seen in Figure 6) sense about the shaft 70 so that the die assembly 72 is driven towards the anvil 50 through an arcuate path, the pin 58 being driven along the slot 62 so that the pawl 56 passes over a tooth of the ratchet wheel 54.

When the die assembly 72 has been driven through some 70% of its path towards the anvil 50, the knee joint formed by the links 94 and 98 is straightened out so that the full mechanical advantage afforded by the lever 100 is applied to the die carrier 60. Towards the end of the working stroke of the die carrier 60, the cutting blade 36 enters the slot 76 so that the wires are severed between the edges of the slot 76 and the blade 36 so that depending end portions of the wires, which portions protrude from the slot 76 (as shown in Figure 5) are trimmed off so as to fall from the apparatus. As the die cavities receive the anvil 50, the terminal on the anvil 50 is crimped to the end portions of the wires W1 to W3 (from which portions the excess parts have been trimmed as described above), in the die cavities of the dies 78 by co-operation be-

tween the anvil 50 and the internal surfaces of the die cavities. During the crimping operation, the side walls 6 of the terminal on the anvil 50 are curled over by the concave surfaces of the bases 77 of the die cavities so as to be positioned (as shown in Figure 3) towards the base 5 of the ferrule 4 of the terminal so that the end portions of the wires W1 to W3 are driven into the slots 8 by the tongues 10 under the action of the ribs 9 so that the edges of the slots 8 penetrate the insulation of the wires and make good electrical contact between the electrically conductive cores of the wires and the ferrule 5. Portions of the film 11 which project beyond the longitudinal edges of the side walls 6 are trapped between the curled-over portions of the side walls, all as described in the specification of our British Patent No. 1,045,380, mentioned above.

The full stroke mechanism 104 is effective to prevent return movement of the lever 100 until the die carrier 60 and thus the die assembly 72 have been driven through a complete working stroke to crimp the terminal to the wires as described above. Upon the working stroke having been completed, the operator pulls on the knob 110 to return the lever 100 to its initial position. During this return movement, the pawl 56 acts upon the ratchet wheel 54 to rotate the feed wheel 46 by one step so as to bring the next following terminal onto the anvil 50 and to cause the blades 38 to sever a terminal from the carrier strips 2 and 3. The return movement of the lever 100 also causes the linkage by which it is connected to the die carrier 60, thus the die carrier 60 also, to be returned to their initial positions, this return movement being limited by the abutment of the pin 58 against the plate 86.

As the feed wheel 46 is rotated step-by-step during operation of the apparatus, the crimped terminals, to each of which a wire of each cable end and also a tap wire have been connected, are ejected from the apparatus by engagement with ejection surfaces 124 of the block 24. One of the crimped terminals is shown in Figure 6, prior to its ejection and is referenced 1a.

The crimp height of the apparatus, that is to say the length of stroke of the die assembly 72 towards the anvil 50 is adjustable by setting the wheels 118 to a desired angular position. The die assembly 72 is non-adjustably fixed in relation to the block 82 and the crimp height cannot therefore be adjusted by adjusting the position of the die assembly 72 with respect to the block 82.

The apparatus can readily be adjusted for operation with the terminals mentioned

above which are of shorter length, i.e., the terminals 1a, than the terminals shown in Figures 1 to 3, by exchanging the guide block 30 and the die assembly 72. To this end, the guide block 30 is replaced by a further and similar guide block (not shown) of which the terminal strip severing blades are more closely spaced than are the blades 38 of the guide block 30, the die assembly 72 being replaced by a further and similar die assembly in which the die parts are of shorter length than the die parts 78. In this assembly the central parts, mentioned above, of the wire guides are omitted. The cutting blade of the further guide block is of such width as to fit snugly in the central slot of said further and similar die assembly. the terminal strip support block 45 is not exchanged since the anvil 50 has a plain working surface and is of a length to accommodate either the longer or the shorter terminals. For crimping the shorter terminals 1a, the apparatus operates in exactly the same way as described above. However, only one wire is introduced into the slot of the die assembly from either side of the apparatus.

The distance between the die set, into which the wires are loaded, and the position at which the crimped terminals are ejected from the apparatus is desirably short thereby reducing the amount of slack that must be provided in the wires to be spliced. The operation of the apparatus is rapid since the lever 100 can be moved very easily up to the position, in which its full mechanical advantage is applied to the die carrier 60.

Where the lengths of the portions of the carrier strips between the terminals are excessive in relation to the dimensions of the projections 48, circumferentially of the wheel 46, these portions of the carrier strips will form undulations on the surface of the block 45 which supports these strips.

