

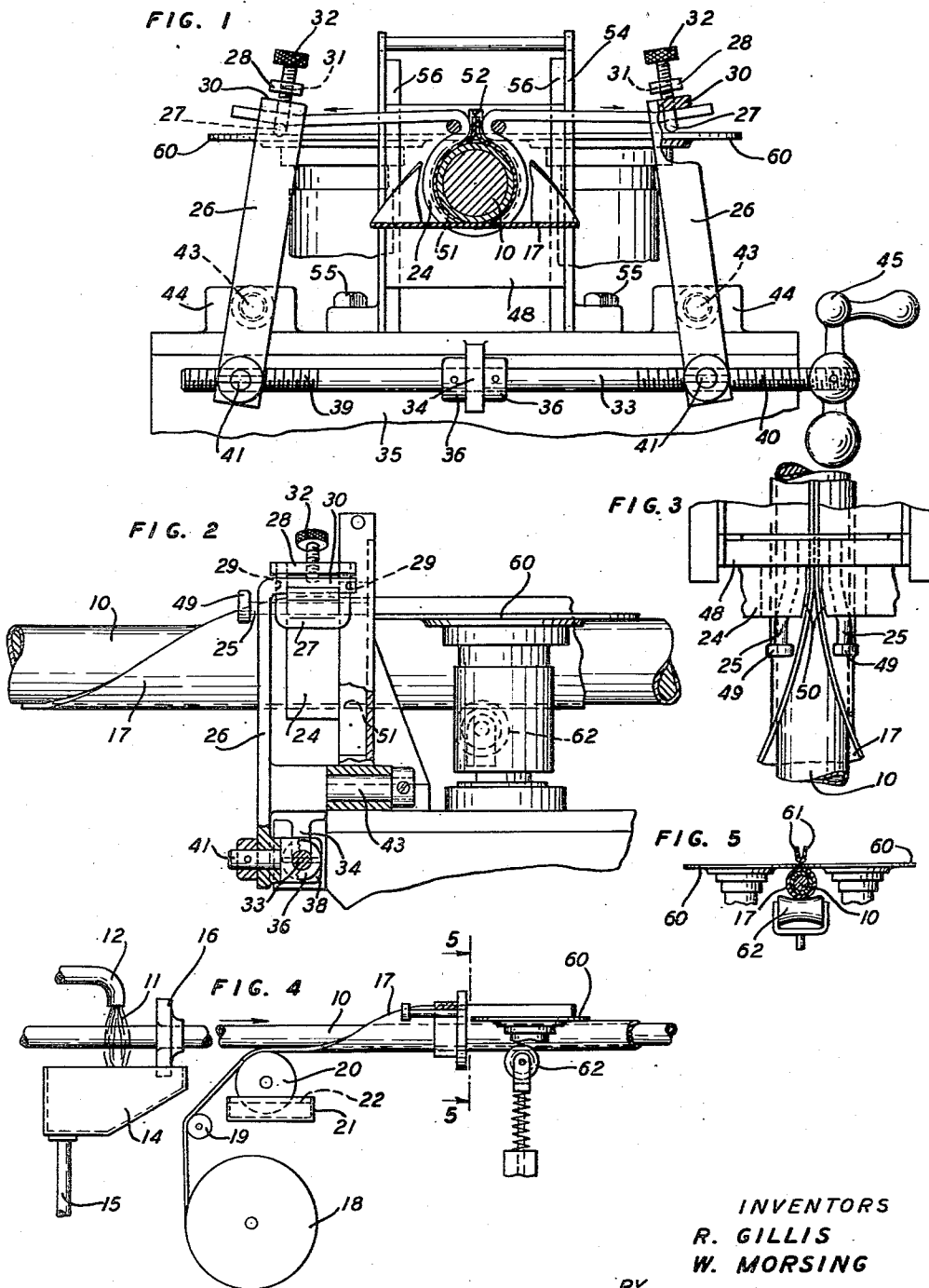
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METHOD OF AND APPARATUS FOR APPLYING MATERIAL TO ADVANCING CORES

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METHOD OF AND APPARATUS FOR APPLYING MATERIAL TO ADVANCING CORES

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This invention relates to a method of and apparatus for applying material to an advancing core, and more particularly to a method of and apparatus for wrapping a strip of thermoplastic material longitudinally around a movable cable

core. In the manufacture of armored cable used in communication arts, the efficiency of the weatherproof layers in the cable structure depends greatly upon how thorough such coverings are in surrounding their portions of the cable and how completely such coverings are cemented to their core or cable portions free of air bubbles therebetween. Such is often made difficult due to the possible existence of irregularities in the contour of the core or cable structure.

