

Oct. 8, 1935.

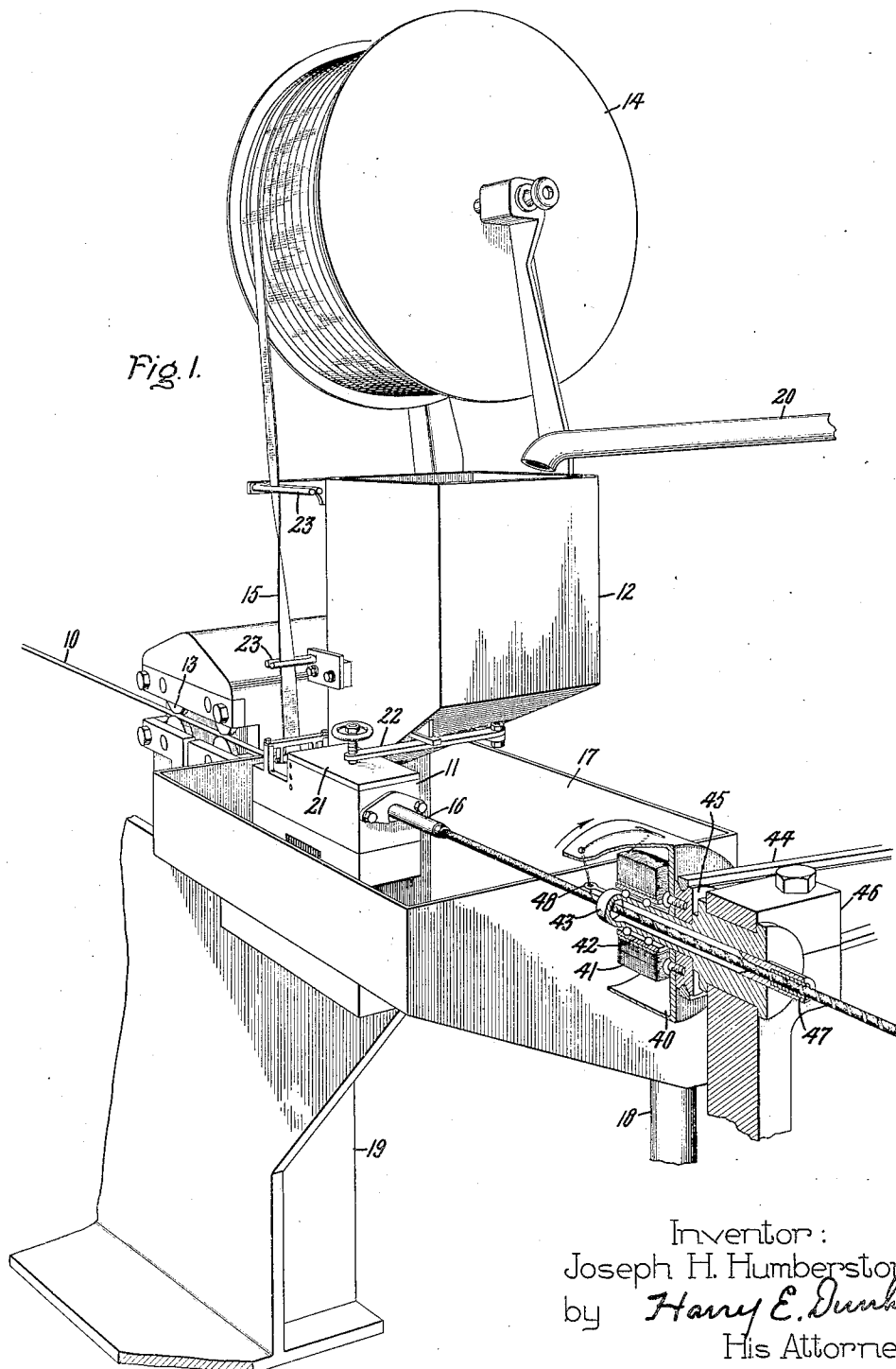
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2,016,900

