April 26, 1927. 1,625,983

H. F. CARTER

METHOD OF AND APPARATUS FOR WRAPPING STRAND MATERIAL AROUND A CORE

Filed Dec. 6, 1923 3 Sheets-Sheet 1

Fig. 1.

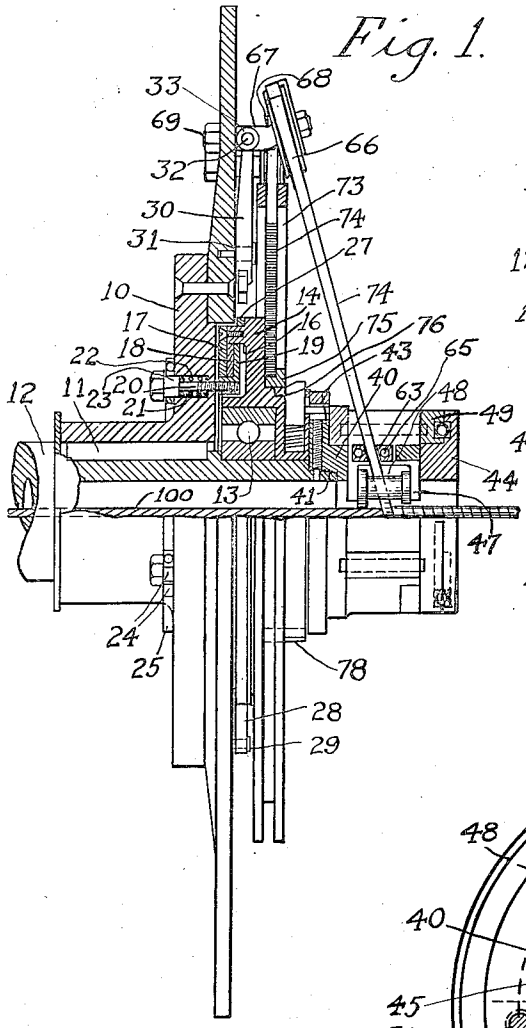


Fig. 2.

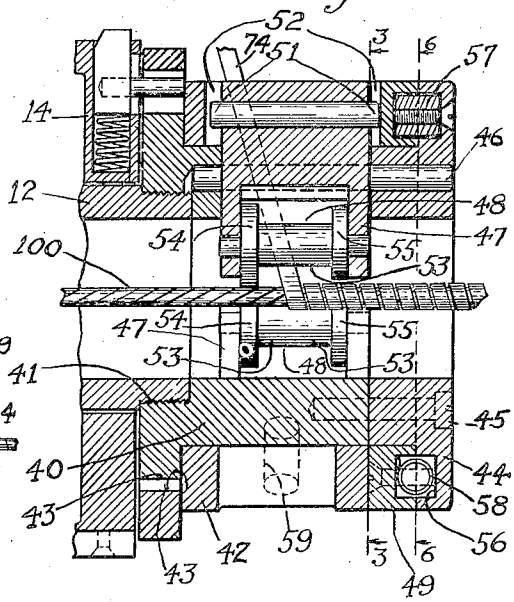


Fig. 3.

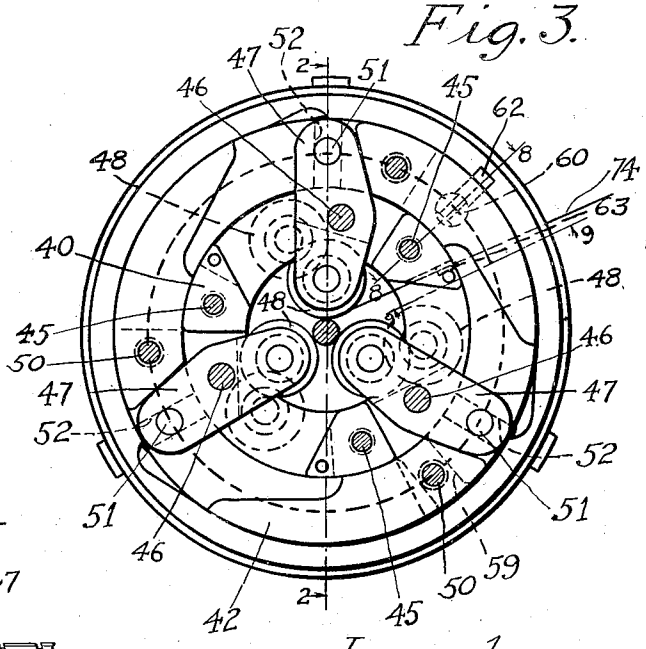
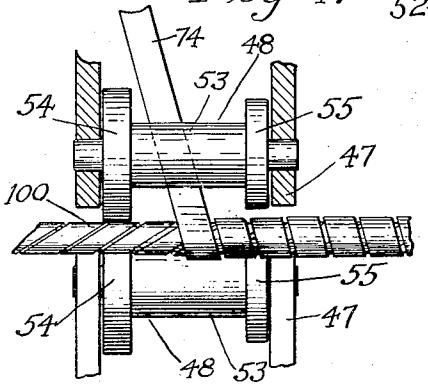


Fig 4.



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Fig. 5.

