May 7, 1935. W. E. SOMERVILLE 2,000,104

STRANDING MACHINE

Filed Jan. 5, 1934 2 Sheets-Sheet 1

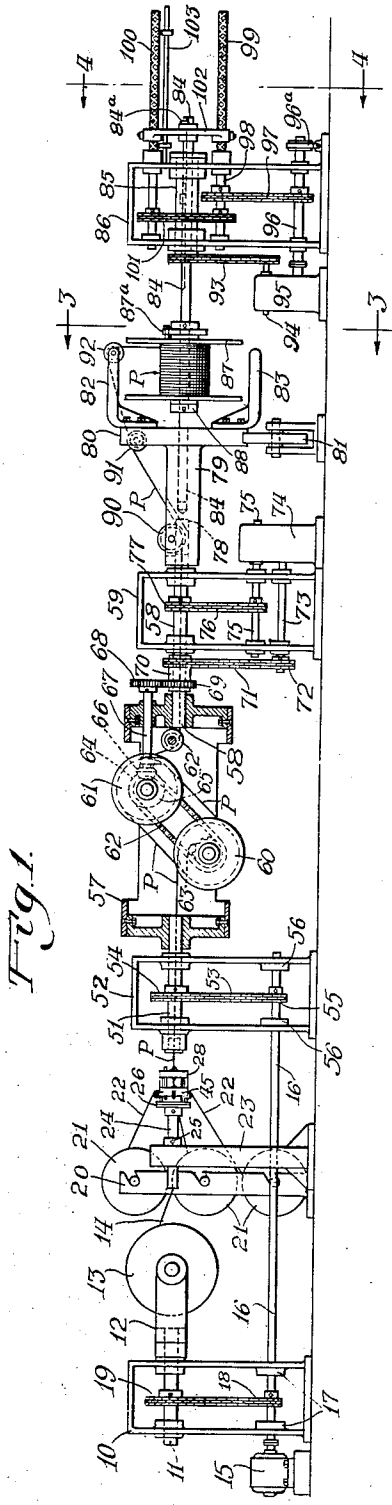


Fig. 1.

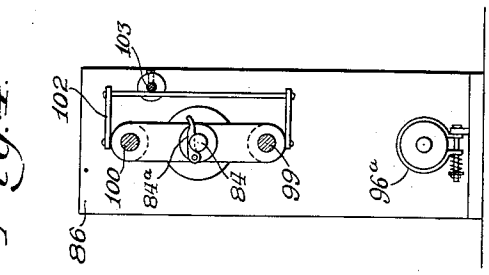


Fig. 4.

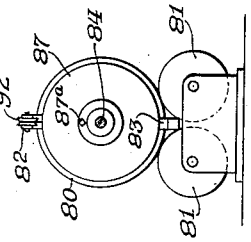


Fig. 3.

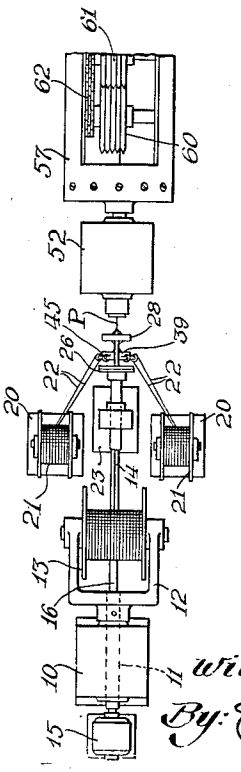


Fig. 2.

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May 7, 1935. W. E. SOMERVILLE 2,000,104

STRANDING MACHINE

Filed Jan. 5, 1934 2 Sheets-Sheet 2

Fig. 5.

