

[54] **APPARATUS FOR ATTACHING
TERMINALS TO ELECTRIC CONDUCTORS**

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29/203 DTS, 203 R; 81/9.51**

[56] **References Cited**

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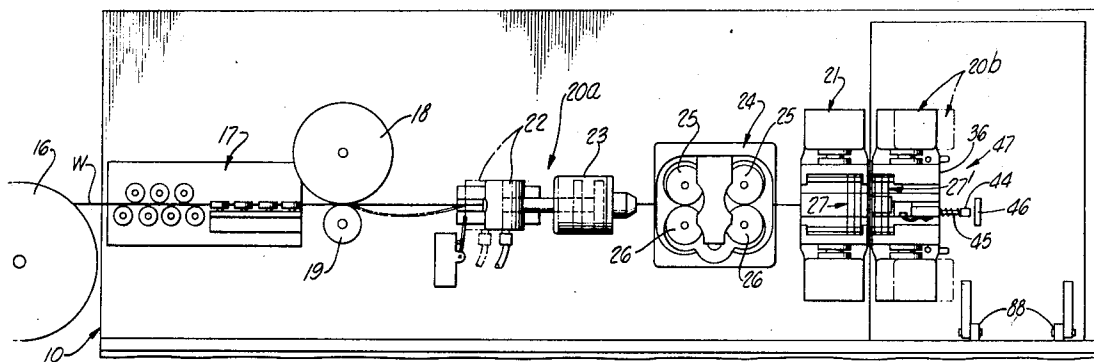
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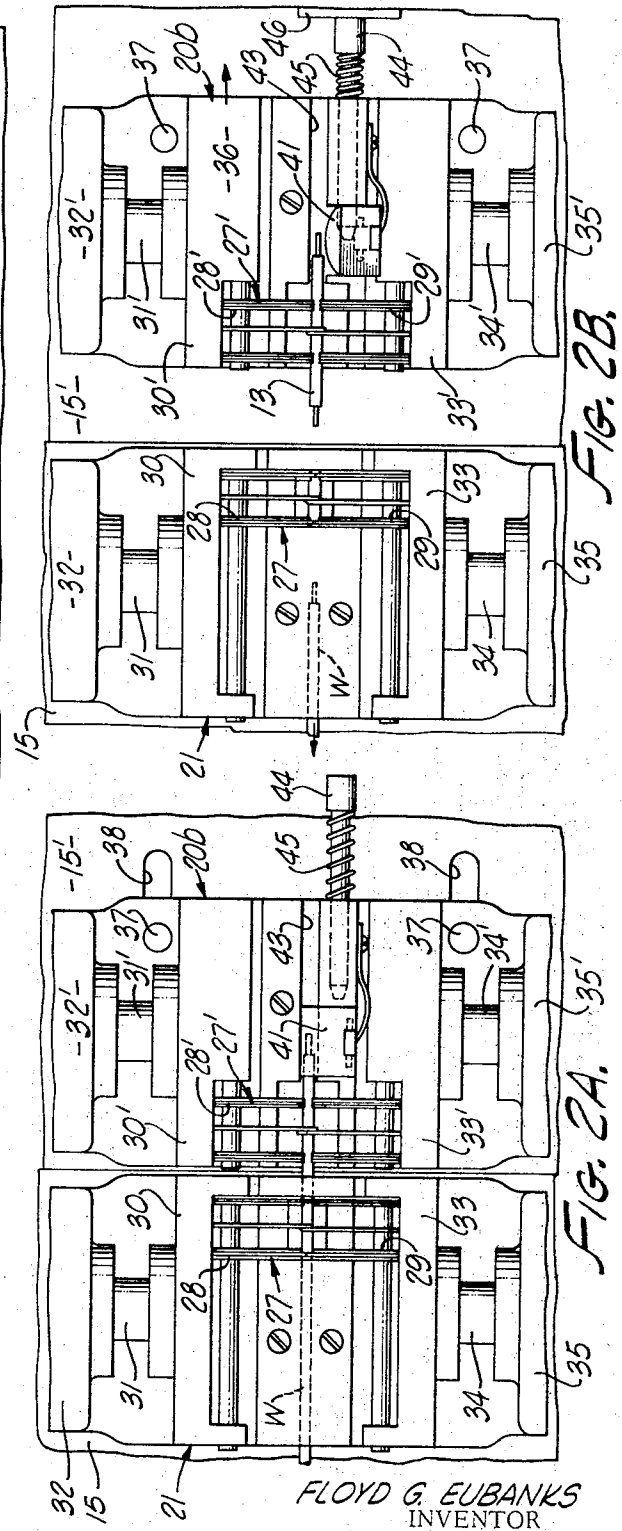
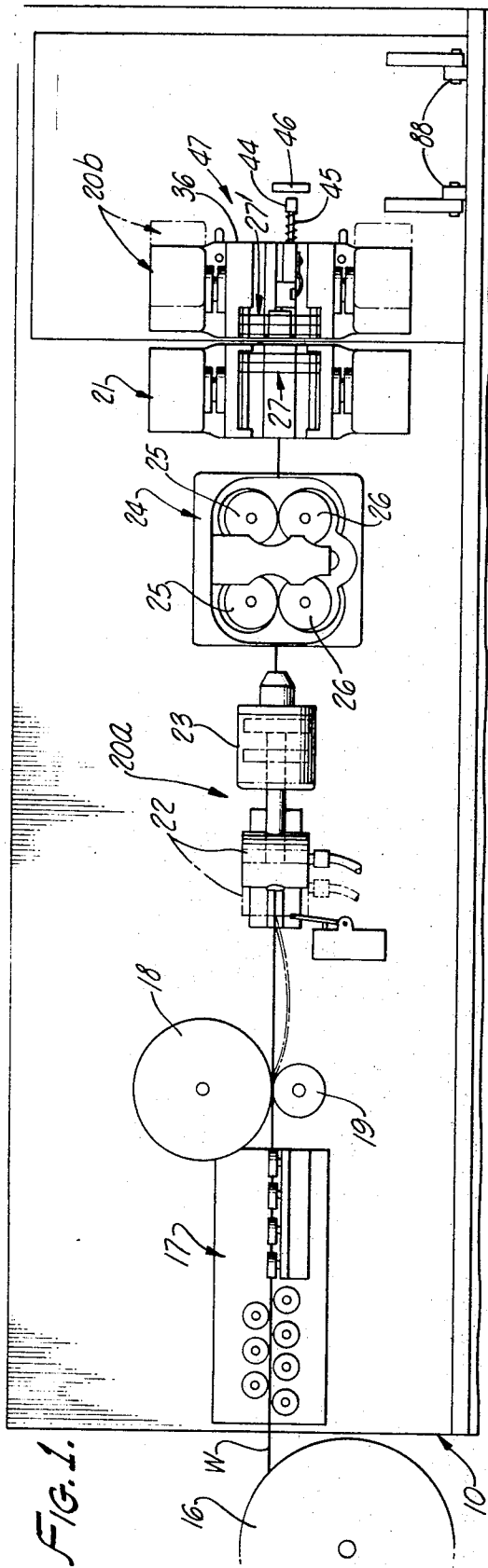
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[57] **ABSTRACT**