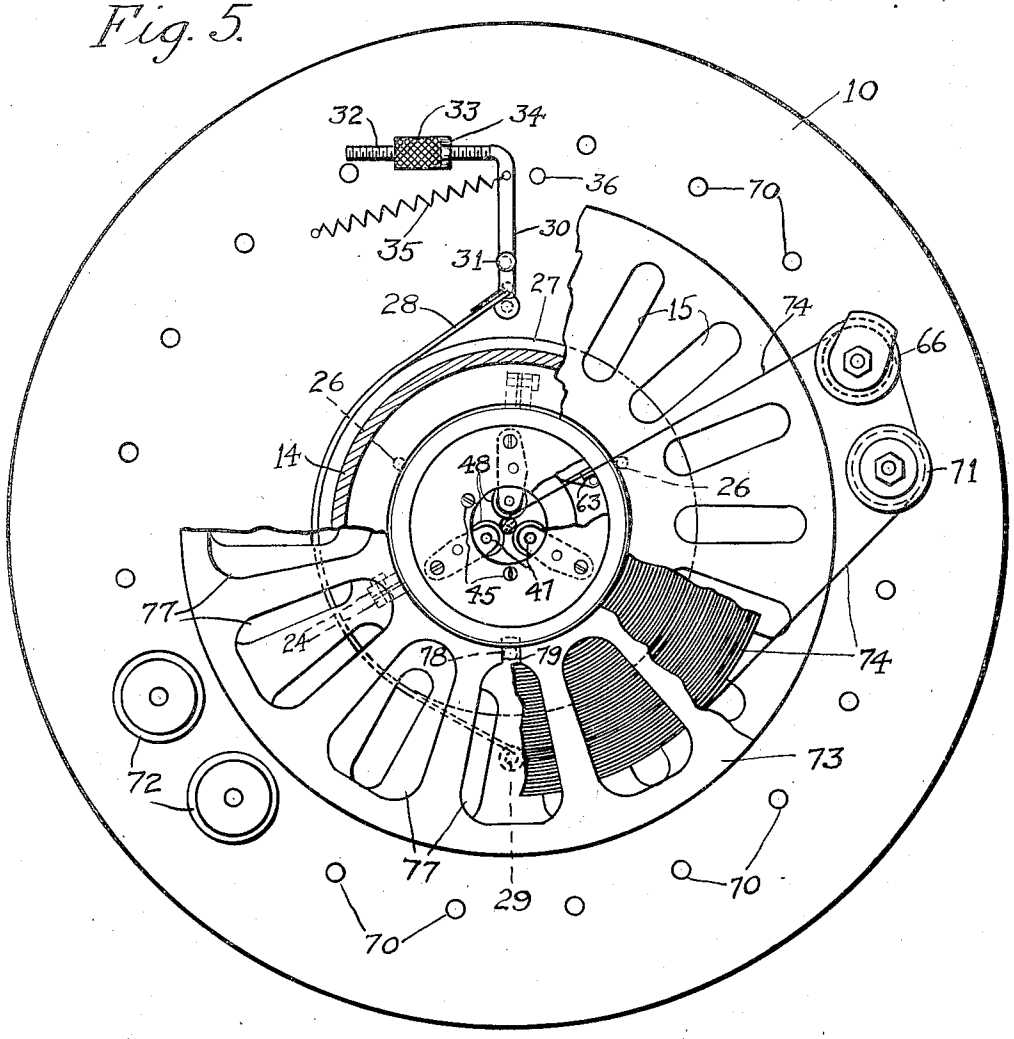
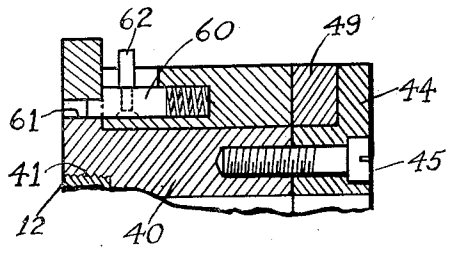


Fig. 8.



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Fig. 6.

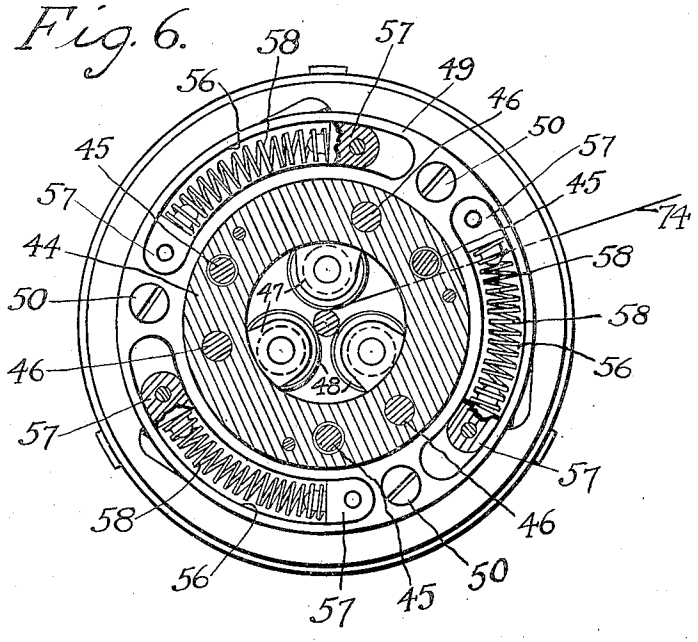


Fig. 7.

