Aug. 20, 1935. C. C. SUNDERLAND 2,012,026

WIRE ROPE MAKING MACHINE AND METHOD

Filed April 1, 1932 3 Sheets-Sheet 1

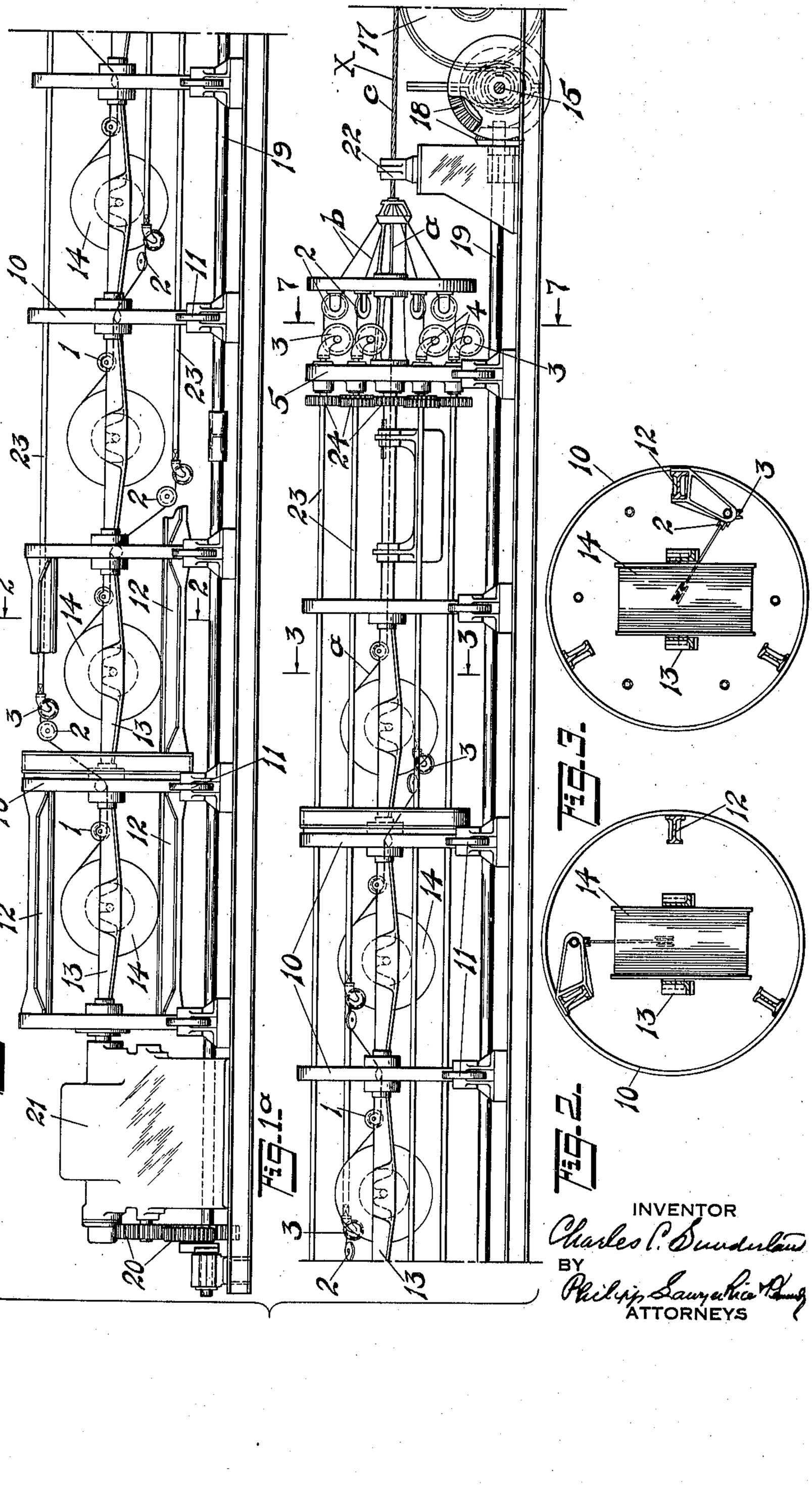

FIG. 1.

FIG. 1a.

FIG. 3.

FIG. 2.

