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WIRE STRANDING MACHINE

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The expression stranding is used herein generically to designate either the forming of a plurality of wires into a strand or the forming of a plurality of strands into a wire rope or the forming of a plurality of wire ropes into a cable, or the like.

In the common types of stranding machines the wire is placed on spools which in turn are carried in frames mounted on the rotating part of the stranding machine. Such spools have to be comparatively small and the machine has to be stopped, whenever a spool of wire is exhausted, for replacement. The wire drawing machines generally deliver wire in coils. The wire has to be spooled from such coils.

According to one feature of my present invention, the wire supplying the stranding machine is carried on a plurality of rotatable supporting members arranged to rotate about fixed vertical axes and which may be in the form of reels to receive coils as delivered by the wire drawing machines, or may be in the form of spool carriers adapted to support large capacity spools.

Other advantages of the invention are referred to in detail hereinafter.

In the accompanying drawings, Figure 1 is a plan, broken away, of a complete stranding machine.

Figure 2 is a side elevation of the same. Figure 3 is a section on the line 3—3 of Figure 1.

Figure 4 is an elevation of one of the reels with a steady ring applied to it.

Figure 5 shows the same steady ring in plan and vertical section.

Figure 6 shows an alternative steady ring in plan and in vertical section.

Figure 7 is an elevation of a reel with a special plate for running off the wire.

Figure 8 is an elevation of a reel preferred for running off wire from the bottom of the coil.

Figure 9 is a view similar to Figure 3, showing a combined reel and drum for running off the wire.

Figure 10 is a view showing a large capacity spool arranged for running off the wire as described.

Figure 11 is a view showing a modified form of drive for the reels or spools.

The wire in coils 11 is placed on vertical reels 12 arranged in fixed positions on a floor 13. The wire is led from the top of each coil upwardly through a projecting eye-piece 14 on a slip ring 15 on top of the reel. The wires pass upwardly, as at 16, over sheaves 17 located substantially in line with the axes of the reels and carried on an overhead framework 18. From the sheaves 17 the wires pass, as indicated at 19, over a number of freely rotating sheaves 20 carried on the forward end of the framework 18 and thence, as shown at 21, the wires pass to the mechanism of the conventional type for twisting the wires together in a strand. This mechanism may be of any usual or suitable design. That shown is what is commonly called a "Stone stranding machine". For control of tension in the wires, tension devices of common design may be installed at or near sheaves 17 and 20.

The wires first pass under a set of sheaves 22 in connection with which there is an automatic stop 23 operated to stop the machine when a wire breaks. Following this is a stationary head 24 in which the wires pass through a circular series of holes, thence to a rotating die 25, through a rotary straightener 26 and a flier 27, also rotating about the strand axis.

The strand is drawn over a drum 28 which is driven at a speed bearing a certain relation to the speed of rotation of the flier so as to determine the length of lay. The strand passes around the drums 28 and 29, through a brake band 30 and is finally wound on a take-up reel 31, driven at varying speed as the size of the coil increases.

Any usual or suitable modification of this mechanism may be adapted to the invention, such as the usual devices for preforming or straightening either the wires, the strand components or the finished product. The rotary straightener 26, for example, is a preformer. The preforming head might be substituted for the stationary head 24.

The reels 12 are designed to be positively rotated or driven.

For this purpose shafts 32 extend down.
wardly, as shown best in Figure 3, and are rotated by means of worm-gears 33 driven from gears 34 on longitudinal shafts 35. The two shafts 35 are geared together at their forward ends, one of them carrying a pinion 36 driven by a gear 37 on a shaft 38 carrying a pinion 39 driven by a gear 40 on a shaft 41 which is driven by a gear and pinion 79, 80, the latter being on a shaft 82 which is driven by a motor 83. The flier 27 is driven from the shaft 41 through a chain drive 81, and the straightener 26 is driven from the gear 42 through the pinion 43 and belt 45.

15 The gearing described can be changed to different ratios so as to rotate the reels 12 at different speeds compared with that of the flier 27. Thus, the rotation of the reels may be made to twist the wires leading off therefrom at 16 just sufficiently to offset the twist given by the flier and the stranding mechanism, or may be rotated to increase or diminish the twist according to the particular result desired.

20 The reels of the different driving strands can be replaced by others when it is desired to change the design or character thereof. When a coil is exhausted from any reel the machine is stopped and a new coil put on and very readily threaded through the necessary path to the stranding mechanism. The upper framework 18 extends across the structure, as in Figure 3, so as to prevent any accidental dropping of the end of a broken wire and to support the wire where it runs in a long length between sheaves.

25 Above the platform are guards 46 with downward projections to keep the wires separated. For facilitating access to the wires and sheaves these guards are carried on shafts 47 which are pivoted and provided with arms 48 connected by links 49 to lever arms 50 on shafts 51 which can be rocked by means of operating levers 52.