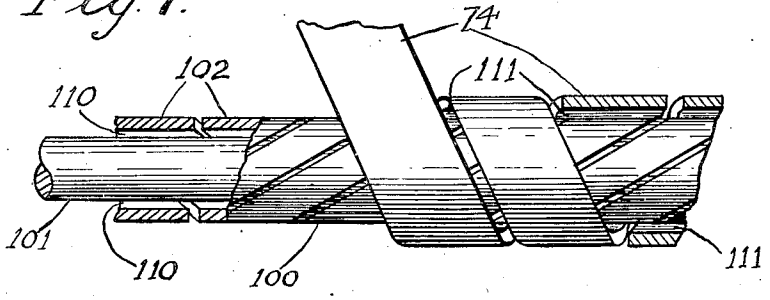
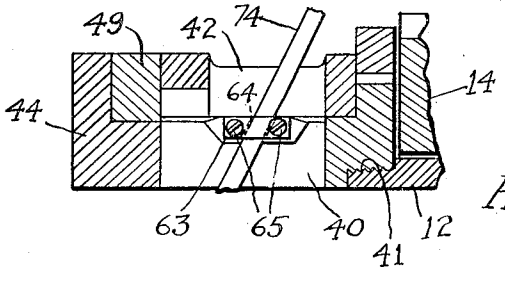


Fig. 9.



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UNITED STATES PATENT OFFICE.

HERBERT FRED CARTER, OF CICERO, ILLINOIS, ASSIGNOR TO WESTERN ELECTRIC COMPANY, INCORPORATED, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

METHOD OF AND APPARATUS FOR WRAPPING STRAND MATERIAL AROUND A CORE.

Application filed December 6, 1923. Serial No. 678,932.

This invention relates to improvements in a method of and apparatus for wrapping strand material around a core, and more particularly to a machine for applying ribbon or tape spirally to a continuous core.

One manner of increasing the inductance of a conductor employed for the transmission of alternating current is to wrap the conductor spirally with a layer of wire or tape of magnetic material. This method is known in the art as continuous inductive loading as distinguished from lump loading by means of coils distributed along the conductor. Until recently iron has been considered to be the only material available for continuous loading. It has been discovered, however, that a more suitable material may be produced in the form of an alloy of nickel and iron. When these two metals are in proper proportions and the alloy is given proper heat treatment, a material having very high permeability at low magnetizing forces is obtained. For a full disclosure of the metallurgical and electrical characteristics of this alloy and its heat treatment, reference is made to the co-pending applications of Gustave W. Elmen, Serial No. 477,877, filed May 31, 1921; Oliver E. Buckley, Serial No. 492,725, filed August 16, 1921, and Gustave W. Elmen, Serial No. 557,928, filed May 2, 1922.

One method of applying the alloy loading material above described to a composite signalling conductor is that described in a Patent #1,537,575, issued May 12, 1925, to A. F. Bandur, in which the loading material is applied in the form of tape wrapped around the conductor and subjected to the requisite heat treatment while wrapped thereon.

It has been found that when this alloy loading material is subjected to stresses or strains the permeability thereof is materially lowered and that in some cases these deleterious stresses and strains occur during the heat treatment of the loading material and are due to the construction of the composite conductor and also to the manner of wrapping the loading material thereon.

The primary object of this invention is to provide a method of and mechanism for wrapping the magnetic material around the composite conductor in such manner that the magnetic material will not be subjected to any deleterious stresses or strains during the heat treatment thereof. To this end a method and mechanism are provided for wrapping the magnetic loading material around the composite conductor with a certain degree of looseness, the loading material being subjected to a minimum amount of bending, a low degree of tension, and to practically no rolling or ironing action during the wrapping operation.

Another object of the invention is to provide in the taping mechanism means for treating a composite conductor, comprising a central metallic wire preferably of copper about which a plurality of copper tapes are tightly stranded, in such manner that the copper tapes are loosened to some extent on the central wire at the point where the magnetic loading material is wrapped around the composite conductor, the purpose of which will be hereinafter explained.

Other objects and advantages of the invention will more fully appear from the following description and will be particularly pointed out in the appended claims.

Although the method and apparatus herein disclosed are particularly adapted for the manufacture of continuously loaded signalling conductors, it is to be understood that they may be used for various other purposes without departing from the spirit and scope of the invention.

In the accompanying drawings,

Fig. 1 is a side elevation of taping head made in accordance with the invention;

Fig. 2 is an enlarged sectional detail view showing the roller device or nozzle for supporting the core and to insure its traveling in a straight line at the point of application of the tape thereto;

Fig. 3 is a vertical sectional view taken on the line 3—3 of Fig. 2;

Fig. 4 is an enlarged fragmentary detail view showing the guiding rollers for centering the composite conductor within the nozzle and also showing the manner in which the said rollers loosen the copper tapes of the composite conductor at the point where the magnetic loading material is wrapped therearound;

Fig. 5 is an enlarged fragmentary front view, partly in section, of the taping head;

Fig. 6 is a vertical sectional view taken on the line 6—6 of Fig. 2 and looking in the direction of the arrows;

Fig. 7 is an enlarged fragmentary vertical sectional view of a loaded signalling conductor in which the loading material has been applied by the improved form of taping head;

Fig. 8 is an enlarged sectional view taken on the line 8—8 of Fig. 3 looking in the direction indicated by the arrows, showing the latch means for holding the nozzle rollers away from the core and illustrating the said means in an operated position; and

Fig. 9 is an enlarged sectional view taken on the line 9—9 of Fig. 3 and showing the guide for the tape.

