Jan. 24, 1956 E. H. SHAFF 2,732,139

TOOL FOR APPLYING A CONDUCTOR TO A TERMINAL

Filed April 4, 1952 2 Sheets-Sheet 1

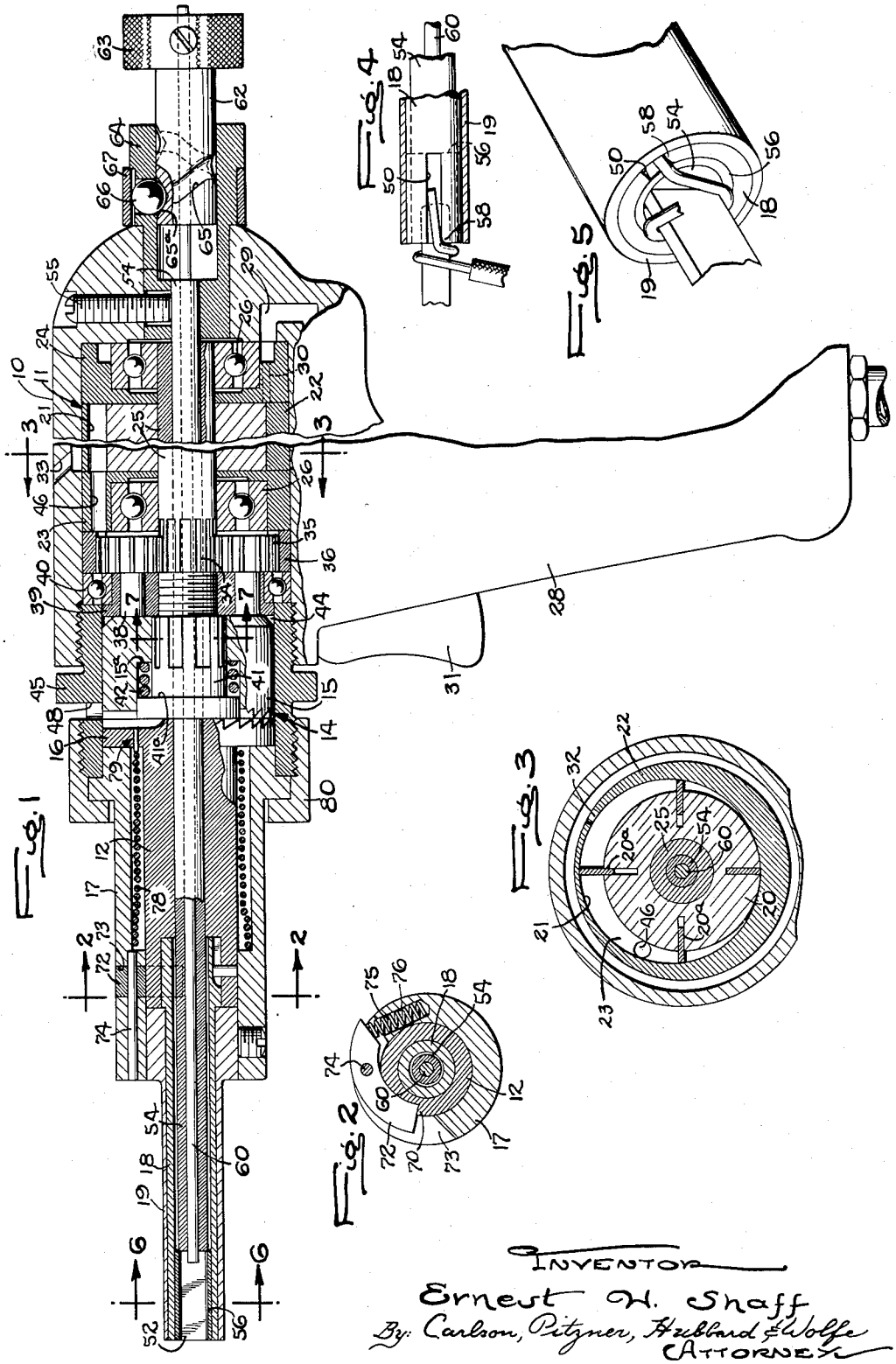


Fig. 1

Fig. 4

Fig. 5

Fig. 3

Fig. 2

INVENTOR
Ernest H. Shaff
By: Carlson, Pitzner, Hubbard & Wolfe
ATTORNEYS

Jan. 24, 1956 E. H. SHAFF 2,732,139

TOOL FOR APPLYING A CONDUCTOR TO A TERMINAL

Filed April 4, 1952 2 Sheets-Sheet 2

Fig. 6

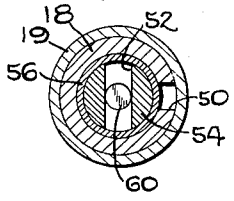


Fig. 8

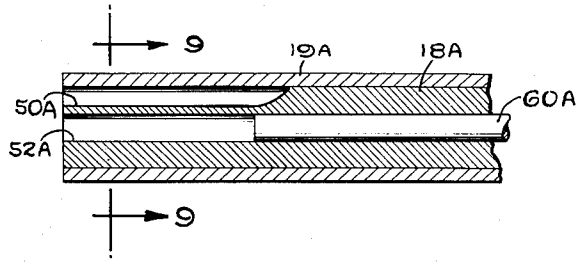


Fig. 7

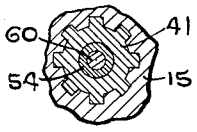


Fig. 10

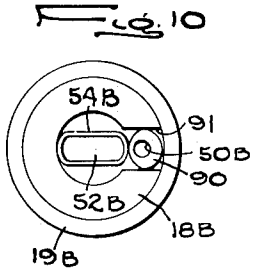


Fig. 11

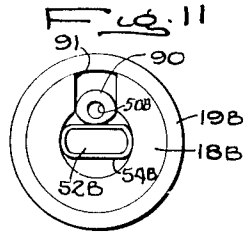
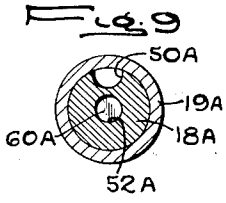


Fig. 9



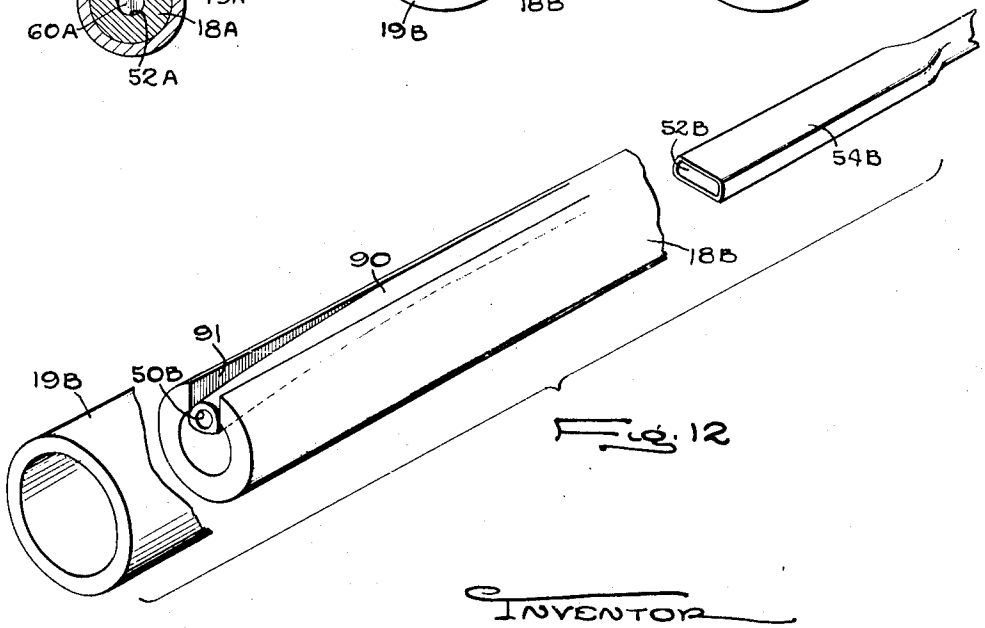


Fig. 12

INVENTOR
Ernest H. Shaff
By: Carlson, Pitzner, Hubbard & Wolfe
ATTORNEY

United States Patent Office 2,732,139 Patented Jan. 24, 1956

2,732,139

TOOL FOR APPLYING A CONDUCTOR TO A TERMINAL

Ernest H. Shaff, Hamilton, Ind., assignor, by mesne assignments, to Gardner-Denver Company, a corporation of Delaware

Application April 4, 1952, Serial No. 280,571

7 Claims. (Cl. 242—7)

The present invention relates generally to a portable tool for coiling or wrapping conducting wires about terminal posts or the like, and more specifically to a tool of the type comprising a wrapping unit or "tip" constructed to receive a length of wire to be wrapped about the terminal. The instant application is a continuation-in-part of application Serial No. 198,428, filed November 30, 1950, now abandoned.

It is a general object of the invention to provide a wire coiling or wrapping mechanism especially constructed to facilitate the insertion into its tip of the wire to be wrapped, and to perform the wrapping operation speedily and effectually.

Another object lies in the provision in a tool of the foregoing character of means effective to hold the terminal against twisting as the conductor is wrapped tightly about it.