WIRE COATING MACHINE

Filed Jan. 27, 1934

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

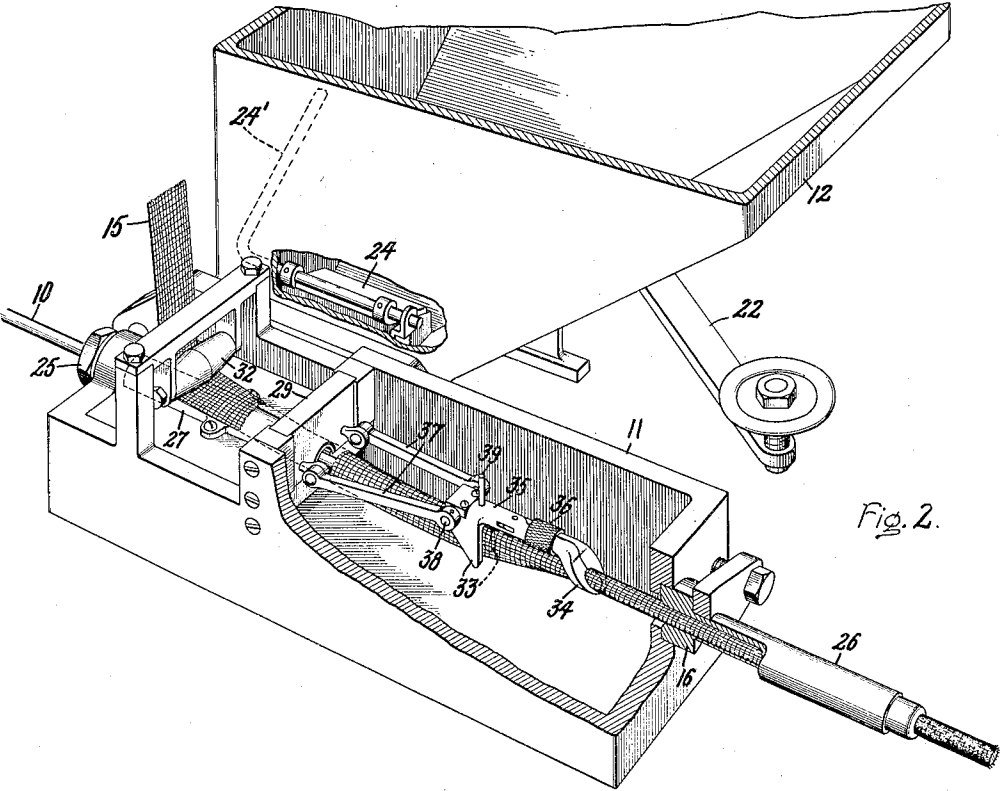


Fig. 2.

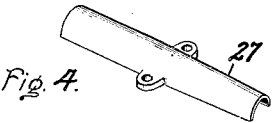


Fig. 4.

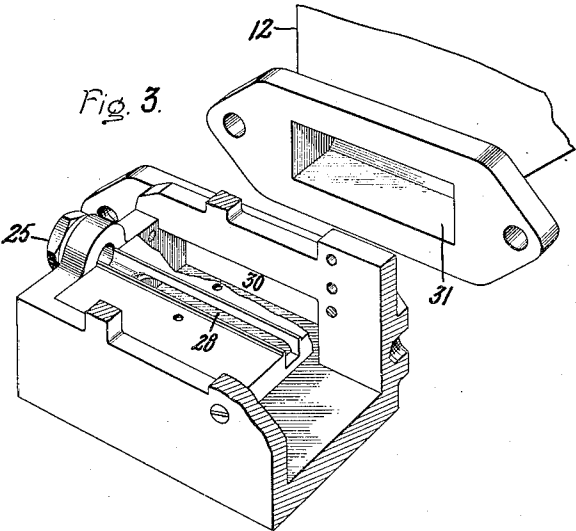


Fig. 3.