Objects of the invention are to provide a method for efficiently applying material to a core and an apparatus which is simple in construction yet highly efficient and practical for the practising of the method.

With these and other objects of the invention in view, one embodiment of the invention comprises an apparatus for applying material to an advancing core including a flexible element to cause a material to be bent longitudinally about an advancing core and force the material into intimate engagement with the core.

Another embodiment of the invention comprises a method aided by the apparatus in bending a material longitudinally about an advancing core and applying pressure to all portions of the material to force the material into intimate engagement with the core.

Other objects and advantages will be apparent from the following detailed description when taken in conjunction with the accompanying drawing, wherein

Fig. 1 is a fragmentary front elevational view of the apparatus by means of which the method may be practised;

Fig. 2 is a fragmentary side elevational view of the apparatus, portions thereof being shown in section;

Fig. 3 is a fragmentary top plan view of the central portion of the apparatus;

Fig. 4 is a schematic side elevational view of the apparatus; and

Fig. 5 is a fragmentary vertical sectional view taken along the line 5—5 of Fig. 4.

Referring now to the drawing, attention is first directed to Fig. 4, where a core 10 is advanced in the direction of the arrow by any suitable means (not shown). The core 10 in the present embodiment is a portion of a cable struc-

ture including a plurality of electrical conductors, individually insulated, encased in a metallic sheath. The metallic sheath may be of thin lead or brass, the latter being corrugated to facilitate bending, the drawing showing, however, only a smooth surfaced sheath. During the advancement of the core 10, a thermoplastic cement 11 is applied thereto through a supply line 12 coupled with a supply not shown. In the present instance the cement is a suitable mixture of soft rubber, light asphalt, resin oil and a compound known commercially as flux A, which mixture may be maintained in a suitable liquid form at 200° F. and which will remain in a sticky condition throughout a wide range of temperatures. The thermoplastic cement 11 is supplied to the core 10 in excess of the amount desired, a portion of the excess cement passing into a trough 14 and through an outlet 15 back to the supply through the aid of a suitable pumping means (not shown). A die 16 of a suitable structure is formed for the passage of the core 10 there-through and to remove the remaining excess cement from the core, allowing a covering of a predetermined thickness of the cement to remain on the core. After the core receives its cement covering and passes through the die 16, it is brought into engagement with a strip of covering material 17 supplied at 18 and directed over rolls 19 and 20. The material 17 is, in the present instance, a thermoplastic, similar in structure to the cement but more solid. For example, the material 17 is formed of a soft rubber, hard asphalt and a clay filler, which mixture results in a pliable solid bendable about the core. The roll 20 extends into a tank 21 containing a lubricant 22, such as resin oil, which is supplied to the adjacent or outer surface of the material 17 for a purpose hereinafter described.

After the material 17 leaves the roll 20 it begins its wrapping longitudinally about the core, with excess portions adjacent the longitudinal edges thereof being brought together in parallel relation side-by-side, as illustrated in Fig. 1. Here the material 17 meets a flexible element 24 which, after the first threading of the core and the material therethrough, serves, during the operation of the apparatus, to form the material 17 longitudinally about the core and force the material into intimate engagement with the cement covering on the core to cause the material to be cemented to the core. The element 24 in the present instance is formed of soft flexible rubber of a predetermined structure, width and thickness so that it may be caused to apply a definite

and uniform pressure to the material 17 about the core to remove all air bubbles from between the material and the core, the pressure being sufficient to cause all portions of the material surrounding the core to be thoroughly cemented thereto.

As illustrated in Fig. 1, the central portion of the element 24 extends about the material 17 formed around the core and has its end portions extending around supporting pins 25 and secured to tension levers 26. The means for securing the ends of the element 24 to the levers 26 include U-shaped gripping members 27, round in cross-section to avoid damaging the element 24 and having cross-pieces 28 fixed to their ends which project through apertures 29 in rearwardly projecting upper ends 30 of the levers 26. The cross-pieces 28 have threaded apertures 31 near the centers thereof for receiving thumb screws 32, the latter being adapted to be forced, through their threaded connections, in engagement with the ends 30 of the levers 26, to force the central portions of the gripping members to cause gripping of the ends of the element 24 between the under surfaces of the portions 30 and the gripping members. With the ends of the element 24 secured to the levers 26, a variable tension may be applied to the element to create a variable pressure on the material toward the core through the actuation of means to simultaneously move the upper ends of the levers in opposite directions. This actuable means includes an adjusting screw 33, journaled in a bearing 34 of a support 35, with collars 36 fixed to the screw upon each side of the bearing to permit rotation of the screw yet hold the screw against axial movement. Threaded elements 38 in the form of nuts are disposed upon opposite threaded ends 39 and 40, the threads 39 being left-hand threads while the threads 40 are right-hand threads. The nuts or threaded elements 38 are pivotally connected, at 41, to the lower ends of the levers 26, the levers being pivotally supported, at 43, upon vertical projecting lugs 44 of the support 35. A crank 45 fixed to one end of the adjusting screw 33 enables manual rotation of the screw to bring about adjustment of the element 24.