Still another object of the invention is to provide in a wire wrapping tool means for applying a conductor to an elongated terminal post at a pre-selected position thereon, thus enabling the application of a plurality of conductors to the terminal post on axially spaced portions thereof.

A further and more specific object is to provide in a tool of this type having conductor receiving means which is rotatable with respect to the terminal receiving means, means to insure resetting of the former with respect to the latter to the same relative initial angular position after each operation thereof.

Yet another object lies in the construction and arrangement of a tool of the above general character to facilitate changing of the conductor wrapping tip portion of the tool without necessity for altering or adjusting the driving means therefor.

A related object is to provide a construction and arrangement by means of which the initial angular position of the conductor receiving means with respect to the tool axis can be readily adjusted according to the convenience of the operator using the tool.

It is also an object of the invention to provide in a wire wrapping tool having a power unit and a wrapping unit, a normally disengaged driving connection between such units which is rendered effective as an incident to the application of power to actuate the tool.

Another object is to provide an improved form of wrapping unit or "tip" for applying conducting wires to generally flat terminals effectually following the contour thereof and laying the wires closely about the same.

The objects of the invention thus generally set forth together with other objects and ancillary advantages are attained by the construction and arrangement shown by way of illustration in the accompanying drawings, in which:

Figure 1 is a central longitudinal section through a wire wrapping tool embodying the present invention.

Fig. 2 is a transverse section taken substantially in the plane of line 2—2 in Fig. 1.

Fig. 3 is a transverse section taken substantially in the plane of line 3—3 in Fig. 1.

Fig. 4 is a fragmentary side elevational view, partly in section, showing the tip portion of the tool illustrated in the preceding figures applied to a terminal post and showing a wire being wrapped about it.

Fig. 5 is similar to Fig. 4 but comprises a fragmentary perspective view illustrating the application of a conducting wire to a terminal post received in the tip portion of the instant device.

Fig. 6 is a transverse section taken substantially in the plane of line 6—6 in Fig. 1.

Fig. 7 is a fragmentary transverse section taken substantially in the plane of line 7—7 in Fig. 1.

Fig. 8 is a fragmentary longitudinal section of a modified form of tip portion of a tool embodying features of the instant invention.

Fig. 9 is a transverse section taken substantially in the plane of line 9—9 in Fig. 8.

Figs. 10 and 11 are end elevational views of still another modified form of tip portion and respectively illustrate relative component relationship in different angular positions thereof, and

Fig. 12 is a fragmentary exploded perspective view of the modified tip portion shown in Figs. 10 and 11.

While the invention is susceptible of various modifications and alternative constructions there are shown in the drawings and will herein be described in detail the preferred embodiments, but it is to be understood that it is not thereby intended to limit the invention to the forms disclosed, but it is intended to cover all modifications and alternative constructions falling within the spirit and scope of the invention as expressed in the appended claims.

As illustrated in the drawings, the exemplary form of the invention is shown embodied in a portable, power operated tool comprising a generally cylindrical main casing 10 having a motor 11 therein for driving a spindle 12 forming part of a wrapping unit or "tip" mounted on the forward end of the casing 10. The spindle is driven by the motor through the medium of a drive mechanism including a clutch indicated generally at 14. The clutch 14 includes a driving element 15 and a driven element 16, the latter in the present instance being formed integral with the spindle 12. The spindle 12 is journaled within a barrel 17 and is drivingly connected at its forward end to a conductor wrapping member 18 journaled within a sleeve 19 which is fixed within the forward end of the barrel 17.

In the illustrative tool the motor 11 is of the type adapted for actuation by pressure fluid such as compressed air and includes a vaned rotor 20 mounted within an eccentrically disposed chamber 21 defined by a generally cylindrical housing 22 having its ends closed by suitable end plates 23 and 24. The rotor 20 is carried by a hollow shaft 25 which is journaled at its opposite ends in bearings 26 which are supported by the end plates.

Pressure fluid, in this instance compressed air, is supplied to the tool by way of a fitting disposed at the lower end of a handle 28 having a valved passage 29 therein which communicates with the motor chamber by way of an inlet port 30 in the rear end plate 24. As shown, the handle is formed integral with the main casing 10 and is equipped with a suitable trigger 31 for operating the valve (not shown) controlling the supply of pressure fluid through the passage 29. Spent pressure fluid is exhausted from the motor chamber by way of exhaust ports 32 in the housing 22 and an exhaust passage 33 in the main casing 10.