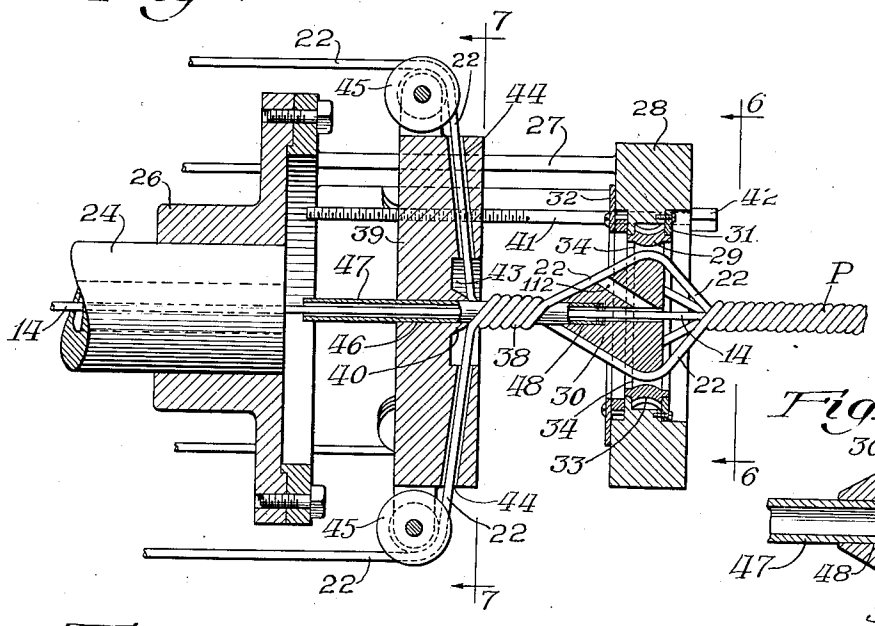


Fig. 8.

Fig. 6.

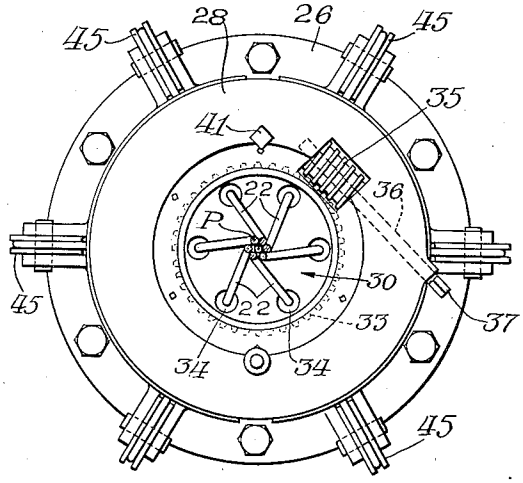


Fig. 7.

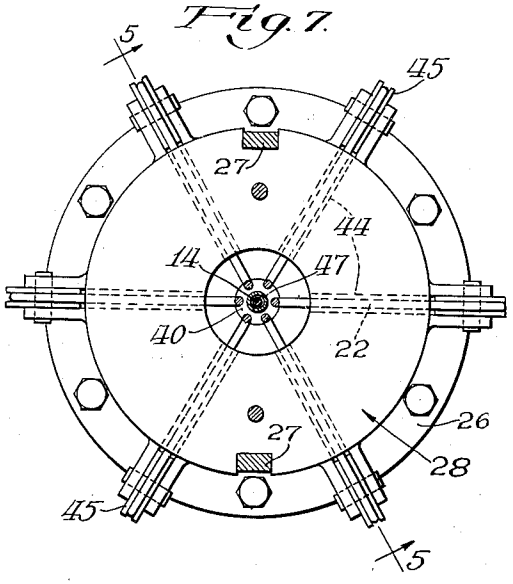
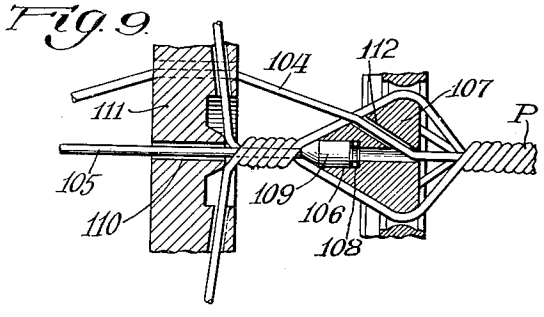


Fig. 9.