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WIRE ROPE MAKING MACHINE AND METHOD

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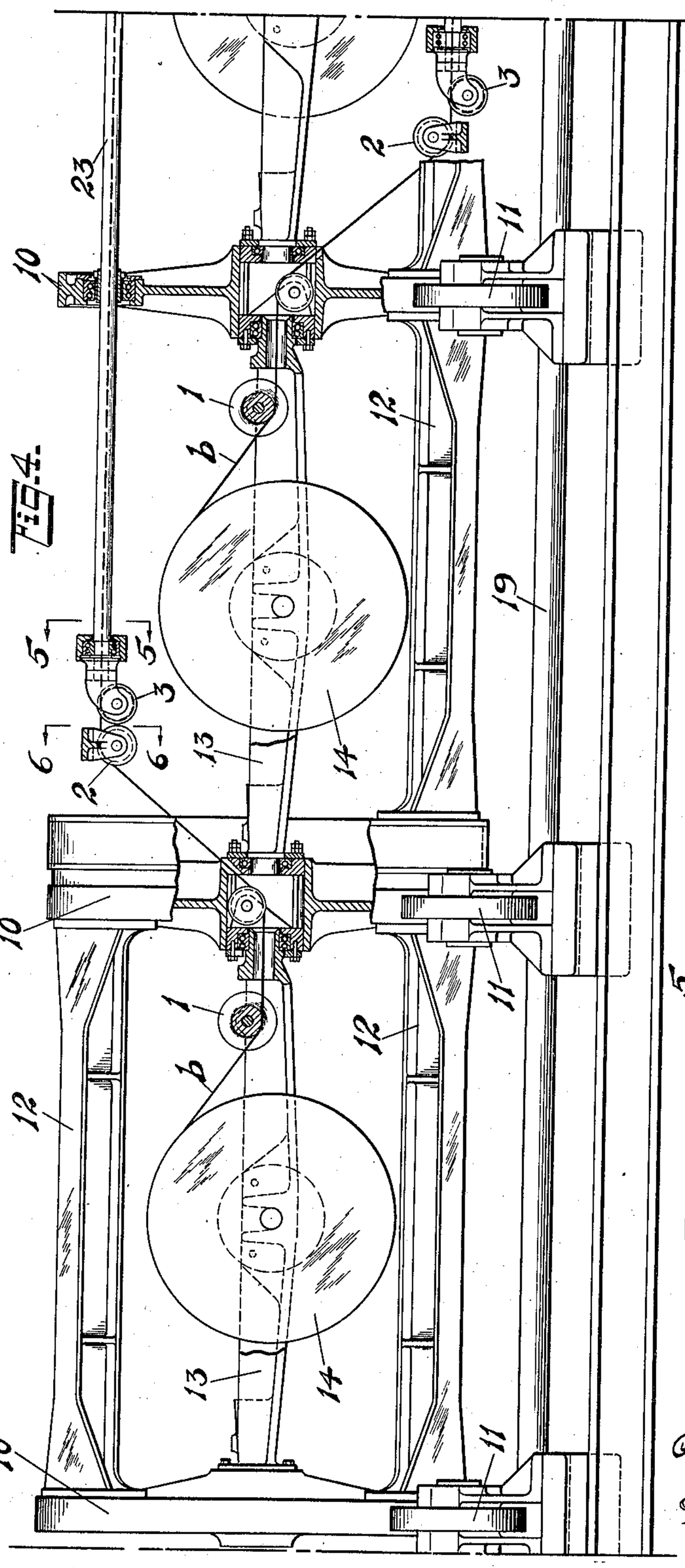

Fig. 4.

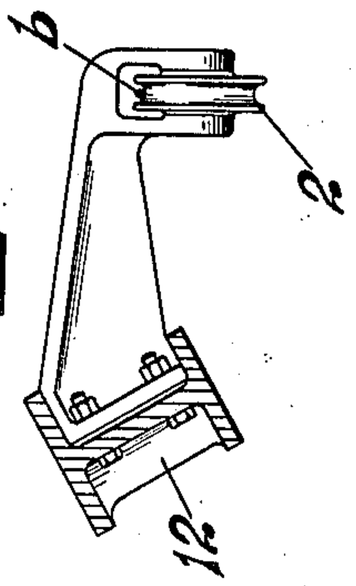

Fig. 6.