In addition to the clutch 14, the driving connection between the motor 11 and the spindle 12 includes planetary speed reduction gearing interposed between the upper

clutch block and the motor **11**. Thus, the motor shaft has rigid with its forward end a driving or sun gear **34** which meshes with planetary gear elements **35** rotatable within a stationary ring gear **36**. The planetary gear elements are supported on pins **38** which are carried by a disklike spider **39**. The spider **29** is journaled in an antifriction bearing **40**. Interposed between the driving clutch element **15** and the spider **39** is a splined stub shaft **41** which is rigid with the spider and affords a driving connection for the driving clutch element **15**, constraining the same to axial movement with respect thereto.

The clutch is normally disengaged, and for this purpose an expansion type spring **42** is interposed between the driving clutch element **15** and the driven clutch element **16**. As shown, the spring is supported on the forward end of the stub shaft **41** and bears at its rear end against an internal shoulder **15***a* in the driving clutch element and the inner face of an external shoulder **41***a* on the stub shaft.

The clutch is arranged to be engaged as an incident to the application of power to the tool. This is accomplished in the illustrative tool by the application of pressure fluid to the rear face of the driving clutch member **15** so as to move the same forwardly on the stub shaft **41** and into engagement with the driven clutch element **16**. For this purpose pressure fluid is supplied to a chamber **44** defined in part by the rear face of the driving clutch element **15** and in part by a clutch housing sleeve **45** which, as shown, is screw-threaded into the forward end of the main casing **10**. Pressure fluid from the motor chamber **21** is supplied to the clutch chamber **44** by way of a bleeder port **46** in the forward end plate **23** of the motor assembly. The bleeder port **46** is located in angular relation to the supply port **30** and the exhaust ports **33** in such a manner that it is intermediate the same, thus insuring the presence of at least one of the rotor vanes **20***a* between it and both of these ports (Fig. 3). At its forward end the bleeder port **46** communicates with the space between the planetary gear elements, and pressure fluid supplied therethrough to such space finds its way through the interstices between the antifriction elements of the bearing **40** to the clutch chamber **44**.

Upon application of pressure fluid to operate the tool, motor rotation is initiated, and a part of the partially spent fluid from the motor chamber **21** is supplied behind the driving clutch element **15** to move it forwardly against the action of the spring **42** into engagement with the driven clutch element **16**. To prevent entrapment of air ahead of the pistonlike driving clutch element, which would hinder engagement of the clutch, the clutch housing **45** is vented to the atmosphere by means of a port **48**. It will be apparent that upon interruption of the supply of pressure fluid to the tool, when the trigger **31** is released, pressure fluid supply to the clutch chamber **44** is interrupted, and the clutch spring **42** becomes effective to retract the driving clutch element **15**, the clutch chamber being vented by way of the interstices between the antifriction elements of the bearing **40**, the space between the planetary gear elements **35** and within the ring gear **36**, the bleeder port **46**, the motor exhaust port **32** and the casing exhaust passage **33**.

Turning now to the wrapping tip, it has hereinbefore been noted that rigid with the spindle **12** and rotatable within the sleeve **19** is the wire wrapping member **18**. This member is of tubular form and has provided therein a longitudinal slot **50** which, with the adjacent portion of the sleeve **19**, defines a recess for the reception of the end of a conductor which is to be wrapped about a terminal post. To receive the terminal post in a manner whereby a conductor can be wrapped thereabout, the wrap to start in spaced relation to the end of the terminal, the forward end of the tip portion of the tool is provided with a terminal receiving recess generally designated **52**.

It will be appreciated that when a conductor is wrapped about a terminal considerable torsional force is applied thereto in wrapping the conductor tightly enough so that it will grip the terminal. An important feature of the present invention lies in the provision of means to prevent the terminal from being twisted as the conductor is wrapped about it. In the first form of the invention illustrated, this means includes a stationary terminal receiving member **54** which is of thick-walled tubular form diametrically slotted adjacent its forward end to define the terminal receiving recess **52**. The terminal receiving member, as shown, extends in coaxial relation entirely through the tool, its tip portion and its power unit, and is held in fixed relation thereto by means of a set screw **55** disposed adjacent the rear end of the main casing **10**.

Upon reference to Figs. 1, 5 and 6, it will be seen that by cross-slotting the forward end of the terminal receiving member, the recess **52** is provided with flat parallel side walls which when a terminal is inserted therein are adapted to engage the opposite sides thereof. Thus the member **54** effectually prevents the terminal from being twisted as a conductor is wrapped about it.

To retain the terminal within the recess **52** and to retain the conductor within the slot **50** in the wire wrapping member **18**, a sleeve **56** is provided on the outer end of the terminal holding member **54**. This sleeve may be press-fitted or otherwise rigidly secured to the end of the member **54**.