The drawings illustrate an apparatus by which the method may be practiced. This apparatus comprises essentially an improved form of taping head which may be applied to the taping machine fully disclosed in the patent to F. S. Kochendorfer et al., No. 1,565,652, issued December 15, 1925, in place of the taping head herein illustrated, and for this reason only the improved form of taping head is disclosed in this application, reference being made to the above mentioned patent for a full disclosure of a machine to which it may be applied.

It is believed that the method will be readily understood by a description of an apparatus by which it may be performed, which comprises a taping head consisting of a disk 10 which is secured by means of a key 11 to a hollow shaft 12 (Fig. 1) which is suitably connected to the main driving shaft of the taping machine (not shown). In front of the disk 10 and rotatable upon a ball bearing 13 carried by the shaft 12 is a tape pad carrier 14 provided with a plurality of openings 15 in its face for lightening it. The rear face of the carrier 14 is provided with an annular shaped ridge 16 supporting a friction ring 17, the face of the latter being wider than that of the ridge 16 and extending toward the axis of the head (Fig. 1). A second ring 18 is mounted adjacent the ring 17 and is supported by a metallic ring 19 carried by screws 20 mounted in the disk 10. The tension between the friction rings 17 and 18 may be regulated by adjusting the screws 20, three of which are provided spaced 120° apart. The screws 20 pass through shouldered openings 21 in the disk 10 and are screw-threaded into the ring 19. Compression springs 22 positioned around the screws 20 and between a shoulder 23 formed thereon and a shoulder formed in the opening 21 function to provide a constant tension between the friction rings 17 and 18 at all times. Any wear on the friction surfaces of the rings is taken up by the springs 22. The screws 20 are held in their set positions by being suitably clamped between bifurcated sections 24 formed on a ring 25 (Fig. 5) which bears against the rear face of the disk 10.

Three pins 26 spaced 120° apart are mounted on the disk 10 (Fig. 5) and project into suitable openings provided in the supporting ring 19 midway between the screws 20 and at equal distances from the axis of the head. The pins 26 form the driving connection between the disk 10 and the supporting ring 19, thereby taking all strain off the adjusting screws 20.

Means for supplying a uniform and sensitive tension to the tape pad carrier 14 (to which a holder supporting the tape is attached, hereinafter to be described) in such a manner that it will readily respond to changes in the speed of the serving head, as when starting or stopping and thereby tending to prevent the breaking of the tape being served, will now be described.

Secured to a shoulder formed on the carrier 14 is a ring 27 of any suitable material forming a brake drum and engaging therewith is a flexible brake band 28 suitably secured at one end to a pin 29 (Figs. 1 and 5) secured in the disk 10 and at its other end to the short arm of a centrifugally operated lever 30 pivotally secured to the disk 10 at a point 31 diametrically opposite the pin 29. Upon a screw-threaded right angle extension 32 of the long arm of the lever 30 is threaded a weight 33 adapted to be held in a set position, after being adjusted, by a lock nut 34. A tension spring 35 with one end secured to the disk 10 and its other end to the long arm of the lever 30 functions to hold the brake band 28 with a certain degree of tension against the brake drum 27 when the serving head is stationary and acts to resist the action of centrifugal force to throw the weighted end of the lever 30 outward when the head is revolving. With proper adjustment the brake band is automatically released from the brake drum just before the head reaches maximum speed. A stop pin 36 prevents the lever 30 from turning about its pivot 31 further than is necessary after the brake band has been released.

In the operation of the serving head the braking force between the brake band 28 and the brake drum 27 on the carrier 14 decreases as the speed of the winding head increases, due to the action of centrifugal force, the braking force being greatest when the head is traveling at its minimum speed.

The end of the shaft 12 projects outside of the carrier 14 and has secured thereto a roller device or nozzle for supporting the core and to insure its traveling in a straight line at the point of application of the tape thereto. This device comprises a supporting housing 40 (Fig. 2) secured to the shaft 12

by a left-hand thread indicated at 41 to prevent it from turning loose when the serving head revolves, which movement is in a right-hand direction. A roller bracket carrier 42 is rotatably mounted upon the housing 40 between a flange 43 thereon and a cover 44 secured to the housing 40 by screws 45. Three pins 46, 46 (Figs. 2 and 3) 120° apart and each pivotally supporting a roller bracket 47 carrying a roller 48, are supported at one end in the housing 40 and at their other end in the cover 44. Between the carrier 42 and the cover 44 is a cover member 49 in the form of a ring secured to the carrier 42 by screws 50. The roller bracket 47 is pivoted intermediate its length and to one side of a line drawn between its ends, the inside end carrying the roller 48 and the outside end equipped with a pin 51 projecting at each side into slots 52 (Figs. 2 and 3) formed in the carrier 42 and its cover 49.