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UNITED STATES PATENT OFFICE

2,000,104

STRANDING MACHINE

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Application January 5, 1934, Serial No. 705,327

6 Claims. (Cl. 117—17)

This invention relates to improvements in stranding machines for forming a plurality of wires into a strand or the formation of a plurality of such strands into a wire rope, as well as the subsequent formation of a plurality of wire ropes into a cable, and therefore the terms "stranding" and "strands" as are here used, are to be construed broadly to include all of such products.

Heretofore in stranding machines rotating heads have been employed and through which heads a central wire or core has been fed and separate strands or wires have also been fed through the head to be wrapped around the core. In such operations the strands have been wrapped around the core wire by the rotation of such head so as to form helices or convolutions in the strands, but the rotation of the head and the manner in which the wires or strands are fed to the core creates torsion in the strands, tending to twist them in laying up the strands or wires in the cable.

This is accentuated by reason of the fact that the strands are fed to the core in a general direction lengthwise of the core.

It is one of the objects of the present invention to provide in a machine of this character a non-rotating head having means whereby the wires or strands will be fed to the core at substantially right angles to the axis of the core, at the point of contact of the strand with the core and at the point where the coiling of the wires about the core commences, thereby allowing the wires or strands to be rolled or coiled into position about the core in laying up the wires or strands in the rope or cable.

A further object is to provide in a stranding machine of this character a haul off, and a take up mechanism which will be entirely separate from each other, thereby reducing the amount of weight, resulting in a perfect balance, and at the same time reduce to a minimum the diameter of the machine, allowing greater speed with less power.

To the attainment of these ends and the accomplishment of other new and useful objects as will appear, the invention consists in the features of novelty in substantially the construction, combination and arrangement of the several parts hereinafter more fully described and claimed and shown in the accompanying drawings illustrating this invention and in which

Figure 1 is a view partly in elevation, partly in section, with parts broken away and parts omitted, of a machine of this character constructed in accordance with the principles of this invention.

Figure 2 is a top plan view of a portion of the machine showing the strander head.

Figure 3 is a detail sectional view, with parts omitted, as taken on line 3—3, Figure 1.

Figure 4 is a detail sectional view, with parts omitted, and on an enlarged scale, as taken on line 4—4, Figure 1.

Figure 5 is an enlarged detail sectional view of the strander head.

Figure 6 is a detail sectional view, with parts omitted, and as taken on line 6—6, Figure 5.

Figure 7 is a detail sectional view, with parts omitted, and as taken on line 7—7, Figure 5.

Figure 8 is a detail sectional view of one end of the spindle shown in Figure 5, through which the core wire passes.

Figure 9 is a modified form of the invention.

Referring more particularly to the drawings, the numeral 10 designates a supporting structure upon which a shaft 11 is mounted, and connected to the shaft is a yoke 12 in which a reel 13 is journaled and wound upon the reel 13 is a strand or wire 14, which constitutes the core wire. The yoke 12 carrying the reel 13 is adapted to be rotated by means of a suitable motor 15, and connected to the shaft of the motor is a shaft 16 journaled in suitable bearings 17. A sprocket wheel is carried by the shaft 16 and over which sprocket wheel a sprocket chain 18 passes, the chain also passing over a sprocket wheel 19 secured to the shaft 11.

Arranged in advance of the reel 13 are supporting frames 20, any number of which may be provided, and removably journaled in these frames are spools or reels 21, any number of which may be provided, and these spools or reels are preferably arranged on each side but in advance of the reel 13. These spools or reels 21 have wound thereupon the strands or wires 22 which are coiled about the core 14 to produce the finished product.

A supporting structure 23 is arranged adjacent the spools 21 and a shaft 24 is mounted upon the structure 23 in a manner to be held against rotation, but so that it may be adjusted lengthwise of its axis and when adjusted may be held in its adjusted position by means of a fastening device 25, such as a set screw or the like. The shaft 24 is hollow as shown more clearly in Figure 5, and through this shaft the core wire 14 loosely passes.

Secured to the end of the shaft 24 is a head 26, and to this head is secured a supporting frame

27 of any desired construction. The members of the frame 27 may be of any desired length and to the free extremities thereof is secured another member 28 within which a member 29 carrying a die 30 is rotatably mounted. This member 29 may be removably secured in position by means of suitable fastening plates 31—32 and is preferably provided with a worm gear 33 about its periphery. The member 29 is provided with openings 34 through which the strands or wires 22 pass in a manner to be later described.

