R. T. SKELTON.

MANUFACTURE OF WIRE ROPES.

APPLICATION FILED APR. 29, 1912.

1,088,467.

Patented Feb. 24, 1914.

3 SHEETS—SHEET 1.

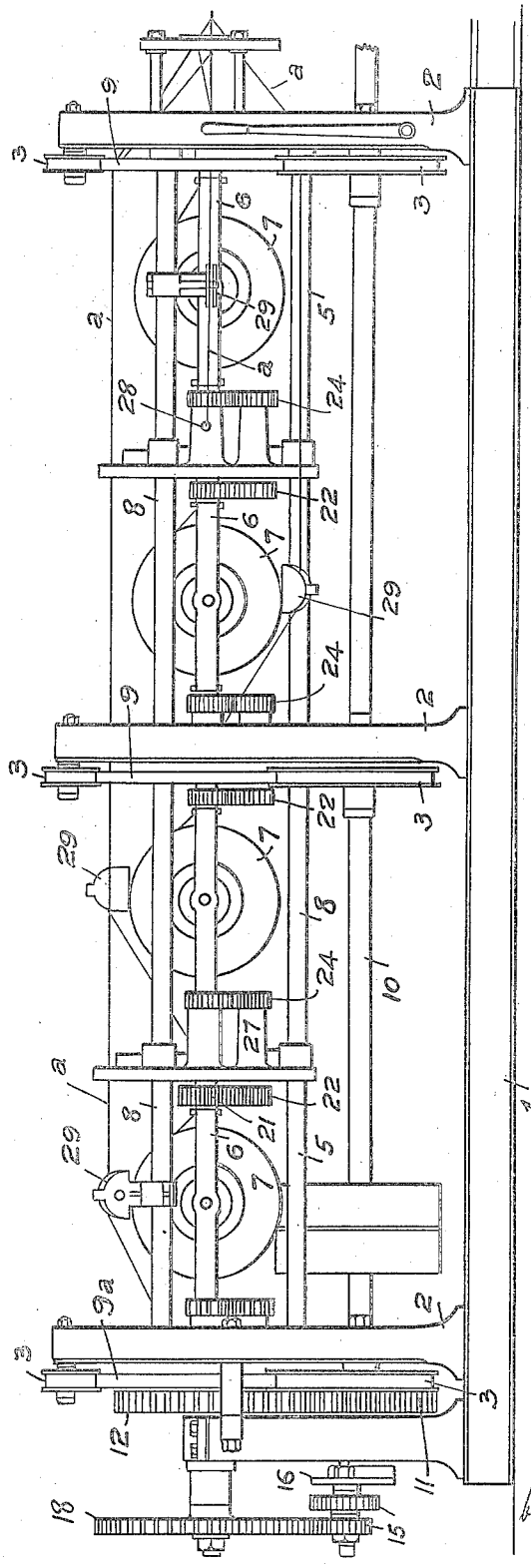


Fig. 1.

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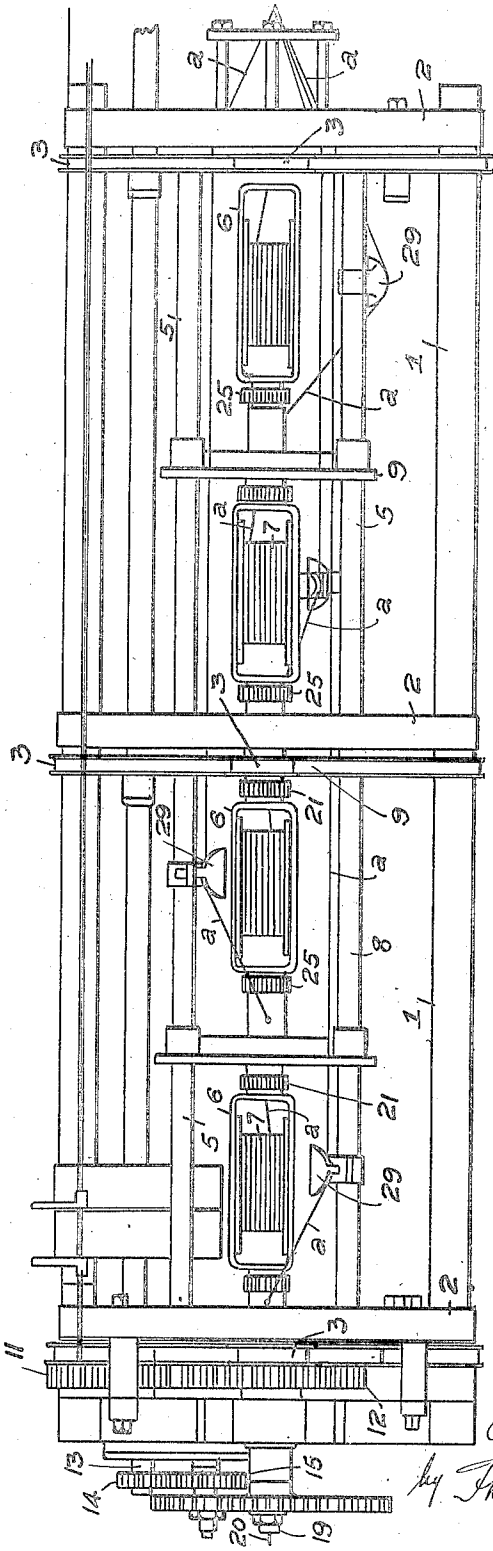
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3 SHEETS—SHEET 2.