Fig. 5.

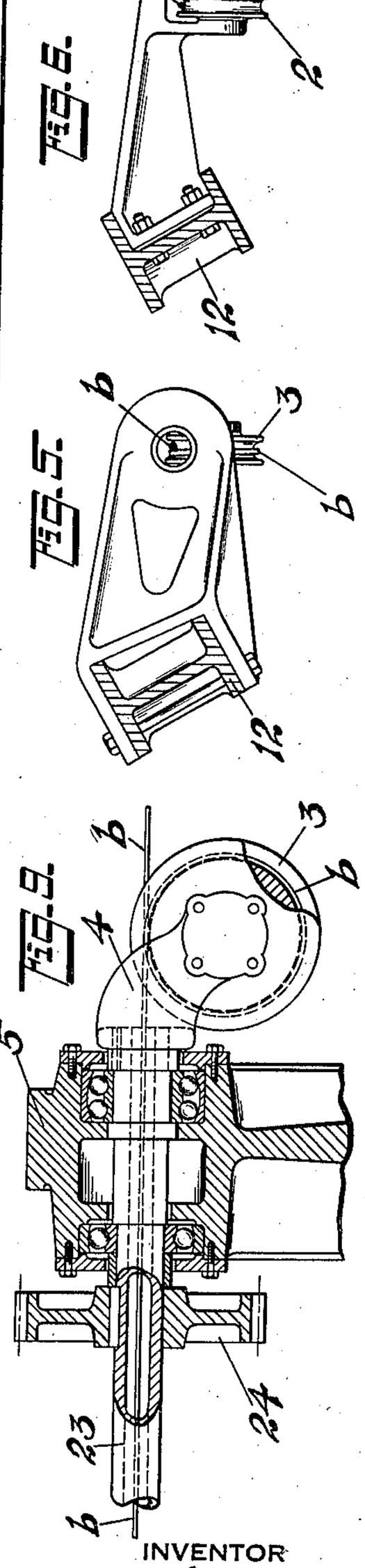

Fig. 9.

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FIG. 7.