The pins 25 are rigidly supported in a floating back-up plate or element 48 and are bent into shapes illustrated in Fig. 3. Head portions 49 are fixed to the pins at the outer ends thereof to allow for the spacing of the edges of the material 17 during its formation longitudinally about the core. The outwardly bent portions of the pins 25 also control the positioning of the element 24 passing therearound, allowing an opening, indicated at 50, for the final closing of the material about the core. These outwardly bent portions of the pins 25 affect the element to cause varied pressures in the different planes from the entrance end of the element to the exit end thereof, the pressures at each point in a plane being identical but the pressures in the different planes increasing as the material passes through the element.

The floating back-up plate 48 is apertured, as at 51, for the passage of the core 10 and the material 17 therethrough, this aperture being substantially cylindrical excepting at the upper extremity where it is extended vertically, as at 52, to allow for the excess portions of the material 17 at the edges thereof. A vertical frame 54 mounted upon the support 35, as at 55, has track portions 56 at the sides thereof to slidably support the back-up plate 48 against movement longitudinally with

the core yet allow vertical movement of the back-up plate with the core and the material thereon when causes arise to create such movement of the core and material.

After the material 17 is formed about the core and forced, with uniform pressure throughout the circumference of the core, into intimate engagement therewith to thoroughly cement the material to the core, the covered core passes relative to a pair of rolls 60 which sever the excess material, indicated at 61, from that surrounding the core, causing the edges of the material to be united and complete the formation of a cover of thermoplastic material completely about the core. The rolls 60 may be driven by any suitable means (not shown) in a direction and at a speed suitable to perform their function. A spring pressed roll 62, over which the covered core advances, assures location of the covered core with respect to the rolls 60 for the shearing of the excess material 61 from that surrounding the core.

The method may include the steps of applying a cement to an advancing core, removing excess cement from the core while passing through the die 16, applying a lubricant 22 to the outer surface of the material 17, forming the material 17 longitudinally about the core, applying uniform pressure to the material to force the material into intimate engagement with the cement covering on the core, severing the excess material and joining the remaining edges of the material to completely form and secure the material about the core.

The advancing of the core will cause the material to be drawn therewith and as the material is drawn from the supply 18 it will pass over the rolls 19 and 20 and be bent longitudinally about the core by the element 24, which also functions to press the material into intimate engagement with the core or cement thereon. The lubricant 22 applied to the outer surface of the material 17 by the roll 20 eliminates frictional disturbances between the material and the element 24 as well as between the material and the rolls 60. Variations in the tension of the element 24 to vary the pressure on the material, may be brought about through the rotation of the adjusting screw 33 to cause relative movement of the levers 26, moving the upper ends thereof toward or away from each other. This variation results in a uniform variation of the pressure throughout the central portion engaging the material. Furthermore, the element 24 is of such a structure that if there should be any variation in the formation of the core at a certain point thereof, the material 17 will be caused to conform to the core in that the portion of the element 24 thereadjacent will exercise its force without interference of or without being influenced by the other portions of the element.

The embodiments of the invention herein disclosed are merely illustrative and may be modified and departed from in many ways without departing from the spirit and scope of the invention as pointed out in and limited solely by the appended claims.

What is claimed is:

1. A method of applying material to an advancing core comprising applying a cement coating to an advancing core, feeding strip material to the advancing core, bending the material longitudinally about the core, and applying pressure to all points of the material adjacent the core while the material and core pass through a plane lying transverse to the advancing core to

force the material into intimate engagement with the cement coating.

2. A method of applying material to an advancing core comprising applying a cement coating to an advancing core, feeding strip material to the advancing core, bending the material longitudinally about the core, and applying increasing pressures to all points of the material adjacent the core while the material and core pass through a plurality of parallel planes lying transverse to the advancing core to force the material into intimate engagement with the cement coating.

