

May 16, 1950

F. P. CIAMBRONE ET AL
WIRE INSULATING APPARATUS

2,507,589

Filed June 30, 1948

2 Sheets-Sheet 1

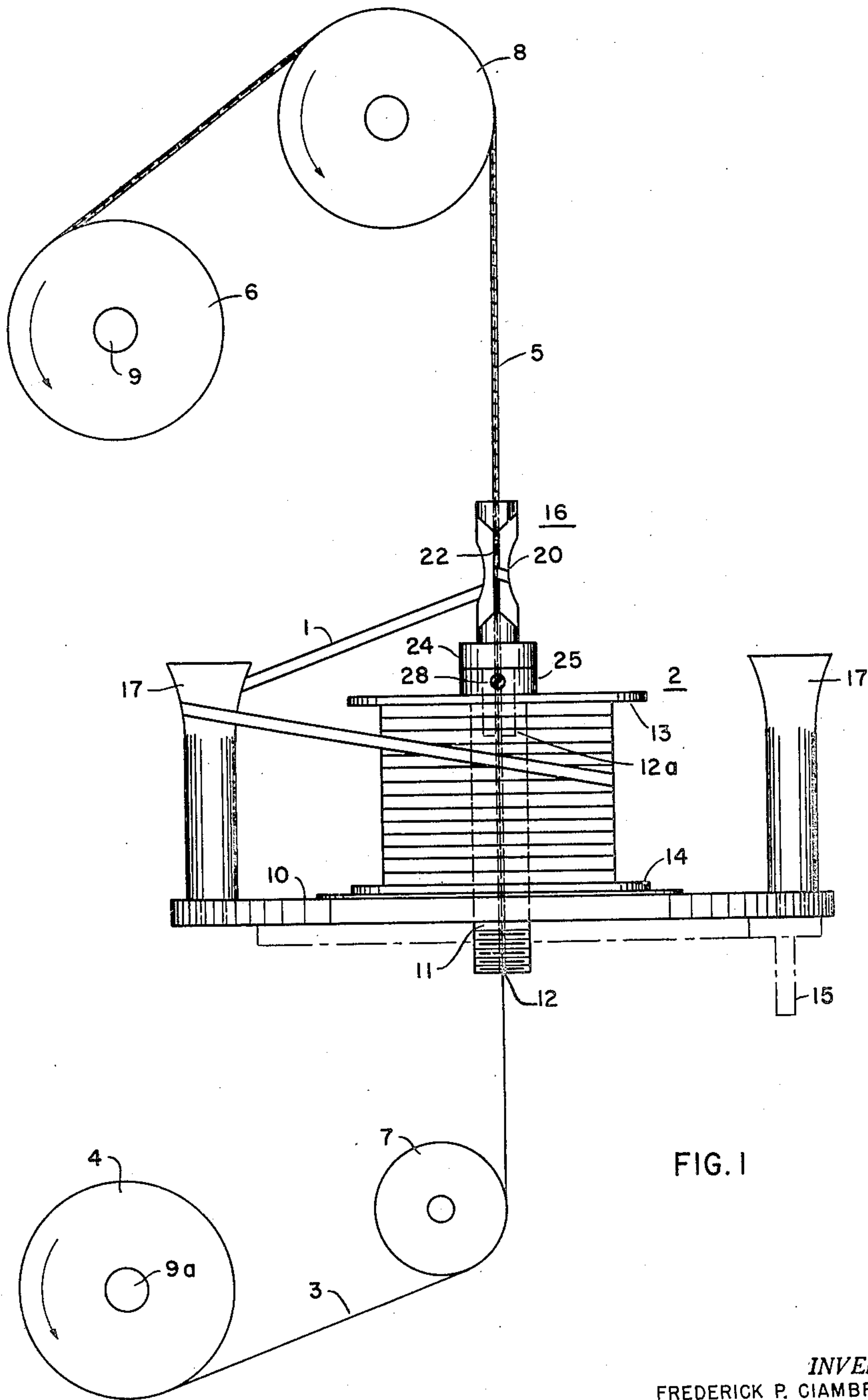


FIG. 1

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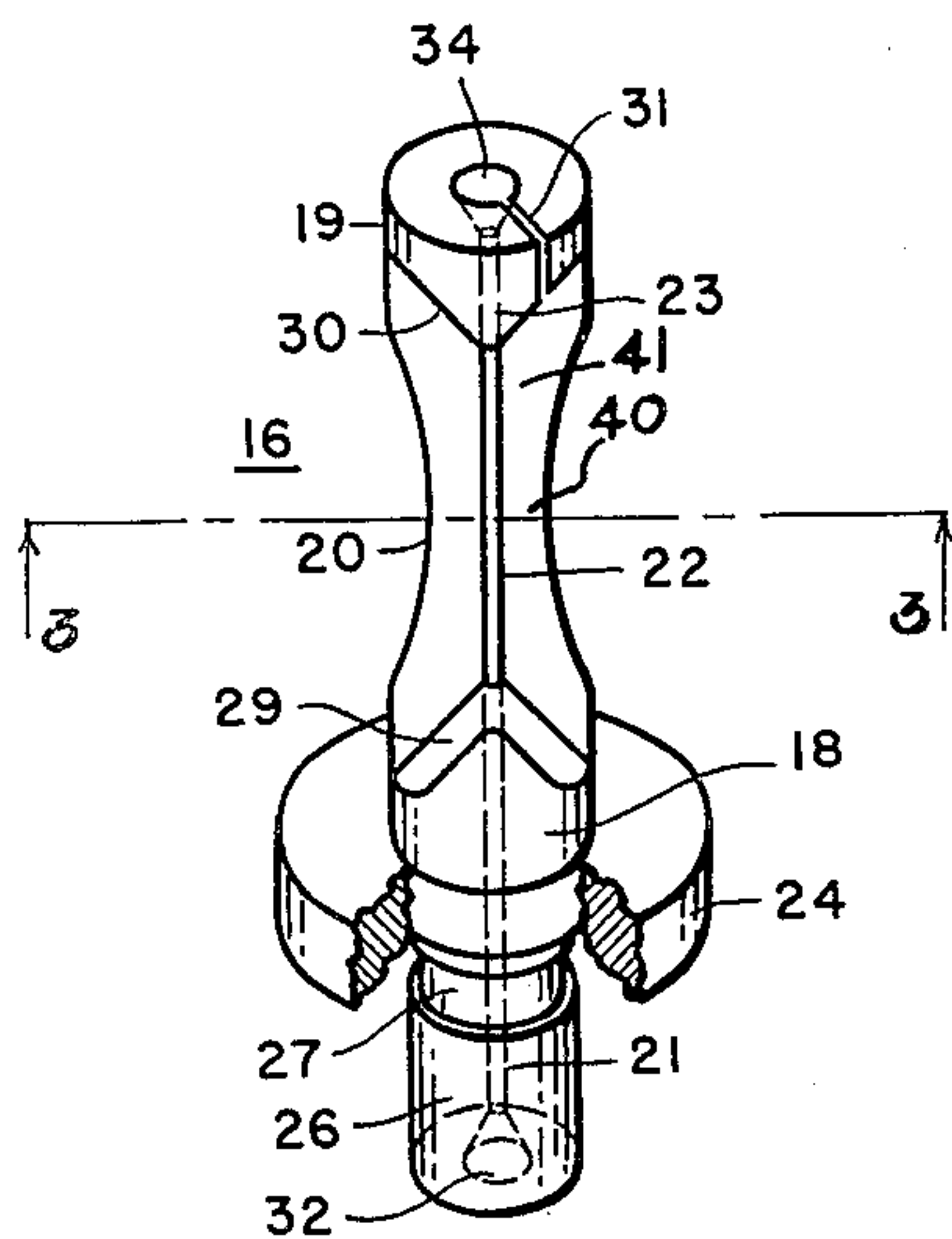