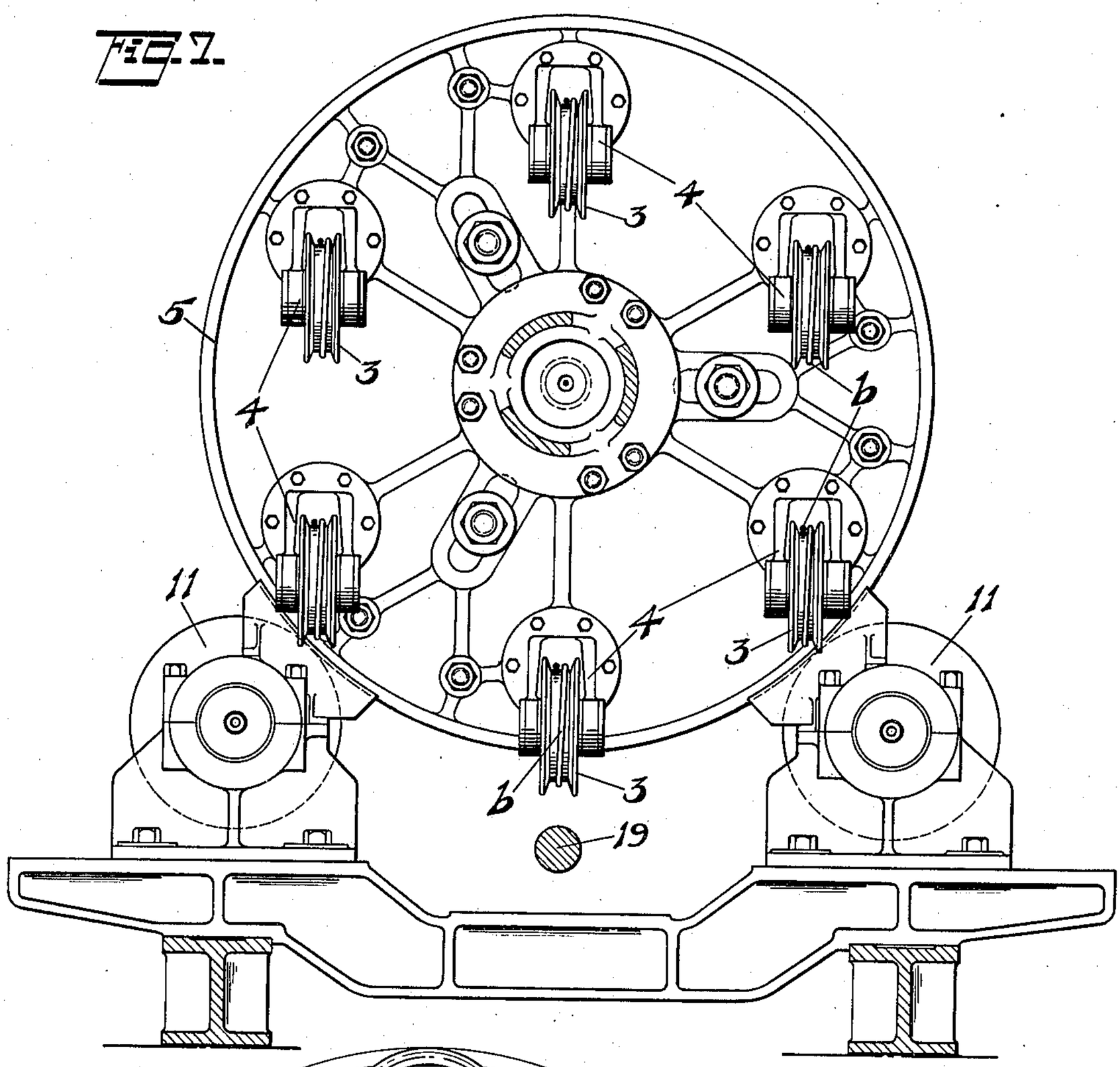
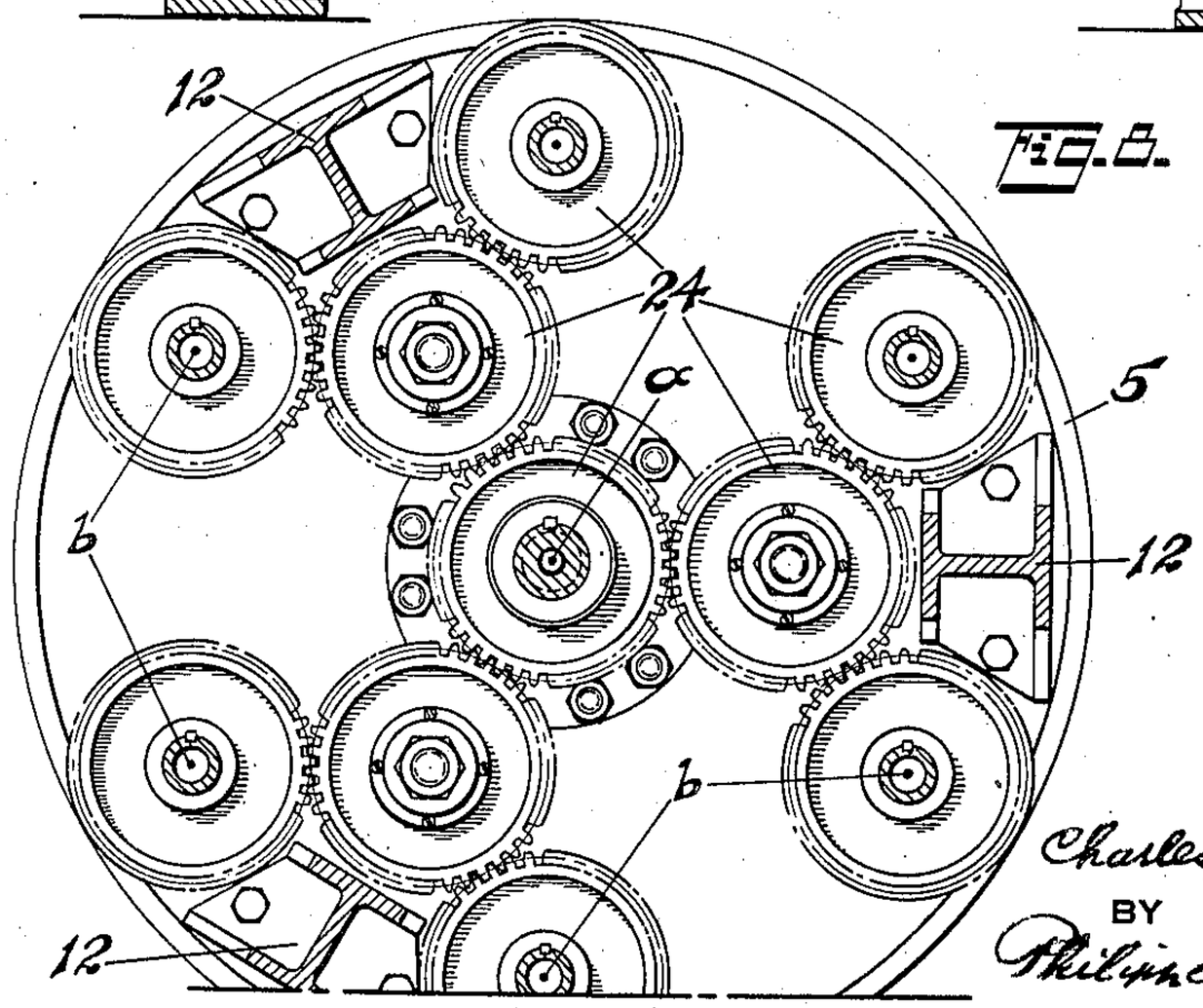