Apparatus for attaching terminals to electric conductors, wherein the electric conductors are cut to a predetermined length in a wire cutting and stripping device in which stripping jaws of the insulation stripping mechanism, which grip the cut-off length of conductor, are mounted on a tiltable movable panel in a conductor supply zone, so that upon being tilted, the cut-off conductor will be carried by a translatory movement into a position where it is engaged by the jaws of a pair of conveyor fingers and carried to a terminal attaching zone where an end of the cut-off conductor is positioned in a conductor end receiving portion of a terminal which is then secured to the conductor end by the operation of appropriate dies embodied in the associated terminal attaching device.

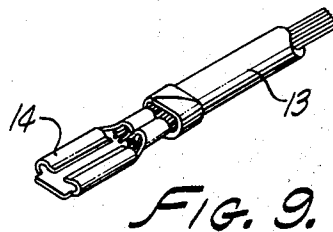
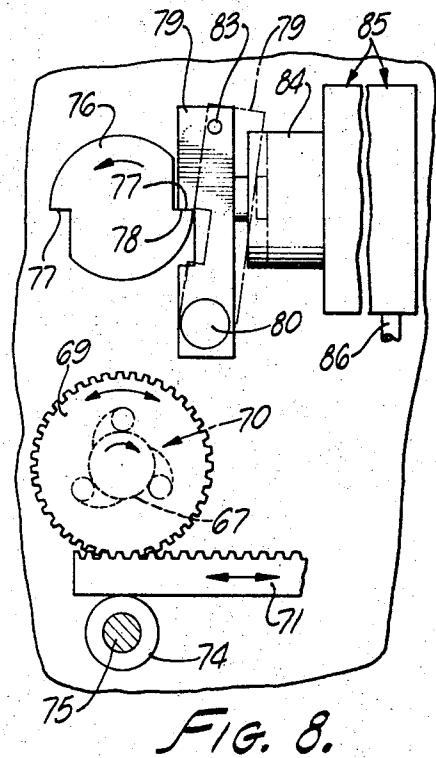
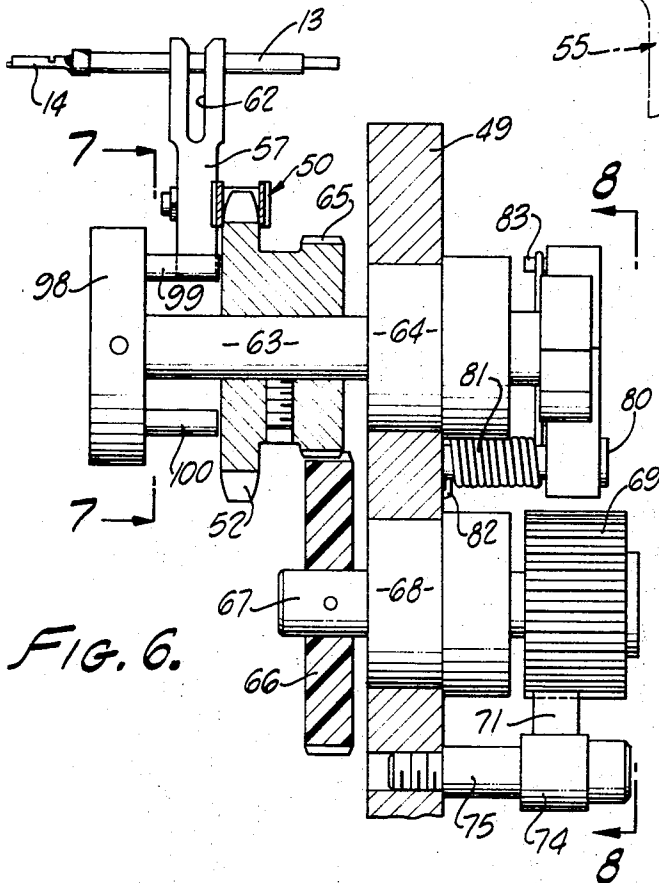
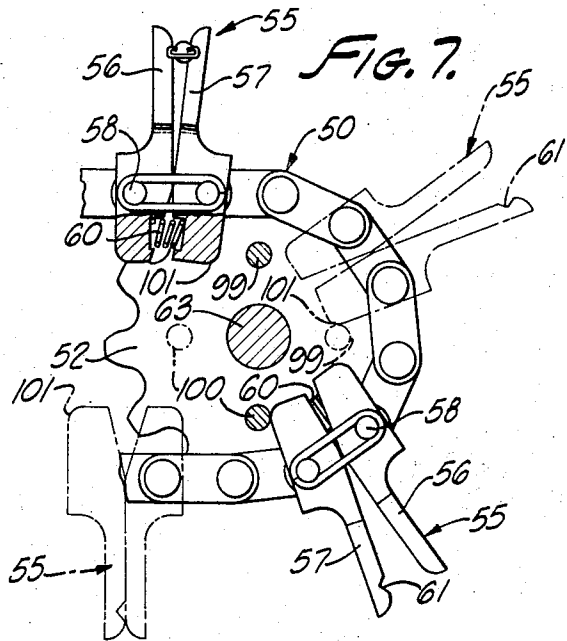
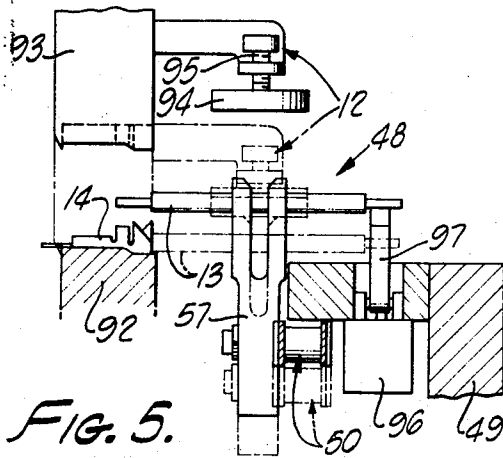
19 Claims, 10 Drawing Figures





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APPARATUS FOR ATTACHING TERMINALS TO ELECTRIC CONDUCTORS

BACKGROUND OF THE INVENTION

The invention relates generally to improvements in the art of producing electrical conductors with an attached end terminal.

Heretofore, a number of types of apparatus have been known in which electric conductors have been cut to predetermined lengths, and by means of terminal attaching devices have been provided on one or more ends with an appropriate terminal. In the main, however, such apparatus has been quite cumbersome and expensive, and relatively slow in operation, so that high speed production has not as a general rule been possible. Moreover, the conductor cutting mechanism and the terminal attaching mechanism have as a general rule been constructed into a unitary apparatus so that diversity of construction is not readily permitted with respect to the terminal attaching mechanism.

The present invention therefore contemplates the provision of a unique conveyor arrangement which may be utilized to connect a high speed wire cutter and insulation stripping apparatus with a terminal attaching device, and with slight modification may be adapted for use with any one of a number of terminal attaching devices of different manufacture. As exemplary of the wire cutter and insulation stripping apparatus, which it is proposed to utilize in carrying out the present invention, reference is made to the apparatus as shown in Eubanks U.S. Pat. No. 2,934,982, issued May 3, 1960. The operation in general of the apparatus of this patent is the same as that of the apparatus which is disclosed in the present application.