FIG. 2

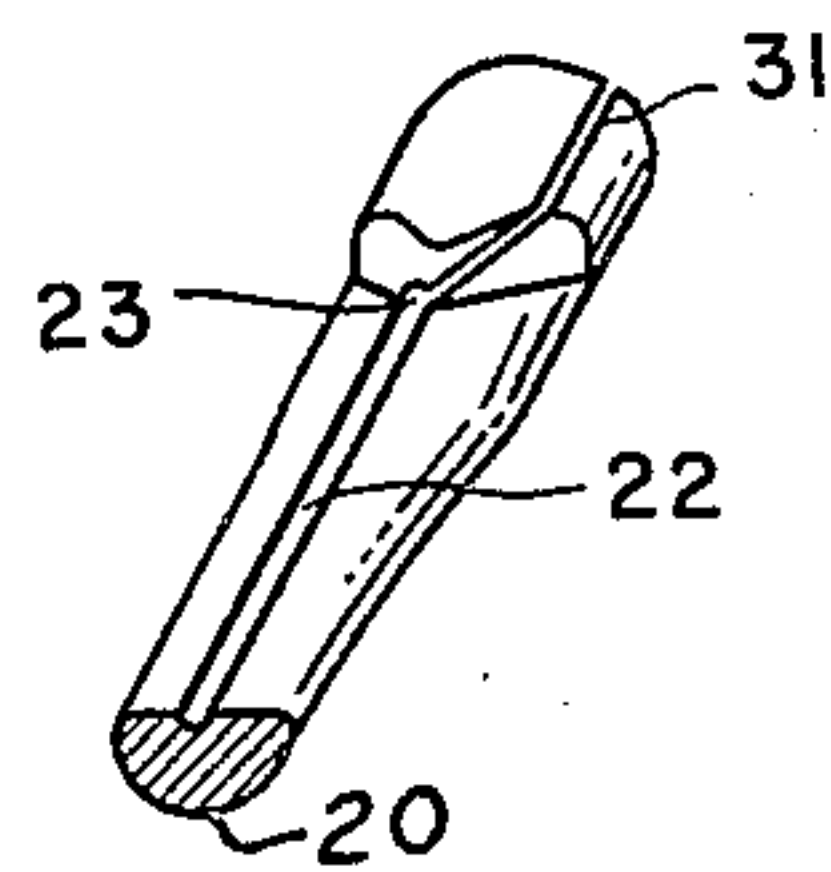


FIG. 3

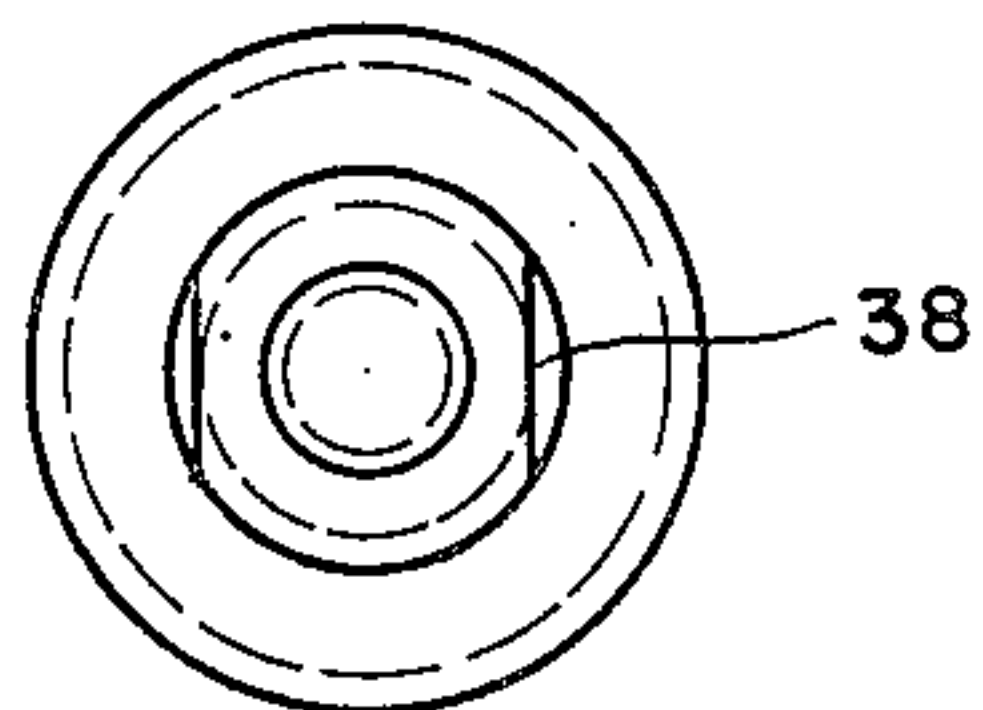


FIG. 5

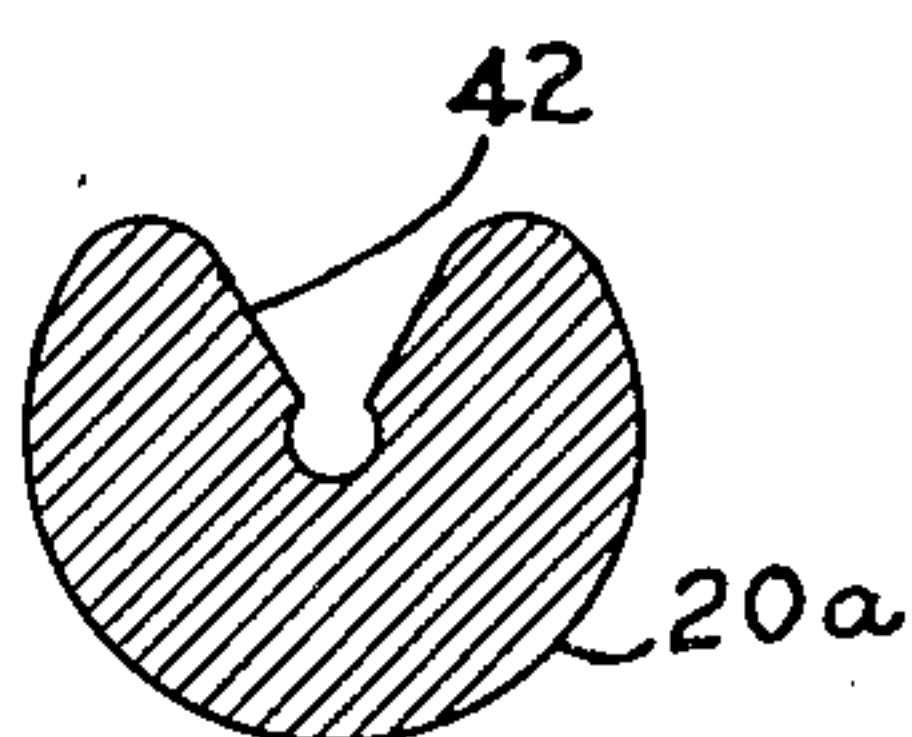


FIG. 6

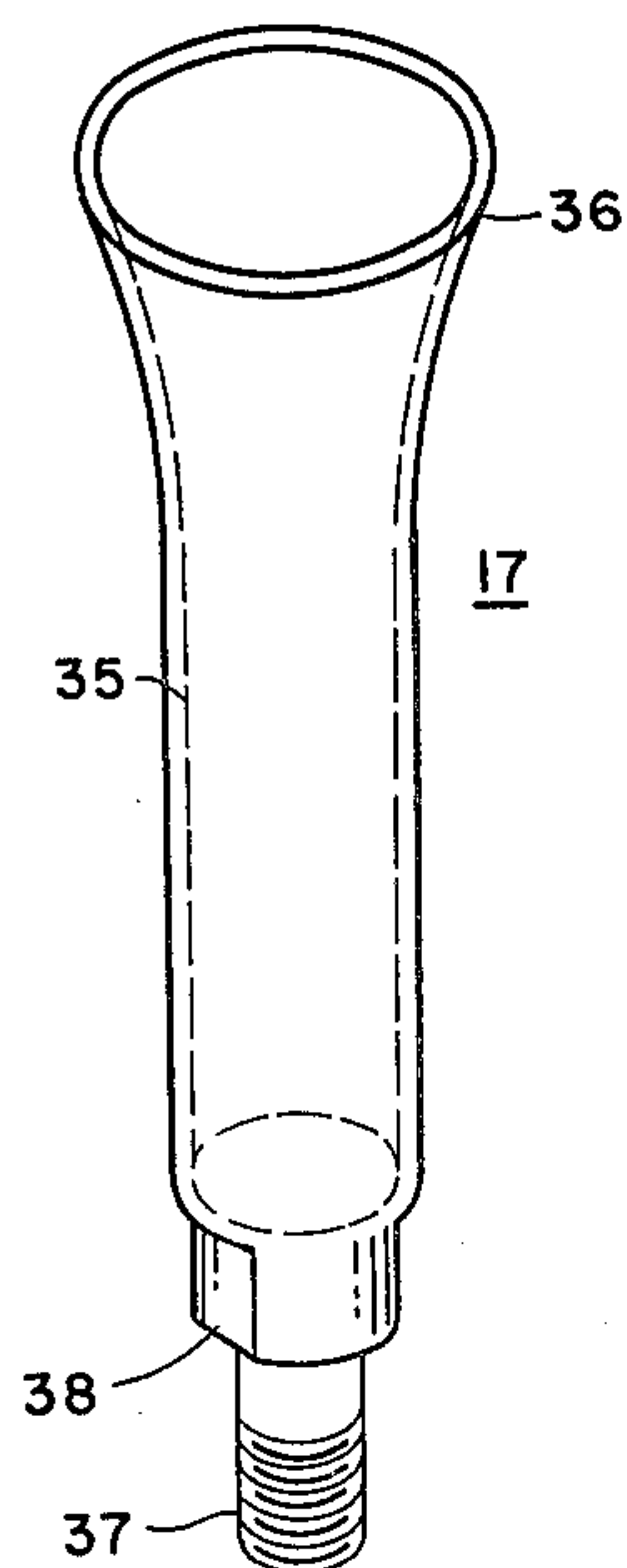


FIG. 4

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WIRE INSULATING APPARATUS

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9 Claims. (Cl. 57—18)

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This invention relates to apparatus for applying insulating material to electrical conductors and more particularly to apparatus for wrapping or winding insulating material about a wire or wires in order to provide an insulating cover therefor.

Apparatus has been provided heretofore for wrapping insulation about electrical conductors. Such prior art apparatus has been subject to so much variation in the amount of tension to which the insulating material is subjected, as, for example, because of the variation in diameter of the cop or spool of insulating material as the insulation is unwound, the tension is frequently insufficient at the start of the winding operation when the spool or cop is full and a wrinkled or non-uniform covering results, and during the later stages, the tension