Fig. 2.



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3 SHEETS—SHEET 3.

Fig. 4.

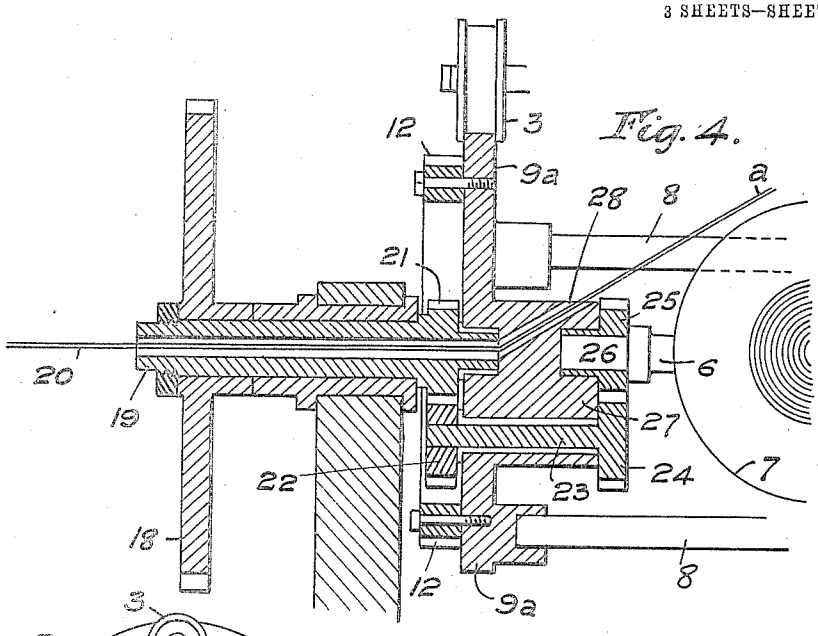


Fig. 3.

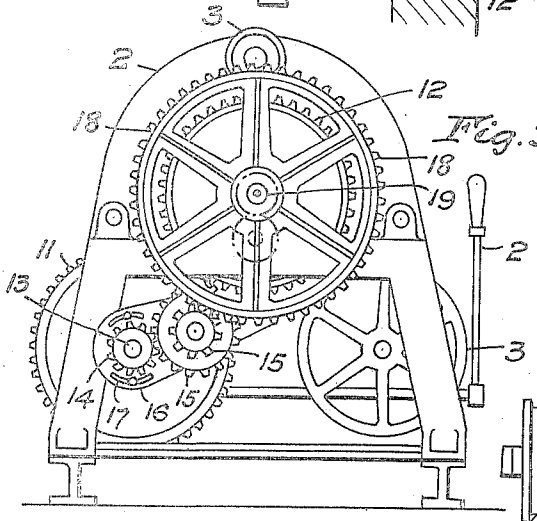
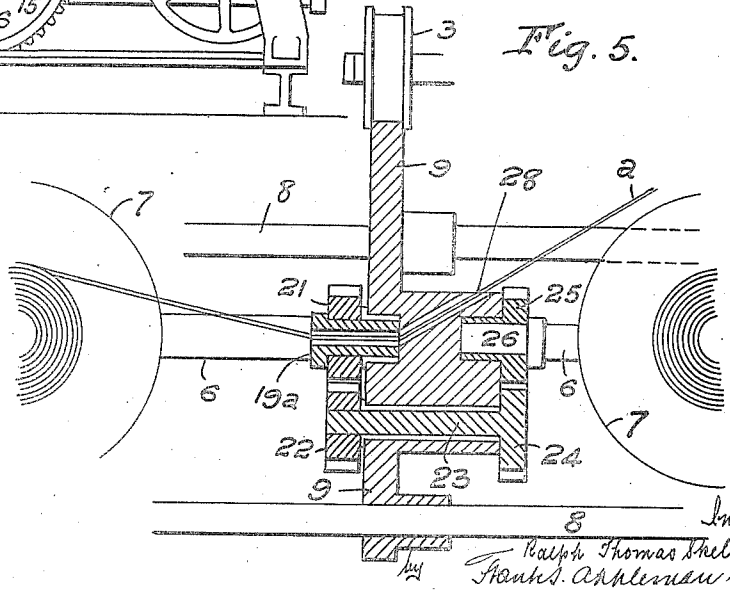