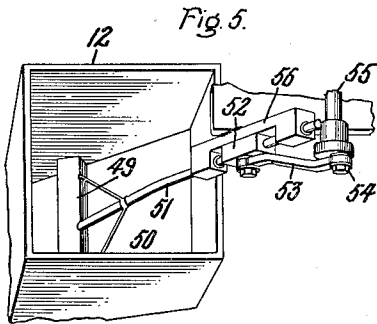


Fig. 5.

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UNITED STATES PATENT OFFICE

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WIRE COATING MACHINE

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Application January 27, 1934, Serial No. 708,642

16 Claims. (Cl. 117—34.5)

My invention relates to wire coating machines.

It is an object of my invention to provide machines by means of which a wire may be uniformly coated with a material which is completely enclosed by a tape folded longitudinally about the wire.

It is a further object of my invention to provide machines for coating wire with material held in place thereon by a flexible tape impregnated with said material and folded longitudinally about the wire with its edges abutting one another and parallel to the axis of the wire.

It is a further object of my invention to arrange the various parts of such machines relative to one another to facilitate the threading of tape through their taping heads.

Further objects of my invention will become apparent from a consideration of the following description taken in connection with the accompanying drawings Fig. 1 of which shows one embodiment of my invention; Fig. 2 of which shows in detail the arrangement of parts in the taping head of the machine illustrated in Fig. 1; Figs. 3 and 4 of which show further details of this taping head; and Fig. 5 of which shows a modification in which an agitator is employed for facilitating the feeding of paste from a pot into the taping head.

In the machine illustrated in Fig. 1 of the drawings a wire 10 is uniformly coated with a material which is completely enclosed by a tape folded longitudinally about the wire. This coating operation is performed by a taping head 11 to which coating material, preferably a paste, is supplied from a pot 12. The wire 10 is fed through the taping head by means of feed rolls 13 and in passing through the taping head withdraws from a reel 14 a tape 15 which is folded about the wire by means enclosed within the taping head. The tape coated wire is fed from the taping head through a die 16 which compresses the taped coating thereon. The taping head is located in a sink 17 provided with a drain 18. The various elements mentioned above are supported on a base 19 forming part of the machine.

Paste may be supplied to the pot 12 through a pipe 20 and the flow of paste to the taping head may be controlled by a valve not shown in Fig. 1. By closing this valve the flow of paste

from the pot to the head may be interrupted. The cover 21 of the taping head may then be removed by loosening and swinging to one side the cover clamp 22, which in the arrangement illustrated is attached to the pot 12. The paste in the head may then be washed out of the head into the sink 17 and a new tape 15 threaded through the tape folding mechanism which is thus rendered accessible for this operation. The tape 15 is directed from the reel 14 to the taping head by means of guides 23.

The construction and arrangement of parts of the taping head 11 are shown in Fig. 2 of the drawings. The taping head comprises a closed receptacle or container through which the wire 10 is fed and to which paste is supplied from the pot 12. The flow of paste from the pot 12 to the taping head is controlled by a valve 24 which is provided with an operating handle 24'. The wire 10 enters the taping head through a bushing 25 and leaves the taping head through a die 16 having an elongated nozzle 26. The bushing 25 closely fits the wire 10 and prevents the flow of paste from the taping head about the wire at its point of entry into the taping head. The die 16 with its elongated nozzle 26 sizes and compresses the taped coating on the wire as it leaves the taping head. The die is slightly tapered at the point where the taped wire enters it.

The taping head is provided with an arched portion 27 spaced from and concentric with the wire 10 which forms a support for the tape 15 before it is fed to the folding mechanism enclosed within the taping head. This tape supporting member is shown in Fig. 4 of the drawings and is in reality a cover for the open passageway 28 in the top portion of the taping head near the bushing 25 as shown in Fig. 3 of the drawings. One terminal of the member 27 cooperates with a removable portion 29 of the taping head to form a concavo-convex opening through which the tape passes into the taping head and by means of which it is partly folded about the wire enclosed within the taping head. It will be noted that paste is supplied to the taping head through a port 30 registering with the discharge opening 31 of the flux pot 12 in such manner as to establish a flow of paste into the taping head directed toward the open por-

tion of the partly folded tape. The flow of paste is also so directed as to completely enclose the wire 10 as it is fed into the taping head. The port 30 may be made to extend the full length of the taping head and such construction is to be preferred with certain types of paste.