The operation of the illustrative tool will be apparent from the foregoing. However, it may be briefly summarized as follows. When it is desired to wrap the end of a conductor about a terminal post, the operator first inserts the end of the conductor into the recess **50** in the wire wrapping member. Then, holding the conductor in one hand and the tool in the other, the operator places the tool over the terminal so that it is disposed within the recess **52**. Upon operating the trigger **31** to admit pressure fluid to the tool, rotation of the motor **11** is initiated and pressure fluid from the motor chamber **21** is supplied to the clutch chamber **44** and the driving clutch element **15** is moved into engagement with the driven clutch element **16**. Thereupon the spindle **12** and with it the wire wrapping member **18** are rapidly rotated and the conductor is wrapped about the terminal post, the conductor being withdrawn from the notch as it is wrapped. It will be apparent that the amount of conductor that is wrapped about the terminal post is determined by how much of the conductor is inserted in the conductor receiving recess **50** in the wire wrapping member **18**.

It will be appreciated that in wrapping the conductor about the terminal post by means of the present tool the helical coil form assumed by the conductor is partly the result of the winding operation and partly the result of actual deformation of the metal constituting the wire as it is withdrawn over the edge of the wire receiving recess **50** during the winding operation. It has been determined that by controlling the shape of the edge of the notch over which the wire is withdrawn during the winding operation, the degree of tightness with which the wire is wrapped about the terminal post can be controlled. More particularly, if the edge **58** of the notch (Fig. 4) is of rounded configuration having a relatively large radius of curvature, the wrapping of the wire about the terminal post will not be as tight as it would be if the corner were made relatively sharper since a rounded corner would produce less stretching of the side of the wire not in contact therewith as compared to that which would result upon withdrawing the wire over a sharper corner.

In many applications where conductors are applied to terminal posts, it is desirable that more than one conductor be applied to a single terminal post. It is usually desirable under these circumstances that the conductors be attached at points axially spaced along the terminal post. To this end, means is provided for varying the extent to which the terminal post can be inserted into the

recess 52 in the terminal receiving member 54. In the present instance this means includes a limit rod 60 which extends axially through the tubular terminal receiving member 54 and which has its forward end adapted to be adjustably projected into the terminal receiving recess 52 from the rear end thereof for engagement by the outer end of a terminal upon insertion of the terminal in the recess. Means is provided for axially adjusting the position of the limit rod 60 from a fully retracted position wherein its forward end is withdrawn so as not to project into the recess 52, through an intermediate position wherein its forward end assumes a position medially of the recess, to a position in the forward end of the recess. In the present instance this means comprises an adjusting screw 62 equipped at its outer end with a finger piece 63 which is secured to the rear end of the limit rod 60. The adjusting screw has a shank portion which projects into a coaxially disposed sleeve 64 fixed in the rear end of the main casing 10. In the outer surface of the shank portion of the adjusting screw there is provided a helical groove 65 adapted for cooperation with a ball detent 66 carried by the fixed sleeve 64. A split annular spring 67 mounted on the outer end of the sleeve and engageable with the ball detent serves to maintain the ball detent in the helical groove of the adjusting screw. Manual rotation of the screw 62 by means of the finger piece 63 results in an axial shifting of the screw which, being rigid with the limit rod 60, serves to shift the limit rod axially within the terminal receiving member 54 and the forward end thereof within the terminal receiving recess 52. Preferably a plurality of detent receiving recesses 65*a* are provided, in spaced relation along the helical groove 65 which serve to denote a plurality of predetermined positions for the limit rod so that the extent to which the terminal post is to be received in the recess 52 of the terminal receiving member 54 can be readily adjusted to permit successive wrapping operations onto a terminal post at predetermined spaced positions therealong.

As hereinbefore set forth, preparatory to performing the wire wrapping operation, the operator using the tool inserts one end of the wire into the longitudinal wire receiving recess 50 provided in the forward end of the wire wrapping member 18. Thereafter the tool with the conductor received in the recess is placed over the terminal so that the conductor can be wrapped thereabout. However, the tool can be placed over the terminal prior to the insertion of the wire therein, as is frequently found to be desirable in assembly line operations on electric relays and electronic devices where the opposite end of the conductor has previously been secured to another terminal post. In either instance it is necessary for the operator to first locate the recess into which the conductor is to be inserted and thereafter to make the insertion. It will be apparent, therefore, that it is particularly desirable for efficient manipulation of the tool and to enhance work production therewith, especially over an extended period of use, that the wire receiving recess be normally positioned in definite angular relationship to the axis of the tool. For example, if the operator who is to use the tool is right handed, so that he normally holds the tool in his right hand, it probably will be more convenient for him to have the conductor receiving recess 50 normally disposed to the right of the tool axis when viewed from the forward end thereof (as seen in Fig. 6) so that with his left hand he can conveniently insert the conductor end into the recess without having to reach around the tip portion of the tool to do so. To this end, means is provided for automatically repositioning the wire wrapping element to a predetermined angular position with respect to the tool axis after each winding operation has been completed.