Fig. 5.



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UNITED STATES PATENT OFFICE.

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MANUFACTURE OF WIRE ROPES.

1,088,467. Specification of Letters Patent. Patented Feb. 24, 1914.

Application filed April 29, 1912. Serial No. 693,960.

To all whom it may concern:

Be it known that I, RALPH THOMAS SKELTON, a subject of the King of Great Britain, and a resident of Bootle, near Liverpool, [redacted] have invented certain new and useful Improvements in the Manufacture of Wire Ropes, of which the following is a specification.

This invention relates to improvements in the manufacture of wire ropes whereby the angular twist or torsion in each wire or strand usually caused by the respective operations of stranding or laying may be neutralized or controlled.

The invention is particularly applicable to that method of constructing wire ropes in which the strand or rope is made up from a number of wires or strands which are uncoiled from a series of bobbins mounted in frames all disposed along the axis of a rotating cage.

In the usual types of such machines the bobbin frames have been stationary, that is non-rotating, and the wires led therefrom to guide pulleys carried from and revolving with bars on the rotating cage. Such an arrangement of the machine, however, necessarily imparts a slight axial twist or torsion to each wire in the same angular direction as that of the angular direction of the wire helices, and the object of the present invention is either to avoid such torsion or to control it as required. Each wire when stranded in the ordinary types of stationary axial bobbin frame machine being initially twisted in the way described, the reflex action or torsional elasticity of each wire to untwist itself about its axis tends therefore to cause unstranding of the wires. Further, the wires being of hard metal are not permanently set or bent into the helix formation during the operation of stranding, the subsequent tendency of the wires to unbend or straighten out also resulting in an unstranding action. Such a condition produces what is known as a "live" rope. By controlling the wires or strands in such a manner that no axial twist is put in them, any individual reflex torsional action is avoided, and also by so manipulating the wires during the operation of stranding that a small degree of axial twist is set up in each wire in an angular direction contrary to that of the angular direction of the wire helices the reflex torsional action of such twist tends to tighten the strand wires on themselves and neutralize the unbending or straightening action of each wire, a "dead laid" rope being thus produced which is of considerable advantage.

According to the present invention the wire bobbin frames are positively driven preferably by gearing from the rotary cage so that their speed and direction of rotation relative to the cage may be regulated as desired, either for the purpose of stranding the wires without setting up individual wire torsion and thus produce a "dead laid" rope, or for controlling the individual wire torsion to any desired extent.

The invention is illustrated in the accompanying drawings, in which,

Figure 1 is an elevation of a wire rope stranding machine constructed in accordance with this invention. Fig. 2 is a plan of Fig. 1, and Fig. 3 an end view. Figs. 4 and 5 are detail sectional views of the epicyclic gear and arrangement for leading the wire through the plates of the rotating cage, Fig. 4 being a view of the front plate gear, and Fig. 5 of the remaining plates.

The bed plate 1 of the machine carries the standards 2 supporting the flanged roller wheels 3 mounted so as to roll upon which are the disk plates 9 carrying the rotating cage 5, the frames 6 carrying the wire bobbins 7 being disposed along the axis of the rotating cage. In carrying out the invention the axially disposed series of frames 6 carrying the bobbins 7 instead of being weighted in the usual way, in order to hold them stationary as the cage rotates, are adapted to be positively rotated at a speed and in a direction different from that of the cage. The cage 5, consisting of a series of axially disposed bars 8 passing through the disk plates 9, is caused to rotate in any suitable manner from the main driving shaft 10 of the machine, preferably by a large primary spur wheel 11 gearing with a spur wheel 12 concentric with, and fixed to, the cage 5.