The middle portion of the tape 15 is tensioned before entering the above described concavo-convex opening by means of a convex roll 32. This roll imparts to the tape a curvature opposite to the curvature imparted thereto by the concavo-convex opening formed between the support 27 and the removable portion 29 of the taping head. The convex roll 32 is supported opposite the arched tape support 27. It is employed to prevent the tape creasing as it is partly folded about the wire.

Within the taping head the tape is completely folded about the wire by shaping fingers 33 and 34. The shaping fingers 33 are parallel to one another and are provided with edge portions which engage the tape along diagonals sloping toward die 16 in the direction of travel of the tape through the taping head. The shaping fingers 34 completely encircle the wire and engage the tape along a section also sloping in the direction of travel of the tape. The fingers 33 and 34 are supported on a member 35 which rests upon the tape. One of the fingers 34 forms a rigid part of member 35 and the other finger 34 is pivotally attached thereto. The fingers 34 are held in an encircling position about the wire and tape by means of a ring 36 which may be moved to an inoperative position in which the fingers 34 may be separated and the member 35 removed from the wire in the taping head. The member 35 is supported for limited universal movement within the taping head 11. This support is obtained through a plurality of links 37 which are attached to the removable portion 29 of the casing of the taping head. These links support a cross-bar 38 to which the member 35 is hooked. The parts are so proportioned that the member 35 has a limited sidewise movement on the cross-bar 38. A limited up and down movement of the member 35 is provided through the agency of the links 37. A stop 39 which engages the cover 21 of the taping head limits the upward movement of the member 35.

When the tape 15 is folded about the wire 10 with its edges abutting one another and parallel to the axis of the wire the coating is so well formed on the wire that the seam between the edges of the tape is not readily detectable. When the coating dries, however, slight openings may appear at the seam and in order to avoid this the tape coated wire may be wrapped with a binding cord immediately after it passes from the taping head. A winding head by means of which a spiral wrapping may be applied to the taped coating is shown in Fig. 1 of the drawings. It comprises a cup 40 within which a spool of cord 41 is supported on a sleeve 42. This sleeve is rotatably mounted upon a spindle 43 which together with the cup 40 is rotated by a belt 44 and a pulley 45. The spindle 43 is supported in a bearing 46 within which it rotates. The delivery end of the spindle 43 is provided with a die 47 by means of which the binding cord is compressed about the taped coating of the wire. As the cup and spindle rotate the binding cord is supplied from the spool 41 over a portion of the cup 40 which acts as a brake and through a guide 48 which rotates with the spindle 43 and applies the cord to the tape coated wire.

It is sometimes desirable to provide an agitator in the flux pot 12 in order more positively to supply paste to the taping head 11. In Fig. 5 of the drawings such a construction is illustrated. The agitator comprises a cross-bar 49 which is connected through a shaft 51, a cross-head 52 and a connecting rod 53 to a crank 54 mounted on a rotating shaft 55. The position of the cross-bar 49 in container 12 depends on the position of shaft 51 which is supported and guided in a block 56 which also forms a support for the cross-head 52. The rotation of the shaft 55 will impart an oscillatory movement to the agitator 49 which will move back and forth along the slanting bottom 50 of the paste container 12 and feed paste from the container to the taping head with which it is associated. It is not always necessary to use an agitator such as shown in Fig. 5 of the drawings since many pastes will freely flow from the container into the taping head without agitation.