Each of the rollers 48 is spool shaped and comprises a central arbor 53 and annular flanges 54 and 55, the flange 55 having a diameter less than the diameter of the flange 54 (Figs. 2 and 4), the purpose of which will be hereinafter explained.

The surfaces of the covers 49 and 44 which are in sliding engagement (Fig. 2) are each formed with complementary depressions 56 (Fig. 6) spaced 120° apart. Secured within each of the pockets formed by the depressions 56 are two spring holders 57, one secured at one end of the depression 56 in the cover 49, and the other in the opposite end of the pocket in the depression 56 of the cover 44. Mounted between each pair of holders is a compression spring 58. The roller brackets 47 are normally held in the position shown in Fig. 4 wherein the flanges 54 rest against the composite conductor, while the flanges 55 are positioned above and normally out of contact with the loading tape wrapped around the composite conductor.

To release the flanges 54 from their engagement with the core a suitable pin or stylus is inserted in an opening 59 provided in the carrier 42, as indicated in dotted outline in Fig. 2, and thereafter the carrier is revolved on the housing 40 clockwise. Due to the roller brackets being pivoted in the housing 40 and the pins 51 engaging the slots 52 in the carrier 42, the three rollers 48 will be rotated clockwise about their pivots 46 and away from the core to be taped, when the carrier is revolved as described above. The position of the rollers after being moved is indicated in dotted outline in Fig. 3. A spring pressed latch 60 is suitably mounted in the carrier 42 (Figs. 3 and 8) and after moving the rollers to the dotted line position, the latch springs into an opening 61 in the housing 40, thereby holding the carrier 42 from moving back to its normal position. A handle 62 is provided on the latch 60 to draw it out of the opening 61, and when the latch is free of the opening the rollers will move back and engage the core due to the action of the springs 58.

Mounted on the housing 40 as shown in Figs. 1, 3 and 9 is a tape guide 63. The tape guide comprises a plate having an angular slot 64 formed therein constituting the guiding portion, the plate being secured to the housing 40 by screws 65. A guide pulley 66 (Figs. 1 and 5) is mounted upon the face of the disk 10 near the periphery thereof and freely rotatable upon a stud 67 provided with a face 68 cut on an angle. The guide 63 and the pulley 66 function to lead the tape to the core at the desired angle. The stud 67 is secured to the disk 10 by a bolt and nut 69, and by loosening the nut the stud may be turned with the bolt, thereby causing the pulley to guide the tape at a different angle.

A plurality of radially disposed and equally spaced holes 70, 70 are provided in the face of the disk 10 for locating the pulley 66 and a second pulley 71 adjacent thereto over which the tape is guided before it is guided by the pulley 66. Counter weights 72 are mounted on the disk 10 at points diametrically opposite the pulleys 66 and 71 or at other positions afforded by the openings 70 to properly balance the serving head.

The guide pulley 66 is so located that the loading tape is fed onto the core tangentially thereof and in a straight line from the periphery of the guiding pulley 66 to the periphery of the conductor. In the normal operation of the device the tape does not touch the guide 63 and the other elements of the nozzle and is therefore not subjected to frictional contact between the guide pulley 66 and its point of application to the core.

The action of centrifugal force tending to turn the roller brackets 47 about their pivots 46 clockwise when the head is revolving and thereby moving the flanges 54 of the rollers 48 away from the core is counteracted to a certain extent by the circularly arranged springs 58 acting against the outside ends of the roller brackets 47 to turn them counter-clockwise.

A tape pad holder 73 (Figs. 1 and 5) holding a supply of tape 74 and provided with a hub 75 fits over a hub-like portion 76 formed on the tape pad carrier 14 with the tape between the disk portion on the carrier 14 and the pad holder 73. The pad holder is formed with a plurality of openings 77, 77, through which the amount of tape on the holder may be observed while the machine is stationary or in operation, so that the operator, at all times, may know when the tape supply on the holder is about to be exhausted. These openings also serve to lighten the holder. The pad holder 73

is secured to the carrier 14 to turn therewith by a key 78 suitably secured in the hub-like portion 76 of the carrier entering a key-way 79 formed in the hub 75 of the pad holder. The pad holder 73 forms the subject-matter of Patent No. 1,545,906 to F. S Kochendorfer, issued July 14, 1925, reference to which may be had for a more detailed description thereof.

In the operation of the machine the conductor 100 to be wrapped with the loading tape 74 is fed from a supply spool (not shown) through the hollow shaft 12 between the flanges 54 of the rollers 48, served with the magnetic loading material 74, and then taken up on a suitable storage device (not shown).

The tension exerted on the tape 74 between the guide pulley 66 and the core 100 is determined by the setting of the tension between the friction rings 17 and 18 by adjusting screws 20. Where the taping head is used for applying the magnetic loading material of the type heretofore described, these screws are so set that a tension of twelve ounces is exerted on the tape when the tape pad is full, which tension increases as the tape pad diminishes in size, reaching a maximum of twenty-four ounces when the tape pad is practically exhausted.