Mounted upon the member 28 in any suitable manner is a worm gear 35 which meshes with the worm 33, and connected to the worm gear 35 is a shaft 36, the extremity 37 of which is preferably angular in cross section, so that by the application of a crank or tool to the end of the shaft the worm 35 may be rotated to impart a rotary movement to the member 29 so as to pre-form the wire into coils or helices 38 and to vary the length of the lap and lay of the coils or helices.

Supported also by the frame 27 is another member 39 having a portion 40 shaped to form a die. This member is adapted to be laterally adjusted toward and away from the member 28 preferably by means of a screw 41 threaded into the member 39 and journaled in the member 28, the extremity 42 of the screw 41 being exposed and projecting beyond the outer face of the member 29 and preferably angular in cross section to receive a tool or wrench so that by rotating the screw 41 the member 39 may be moved towards or away from the member 28 to vary the length of the lap or lay of the wires 22 about the core 14 between the members 28 and 39.

The central portion of the member 39 is preferably cut away or recessed as at 43 and radial openings 44 communicating with such space 43, opening through the periphery of the member 39. These openings 44 are arranged at substantially right angles to the axis of the member 39 and adjacent each of the openings 44, any number of which may be provided, and rotatably supported by the periphery of the member 39 are pulleys 45, over which the strands or wires 22 pass as the strands or wires pass through the openings 24 to be coiled about the core.

The opening 46 at the center of the member 39 and through which the core wire 14 passes, is of a diameter considerably greater than the diameter of the core wire, and a tubular member or spindle 47 freely rotates in such opening. One end of this spindle 47 projects beyond the front face of the member 39 and is journaled as at 48 in the die 30, the opening in the spindle registering with the opening 49 in the die 30 and member 29. A roller thrust bearing 50 may be provided at the end of the spindle 47 so as not to interfere with the free rotation thereof. The spindle is of such a length as to project for a considerable distance beyond the other face of the member 39 so that no matter what position the member 39 may assume with respect to the member 28, the spindle 47 will not be detached therefrom.

The core wire 14 is fed through the shaft 24 to the spindle 47, and through the member 28 and is advanced in a manner to be described. The strands or wires 22 are fed from the reels 20 which are held in a fixed position rotatable only about their own axes, and the wires pass over the pulleys 45 through the openings 44 at right angles to the axis of the core 14, and at the point of contact of the wires with the core. At this point any desired number of convolutions or helices 38 are formed by rotating the member 29 with respect to the member 39, which may be accomplished preferably by threading the wires or strands 22 through the openings 34 in the member 29 to any desired extent, and then rotating the latter, or the convolutions 38 may be formed between the members 28—39 in any other desired or suitable manner. After the strands or wires pass through the openings 34 they are directed around the core 14 to form the completed strand or product P, and this is accomplished by reason of the fact that the core 14 with the wires or strands 22 wrapped therearound beyond the member 28, is rotated, causing the pre-formed coils or helices to lay properly upon the core in the finished product. As the product P is advanced the strands or wires 22 will be drawn through the openings 24 in the member 29 and this will cause the pre-formed coils or convolutions 38 to be unwrapped, while at the same time they will retain their shape which they assume in the finished product. As the convolutions 38 are being unwound and by reason of the grip of the convolutions upon the spindle 47, the latter will be rotated and as the strands or wires 22 are fed to and at right angles to the axis of the spindle, it will be manifest that these wires or strands will be wound or coiled about the spindle without creating any torsion or twist in the wires or strands.

The product P passes through a hollow shaft 51 rotatably supported upon an upright frame 52, the shaft 51 being rotated by means of a sprocket chain 53 which passes over a sprocket wheel 54 secured to the shaft and over a sprocket 55 secured to the shaft 56, which latter is journaled in bearings 56 in the supporting structure 52.

To the end of the shaft 51 is secured a flier 57 which is also connected to a shaft 58 at its other end, the latter being journaled in a supporting structure 59. Mounted upon the flier 57 is a haul off mechanism comprising a series of drums or pulleys 60—61, over which the product P is wound any desired number of times, and from the pulleys 61 passes over a pulley 62 on the flier and through the tubular shaft 58.