The machine illustrated in the drawings and described above operates as follows:—A wire 10 is fed by rollers 13 through the container 11 constituting the taping head. Within this taping head the tape 15 is partly folded about the wire through the agency of the tape support 27 in cooperation with the member 29 forming part of the taping head container. In order to prevent the tape creasing as it is thus partly folded about the wire a convex roller 32 is employed to impart an opposite curvature to the tape from that imparted thereto by the concavo-convex opening formed between the tape support 27 and the wall member 29 of the taping head. Paste is supplied to the taping head from the container 12 through a port 30 in such manner as to flow about the bare wire 11 and into the open portion of the partly folded tape 15 located within the taping head. The tape is then completely folded about the wire by taping fingers 33 and 34, and the taped coating is then sized and compressed about the wire by means of the die 16 located in the discharge opening of the taping head 11. The taped coating is then bound to the wire by a spiral wrapping applied by the winding head supported on the spindle 43 through which the wire is fed. The rotation of the spindle wraps the cord about the wire and a die 47 in the spindle compresses the spiral wrapping about the tape coated wire and also acts to size the tape coated wire.

As has been pointed out above, when it is necessary to rethread the taping head with another supply of tape, the flow of paste from the container 12 to the taping head 11 is interrupted by closing the valve 24, the taping head is then opened by removing cover 21 and the pasty material therein may then be washed from the taping head into the sink 17 by a jet of water. The removal of the paste from the taping head 11 makes it possible to thread the taping head with a new supply of tape. The tape is passed through the concavo-convex opening in the side wall of a taping head and under the member 35 supporting the taping fingers 33 and 34 and out through the die 16 along with the wire 10. The cover is then applied to the taping head and the valve 24 opened so that paste may be supplied to the taping head from the paste pot 12. This paste flows into the container up around the wire and between the wire and the tape as has been described above.

The tape support 27 and the convex roll 32 may be included within the taping head receptacle or container within which the taping

fingers are located. The support of the various members of the taping head relative to one another may be modified in many ways without departing from the spirit and scope of my invention. The taping fingers may be supported in any suitable manner for limited universal movement within the taping head. It is not always necessary to employ two sets of taping fingers such as described above, but I find it preferable to do so. I also find it preferable to employ fingers having tape engaging portions which slope toward the die since this slope very decidedly decreases the tendency of the tape to crease while being shaped about the wire.

The machine of my invention is particularly suited for applying a flexible tape to a paste coated wire. Although particularly designed to feed a tape of fibrous material which will not stretch appreciably in a lengthwise or crosswise direction, it may be used to apply other types of tape to a wire to be coated.

When using a machine of my construction the wire coating operation is in effect a continuous process. Lengths of wire may be butt welded to one another so as to form an endless supply of wire and, except at those points where a rethreading operation is necessary to supply new tape, a uniformly coated wire of indefinite length may be produced. By matching the length of the tape to the length of the wire to be manufactured it will not be necessary to rethread the machine except at the beginning of the manufacturing operation of a particular length of wire. It is also to be noted that by reason of the construction of my machine the wire coating operation may be performed at a high rate of speed which materially reduces the cost of the coated wire.

Machines constructed in accordance with my invention are particularly suited for the manufacture of arc welding electrodes such as described and claimed in my copending application, Serial No. 648,651, Welding electrodes, filed December 23, 1932, and assigned to the same assignee as the present case.

In metallic arc welding an arc is maintained between the work to be welded and a wire of metal which is referred to as an electrode by connecting the work and the electrode to a suitable source of welding current. During the welding operation the electrode is fused or vaporized, or both, and the metal thereof deposited upon and welded to the work as the electrode is fed toward the work, either manually or automatically, to maintain the arc length substantially constant. The quality of the weld metal as well as the behavior of the welding arc depends to a large extent upon the influence of certain elements or compounds associated with the electrode usually in the form of a coating. Electrodes so coated are commonly designated as flux coated electrodes.