becomes so great as the torque increases with the decreasing diameter of insulation remaining on the cop or spool that breakage frequently occurs. Furthermore, in the former types of apparatus, sudden changes in direction of travel of the insulating material occur, thereby resulting in wrinkles in the tape which detract from the appearance of the finished product and decrease its insulating effectiveness. Moreover, when a plurality of colors is utilized in an insulating covering, devices or apparatus assembled according to the prior art are prone to improper mixing of the colors which renders less effective color coding.

It is, therefore, an object of our invention to provide apparatus for applying tape or thread insulation to electrical conductors such as wires or the like, whereby wrinkles and non-uniformities in the insulating cover are minimized.

It is another object of our invention to provide apparatus for applying insulation such as tape or thread to electrical conductors in which the insulating material is maintained at relatively uniform tension, whereby breakage of the insulating material during application to the electrical conductor or conductors is minimized.

Still another object of our invention is to provide wire insulating apparatus by means of which a smooth appearance is achieved, and there is substantially no improper mixing of colors in color coded conductors.

Further objects and advantages of our invention will become apparent as the following description proceeds, and the features of novelty which characterize our invention will be pointed out with particularity in the claims annexed to and forming a part of this specification. For a better understanding of our invention, reference

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may be had to the accompanying drawing in which Fig. 1 is a diagrammatic showing of wire insulating apparatus embodying the principles of our invention; Fig. 2 is an enlarged view, partly in section, of a nose piece used for applying the insulating material to the wire or other electrical conductor; Fig. 3 is a perspective view of the nose piece shown in Fig. 2, partly in section, the section being taken along the line 3—3 of Fig. 2; Figs. 4 and 5 are different views of a serving head post utilized in the preferred embodiment of our invention; and Fig. 6 is a cross-sectional view of a modification of the nose piece shown in Figs. 2 and 3.