45 Figures 4 to 6 illustrate the use of steady-ing rings. These may be a simple ring 53 with a conical outer face which can be dropped over the top of the reel and fit within the upper end of the coil of wire so as to steady the wire at the bottom where it is being drawn off and is liable to be loosened. The ring 54, of Figure 6, is substantially the same but has downward extensions 55 at intervals which enter the coil more freely.

55 Instead of the slip ring on top of the reel for drawing off the wire a plate ring may be used, resting on the top of the coil. Or such a plate ring 56 may be used, as in Figure 7, constituting a flange on a steady ring 57 similar to that shown in Figure 4.

For drawing the wire from the top of the coil the reels may be made practically cylin-drical with a slight upward taper. For some wires, particularly very fine wires, it has been found that they may be drawn off more even-ly from the bottom of a coil. For such wires I could use a reel 58 (Figure 8) similar to those shown in the other figures but with a different taper, and could draw the wire off from the bottom by way of a sheave 59 carried on the lower end of an arm 60, supported from the top of the reel.

It is not essential to draw the wire directly from reels such as have been described. Figure 9 shows an alternative arrangement in which the wire is drawn off from a drum 61 driven in the manner of the reels previously referred to. The coil 11 is placed on a conventional reel 62 adjacent the drum 61. The wire from the coil 11 is led to the drum 61 and is wrapped around the drum to form an accumulation of convolutions 63 from which the wire is drawn upwardly in the same manner it is from the reel previously described. Due to the rotation of the drum 61 in the manner that the reels previously described are rotated, the accumulation of the convolutions 63 will be continuously renewed as the wire is drawn from the drum, and when the coil 11 is completely gone from the reel 62 a new coil may be mounted on the reel 62 and its end joined to the end of wire which has been wrapped on the drum 61 so as to provide for continuous feeding of wire from the drum 61, since the accumulation 63 will permit the drawing of wire from the drum while the front end of the new coil is being joined to the last end of the previous coil on the drum 61.

A certain accumulation of wire 63 is formed on the drum and the advance end of the wire is taken off, as at 16, and follows the path previously described. The term "drums" here is used to describe any means for drawing the wire from a freely rotating reel.

In Figure 10, I have shown a modified form of wire supply support. In this construction, the reel 12 is omitted and a large spool 70 is mounted on the shaft 32. In this construction, the eye-piece 14 and slip ring 15 are omitted since the upper flange 16 of the spool serves to guide the wire from the spool to the sheave 17.

In Figure 11, I have shown a modified form of gearing which may be used to drive the reels 12 or spools 70. In this construction the shaft 32 is extended downward as in the construction previously described and is rotated by means of a bevel gear 73 driven by a bevel gear 73 carried by a variable speed reducer 74 of any desired standard construction. The speed reducer has a gear 75 meshed with a gear 76 on the longitudinal drive shaft 35 of the machine. The standard variable speed reducer 74 is provided with a speed change wheel 77 carried by a vertical shaft 78 which is adapted to be rotated to vary the speed delivered by the reducer.

It will be understood that the above modi-
fied drive may be used with any one or any number of the reels, as desired.

With the modified drive above described the driving speeds of the reels can be readily changed so as to be rotated at different speeds relative to each other as well as different speeds compared with the flier, thereby adapting the machine for the manufacture of many different and special types of strands.

The term coil, as used throughout this specification and the claims, is meant to include any accumulation of wire whether wrapped on a spool or other core member or coiled in a bundle without a core, and the term reel is meant to include any support for the accumulation of wire whether it be in the form of a frame to receive unsupported or loose coils of wire or means for supporting spools or other wire carriers.

Various other modifications may be made by those skilled in the art without departing from the invention, as defined in the appended claims.

I claim:

1. In a wire stranding apparatus a plurality of reels arranged in stationary positions on a fixed base and rotatable about their vertical axes, said reels being adapted to carry coils of wire, means for operating said stranding apparatus to draw the wire from said reels, means for positively rotating said reels, and means adapted to fit within the top of the coil on each of said reels to steady the wire at the point where it is being drawn off.

2. In a wire stranding apparatus a plurality of reels arranged in stationary positions on a fixed base and axially rotatable, said reels being adapted to carry coils of wire, means for operating said stranding apparatus to draw the wire from said reels, means for positively rotating said reels, and means adapted to fit within the top of the coil on each of said reels to steady the wire at the point where it is being drawn off.

3. In a wire stranding apparatus a plurality of reels arranged in stationary positions on a fixed base and axially rotatable, said reels being adapted to carry coils of wire, arms hung from the upper end of at least some of the reels and extending downwardly to adjacent the lower ends thereof, the wire being led off from the lower end of the coils of wire and over said arms upwardly and to the stranding apparatus to draw off the wire from said reels, and means for positively rotating said reels.

4. In a wire stranding apparatus a plurality of reels arranged in stationary positions on a fixed base and axially rotatable, said reels being adapted to carry coils of wire, arms hung from the upper end of at least some of the reels and extending downwardly to adjacent the lower ends thereof,