While I have described a particular embodiment of my invention it will be obvious to those skilled in the art that various modifications may be made without departing from the spirit and scope of my invention, and I desire to cover all such modifications as fall within the true spirit and scope of my invention as set forth in the appended claims.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. A wire coating machine comprising a paste container, means for feeding a wire through said container, means spaced from said wire for part-

ly folding a tape about said wire and the paste in said container adjacent said wire, means resting on said partly folded tape for directing the edges of said tape toward one another, means for supporting said last mentioned means for limited universal movement relative to said wire, and means for compressing and sizing the coating on said wire as it is fed from said container.

2. A wire coating machine comprising a paste container, means for feeding a wire through said container, means spaced from said wire for partly folding a tape about said wire and the paste in said container adjacent said wire, means for tensioning the middle portion of said tape before it is fed to said last mentioned means, means resting on said partly folded tape for directing the edges of said tape toward one another, means for supporting said last mentioned means for a limited universal movement relative to said wire, and means for compressing and sizing the coating on said wire as it is fed from said container.

3. A wire coating machine comprising a paste container, means for feeding a wire through said container, means spaced from said wire for partly folding a tape about said wire in said paste container, means for establishing a flow of paste into said container directed toward the open portion of said partly folded tape, means in said container for completely folding said tape about said wire and the paste adjacent thereto, and means for compressing and sizing the taped coating on said wire as it is fed from said container.

4. A wire coating machine comprising a paste container, means for feeding a wire through said container, means spaced from said wire for partly folding the tape about said wire and the paste in said container adjacent said wire, means for establishing a flow of paste into said container directed toward the open portion of said partly folded tape, shaping fingers engaging the edge portions of said partly folded tape along diagonals sloping in the direction of travel of said tape, means for supporting said fingers for limited universal movement relative to said wire, and means for compressing and sizing the taped coating on said wire as it is fed from said container.

5. A wire coating machine comprising a paste container, means for feeding a wire through said container, means spaced from said wire for partly folding a tape about said wire and the paste in said container adjacent said wire, parallel shaping fingers engaging the edge portions of said partly folded tape along diagonals sloping in the direction of travel of said tape, additional shaping fingers encircling said wire and engaging said tape along a section also sloping in the direction of travel of said tape, a cross-bar located above said wire and tape, means for supporting said fingers for limited sidewise movement along said bar, means pivotally attaching said cross-bar to said container for movement toward and away from said wire and tape, and means for compressing and sizing the coating on said wire as it is fed from said container.

6. A wire coating machine comprising means for partly folding a tape about a wire, means resting on said partly folded tape and having shaping fingers engaging the edge portions thereof for directing said edge portions into abutting engagement, and means for supporting said last mentioned means for limited universal movement relative to said wire.

7. A wire coating machine comprising means including a convex tape support for partly folding a tape about a wire, means including a convex roller located opposite said tape support for directing said tape along said support, means resting on said partly folded tape and having shaping fingers which engage the edge portions thereof for directing said edge portions toward one another, and means for supporting said last mentioned means for limited universal movement relative to said wire.

8. A wire coating machine comprising means including a convex tape support for partly folding a tape about a wire, means including a convex roller located opposite said tape support for directing said tape along said support to said wire, parallel shaping fingers initially engaging the edge portions of said partly folded tape along diagonals sloping in the direction of travel of said tape, additional shaping fingers encircling said wire and engaging said tape along a section also sloping in the direction of travel of said tape, and means for supporting said shaping fingers for limited universal movement relative to said wire.

9. A wire coating machine comprising a paste container, means for supplying paste to said container, means for feeding a wire through said container, means spaced from said wire for partly folding a tape about said wire and the paste in said container adjacent said wire, means in said container for completely folding said tape about said wire and the paste adjacent thereto, means for compressing and sizing the taped coating on said wire as it is fed from said container, means for applying a spiral binding cord to said taped coating immediately after it passes from said last mentioned means, and means including a rotating die for compressing said binding cord about said taped coating.