SUMMARY OF THE INVENTION

The present invention relates generally to the production of electric conductors, and is more particularly concerned with improved apparatus for attaching terminals at the ends of electric conductors.

Having in mind the inherent disadvantages of prior known structures for this purpose, it is one object of the present invention to provide a simplified, improved and efficient apparatus having components operable in timed synchronized relation for cutting an electric conductor into predetermined conductor lengths and attaching a terminal to at least one end of each conductor length.

A further object is to provide in combination with wire cutter and insulation stripping apparatus, improved means for connecting the apparatus, with a minimum of modification, to terminal attaching devices of different manufacture for coordinated operation as a composite assembly.

A further object is concerned with the provision in combination with terminal attaching apparatus, improved means for producing at a conductor supply zone predetermined lengths of insulated electrical conductors having at least one insulation stripped end, and novel means for transferring the produced conductor lengths from the supply zone to conveyor means for transport movement to an associated terminal attaching device.

Another object is to provide in apparatus of the character described, improved means for conveying or transporting predetermined lengths of electric conduc-

tors from a conductor supply zone to a terminal attaching zone.

Still another object is to provide in apparatus for attaching terminals to the ends of electrical conductors, improved and novel means for successively feeding the output of an associated conductor cutting and insulation stripping apparatus to a conveyor for movement to a remotely positioned terminal attaching zone.

It is also a further object to provide novel means in terminal attaching apparatus for positioning an end of an electric conductor in a receiving portion of a terminal which is to be attached thereto.

Further objects of the invention will be brought out in the following part of the specification, wherein detailed description is for the purpose of fully disclosing the invention without placing limitations thereof.

BRIEF DESCRIPTION OF THE DRAWINGS

Referring to the accompanying drawings, which are for illustrative purposes only:

FIG. 1 is a front elevational view of wire cutter and insulation stripping apparatus as embodied in the present invention;

FIG. 2A is an enlarged fragmentary view of the cutter mechanism and the stripping mechanism at the conductor supply zone, prior to performing a stripping operation;

FIG. 2B is a similar view in which the relative position of the cutter mechanism and stripping mechanism is shown, with the stripping mechanism shifted away from the cutter mechanism as the result of a stripping operation;

FIG. 3 is a transverse side elevational view of the stripping mechanism at the conductor supply zone, showing its operative relationship with conveyor mechanism for transporting electric conductors from the conductor supply zone to a terminal attaching zone;

FIG. 4 is a fragmentary detail sectional view taken substantially on line 4—4 of FIG. 3, and illustrating the operative relationship of the conveyor finger members in picking up electric conductors at the conductor supply zone;

FIG. 5 is an enlarged fragmentary sectional view taken substantially on line 5—5 of FIG. 3, and showing the operative relationship of the components of the terminal attaching mechanism at the terminal attaching zone;

FIG. 6 is an enlarged fragmentary transverse section taken substantially on line 6—6 of the conveyor mechanism, showing details of the conveyor driving components and their operative relationship;

FIG. 7 is an enlarged fragmentary side elevational view, partly in section, taken substantially on line 7—7 of FIG. 6, showing the actuating means for opening and closing the conveyor gripping fingers at the outermost end of the conveyor mechanism;

FIG. 8 is a fragmentary elevational view, partly in section, showing details of the driving means for the conveyor mechanism, taken substantially on line 8—8 of FIG. 6; and

FIG. 9 is a perspective view showing a terminal as attached to an electric conductor by means of the apparatus of the present invention.

DESCRIPTION OF A PREFERRED EMBODIMENT

Referring now more specifically to the drawings, the apparatus of the present invention utilizes wire cutter

and insulation stripping apparatus, as generally indicated at 10, in association with a conveyor mechanism, as generally indicated at 11, and terminal attaching mechanism, as generally indicated at 12, these components being operatively interconnected and synchronized to produce an electric conductor 13 of predetermined length, having a terminal 14 attached to one end, as shown in FIG. 9.

The wire cutter and stripping apparatus 10 is of the type disclosed in the above noted U.S. Pat. No. 2,934,982 and in its broad concept utilizes similar components which are operative generally in the same manner as described in the patent. Although it is believed that specific details will not be necessary in the description, a brief description will manifestly be helpful in understanding the cooperative relationship of the wire cutter and stripping apparatus in respect to the associated components. As in the patent referred to, the wire cutter and stripping apparatus as herein disclosed, embodies a main panel 15 and an associated main panel section 15'. As best shown in FIG. 1, a wire W is fed from the left end of panel 15 from a reel 16 or other suitable source into a wire straightening device 17 of conventional construction, and thence to a length measuring mechanism which includes a measuring wheel 18 against which the wire is held by means of a presser wheel 19. This measuring wheel is associated with cycling control for determining the sequence of operation of the cutter and stripping mechanisms.