3. An apparatus for applying material to an advancing core comprising means to feed strip material to an advancing core, a flexible element conformable to the core and adapted to apply pressure to all points of the material adjacent the core to force the material into intimate engagement with the core, means to support the element against longitudinal movement with the core, and means to cause the element to apply variable pressures to the material.

4. An apparatus for applying material to an advancing core comprising means to feed strip material to an advancing core, an element adapted to cause bending of the material longitudinally about the core, and means to support the element and cause it to apply successively increasing pressures to all portions of the material adjacent the core to force them into intimate engagement with the core.

5. An apparatus for applying material to an advancing core comprising means to feed strip material to an advancing core, an element conformable to the core to apply pressure to all points of the material adjacent the core to force the material into intimate engagement with the core, and means to support the element against movement longitudinally with the core but for transverse movement therewith relative to the normal longitudinal path of the core.

6. An apparatus for applying material to an advancing core comprising means to feed strip material to an advancing core, an element conformable to the core to apply pressure to all points of the material adjacent the core to force the material into intimate engagement with the core, and a floating member to support the element against movement longitudinally with the core but for movement with the core transverse to the axis of the core.

7. An apparatus for applying material to an advancing core comprising means to feed sheet material to an advancing core, a flexible strip, and means to hold the flexible strip under a variable tension about the core to cause the material to bend longitudinally about the core and to apply a variable force to the material toward the core.

8. An apparatus for applying material to an advancing core comprising means to feed strip material to an advancing core, a flexible floating element, means to support the element under tension about the core and against movement longitudinally with the core but for floating movement with the core transverse to the axis thereof to force the material into intimate engagement with the core.

9. A method of applying material to an advancing core comprising applying a cement coating to an advancing core, feeding strip material to the advancing core, lubricating the outer surface of the material, and passing the core and material through a flexible pressure element

drawn circularly thereabout which causes bending of the material longitudinally about the core, and applying pressure to all radially disposed points of the material adjacent the core to force the material into intimate engagement with the cement coating.

10. An apparatus for applying material to an advancing core comprising means to feed strip material to an advancing core, a flexible element, having a normally flat surface, bent circularly about the core, and the material thereon, under tension with the said surface engaging the material to apply pressure to all points of the material adjacent the core to force the material into intimate engagement with the core, and means to support the element against longitudinal movement with the core.

11. An apparatus for applying material to an advancing core comprising means to feed strip material to an advancing core, a flexible element, having a normally flat surface, bent circularly about the core, and the material thereon, under tension with the said surface engaging the material to apply pressure to all points of the material adjacent the core to force the material into intimate engagement with the core, and means to support the element against longitudinal movement with the core but for transverse movement therewith relative to the normal longitudinal path of the core.

12. An apparatus for applying material to an advancing core comprising means to feed strip material to an advancing core, stationary supports, an element formed of a length of flexible material bent circularly about the core and strip material and also about the supports, the latter supporting the element against longitudinal movement and causing the element to apply pressure to all points of the strip material adjacent the core to force the material into intimate engagement with the core.

13. An apparatus for applying material to an advancing core comprising means to feed strip material to an advancing core, stationary supports, an element formed of a length of flexible material bent circularly about the core and strip material and also about the supports, the latter supporting the element against longitudinal movement and causing the element to apply pressure to all points of the strip material adjacent the core to force the material into intimate engagement with the core, and members to hold the ends of the element.

14. An apparatus for applying material to an advancing core comprising means to feed strip material to an advancing core, stationary supports, an element formed of a length of flexible material bent circularly about the core and strip material and also about the supports, the latter supporting the element against longitudinal movement and causing the element to apply pressure to all points of the strip material adjacent the core to force the material into intimate engagement with the core, members to hold the ends of the element, and means to move the members to vary the pressure the element will apply to the material.

15. An apparatus for applying material to an advancing core comprising means to feed strip material to an advancing core, stationary supports, an element formed of a length of flexible material bent circularly about the core and strip material and also about the supports, the latter supporting the element against longitudinal movement and causing the element to apply pres-

sure to all points of the strip material adjacent the core to force the material into intimate engagement with the core, members to hold the ends of the element, and means to move the members relative to each other simultaneously to vary the pressure the element will apply to the material.

16. An apparatus for applying material to an advancing core comprising means to feed strip material to an advancing core, stationary supports disposed adjacent each other and having outwardly extending portions, and an element

5 formed of a length of flexible material with its intermediate portion bent circularly about the core, and the strip material thereon, under tension and over the supports to apply pressure to all points of the strip material adjacent the core to force the material into intimate engagement with the core, the said portions of the supports causing the element to apply successively increased pressures to the material.

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