10. Apparatus comprising a sink, a taping head in said sink, a paste pot, means connecting said pot with said taping head, means for controlling the flow of paste from said pot to said taping head, means for feeding a wire through said taping head, means for supplying tape to said taping head, and means in said taping head for folding said tape about said wire and the paste in said head immediately adjacent said wire, said taping head forming a closed paste receptacle which can be opened for washing the paste therein into said sink and for threading tape through said folding means.

11. Apparatus comprising a sink, a taping head in said sink, means for controlling a supply of paste to said taping head, means for feeding a wire through said taping head, means for supplying tape to said taping head, and means in said taping head for folding said tape longitudinally about said wire and the paste in said head immediately adjacent said wire, said taping head forming a closed paste receptacle which can be opened for washing the paste therein into said sink and for threading tape through said folding means.

12. Apparatus comprising a sink, a taping head in said sink, means for controlling a supply of paste to said taping head, means for feeding a wire through said taping head, means for supplying tape to said taping head, and means in said taping head for folding said tape about said wire and the paste in said head immediately adjacent said wire with the edge portions of said tape abutting one another and parallel to the axis of said wire, said taping head forming a

closed paste receptacle which can be opened for washing the paste therein into said sink and for threading tape through said folding means.

13. Apparatus comprising a closed receptacle having openings therein for the passage of a wire therethrough and having an arched portion terminating in a concavo-convex opening spaced from and partially surrounding a portion of said wire for the passage of tape into said receptacle, means for supplying paste to said receptacle, a die, means for supporting said die in registry with the discharge opening in said receptacle, means for feeding said wire through said receptacle and said die, a convex roll, means for supporting said roll opposite said arched portion of said receptacle and in front of said concavo-convex opening, and means in said receptacle for folding about said wire and the paste in said receptacle immediately adjacent said wire tape introduced therein over said roll and through said concavo-convex opening.

14. Apparatus comprising a closed receptacle having openings therein for the passage of a wire therethrough, means for supplying paste to said receptacle, a die having an elongated nozzle, means for supporting said die in registry with the discharge opening of said receptacle with its nozzle extending from said receptacle, means for feeding said wire through said receptacle and said die, means spaced from said wire for partly folding a tape about that portion of the wire in said receptacle, means including a convex roll for imparting to the tape before it is fed to said last mentioned means a curvature that is opposite to the curvature imparted there- to by said last mentioned means, and means in said receptacle for completely folding said tape about said wire and the paste immediately adjacent said wire with the edge portions of said tape abutting one another and parallel to the axis of said wire.

15. Apparatus comprising a closed receptacle having openings therein for the passage of a wire therethrough, an arched portion concentric with said wire and a removable portion spaced from said arched portion to form a concavo-convex opening for the passage of tape into said receptacle, means for supplying paste to said receptacle, a die, means for supporting said die in registry with the discharge opening in said receptacle, means for feeding a wire through said receptacle and said die, a convex roll, means for supporting said roll opposite said arched portion of said receptacle and in front of said concavo-convex opening, means including shaping fingers having tape engaging edge portions sloping toward said die and adapted to engage said tape for folding said tape about said wire and the paste in said receptacle immediately adjacent said wire, and means attached to said removable portion of said receptacle for supporting said last mentioned means for limited universal movement relative to the portion of said wire in said receptacle.

16. Apparatus comprising a closed receptacle having openings therein for the passage of a wire therethrough, means for supplying paste to said receptacle, a die, means for supporting said die in the discharge opening of said receptacle, means for pushing said wire through said receptacle and said die, means spaced from said wire for forming a tape into a concavo-convex shape with the concave side thereof adjacent to but spaced from said wire, means adjacent said last mentioned means and located between the source

of supply of said tape and said last mentioned means for imparting an opposite curvature to said tape, means including a plurality of shaping fingers having tape engaging edge portions sloping toward said die and adapted to engage said tape for folding said tape about said wire

and the paste in said receptacle immediately adjacent said wire, and means in said receptacle for supporting said last mentioned means for limited universal movement relative to the portion of said wire in said receptacle.

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