From the measuring wheel, the wire passes through a first stripping mechanism 20a which is positioned on the feed side of a wire cutting mechanism 21 and includes pneumatically operable means 22 for controlled gripping of the wire W during a stripping operation in response to movement by means of pneumatically energizable piston-cylinder actuator 23 in a manner well known in the art and as disclosed in the above noted patent.

From the stripping mechanism 21a, the wire W passes through a feeding mechanism 24 between a set of upper rollers 25 and lower rollers 26 arranged for actuation in a well known manner into a wire feeding position in engagement with the wire, and a slightly separated position so that the feeding of the wire will be terminated.

The wire is then conducted from the feed mechanism through an appropriate guide into the cutter mechanism 21.

As best shown in FIG. 2A, the cutter mechanism comprises three sets of blades 27, each set comprising an upper blade 28 and lower blade 29. These sets of blades have cooperatively associated cutting edges which operate in a manner well known in the art of wire cutting and stripping. Briefly, however, the central set of cutting blades has cutting edges adapted to cut through the wire and completely sever it, whereas the sets of cutting blades on each side of the central set are arranged to cut through the insulation only. The spacing between the sets of blades, and the consequent length of insulated portion which is to be severed is determined by the mounted spacing of the blades in their supporting actuating head structure. The upper blades 28 are carried by a head member 30 connected with a stem 31 arranged to be reciprocally actuated by movement of a connected piston within an air cylinder 32. In a similar manner, the lower blades 29 are supported

in a head member 33 connected with a stem 34 operatively associated with the air cylinder 35.

A second stripping mechanism 20b is shown as being positioned on the discharge side of the cutting mechanism. The second stripping mechanism is constructed with a configuration similar to that of the cutter mechanism, except that instead of utilizing cutting blades, the blades are formed to provide sets of clamping jaws 27', each of which sets comprises an upper jaw 28' and a lower jaw 29'. The corresponding support members and actuating parts corresponding to those of the cutter mechanism have been indicated by corresponding primed numbers in the second stripping mechanism.

In order to provide for lateral shifting of the second stripping mechanism 20b so as to perform a stripping operation, this stripping mechanism is of unit assembly and carried on a back frame 36 which is supported on vertically spaced mounting bolts 37—37 which extend through slots 38—38, respectively, in the panel section 15', these bolts being rearwardly secured to a bracket member 39, as shown in FIG. 3. Lateral shifting of the stripping mechanism 20b is by means of an appropriate pneumatic actuator (not shown) having a reciprocable piston rod 40 connected with the bracket 39.

During a cutting operation, the stripping mechanisms 20a and 20b will initially occupy positions as shown in full lines in FIG. 1. However, at the conclusion of the cutting operation, the stripping mechanisms are moved laterally away from the cutting mechanisms in opposite directions to the positions shown in dotted lines. This stripping movement removes the severed insulation portions at the contiguous ends of the cut wire so that in the shifted position of the stripping mechanism, as shown in FIG. 2B, the stripping mechanism constitutes receiver means in which a predetermined length of electric conductor 13 will be supported and held between the sets of upper and lower clamping jaws 28' and 29' of the stripping mechanism 20b.

It will be observed in FIG. 2B that the electric conductor 13 is in this case relatively short, so that it projects only a short distance on opposite sides of the clamping jaws. The wire cutter and stripping apparatus is not, however, limited to the production of short electric conductors only, but may with equal facility cut extremely long conductors which will project to the right of the clamping blades a considerable distance beyond the stripping mechanism, and may even extend beyond the right end of the panel section 15'. In order to facilitate the production of these long conductors, it is a feature of the invention to provide a pivoted gate member 41 on the right side of the clamping jaws, as seen in FIG. 2A. This gate member is supported for swinging movement upon a hinge pin 42, and is normally biased by a suitable spring or otherwise to a closed position in which its upper end extends over and forms a closure for an open sided groove 43 which is provided to guide the movement of the wire therethrough during a feeding movement. This gate prevents the long wire moving in a curved abnormal path out of its axial aligned axis and forces it to follow the groove 43. However, since it subsequently will become necessary to laterally move the clamped end of the conductor from the clamped position shown in FIG. 2B, provision is made for moving the gate 41 to an open position with respect to the open side of groove 43, as shown in FIG. 2B.

The gate is opened by means of an actuator rod 44 which is normally biased towards the right to an inac-

tive position by means of a compression spring 45. In the shifted position of the stripping mechanism 20b, as shown in FIG. 2B, the rod 44 as a result of its engagement with a stop 46 acts to cam the gate 41 to open position. Upon return of the stripping mechanism 20b to the position shown in FIG. 2A, the gate 41 will be released and automatically biased to its closed position.