The pulleys 60—61 are rotated by means of a sprocket chain 62 passing over a sprocket wheel 63 on one of the pulleys and a sprocket wheel 64 on the other pulley. A beveled gear 65 is connected to the shaft of one of the pulleys and with which beveled gear 65 a beveled gear 66 carried by a shaft 67 meshes. The shaft 67 is journaled in the flier and has connected to it a gear wheel 68 that meshes with a gear wheel 69 on a rotatable collar or sleeve 70 which surrounds the shaft 58. A sprocket chain 71 passing over a sprocket wheel on the sleeve 70 also passes over a sprocket wheel 72 on a shaft 73 also journaled in the supports 59, and this shaft 73 has connection with a speed reduction gear 74 (diagrammatically illustrated) and to which speed reduction gear is also connected a shaft 75 having a sprocket wheel over which a sprocket chain 76 passes, and this sprocket chain 76 also passes over a sprocket wheel 77 secured to the shaft 58 so that when the flier 57 is rotated, the shaft 58 will be rotated, and the rotation of the shaft 58 will, through the medium of the sprocket chain 76, rotate the shaft 75 and the shaft 75 through the medium of the reduction gear 74 will rotate the shaft 73. The rotation of the shaft 73 will through the medium of the sprocket chain 71 rotate the sleeve 70, and this in turn will rotate the gear 69 and the gear 68 will rotate the shaft 67 and thereby cause the sprocket 62 to rotate the pulleys or draw off mech-

anism 60—61, thereby imparting a rotary movement to the finished product P, causing the core wire 14 as well as the strands 22 to be advanced.

From the haul off mechanism the strand passes through the shaft 58 into a hollow portion 78 of a shaft 79. To this shaft 79 is connected a head 80 which is supported by means of rollers 81 for free rotation and the head 80 is provided with an arm 82 projecting laterally therefrom. Other arms 83 may be provided on the head, if desired, for counterbalancing purposes. Extending into the shaft 79 is one end of a shaft 84 and the shaft is adapted to be moved lengthwise of its axis.

The other end of the shaft passes through a sleeve 85 supported by a supporting structure 86.

The shaft 84 is keyed to the sleeve 85 for rotation therewith, but for longitudinal movement with respect thereto, and mounted upon the shaft 84 is a reel 87 secured to the shaft in any suitable manner, such as by resting against a collar 88 at one end and by means of a fastening device 87a at the other end, so that the reel 87 and shaft 84 will rotate together. The cable P passed into the hollow end 78 of the shaft 79 passes under a pulley 90, thence over a pulley 91 on the head 80 and over a pulley 92 on the arm 82 to be directed to the reel 87 to be wound therearound. The winding of the cable P upon the reel 87 rotates the latter and the rotation of the reel rotates the shaft 84.

Connected to the sleeve 85 is a sprocket wheel over which a sprocket chain 93 passes and this chain also passes over a sprocket on a shaft 94. The shaft 94 through a transmission gear 95 rotates a shaft 96 which is connected by means of a sprocket chain 97 to a shaft 98 having a double screw thread feed construction 99 formed thereon. A similar double feed screw 100 is connected by means of a sprocket chain 101 to the feed screw 99, and a yoke 102 is connected to the shaft 84 by means of a latch 84a. When the shaft 84 is rotated the sleeve 85 will be rotated, and this will actuate the sprocket chain 93 to rotate the shaft 96, and the sprocket chains 97—101 will rotate the feed screws 99—100 to move the shaft 84 longitudinally and shift the reel 87 forwardly and backwardly with respect to the roller 92, so that the cable or strand P may be wound upon the reel.

Suitable trip mechanism may be provided for controlling the reverse movement of the yoke 102 with respect to the feed screws 99. Suffice it to say that such trip mechanism embodies a yoke 102 which co-operates with a shift rod 103 of any ordinary and well known construction. When the shaft 84 has been shifted in one direction by the feed screws 99—100, so that the cable will be wound to one end of the reel, the shift mechanism will cause a reverse direction of movement of the shaft 84 longitudinally to move the reel 87 in the opposite direction so that a reciprocating movement may be given to the reel 87.