Referring to Fig. 1, there is illustrated apparatus for wrapping insulating material 1, as tape, for example, carried by a suitable spool or cop 2 about an electrical conductor such as the wire 3 obtained from a suitable source as the spool 4. After the insulation is applied to the wire 3, the insulated wire 5 may be wound up on a suitable take-up spool or other suitable device 6. Any suitable means may be used for causing the reeling or winding up of the insulated wire 5 and the unreeling or unwinding of the wire 3 from the spool or other suitable source 4. For example, the reels 4 and 6 may be suitably mounted on axles 9 and 9a, respectively, axle 9 being suitably coupled to the shaft of a motor or other driving means, not shown.

In the illustrated embodiment of our invention the cop 2 is suitably mounted at the center of a bed or base member 10. Preferably, the cop 2 has a hollow center portion through which extends a suitable center post 11 which is carried by the base 10. The center post has an axial passage 12 through which wire 3 passes. The insulating tape 1 is carried on the cop 2 between end flanges 13 and 14.

The base member 10 is suitably mounted for rotation about its center as for example by a geared connection to a suitable drive shaft 15, gearing and shaft being indicated by dash-dot lines, whereby the supply of insulating tape or the like is mounted at the center of base 10 for rotation therewith. In order to facilitate wrapping the insulation about the wire after it emerges from passage 12, there is provided a suitable nose piece 16 mounted coaxially with respect to the source of supply or cop 2 of insulation and the base 10, the wire 3 being drawn upwardly through passage 12 and through suitable passages in the nose piece.

In order to guide the insulating tape 1 from the cop 2 to the nose piece 16 and to help main-

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tain the tape flat and smooth, there is provided one or more serving head posts 17. For the winding function, one serving head post is sufficient, but the use of a pair of diametrically opposed posts located adjacent the edge of the base member 10 serves to dynamically balance the centrifugal forces. The conducting tape may be guided around one or more of the serving head posts depending upon the conditions encountered in a given winding operation and the location of parts. For example, while the cop 2 is located centrally of the base member 10, it may be otherwise located and, in some cases, may even be mounted separately from the base 10.

The nose piece 16, as best seen in Figs. 2 and 3, is generally cylindrical and has a body portion 40 between substantially cylindrical end portions 18 and 19. A substantial portion of portion 40 is of substantially semicircular cross-section, as best seen in Fig. 3, and is also generally concave or longitudinally curved inwardly as indicated by the numeral 20 to a minimum cross-sectional area at approximately the middle of the intermediate body portion 40. There is provided a longitudinally extending coaxial passage 21 extending through the lower end portion 18, a longitudinally extending groove 22 lying along the relatively flat face 41 of the intermediate portion 40 in alignment with passage 21 and the other end portion 19 is provided with a longitudinally extending coaxial passage 23 whereby the wire 3 may be drawn through passage 21, groove 22 and passage 23.

The lower end portion 18 is provided with a suitable flange or collar 24 which is adapted to seat on a suitable collar 25 which is carried in any desired manner upon the upper flange 13 of cop 2. The end portion 18 is provided with a reduced portion 27 to receive suitable adjusting means as a threaded member or set screw 28, the lowermost portion 26 extending into recess 12a at the upper end of post 11. By this means the relative position of nose piece 16, with respect to the cop 2 as well as the serving head post 17, may be varied to suit conditions.

As stated heretofore, the upper part of nose piece 16 has a substantial portion provided with a substantially semicircular cross-section. This arrangement is preferably provided by machining or otherwise cutting away the cylindrical base on a plane extending through the axis of the nose piece, thereby providing a substantially flat surface. The edges are rounded off as best seen in Fig. 3 so that there is provided a smoothly curved surface for engagement with the insulating material. Flat shoulders may be left at the extremities of the cut away portion or any other desired conformation may be provided. In the illustrated embodiment of our invention these shoulders 29 and 30 have been machined to the approximation of opposed V's. The wire receiving slot or groove 22 may then be provided in some suitable manner in the surface of the relatively flat area, although if preferred, a passage may be formed before the cutting away operation in which case the groove is already provided at the time the flat surface is formed.

In order to facilitate threading of the wire, especially after the first few turns of insulation have been applied, there is provided a generally radial slot 31 extending between the outer surface and the passage 23 of the upper portion of the nose piece.