The rotation of the bobbin frames 6 is preferably effected by a gear train disposed as follows: On the extended spindle 13 of the primary gear wheel 11, or the end of the main shaft 10, is mounted a pinion 14 which gears with the inner one of a pair of integrally rotating intermediate gear wheels 15 carried upon a change quadrant 16 after the manner of that used on a lathe. The intermediate gear 15 is interchangeable so as to

provide for different speeding, and the quadrant is provided with slots 17 and studs for angular adjustment in the usual manner to provide for different gears. This intermediate gear 15 meshes with a large spur wheel 18 mounted upon a hollow spindle 19 through which the central core wire 20 of the strand is passed. The inner end of this hollow spindle, Fig. 4, is furnished with a pinion 21 gearing with a secondary pinion 22 carried upon a spindle 23 journaled in the rotating front plate 9^a of the cage. The gear wheel 22 in the rotating plate 9^a forms with the central pinion 21 on the hollow spindle 19 an epicyclic gearing. The spindle 23 journaled in the disk plate carries a further pinion 24 at its opposite end on the other side of the plate which pinion engages with a fourth pinion 25 keyed on the spindle end 26 of the bobbin frame 6. This spindle end 26 is journaled in the boss 27 of the disk plate 9^a. The remaining disk plates 9 of the machine are made similar to the front plate 9^a and fitted with similar epicyclic gear with the exception that the long hollow spindle 19 of the front disk plate is replaced in each case by a short hollow spindle 19^a, Fig. 5, carrying the primary pinion 21 of the epicyclic gear. This short hollow spindle of the plates 9 is integral with the bobbin frames and serves to lead the wire from each particular bobbin through the axis of the disk plate, an oblique hole 28 leading from the bore of the hollow spindle by way of which the wires *a* pass outward to the guide rollers 29 carried in yokes on the bars 8 of the rotating cage in the usual way. By removing the intermediate gear 15 of the change quadrant and causing the pinion 14 to gear directly with the large spur wheel 18 or preferably by inserting another gear in the train connecting the pinion 15 and spur wheel 18 the bobbin frames may be rotated in a reversed direction to that previously described. The whole series of separate bobbin frames between each standard being linked up to the hollow driving spindle 19 through the short spindles 19^a and epicyclic gears, the same rotary movement imparted to the hollow spindle through the gear train 14, 15 and 18 is transmitted through the whole system of bobbin frames. With such an arrangement, therefore, the bobbin frames may be given a different rotation as regards speed and direction from that of the cage 5, and by suitably arranging the value of the gear train 14, 15 and 18 the bobbin frames may be caused to rotate in a reversed direction to the cage but at a slower speed, or by inserting another gear in the train they may be rotated in the same direction as that of the cage and at any suitable speed. By imparting these different rotary movements to the bobbin frames the individual twist or torsion of the wires as they are uncoiled and stranded which takes place in such machines when the bobbin frames are stationary with reference to the cage, may be either neutralized or controlled. If for instance it is desired to produce a "dead laid" strand the bobbin frames are caused to rotate in the opposite direction to the cage and at a reduced speed.

Instead of causing the whole series of bobbin frames to rotate at the same speed, it may be desirable in order to obtain varying torsions in the wires to cause several of the frames to rotate faster than the others, and this may be effected by suitably arranging the values of the geared pinions 21, 22, 24, 25.

While the invention has been described as applicable to the laying of wires into strands it would also be available for use in laying together several strands to form a complete rope, and would offer special advantages in such conditions, inasmuch, as when laying a number of strands to form a rope the wires in the strands being laid in the same twist as that in which the strands are laid in the rope, there is a tendency for the strands to become slightly untwisted, and with an arrangement of machine such as described this untwisting effect on the strands could be corrected.

Claim:

In a wire rope machine, standards, a rotary stranding cage supported by the standards, frames for supporting bobbins in the cage, each of the frames having a pinion, means for rotating the cage and bobbins, said means comprising a hollow shaft extending through one of the standards, a gear on each end of the hollow shaft, a front plate having a depression forming a bearing for one end of the hollow shafts, said front plate having an opening forming a bearing, a shaft carrying a pinion on each end thereof operating in the opening, the gear on one end of the shaft adapted to mesh with one of the gears on the hollow shaft for receiving motion therefrom, the gear on the opposite end of the shaft adapted to mesh with a gear on one of the bobbin frames for communicating motion thereto and said front plate having a diagonally disposed opening through which the wire from one of the bobbins is fed.

In testimony whereof I affix my signature in presence of two witnesses.

RALPH THOMAS SKELTON.

Witnesses:
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