In the illustrative tool and forming a part of the aforesaid means, the spindle 12 has associated therewith means which permits the spindle to be rotated within the barrel

19 when turning in one direction, as upon its being driven by the power unit of the tool, but which, when the spindle is turned in the opposite direction, is effective to stop rotation of the spindle in such direction at a particular angular position of the spindle with respect to the remainder of the tool. It will be apparent, of course, that control of the angular position of the spindle will also result in the control of the angular position of the conductor wrapping member 18 since these elements are secured together.

As shown, the spindle is provided with a drop-off notch or shoulder 70 in the periphery thereof for cooperation with a pawl 72. The latter is disposed in a transverse slot 73 formed in the barrel 19 and is pivoted therein for movement into and out of engagement with the drop-off notch 70 on a pivot pin 74. The pawl is normally biased toward engagement with the notch by means of an expansion type spring 75 which is received within a suitable recess 76 provided therefor in the barrel 19. It will be apparent, therefore, that, as viewed in Fig. 2, the spindle can be freely rotated in a counterclockwise direction but is limited in clockwise rotation by engagement of the shoulder or drop-off notch 70 with the pawl 72.

The repositioning means for the spindle and conductor wrapping member also includes a mechanism for imparting reverse rotation to the spindle upon completion of a winding operation so as to return the spindle 12 and wire wrapping member 18 to their initial positions as determined by the engagement of the shoulder 70 with the pawl 72 and thus reposition the conductor receiving recess 50 in the wire wrapping member at the desired angular position with respect to the tool axis. In the present instance, this mechanism includes a torsional coil spring 78 which is disposed about the spindle 12 and within the barrel 17. The spring 78 has one end thereof anchored to the spindle as at 79 and it is arranged to be conditioned during the driving operation to enable it to impart the desired reverse rotation to the spindle upon completion of a winding operation. For this purpose, a portion of the spring is arranged to frictionally engage the inner wall of the barrel 17, and the spring is so formed that it tends to be unwound during the driving of the spindle by the power unit of the tool by virtue of such frictional engagement. More particularly, when the clutch 14 is engaged and its driven element 16 and the spindle are rotated in a counterclockwise direction, as viewed in Fig. 2, so as to perform a winding operation, the spindle 12 and with it the conductor winding member 18 can be freely rotated. During such rotation, because of the frictional drag of the enlarged portion of the coil spring 78 on the barrel 17 in its rotation with the spindle, the coil spring 78 tends to be unwound. There is substantial slippage between the spring and the barrel so that the spring is not damaged. As soon as the clutch 14 is released, upon interruption of the supply of pressure fluid to the tool, the spring 78 tends to return to its normal condition. In so doing it applies a reverse rotation to the spindle 12 and consequently to the conductor winding member 18 until such time as the notch 70 is positioned to receive the spring biased pawl 72 in which position the conductor receiving recess 50 in the conductor winding member 18 assumes its initial position at the right side of the tool axis as seen in Fig. 6 where it is again readily accessible for a succeeding conductor insertion. Since there is only frictional engagement between the return spring 78 and the barrel 17, any further energy stored in the spring is simply dissipated by slippage between these two elements.

The present construction and arrangement is such that the tip portion of the instant tool can be readily changed, as for example, to accommodate different sizes of conductors or terminal posts, and also it facilitates adjustment of the angular initial position of the wire receiving recess with respect to the tool axis according to the convenience of the operator using the tool, without neces-

sity for altering or adjusting the driving means therefor. It will be seen from Fig. 1 that the tip portion of the tool, including the barrel **17** and sleeve **19** with the spindle **12** and conductor wrapping member **18** journaled therein, can be readily removed from the tool simply by loosening a single retaining collar **80** by means of which the barrel is attached to the clutch housing **45** when the collar is loosened. The aforesaid components can then be separated by axial movement from the power unit. To release the terminal receiving member **54** it is only necessary to loosen the set screw **55** disposed adjacent the rear end of the main casing **10** and it, too, can be withdrawn by forward axial movement.

It will be noted that in effect the tip portion of the tool is comprised of two main separable parts, namely, the conductor receiving member **18** with the means for rotating it, and the stationary terminal receiving member. From the foregoing it will be noted that the angular positions of either or both of them can readily be changed with respect to the tool axis and thus with respect to each other; the former by simply loosening the set screw **55**, and the latter by simply loosening the retaining collar **80** whereupon the necessary angular adjustment can be readily effected.