The flanges 54 of the rollers 48 serve to centralize the conductor within the nozzle so that the loading tape may be accurately wrapped therearound. After the loading tape has been applied to the conductor, the taped conductor emerges from the nozzle without being subjected to any rolling action, since the flanges 55 of the rollers 48 are spaced therefrom, as shown in Fig. 4, and during the normal operation of the nozzle do not contact with the taped conductor. The flanges 55 merely constitute a guiding means for the taped conductor as it emerges from the nozzle whenever the said conductor is not pulled accurately through the center of the nozzle by the capstan of the taping machine (not shown).

The loading tape 74 is relatively stiff and springy, and since it is not bent between the guide pulley 66 and its engagement with the core, is not subjected to any rolling action, and is applied under relatively light tension (12 to 24 ounces), the helix thereof formed on the core does not tightly grip the core, but surrounds it with a certain degree of looseness, as shown in Fig. 7. The actual clearance between the loading tape and the core is very small (approximately half a thousandth of an inch) which appears as an appreciable distance in Fig. 7 since this figure is a very considerable enlargement of the actual loaded conductor.

As shown in the drawings, the core 100 comprises a composite conductor consisting of a central metallic wire 101, preferably of copper, around which a plurality of copper tapes 102 are tightly stranded. The loading tape 74 is fed to the core 100 in a direction such that it is wrapped around the composite conductor in a direction opposite to that in which the copper tapes 102 are stranded around the central wire 101, as shown in Figs. 2 and 4. The flanges 54 of the rollers 48 are forced into contact with the core under considerable pressure exerted by the springs 58 and these flanges in addition to centralizing the core within the nozzle also serve to twist the copper tapes 102 around the central wire 101 due to the rotation of the flanges therearound, which twisting action is in the same direction in which the tapes 102 are stranded around the central wire 101. The twisting action of the flanges 54 serves to tighten on the central wire 101 the section of the tape 102 between the flanges 54 and the core supply reel (not shown) and serves to loosen the section of these tapes between the flanges 54 and the point of application of the magnetic loading material 74 thereon, as is readily understood. As a consequence, just prior to the application of the magnetic loading material, the copper tapes 102 are loosened slightly from the central wire 101, as shown in Fig. 7.

The rollers 48 function to wrap the alloy tape 74 around the conductor 101 in such manner that the alloy tape will not be subjected to deleterious stresses and strains during the heat treatment thereof. The explanation of this result is believed to be as follows:

The central copper conductor 101 and the copper tapes have a higher coefficient of elongation than the magnetic loading tape 74. Measuring a plurality of samples of the composite conductor and the alloy tape, the former has been found to have a coefficient of elongation from 11 to 53 per cent higher than that of the alloy tape. During the heat treatment of the loaded signalling conductor the copper conductor and copper tapes expand to a greater degree than does the alloy tape and thus tend to eliminate any spaces normally existing between the composite conductor and the tape. Upon subsequent cooling the alloy tape contracts more rapidly since it is in more intimate contact with the cooling medium and it is thus drawn into close contact with the copper conductor and may be subjected to deleterious stresses and strains which will result in a decrease of the permeability of the loading material. Where the composite conductor is wrapped with the loading tape by the mechanism heretofore described, a space is provided between the alloy tape and the loading material sufficient to prevent the alloy tape upon cooling to be drawn into such intimate contact with the composite

conductor as to be subjected to deleterious stresses, which will result in a decrease of the permeability of the loading material.

The advantageous results due to the use of the rollers 48 may further be explained somewhat as follows:

The copper tapes 102 upon being stranded around the central conductor 101 do not present a true cylindrical surface since the edges of the tape do not lie in close contact with the central conductor but present spiralled edges. During the cooling portion of the heat treatment, the alloy tape cools more rapidly at first than does the copper conductor due to its intimate contact with the cooling medium so that the alloy tape quickly comes into intimate contact with the raised edges of the copper tapes. As the cooling proceeds, a sticking or welding of the materials occurs at various points along these edges and the subsequent contraction of the copper therefore sets up stresses in the alloy tape. However, when the alloy tape is applied by the mechanism and in the manner heretofore described the space between the loading tape 74 and the copper tapes 102, afforded by the loose wrapping of the loading tape on the composite conductor, permits free relative movement between the alloy loading tape 74 and the copper tapes during the heating and cooling thereof incident in the heat treatment of the loading material and prevents the latter from being subjected to deleterious stresses and strains.

What is claimed is:

1. In a mechanism for serving strand material spirally to a core, a rotatable serving head, a strand material supply holder carried by the serving head, a serving device rotatable with said head, means carried by said serving device so located as to be out of contact with the served strand material and adapted to support the core to insure its traveling in a straight line at the point of application of the strand serving material, and means for subjecting said means to pressure tangentially of the served strand.

2. In a mechanism for serving tape spirally to a core, a rotatable serving head, a tape supply holder carried by the said head, a serving device rotatable with said head, and a plurality of rollers carried by said serving device, said rollers so located as to be out of contact with the served tape and to support the core to insure its traveling in a straight line at the point of application of the tape.