The guide sheave 64 is, as shown in Figure 10, adapted for use with the terminals of Figures 1 to 3 or with the shorter length terminals 1a, as may be desired, so that the guide sheave 64 need not be exchanged. To this end, each cheek 148 of the sheave 64 comprises first and second supporting surfaces 150 and 152, respectively, for the carrier strips of the terminals, the surfaces 150 being more widely spaced from one another axially of the sheave 64 than the surfaces 152 and the surfaces 152 being nearer to the rotational axis of the sleeve 64 than the surfaces 150. As shown, the carrier strips 2 and 3 of the longer terminals 1 can be supported by the surfaces 150, whereas the carrier strips 2a and 3a of the shorter terminals 1a can be supported by the surfaces 152.

WHAT WE CLAIM IS:—

1. Apparatus for severing channel-shaped electrical terminals joined together by carrier strips in parallel side-by-side relationship to constitute a strip of terminals, from the carrier strips and for crimping the severed terminals to wires, the apparatus comprising a crimping anvil, a rotatable conveyor wheel having projections arranged to extend between the terminals of the strip, for feeding the strip of terminals step-by-step towards the crimping anvil, terminal strip severing means for severing each terminal from the carrier strips prior to the terminal reaching the crimping anvil, a crimping die assembly co-operable with the anvil to crimp the terminals to the wires, and a wire severing blade arranged to enter a slot in the die assembly to trim the wires, prior to each crimping operation, the terminal strip severing means and the wire severing blade being mounted on a terminal guide member which partially surrounds the conveyor wheel.

2. Apparatus for severing channel-shaped electrical terminals joined together by carrier strips in parallel side-by-side relationship to constitute a strip of terminals, from the carrier strips and for crimping the severed terminals to wires, the apparatus comprising an exchangeable crimping die assembly and a crimping anvil co-operable to crimp the terminals to the wires, a conveyor for feeding the strip of terminals step-by-step towards the crimping anvil, terminal strip severing blades for severing each terminal from the carrier strips prior to the terminal reaching the crimping anvil and a wire severing blade arranged to enter a slot in the die assembly to trim the wires to which the terminals are to be crimped, prior to each crimping operation, the conveyor comprising a conveyor wheel having projections arranged to extend between the terminals of the strip, the terminal strip severing blades and the wire severing blade being mounted on an exchangeable guide block which partially surrounds the conveyor wheel and which co-operates with the conveyor for guiding the terminals towards the crimping anvil.

3. Apparatus according to Claim 1, in which the conveyor wheel is mounted for rotation with respect to a conveyor wheel support block with which the crimping anvil is integrally formed, the conveyor wheel support block being mounted between side plates of the apparatus and the guide member being detachably secured between the side plates.

4. Apparatus according to Claim 1, 2 or 3, in which a guide sheave for the strip of terminals is mounted adjacent to the

above which are of shorter length, i.e., the terminals 1a, than the terminals shown in Figures 1 to 3, by exchanging the guide block 30 and the die assembly 72. To this end, the guide block 30 is replaced by a further and similar guide block (not shown) of which the terminal strip severing blades are more closely spaced than are the blades 38 of the guide block 30, the die assembly 72 being replaced by a further and similar die assembly in which the die parts are of shorter length than the die parts 78. In this assembly the central parts, mentioned above, of the wire guides are omitted. The cutting blade of the further guide block is of such width as to fit snugly in the central slot of said further and similar die assembly. The terminal strip support block 45 is not exchanged since the anvil 50 has a plain working surface and is of a length to accommodate either the longer or the shorter terminals. For crimping the shorter terminals 1a, the apparatus operates in exactly the same way as described above. However, only one wire is introduced into the slot of the die assembly from either side of the apparatus.

The distance between the die set, into which the wires are loaded, and the position at which the crimped terminals are ejected from the apparatus is desirably short thereby reducing the amount of slack that must be provided in the wires to be spliced. The operation of the apparatus is rapid since the lever 100 can be moved very easily up to the position, in which its full mechanical advantage is applied to the die carrier 60.

Where the lengths of the portions of the carrier strips between the terminals are excessive in relation to the dimensions of the projections 48, circumferentially of the wheel 46, these portions of the carrier strips will form undulations on the surface of the block 45 which supports these strips.