Turning now to the form of the tool illustrated in Figs. 7 and 8, there shown is a modified form of tip portion for the instant tool intended primarily for the application of a conductor to a round terminal post or to a terminal post where it is not necessary to hold the same against being twisted as the conductor is wrapped about it. Thus this form of wire wrapping tip is of substantially simplified form as compared to that previously described. It includes a wire wrapping member **18A** which is adapted to be rigidly secured in coaxial relation to the spindle **12**. This wire wrapping member has a central bore therethrough which at its outer end defines the terminal receiving recess **52A**. To receive the conductor this wire wrapping member is provided with a longitudinal notch **50A** in its side wall. This notch, together with a stationary outer sleeve **19A**, within which the member is journaled, defines the conductor receiving recess. Like the first form of the invention hereinbefore described, a terminal insertion limit rod **60A** can be employed with this form of wrapping tip. This limit rod **60A** is adapted to extend coaxially through the tool and can be made axially adjustable within the bore **52A**.

In Figs. 10 to 12, inclusive, there is illustrated yet another form of tip portion for the wire wrapping tool. This form, like the first form of the invention illustrated, is adapted to receive and hold a terminal against deformation due to torsional forces applied thereto as a conductor is wrapped about it. Thus it is equipped with a central coaxially disposed terminal receiving member **54B** which, as shown, is of tubular form having a flattened tip portion defining a terminal receiving recess **52B** shaped to engage the sides of a terminal inserted therein to hold it against twisting.

This wrapper tip also includes a wire wrapping member **18B** which is adapted to be rotated by suitable connection with the spindle **12** and within a stationary outer sleeve **19B**. The sleeve **19B** is adapted to be rigidly secured within the forward end of the barrel **17**.

In this form of the invention the wrapper tip is not only adapted to receive the end of a conductor, but is constructed so as to lay the same closely about a flat terminal received in the recess **52B** as it is rotated. For this purpose the conductor wrapping member is equipped with a resilient, fingerlike follower **90** which is disposed in a longitudinal slot **91** in the side wall of the wire wrapping member **18B**. The follower is rigidly secured at its rear end in the rear end of the slot in the wire wrapping member and is of tubular form having an outer open end to define a conductor receiving recess **50B**. The forward end of the follower extends into the interior of the conductor wrapping member **18B** so that at its forward end it bears against the forward end of the terminal receiving member **54B**. Because of its resiliency, as the wire wrapping member is rotated about the terminal receiving member, the forward end of the follower, bearing against the forward end of the terminal receiving member, is moved in and out of the slot **91**, as it follows the flattened contour of the terminal receiving member **54B**. Thus, as a conductor received therein is withdrawn upon winding it about a terminal inserted in the terminal receiving member, the conductor is laid closely about the terminal.

As with the form of wire wrapping tip illustrated and described for the first of the illustrative forms of the invention, tension control in the conductor can be effected by appropriately curving the outer end of the conductor receiving recess.

From the foregoing, it will be apparent that a wire wrapping tool constructed in accordance with the present invention is capable of quickly and efficiently applying a conductor to a terminal post to the end that one or more turns of the conductor are wrapped tightly thereabout so as to intimately engage the same. Even though comparatively large torsional stresses are applied to the terminal post during the wrapping of the conductor about it, the terminal post is effectively held against twisting. Furthermore, an operator using the tool can control the axial position at which the conductor is applied to the terminal post. Also the present construction and arrangement facilitates alteration of the "at rest" position of the conductor receiving recess according to his convenience and by the same token tip changes to accommodate different applications can readily be effected.

I claim as my invention:

1. In a power operated tool for applying a conducting wire to a terminal, the combination of a hollow spindle, drive means for rotating said spindle in one direction, a normally disengaged driving connection interposed between said drive means and said spindle engaged in response to application of power to the tool to actuate said drive means, a wire wrapping member rigid with said spindle for rotation therewith, said wire wrapping member being adapted to be telescoped over the terminal and having a forwardly open recess therein eccentrically disposed with respect to its rotational axis for receiving the wire, means effective upon disengagement of said connection in response to interruption of power supply to said drive means for reversely rotating said spindle, and stop means operative upon reverse rotation of said spindle to define a particular angular reset position of said spindle, wire wrapping member and its wire receiving recess with respect to the tool axis.

2. In a tool for applying a conducting wire to a terminal, the combination of a spindle, drive means for said spindle, a wire wrapping member rigid with said spindle for rotation therewith, said wire wrapping member having a forwardly opening recess therein eccentrically disposed with respect to its rotational axis for receiving the wire, a stationary terminal holding member having a coaxially disposed and forwardly opening recess therein for receiving and holding the terminal against twisting as said wire wrapping member is rotated upon rotation of said spindle and the wire is wrapped about the terminal, stop means engageable with said spindle and defining a normal angular position thereof with respect to the tool axis, and means operatively connected to said spindle and conditioned during the operation of said drive means for reversely rotating said spindle for engagement by said stop means whereby said spindle is reset for a subsequent wire wrapping operation.