3. In a mechanism for serving strand material spirally to a core, a rotatable serving head, a strand material supply holder carried by said serving head, a serving device rotatable with said head, guide means carried by the head over which the strand is guided from the strand holder to the serving device, said serving device so designed and said guide means so positioned that the strand serving material travels in substantially straight lines from the material supply holder to its point of contact with the core.

4. In a mechanism for serving tape spirally to a core, a rotatable serving head, a tape supply holder carried by said head, a serving device rotatable with said head, guide means carried by the head over which the tape is guided from the supply holder to said serving device, said serving device so designed and said guide means so positioned that the tape travels in substantially straight lines from the tape supply holder to its point of contact with the core.

5. In a mechanism for serving strand material spirally to a core, a rotatable serving head, a strand material supply holder carried by said head, a serving device rotatable with said head, a guide roller carried by the head over which the strand material is guided from the supply holder to said serving device, said serving device so designed and said guide roller so positioned that the strand material is provided a straight and uninterrupted path from the guide roller to its point of contact with the core.

6. In a mechanism for serving tape spirally to a core, a rotatable serving head, a tape supply holder carried by said head, a serving device rotatable with said head, guide means carried by the head over which the tape is guided from the supply holder to said serving device, said serving device so designed and said guide means so positioned that the tape is provided a straight path from the guide means to its point of contact with the core, and means carried by said serving device and so located as to be out of contact with the taped core and adapted to support the core to insure its traveling in a straight line at the point of application of the tape.

7. In a mechanism for serving tape spirally to a core, a rotatable head, a tape supply holder carried by said head, a serving device rotatable with said head, a guide roller carried by the head over which the tape is guided from the supply holder to said serving device, said serving device so designed and said guide roller so positioned that the tape is provided a straight and uninterrupted path from the guide roller to its point of contact with the core, and a roller carried by said serving device and so located as to be out of contact with the taped core and to support the core to insure its traveling in a straight line at the point of application of the tape.

8. In a mechanism for serving tape spirally to a core, a rotatable serving head, a tape supply holder carried by said head, a serving device rotatable with said head, a

roller carried by said serving device, a flange associated with said roller engaging the core at a point in advance of the application of the tape thereto and in such manner as to support the core and insure its traveling in a straight line at the point of application of the tape.

9. In a mechanism for serving tape spirally to a core, a rotatable serving head, a tape supply holder carried by said head, a serving device rotatable with said head, a roller carried by said serving device, a flange having a greater diameter than a second flange associated therewith, the said roller so located within the serving device that the larger flanges thereof engage the core at a point in advance of the application of the tape thereto and in such manner as to support the core and insure its traveling in a straight line at the point of application of the tape, the smaller diameter flanges associated with said rollers being positioned above the taped portion of the core but normally out of contact therewith.

10. In a mechanism for serving metallic tape on a metallic core, a rotatable serving head, a tape supply holder carried thereby and rotatable therewith in such manner that the tape is wrapped on the core with a minimum amount of tension exerted on the tape, and means carried by the serving head and so located as to be out of contact with the served tape to support the core to insure its traveling in a straight line at the point of application of the tape.

11. In a mechanism for serving metallic tape on a metallic core, a rotatable serving head, a supply of tape carried thereby and rotatable therewith in such manner that the tape is wrapped on the core with a minimum amount of tension exerted on the tape, and a spring pressed roller rotatable with said serving head, a flange larger than said roller engaging the core at a point in advance of the application of the tape thereto to support the core and insure its traveling in a straight line at the point of application of the tape.

12. In a mechanism for serving metallic tape on a metallic core, a rotatable serving head, a supply of tape carried thereby and rotatable therewith in such manner that the tape is wrapped on the core with a minimum amount of tension exerted on the tape, guide means for the tape carried by the serving head, said serving means so designed and the guide means so positioned that the tape is provided a straight path from the guide means to its point of contact with the core, and means engaging the core and out of contact with the taped portion thereof, said means supporting the core to insure its traveling in a straight line at the point of application of the tape.

13. In a mechanism for serving metallic tape on a metallic core, a rotatable serving head, a supply of tape carried thereby and rotatable therewith in such manner that the tape is wrapped on the core with a minimum amount of tension exerted on the tape, a guide roll for the tape carried by the serving head, said serving head so designed and the guide roll so positioned that the tape is provided a straight and uninterrupted path from the guide roller to its point of contact with the core, and spring pressed rolls rotatable with the serving head, said rolls engaging the core and out of contact with the taped portion thereof, said rollers serving to support the core and insure its traveling in a straight line at the point of application of the tape.

14. In a mechanism for serving strand material spirally to a core, which consists of a central strand and a wrapping of strand material thereon, a rotatable serving head, a strand material supply holder carried by said head, a serving device rotatable with said head, and means associated with said serving device and in contact with the composite core for loosening the strand wrapping thereon at a point in advance of the application of the strand serving material to said composite core.

15. In a mechanism for serving strand material spirally to a core, which consists of a central strand and a wrapping of strand material thereon, a rotatable serving head, a strand material supply holder carried by said head, a serving device rotatable with said head, and means associated with said serving device and in contact with the composite core to support the core to insure its traveling in a straight line at the point of application of the tape, said means designed to loosen the strand wrapping of the composite core at a point prior to the application of the strand serving material thereto.