With each operation of the wire cutter and stripping apparatus, the movement of the stripping mechanism 20b to its stripping position, as shown in FIG. 2B, will provide a conductor 13 with stripped ends at a position which has been termed a conductor supply zone, as indicated by the numeral 47. As will hereinafter be described more fully, each conductor is successively picked up by the conveyor mechanism 11 and transported to the terminal attaching mechanism 12 where the terminals are secured to an end of the conductor at a terminal attaching zone as generally indicated by the numeral 48. As disclosed in FIG. 3, the conveyor mechanism 11 is supported upon an upstanding frame plate member 49 which extends forwardly of the panel section 15' in a generally normal direction thereto. On one side of the plate member 49 there is provided a conveyor chain 50 which is looped around an idler sprocket 51 at the inward end of the loop, and around a driving sprocket 52 at the outer end of the loop so as to provide upper and lower chain runs 53 and 54, respectively. The chain carries a plurality of conductor gripping finger assemblies 55 which are supported at spaced intervals along the chain. As best shown in FIG. 7, each finger assembly comprises a fixed jaw 56 and a cooperable movable jaw 57 which are respectively supported upon the laterally extending pivot pins 58 and 59 at the opposite ends of a chain link. Each member is of elongate construction so as to project on opposite sides of its supporting pin. The inner ends of the members are interconnected by a compression spring 60 which acts to force the associated ends of the members away from each other in such a manner that the other ends of the members which form the gripping jaws will normally be forced together in a gripping direction. The fixed jaw member is held against rotative movement on its supporting pin 58 by providing an inner recess for receiving a face portion of the adjacent link in rather closely fitting relation which holds the member against movement, while the recess which is provided in the movable jaw has a sufficient loose fit to permit relative tilting movement of the movable jaw on its supporting pin 59. The movable jaw at its outermost end is preferably provided with a transversely extending grooved portion 61 in order that a conductor may be gripped more firmly and held in the proper position during transport. Also, it will be observed in FIG. 6 that the jaw ends of the finger members are of bifurcate construction with finger portions extending on opposite sides of a separating end slot 62 for a purpose which will subsequently be explained in detail.

The driving sprocket 52 for the conveyor chain is affixed to a driving shaft 63 which extends through the plate member 49 to the opposite side thereof and is rotatably supported in a suitable bearing 64. The sprocket is constructed with a hub portion which is fabricated to provide a gear 65, this gear having meshed driving engagement with a gear 66 carried by rotatable shaft 67. The gear 66 is preferably constructed of a material such as nylon as a protection against damage and jamming by a displaced conductor, terminal, or the

like. The shaft 67 projects through the plate member 49 and is supported in a suitable bearing 68.

The shaft 67 is advanced intermittently by means of a pinion 69 which is connected with the opposite end of the shaft through a one-way clutch mechanism as generally indicated at 70. The pinion 69 meshes with the teeth of a linear rack 71 supported for reciprocable movement in opposite directions by a power delivery piston rod 72 which is operatively associated with an actuating double acting pneumatic cylinder 73. The rack 71 is guided with respect to its movement and driving relationship with the pinion 69, by means of a rotatably mounted back-up roller 74 which is supported from the plate member 49 on a suitable stud support 75.

During the intermittent advancing movements of the conveyor chain by means of the actuating mechanism just described, it is necessary that the dwell positions of the finger assemblies 55 shall be definitely determined with respect to the positions of these assemblies at the conductor supply zone 47, and the terminal attaching zone 48. For this purpose, latching means are provided for positively stopping the forward feeding movement of the shaft 63 at the proper dwell positions. As shown, the opposite end of the shaft 63, from that which carries the driving sprocket 52, is provided with a disc 76 which is diametrically notched to provide abutment shoulders 77—77 which are adapted to be engaged by a shoulder 78 carried by latching lever 79, when this lever is in latching position. The latching lever is swingably supported on a pivot 80 at one end for swinging movement into latching and unlatching positions. The lever is normally spring-urged to a non-latching position by means of a spring 81 coiled about the pivot 80, as shown in FIG. 6, one end of the spring being anchored at 82 to the plate member 49, and the other end of the spring being connected with a pin 83 positioned at the outermost end of the latching lever. Movement of the latching lever to a latching position is accomplished by means of a power delivery piston rod 84 which is operatively associated with a single acting pneumatic actuating cylinder 85 connected for energization through a fluid conductor 86 which is supplied from the same pressurized fluid source as the cylinder 73, a delay valve 87, however, being interposed in the supply to the cylinder 85 in order that its operation will be slightly delayed with respect to the operation of the cylinder 73, and thus assure that the latching lever will not be impelled towards a latching position until after conveyor movement has started.