3. In a tool for applying a conducting wire to a terminal, the combination of a stationary barrel, a hollow spindle journaled within said barrel, drive means for rotating said spindle in one direction, a wire wrapping member rigid with said spindle for rotation therewith, said wire wrapping member being adapted to be telescoped

over the terminal and having a forwardly open recess therein eccentrically disposed with respect to its rotational axis for receiving the wire, a pawl mounted on said barrel for movement transaxially of said spindle, said spindle having a shoulder thereon for cooperation with said pawl, and means for reversely rotating said spindle upon completion of a wire wrapping operation, said pawl being engageable with said spindle shoulder during reverse rotation only of said spindle so as to determine a particular angular reset position of said spindle, wire wrapping member and its wire receiving recess with respect to the tool axis.

4. In a tool for applying a conducting wire to a terminal, the combination of a stationary barrel, a hollow spindle journaled within said barrel, drive means for rotating said spindle in one direction, a wire wrapping member rigid with said spindle for rotation therewith, said wire wrapping member being adapted to be telescoped over the terminal and having a forwardly open recess therein eccentrically disposed with respect to its rotational axis for receiving the wire, a pawl mounted on said barrel for movement transaxially of said spindle, said spindle having a shoulder thereon for cooperation with said pawl, and means including a torsional spring interposed between said barrel and said spindle conditioned during the operation of said drive means for reversely rotating said spindle upon completion of a wire wrapping operation, said pawl being engageable with said spindle shoulder during reverse rotation only of said spindle so as to determine a particular angular reset position of said spindle, wire wrapping member and its wire receiving recess with respect to the tool axis.

5. In a tool for applying a conducting wire to a terminal, the combination of a stationary barrel, a hollow spindle journaled within said barrel, drive means for rotating said spindle in one direction, a wire wrapping member rigid with said spindle for rotation therewith, said wire wrapping member being adapted to be telescoped over the terminal and having a forwardly open recess therein eccentrically disposed with respect to its rotational axis for receiving the wire, a torsional spring frictionally engaging said barrel and having one of its ends secured to said spindle, said spring being tensioned during the operation of said drive means and operative upon completion of a wire wrapping operation to reversely rotate said spindle, and stop means effective upon reverse rotation of said spindle to determine a particular angular reset position of said spindle, wire wrapping member and its wire receiving recess with respect to the tool axis.

6. In a tool for applying a conducting wire to a flat terminal post, the combination of a rotatable wire wrapping sleeve having a longitudinal slot in one side thereof, a resilient follower fixed at one end to said sleeve and having a free end extending into said slot, said follower having a forwardly opening recess therein for receiving the wire, and a stationary tubular terminal holding member in said sleeve having a flattened forward end portion defining a coaxially disposed and forwardly opening recess for receiving the terminal, the free end of said follower being biased toward said member adjacent the forward end thereof and movable in and out of said slot upon its rotation with said sleeve to follow the contour of said member, said terminal receiving recess having flat side walls adapted to engage corresponding sides of the terminal to hold the terminal against twisting as said wire wrapping sleeve is rotated and the wire is wrapped about the terminal, said follower laying the wire closely against the terminal during the wrapping operation.

7. In a tool for connecting a wire to a terminal, the combination comprising a casing having a forward tubular extension, a tubular member rotatable in said extension and having a passage disposed eccentrically thereof and opening forwardly for the reception of a wire, a terminal holding member extending axially through said member and secured to said casing, said terminal holding member defining a coaxially disposed and flat-sided terminal-receiving recess in its forward end, said terminal holding member further having an axial bore therethrough opening into said recess, a stop rod disposed in said bore and having its forward end extending into said recess for engagement with the outer end of a terminal received therein, a fingerpiece rigid with the other end of said stop rod, and means fixed with respect to said terminal holding member and engageable with said fingerpiece for axially adjusting the position thereof and of said rod within said bore whereby to limit the extent of insertion of said terminal in said recess to determine the axial position of the wire connection along the terminal.

References Cited in the file of this patent

UNITED STATES PATENTS

789,941	Sibley	May 16, 1905
1,634,801	Schneider	July 5, 1927
2,199,113	Pierce	Apr. 30, 1940
2,375,861	Martin et al.	May 15, 1945
2,585,010	Hickman et al.	Feb. 12, 1952
2,635,819	Bennett	Apr. 21, 1953
2,648,356	Beaulien et al.	Aug. 11, 1953
2,649,121	Reck	Aug. 18, 1953