16. In a mechanism for serving tape spirally to a composite core, consisting of a central strand and a wrapping of strand material thereon, a rotatable serving head, a tape supply holder carried by the said head, a serving device rotatable with said head, and means associated with said serving device and in engagement with the core to insure its traveling in a straight line at the point of application of the tape, said means designed to loosen the strand wrapping of the composite core at a point in advance of the application of the serving tape thereto.

17. In a mechanism for serving tape spirally to a composite core, consisting of a central strand and a wrapping of strand material thereon, a rotatable serving head, a tape supply holder carried by said head, a serving device rotatable with said head, and means associated with said serving device and in engagement with the core to in-

sure its traveling in a straight line at the point of application of the tape, said means positioned so as to be out of contact with the served tape and so designed as to loosen the strand wrapping of the composite core at a point in advance of the application of the serving tape thereto.

18. In a mechanism for serving tape spirally to a composite core, consisting of a central strand and a strand wrapping thereon, a rotatable serving head, a tape supply holder carried by said head, a serving device rotatable with said head, a plurality of rollers associated with said serving device and so located as to be in contact with the composite core, said rollers adapted to loosen the strand wrapping of the core at a point in advance of the application of the tape serving thereto.

19. In a mechanism for serving tape spirally to a composite core, consisting of a central strand and a strand wrapping thereon, a rotatable serving head, a tape supply holder carried by said head, a serving device rotatable with said head, a plurality of rollers associated with said serving device and in contact with the composite core to support the core to insure its traveling in a straight line at the point of application of the tape, said rollers adapted to loosen the strand wrapping of the composite core of the point of application of the serving tape thereto.

20. In a mechanism for serving tape spirally to a composite core, consisting of a central strand and a strand wrapping thereon, a rotatable serving head, a tape supply holder carried by said head, a serving device rotatable with said head, a plurality of rollers carried by said serving device so located as to be in contact with the composite core and out of contact with the served tape, said rollers serving to support the core to insure its traveling in a straight line at the point of application of the tape and to loosen the strand wrapping of the composite core at the point of application of the serving tape thereto.

21. The method of serving strand material to a conductor, which consists in subjecting the conductor to pressure, serving the material to the conductor synchronously with its subjection to pressure, and guiding the material from its supply source to its point of contact with the conductor in substantially straight lines.

22. In a mechanism for serving strand material spirally to a core, a rotatable serving head, a strand material supply holder carried by said serving head, a serving device rotatable with said head, freely revolvable guide means carried by the head over which the strand is guided from the strand holder to the serving head, said serving device so designed, and said guide means so positioned that the strand serving material is provided with a straight path from the guiding means to its point of contact with the core.

23. In a mechanism for serving tape spirally to a core, a rotatable serving head, a tape supply holder carried by said head, a serving device rotatable with said head, a plurality of spool shaped rollers carried by said serving device, said rollers so located that one flange thereof engages the core at a point in advance of the application of tape thereto and in such manner as to support the core and insure its traveling in a straight line at the point of application of the tape, and means for pressing said rollers tangentially against said served strand.

24. In a mechanism for serving tape to a core, a rotatable serving head, a tape supply holder associated therewith, a serving device rotatable with the head, a roller carried by said device, a support therefor, a flange associated with said roller engaging the core at a point in advance of the point of application of the tape thereto and in such manner as to support the core and insure its traveling in a straight line at the point of application of the tape, and means for moving the said support to vary the position of said roller with respect to the core.

25. In a mechanism for serving tape spirally to a core, a rotatable head, a tape supply holder carried by said head, a serving device rotatable with said head, a guide roller, carried by the head over which the tape is guided from the supply holder to said serving device, said serving device so designed and said guide roller so positioned that the tape is provided a straight and uninterrupted path from the guide roller to its point of contact with the core, and a plurality of rollers carried by said serving devices and so located as to be out of contact with the taped core and to support the core to insure its traveling in a straight line at the point of application of the tape, and means for swinging said rollers into or out of engagement with said core.

26. In a machine for applying tape material to an elongated core, means for applying mechanical force to an element of said core whereby the circumference of a portion of said core is increased, means for applying the tape about said portion, and means for advancing said core to remove said portion from the influence of said force.

27. The method of applying a serving to a core which comprises applying the serving to said core while said core is in a non-compact condition, and subsequently increasing by the application of mechanical force the compactness of said core to secure looseness of said serving.

28. A method of applying a loose wrapping about a stranded core which comprises

temporarily loosening the strands of said core, wrapping a tape about said strands in their loosened condition, and then allowing said tape to assume a loosened condition.

29. A method of providing a stranded core with a loose wrapping comprising partially separating the strands of said core, wrapping a tape about said separated strands, and then causing said strands to be less separated.

30. The method of producing a composite core surrounded by a strand which includes the steps of serving the strand about the composite core and applying a twisting force to said core sufficient to secure looseness of said strand about said core.

31. A method of securing looseness of a wrapping about a stranded core comprising applying a mechanical force to an element of said stranded core in order to increase the circumference of a portion of said stranded core, then wrapping a tape about said portion, and relieving said portion from the influence of said force.

In witness whereof, I hereunto subscribe my name this 14th day of November, A. D. 1923.

HERBERT FRED CARTER.