If desired and in order to cause a tension to be exerted upon the cable P being wound upon the reel 87, a suitable brake device 96a may be used in connection with the shaft 96 and which brake mechanism is of the usual pulley and band type which acts automatically.

With this improved construction it will be manifest that the haul off mechanism embodying the flier 57 and the take up mechanism, embodying the member 80, will be separate and distinct from each other so that it will not only be possible to reduce the diameter of the machine, but one being separate from the other a perfect balance of the mechanism may be obtained, and at the same time a reduction in the weight carried by each of these parts will be produced, with the further result that a greater speed of rotation may be obtained with less power.

It will also be manifest that by reason of the wires or strands being fed to the core at right angles to the axis of the core and at right angles to the point of contact of the strands with the core, no twist or torsion will be created in the wires 22 and they will be rolled about the core during the advancement of the core.

In Figure 9 the core wire 104 is fed across and separate from a temporary core 105, which latter is supported by one end in an opening 106 in the die member 107, corresponding to the die member 30, a thrust bearing 108 being provided for one end of the temporary core. One extremity of this temporary core is preferably enlarged as at 109, while the other extremity passes freely through the opening 110 in the member 111, corresponding to the member 39.

An opening 112 is provided in the die 107 (see also the die 30) through which the core 104 may be passed, when the form of the invention shown in Figure 9 is employed, otherwise this form of the invention operates in the same manner as that shown in Figure 5.

While the preferred forms of the invention have been herein shown and described, it is to be understood that various changes may be made in the details of construction and in the combination and arrangement of the several parts, within the scope of the claims, without departing from the spirit of this invention.

What is claimed as new is:—

1. In a stranding machine a non-rotating preforming head provided with means for feeding the strand components to a core to be temporarily wound therearound, at substantially right angles to the axis of the core at the point of contact of the strand components with the core, the said core embodying a freely rotatable spindle about which the helices are formed.

2. In a stranding machine a non-rotating preforming head provided with means for feeding the strand components to a core to be temporarily wound therearound, at substantially right angles to the axis of the core at the point of contact of the strand components with the core, the said core embodying a freely rotatable spindle about which the helices are formed, and an end thrust ball bearing for the spindle.

3. In a stranding machine a non-rotating preforming head provided with means for feeding the strand components to a core to be temporarily wound therearound, at substantially right angles to the axis of the core at the point of contact of the strand components with the core, the said core embodying a freely rotatable hollow spindle about which the helices are formed, and through which spindle a core wire is fed, and about which core wire the strand components are laid beyond the spindle.

4. In a wire twisting machine, the combination of a stationary head, a plurality of supply reels for wire strands, said reels mounted for rotation about their individual axes but maintained against bodily rotation, means for supplying a core wire, stationary means adjacent said head for feeding the strands to the core wire at substantially right angles to the axis of the core to be wound about the core, and means for axially rotating the core to wrap the strands therearound and thereafter

rotating the formed product, whereby the individual strands will be maintained against twisting about their individual longitudinal axes as the strands are fed to and wrapped or laid about the core.

5. In a wire twisting machine, the combination of a stationary head, a plurality of supply reels for wire strands, said reels mounted for rotation about their individual axes but maintained against bodily rotation, means for forming a coil from said strands, the said means embodying stationary means in proximity to said head for feeding the strands to the coil at substantially right angles to the axis of the coil, and means for axially rotating and advancing the coil, whereby the individual strands will be maintained against twisting about their individual longitudinal axes as the strands are fed to and wrapped or laid about the core.

6. In a wire twisting machine, the combination of a plurality of rotatable but nonrevoluble supplies of wire strands, a core wire, a stationary head through which the strands are fed to the core, and means for causing the wire strands to be coiled about the core and thereafter advanced, the said means embodying passages through the head at substantially right angles to the axis of the core and through which passages the strands are fed to the core whereby the individual strands will be maintained against twisting about their individual longitudinal axes as the strands are fed to and wrapped or laid about the core.

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