If it be assumed that the reel or cop 2 of insulation and the reel of wire 4 are properly placed,

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the operator may fasten the nose piece in place and thereafter thread the wire 3 up through passages 12 and 21, groove 22 and passage 23. The insulating material 1 is then drawn from the cop 2 and wrapped about the serving head post 17 and finally about the curved surface of the nose piece 16. The end of the insulation is then wrapped around the wire sufficiently to secure the end. Thereafter, when the take-up spool 6 and the base member 10 are suitably rotated, the wire 3 is drawn up through the apparatus and the insulating tape is wrapped therearound.

Inspection of Fig. 1 indicates the purpose of reducing the middle portion of the nose piece 16.

The curved surface resulting tends to cause insulating material 1 to ride about the middle of the intermediate or body portion 40.

From Fig. 2, it is seen that the lower end of passage 21 is provided with a conically shaped opening 32 and the upper end of passage 23 is provided with a conically shaped opening 34. The lower opening or flare 32 serves to straighten out any kinks in the wire 3 or to smooth out the surface of an insulated wire if one or more layers were previously applied. The conical opening or flare 34 serves a similar purpose in case it is desired to back up the insulated wire, as for example, if breakage occurs. Hence, any surface irregularities tend to be smoothed out regardless of the direction of movement through the nose piece.

The adjustable feature provided in connection with nose piece 16 permits adjustment of the amount of surfaces 20 and 41 of the nose piece in engagement with the insulating material 1 and, therefore, determines the amount of tension on the insulating material 1 and the tightness of the wrapping. Therefore, a change in the area of contact results in a change in tension. A considerable degree of adjustment is provided with the arrangement shown in Figs. 2 and 3. If a still greater contact area is necessary a different cross-section of the intermediate portion may be provided as illustrated in Fig. 6 wherein surface 20a is of greater extent than surface 20.

With the foregoing arrangement, the insulating material 1 engages the curved back and one-half of the flat portion of the nose piece and tension is applied at a relatively short distance from the point of application to the wire rather than at a greater distance, such as the cop source, where the tension varies considerably during wind down. Hence, a substantially constant tension on the insulating tape or thread results.

The serving head post is illustrated in Figs. 4 and 5 and preferably comprises a hollow cylindrical member 35 made of a relatively light weight material as aluminum for example. The cross-section need not be circular but the outer surface should be smooth. The circular cross-section is preferred in order that changes in tension be avoided. The serving head post is flared outwardly as indicated by the numeral 36 in order to keep the insulating material from flying off the post. With a gradually flared end 36, there are no sharp shoulders, hooks or the like to catch or to break the insulating material and yet the tape or thread is completely free to ride up and down the post according to the position of the tape on the cop 2.

The serving head post 17 may be secured adjacent the edge of the base 10 or in any other desired position as by means of a suitably threaded end 37 engaging a suitably tapped opening. To facilitate fastening the post to the base member,

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the lower portion of the post 17 is provided with oppositely disposed faces 38 machined to fit a wrench.

The preferred length of post 17 depends upon the distance between the extremities of the source of insulating material as, for example, the distance between flanges 13 and 14. Preferably the length is so chosen that the mid-portion of the curved or flared section 36 is opposite one extremity of the package of insulation.

While we have shown and described a particular embodiment of our invention, it will be obvious to those skilled in the art that changes and modifications may be made without departing from our invention in its broader aspects. We, therefore, aim in the appended claims to cover all such changes and modifications as fall within the true spirit and scope of our invention.

What is claimed is:

1. Apparatus for wrapping insulating material about an electrical conductor comprising a base member, means for rotating said base member, a supply of insulating tape or the like mounted at the center of said base member for rotation therewith, means providing a longitudinally extending passage through said base member and said supply for said electrical conductor, a nose piece mounted coaxially with respect to said supply and said base member above said supply, a substantial portion of said nose piece intermediate its ends having a substantially semicircular cross-section thereby providing a relatively flat side and an adjacent curved surface, said nose piece having a longitudinally extending groove along the relatively flat side of said semi-circular portion disposed coaxially with respect to the first-mentioned passage for guiding said electrical conductor, serving head post means adjacent the edge of said base member for guiding said insulating material from said supply to said nose piece, the upper end of said post being flared outwardly for maintaining said insulation on said post, and means for adjusting said nose piece with respect to said post in order to control the area of contact between the curved surface of said portion and said insulating material.