Referring again to FIG. 3, it will be observed that in a latched position of the conveyor chain drive, a finger assembly 55 is positioned in front of the second stripping mechanism 20b in a conductor receiving position. During the stripping operation, the panel section 15' is in a flush position with the main panel 15 as shown in full lines in FIG. 3. At the conclusion of the stripping operation, when the second stripping mechanism 20b is shifted laterally to the position shown in FIG. 2B, the clamping blades together with the stripped conductor 13 will be brought into alignment with the finger assembly as shown in FIG. 4, so that the central clamping blades will be in a position to be straddled by the jaw portions lying on opposite sides of the slot 62. In order to transport the stripped conductor, which is clampingly retained in the shifted second stripping mechanism 20b, and place the conductor in gripped position

between the jaws of the finger assembly, the panel section 15' is provided at its bottom with appropriate hinge connections 88—88 which will permit forward tilting of the panel section 15' from its full line position to the position shown in phantom lines, when a conventional pneumatic cylinder actuator 89 is energized to extend its piston rod 90. The outer end of the piston rod 90 is connected to the panel section by means of an appropriate connecting bracket 91. The energization of the cylinder actuator is, of course, properly synchronized with the timing operation of the other components of the apparatus. In the tilted position of the panel section 15', the conductor 13 will be transported from the phantom line position shown in FIG. 4 to the full line position shown therein, and where in the latter position the electric conductor 13 will have been moved into a gripped position between the jaws of the finger assembly, as shown in FIG. 3. After this operation, the panel section 15' will be returned to its normal position so that the next stripping action may be performed. With the conductor thus transported to the conveyor, the conveyor will now be advanced another step by energization of the actuating cylinder 73.

It will be apparent from the foregoing description, that the finger assemblies with the conductors held in the jaws thereof will traverse the upper run of the conveyor so that after the proper number of intermittent movements, the conductor will be brought to the terminal attaching zone 48, at which position the synchronized timed actuation of the terminal attaching mechanism will be motivated.

The terminal attaching mechanism or lugger is of conventional construction and contains components which are common to several commercially available terminal attaching devices. These devices, usually contain an anvil 92 which is adapted to have terminals 14 successively fed thereto by conventional means to place a terminal in a position for attachment to an end of the conductor as it is brought into the terminal attaching position. An appropriate die 93 is positioned for reciprocable movement into engaged and non-engaged positions with respect to the anvil 92, the die being appropriately configured on its active end to deform conductor receiving portions of the terminal into clamped position around the conductor. As shown in FIG. 5, the conveyor carries the conductor 13 to the terminal attaching position, the conductor in this position having its stripped end positioned above the terminal which is to be attached thereto. At this point, the die 93 is motivated to move towards the anvil, and during this movement is arranged to carry a presser plate 94 into engagement with the ends of the jaws which support the conductor 13, and as the die continues to move towards the anvil 92, the finger assembly and chain will be deflected sufficiently to permit the stripped end of the conductor to be positioned in the receiving end of the terminal, as shown in dotted lines in FIG. 5. At this point, the die continues to fold and clamp the securing portions of the terminal to the conductor. The presser plate 94 is supported for adjustment of its normal position by means of a suitable adjusting screw 95 having threaded engagement with a supporting bracket connected to the die 93. When the die is retracted, the conveyor chain will move back into its normal position, carrying the conductor 13 with the attached terminal 14 connected to the end thereof.

In order to prevent the continuation of a terminal attaching operation, in the event that for some reason the finger assembly did not have a conductor therein, a microswitch 96 is mounted in a suitable position so that a feeler actuating arm thereof as indicated at 97 will be positioned in the path of the conductor as it is moved downwardly for association with the terminal which is to be attached thereto. The actuating arm is arranged to operate suitable control contacts so as to interrupt the terminal attaching operation in the event that there is no conductor present.

After the terminal is attached to the conductor, the conductor and terminal are carried during successive movements of the conveyor to a discharge position at the outer driving end of the conveyor. Provision is made for automatically opening the jaws of the finger assembly as the finger assembly is moved around the axis of shaft 63. For such purpose, there is provided at the adjacent end of the shaft 63 a circular disc member 98 which carries a pair of diametrically spaced axially extending pins 99 and 100 which project into the path of movement of the inner ends of the fingers of the finger assembly as shown in FIG. 7. As there shown, it will appear that the pin 99 is so positioned with respect to the adjacent rounded corner 101 of the inner end of the jaw 57 that, as the finger assembly moves from a tangential path of movement around a circumferential path as determined by the sprocket 52, the rounded corner 101 and the pin 99 will be brought into camming engagement which will cause the movable jaw to pivot and thus release the previously held conductor 13. The discharge position of the finished conductor with a fixed terminal is thus determined. As the finger assembly leaves the circular peripheral path of the sprocket 52 and moves into a tangential path, the fingers of the assembly will be permitted to again close during travel over the lower run of the chain.