The guide sheave 64 is, as shown in Figure 10, adapted for use with the terminals of Figures 1 to 3 or with the shorter length terminals 1a, as may be desired, so that the guide sheave 64 need not be exchanged. To this end, each cheek 148 of the sheave 64 comprises first and second supporting surfaces 150 and 152, respectively, for the carrier strips of the terminals, the surfaces 150 being more widely spaced from one another axially of the sheave 64 than the surfaces 152 and the surfaces 152 being nearer to the rotational axis of the sleeve 64 than the surfaces 150. As shown, the carrier strips 2 and 3 of the longer terminals 1 can be supported by the surfaces 150, whereas the carrier strips 2a and 3a of the shorter terminals 1a can be supported by the surfaces 152.

WHAT WE CLAIM IS:—

1. Apparatus for severing channel-shaped electrical terminals joined together by carrier strips in parallel side-by-side relationship to constitute a strip of terminals, from the carrier strips and for crimping the severed terminals to wires, the apparatus comprising a crimping anvil, a rotatable conveyor wheel having projections arranged to extend between the terminals of the strip, for feeding the strip of terminals step-by-step towards the crimping anvil, terminal strip severing means for severing each terminal from the carrier strips prior to the terminal reaching the crimping anvil, a crimping die assembly co-operable with the anvil to crimp the terminals to the wires, and a wire severing blade arranged to enter a slot in the die assembly to trim the wires, prior to each crimping operation, the terminal strip severing means and the wire severing blade being mounted on a terminal guide member which partially surrounds the conveyor wheel.

2. Apparatus for severing channel-shaped electrical terminals joined together by carrier strips in parallel side-by-side relationship to constitute a strip of terminals, from the carrier strips and for crimping the severed terminals to wires, the apparatus comprising an exchangeable crimping die assembly and a crimping anvil co-operable to crimp the terminals to the wires, a conveyor for feeding the strip of terminals step-by-step towards the crimping anvil, terminal strip severing blades for severing each terminal from the carrier strips prior to the terminal reaching the crimping anvil and a wire severing blade arranged to enter a slot in the die assembly to trim the wires to which the terminals are to be crimped, prior to each crimping operation, the conveyor comprising a conveyor wheel having projections arranged to extend between the terminals of the strip, the terminal strip severing blades and the wire severing blade being mounted on an exchangeable guide block which partially surrounds the conveyor wheel and which co-operates with the conveyor for guiding the terminals towards the crimping anvil.

3. Apparatus according to Claim 1, in which the conveyor wheel is mounted for rotation with respect to a conveyor wheel support block with which the crimping anvil is integrally formed, the conveyor wheel support block being mounted between side plates of the apparatus and the guide member being detachably secured between the side plates.

4. Apparatus according to Claim 1, 2 or 3, in which a guide sheave for the strip of terminals is mounted adjacent to the



15

conveyor wheel, for rotation about an axis which is parallel to that of the conveyor wheel and is positioned on the opposite side of the conveyor wheel to the crimping anvil, a terminal strip guide plate being movable between a first position to co-operate with the guide sheave to guide the strip of terminals thereon and a second position to expose the guide sheave.

5. Apparatus according to Claim 4, in which the guide sheave comprises a pair of axially spaced cheeks each having first and second carrier strip supporting surfaces, the first supporting surfaces being more widely spaced from one another axially of the guide sheave than the second supporting surfaces, the second supporting surfaces being nearer to the rotational axis of the guide sheave than the first supporting faces.

6. Apparatus according to any one of the preceding claims, in which the crimping die assembly is mounted for movement towards and away from the crimping anvil on a pivotable die carrier which is driven by a lever through the intermediary of a linkage providing two knee joints, one of which is straightened from a broken position, by the action of the other knee joint as the die assembly approaches the crimping anvil, so that the full mechanical advantage of the lever is applied to the die carrier.

7. Apparatus according to Claim 6, in

which a shaft about the axis of which one of the links of the linkage pivots, is eccentrically mounted for adjusting the throw of the link, in turn to adjust the extent to which the die assembly approaches the anvil, the shaft being securable in a plurality of chosen angular positions.

8. Apparatus according to Claim 7, in which the shaft is secured to a toothed wheel, a pin being provided for engaging between a selected pair of teeth of the toothed wheel to determine the angular position of the shaft.

9. Apparatus according to Claim 6, 7 or 8, in which a pawl is pivotally connected to the die carrier for co-operation with a ratchet on the shaft of the conveyor wheel to drive the conveyor wheel, the travel of the die carrier in a direction away from the anvil being limited by a stop block screwed to a frame block of the apparatus.

10. Apparatus for severing channel-shaped electrical terminals joined together by carrier strips in parallel side-by-side relationship to constitute a strip of terminals, from the carrier strips and for crimping the severed terminals to wires, substantially as hereinbefore described with reference to the accompanying drawings.

For the Applicants:
R. G. STUART-PRINCE,
Chartered Patent Agent.