2. Apparatus for wrapping or winding insulating material about an electrical conductor comprising a source of insulating material, means for applying said insulating material to an electrical conductor comprising a nose piece having a smoothly curved surface intermediate its ends for engaging said insulating material, means for adjustably mounting said nose piece with respect to said source of insulating material whereby the area of engagement between said insulating material and said curved surface is adjustable, and means for rotating said nose piece in order to wrap or wind said insulating material about said conductor, the diameter of said intermediate portion being reduced in a predetermined region whereby said insulating material tends to ride in the center of said smooth portion.

3. In apparatus for wrapping or winding insulating material about an electrical conductor of the type including a spool of insulating material and means for applying said insulating material to said conductor, a serving head post for guiding said insulating material from said spool to said applying means comprising a hollow cylindrical member of smooth exterior surface formed from a relatively light weight material, said member being flared smoothly outwardly at one end thereof.

4. In apparatus for wrapping or winding in-

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insulating material about an electrical conductor of the type including a spool of insulating material and means for applying said insulating material to said conductor, a serving head post for guiding said insulating material from said spool to said applying means comprising a hollow member of smooth exterior surface, said member being flared smoothly outwardly at one end thereof.

5. In apparatus for wrapping or winding insulating material about an electrical conductor, means for applying insulating material to said conductor comprising a generally cylindrical member having a substantial portion intermediate its ends of approximately semicircular cross-section thereby providing a relatively flat face and an adjacent curved surface, a longitudinally extending coaxial passage extending through each end portion, a longitudinally extending groove along the relatively flat face of said portion in alignment with said passages whereby said electrical conductor may be drawn successively through one end passage, then through said groove, and then through the other of said end passages.

6. In apparatus for wrapping or winding insulating material about an electrical conductor, a source of insulating material, means for applying insulating material to said conductor comprising a generally cylindrical member having a substantial portion intermediate its ends of approximately semicircular cross-section thereby providing a relatively flat face and an adjacent curved surface, said surface also being generally concave longitudinally of said member, said member being disposed such that a substantial length of insulating material engages the concave portion of said curved surface, a longitudinally extending coaxial passage extending through each end portion, a longitudinally extending groove along the relatively flat face of said portion, said groove being aligned with said passages whereby said electrical conductor may be drawn successively through one end passage, then through said groove, and then through the other of said end passages, a radially disposed slot extending between the exterior surface of said applying means and the last-mentioned passage in order to facilitate threading said conductor through said applying means.

7. In apparatus for wrapping or winding insulating material about an electrical conductor, a source of insulating material, means for applying insulating material to said conductor comprising a generally cylindrical member having a substantial portion intermediate its ends of approximately semicircular cross-section, said portion being curved inwardly to a minimum cross-sectional area at approximately the middle of said portion, said member being disposed such that a substantial length of insulating material engages the curved surface of said semicircular portion, a longitudinally extending coaxial passage extending through each end portion, a longitudinally extending groove along the relatively flat face of said portion, said groove being aligned with said passages whereby said electrical conductor may be drawn successively through one end passage, then through said groove, and then through the other of said end passages, said applying means being adjustably secured to a base member.

8. In apparatus for wrapping or winding insulating material about an electrical conductor, means for applying insulating material to said

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conductor comprising a generally cylindrical member having a substantial portion intermediate its ends having a smoothly concave surface for engaging said insulating material prior to its application to said conductor, and a longitudinally extending passage through said nose piece for guiding said conductor, said portion being provided with an opening into said passage to facilitate the application initially of insulating material to said conductor.

9. In apparatus for wrapping or winding insulating material about an electrical conductor, means for applying insulating material to said conductor comprising a generally cylindrical member having a substantial portion intermediate its ends having a smoothly concave surface for engaging said insulating material prior to its application to said conductor, a longitudinally extending passage through said nose piece for guiding said conductor, said portion being provided with an opening into said passage to facilitate the application initially of insulating ma-

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terial to said conductor, said passage being flared at both ends whereby irregularities in the surface of said conductor tend to be smoothed out regardless of the direction of movement through said passage.

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10 The following references are of record in the file of this patent:

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