From the foregoing description, it is believed that it will be appreciated that the heretofore outlined objects of the invention will be attained, and that the apparatus embodying the described features provides inherent advantages in the production of electric conductors with affixed terminals.

Various modifications may suggest themselves to those skilled in the art without departing from the spirit of my invention, and, hence, I do not wish to be restricted to the specific form shown or uses mentioned, except to the extent indicated in the appended claims.

I claim:

1. Apparatus for attaching terminals to the ends of electric conductors, comprising:

- a. means for delivering predetermined lengths of electric conductors to a conductor supply zone;
- b. a terminal attaching zone spaced from said conductor supply zone, including cooperable terminal attaching die means;
- c. means for feeding a supply of terminals to said die means, each of said terminals having a portion adapted to receive an end of said conductor;
- d. means for successively transporting the conductor lengths laterally from the conductor supply zone to a position in said terminal attaching zone, in which said end of the conductor is disposed for reception by said terminal portion; and
- e. means including said die means for crimping said terminal portion on the received conductor end.

2. Apparatus according to claim 1, wherein the conductor has an insulation covering and is delivered with a stripped end portion from an insulation stripping mechanism to receive means thereof supported for translatable movement from a normal receiving position to a displaced position in which the conductor is carried to the supply zone.

3. Apparatus according to claim 2, wherein the receiver means are mounted on a forwardly tiltable panel, and in the tilted position of said panel places the stripped conductor in the supply zone.

4. Apparatus according to claim 2, wherein the receiving means in its normal position receives the conductor by an axial feeding movement; and means for thereafter moving said receiving means in a direction normal to the conductor axis to transport the stripped conductor to said supply zone.

5. Apparatus according to claim 4, including an elongate open sided groove in said receiver means for guidingly receiving said axially fed conductor; a gate member closing a portion of the open side of said groove in said normal position of the receiving means; and means for opening and maintaining said gate in an open position in relation to said groove in said displaced position of said receiving means.

6. Apparatus for attaching terminals to the ends of electric conductors, comprising:

- a. means for delivering predetermined lengths of electric conductors to a conductor supply zone;
- b. a terminal attaching zone spaced from said conductor supply zone, including cooperable terminal attaching die means;
- c. means for feeding a supply of terminals to said die means, each of said terminals having a portion adapted to receive an end of said conductor;
- d. means for successively transporting the conductor lengths from the conductor supply zone to said terminal attaching zone including a movable conveyor having spaced finger assemblies for successively picking up conductors at said conductor supply zone and carrying them to said terminal attaching zone; and
- e. means including said die means for crimping said terminal portion on the received conductor end.

7. Apparatus according to claim 6, wherein the conveyor comprises a link chain looped between a driving sprocket at one end and an idler sprocket at the other end, and each finger assembly includes a pair of relative movable projecting finger members having jaws for coaxially gripping a conductor, and means normally urging said finger members towards a jaw closed position.

8. Apparatus according to claim 7, wherein the finger members of each assembly are supported on extensions

of the chain connecting pivots at the opposite ends of a chain link.

9. Apparatus according to claim 7, wherein the plane of said loop is vertical, and the conveyed conductors at the terminal attaching zone are positioned above the uppermost run of the chain loop.

10. Apparatus according to claim 9, wherein the conductor at the terminal attaching zone has an end portion normally positioned above said conductor end receiving portion of the terminal which is to be attached; and including means operable in timed relation to said die means for moving said conductor in a direction to position said conductor end in said end receiving portion of the terminal.

11. Apparatus according to claim 10, wherein the means for moving said conductor in said timed relation comprises a presser member carried by said die means, said presser being adapted to deflect said chain from its normal path in said terminal attaching zone an amount sufficient to position said conductor end in said end receiving portion of the terminal.

12. Apparatus according to claim 11, wherein the presser member is arranged to engage the finger assembly supporting the conductor at said terminal attaching zone.

13. Apparatus according to claim 11, wherein the support for the presser member is adjustable.

14. Apparatus according to claim 10, including means for controlling the operation of said die; and switch means in the path of movement of said conductor to position its end in the end receiving portion of the terminal for modifying the die operation, when no conductor has been delivered to the terminal attaching zone.

15. Apparatus according to claim 7, including means at the driver sprocket end of said conveyor for automatically opening the finger members.

16. Apparatus according to claim 15, wherein the means for opening the finger members comprises means connected with the driving sprocket for effecting a camming finger opening action with respect to at least one of said finger members.

17. Apparatus according to claim 6, including means for intermittently actuating said conveyor to move said finger assemblies into and away from said conductor supply zone.

18. Apparatus according to claim 17, including means for automatically terminating the movements of said conveyor at predetermined dwell positions.

19. Apparatus according to claim 18, including means for releasing said means for terminating the movement of said conveyor prior to each subsequent intermittent actuation thereof.

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