FIG. 8.



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UNITED STATES PATENT OFFICE

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WIRE ROPE MAKING MACHINE AND METHOD

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Application April 1, 1932, Serial No. 602,427

9 Claims. (Cl. 117—20)

This invention relates to machines for making wire rope or wire strands of that class in which a number of wire strands or wires are wound helically, usually on a metal or hemp core, the principal object of the invention being to provide a better control of the strands or wires in respect to torsion, so as to enable the production of a rope of exactly the characteristics desired and maintain the strands or wires in the condition required for the best service and greatest durability of the rope under its service conditions. I aim especially at the positive control of the strands or wires in respect to torsion, between the spools and the flyer head from which the strands or wires pass to the closing point.

The invention is especially applicable to machines of that type in which the wire supply spools are arranged in line axially of the machine, as common in horizontal or so-called snake rope machines, the paths of the wires and the variation in length of travel of the wires from the different spools in such machines making the accurate control of torsion especially difficult.

For a full understanding of the invention, a detailed description of the construction embodying all the features of the same in a preferred form will now be given in connection with the accompanying drawings forming a part of this specification, and the features forming the invention then be specifically pointed out in the claims.

In the drawings, which show the invention applied to a horizontal wire rope machine of a common type:

Figures 1, 1*a* show the machine in diagrammatic elevation;

Figures 2, 3 are cross sections on the lines 2, 3 of Figures 1, 1*a*;

Figure 4 is a sectional elevation of a part of the machine on an enlarged scale;

Figures 5 and 6 are cross sections on the lines 5, 6 of Figure 4;

Figures 7 and 8 are cross sections on the lines 7, 8, of Figure 1*a*, on an enlarged scale; and

Figure 9 is a detail of one of the tension controlling rolls.

In the following description and claims, the word "wire" will be used as including both wire and wire strands, and the word "rope" as including both rope formed of strands and strands formed of wires, the invention being equally applicable to both.

The invention is shown as applied in connection with a machine of the well-known horizontal type, generally, as shown, for instance, in patents to Hallidie No. 369,055, Sisum No. 592,453 and Larmuth No. 1,073,052, and is especially applicable in connection with such machines, in which the mounting of the spools axially in line with each other results in considerable and varying lengths of travel of the wires from the wire supply spools to the closing point, and the lead of the wires from the axially mounted spools over the guide rolls tends to produce friction and irregular action and torsion of the wires. It will be understood, however, that the invention is applicable also to the common vertical or horizontal planetary type of machine and to that type of machine in which the wires are laid up helically by the rotation of the rope closing devices and the rope instead of by the rotation of a frame or flyer carrying the wire supply spools.

Referring to the drawings, the horizontal frame or flyer is shown as of common form, consisting of the disks 10 running on rollers 11 and connected by horizontal bars 12. Within this flyer are mounted the frames 13 carrying the wire spools 14, these frames 13 being pivoted axially of the machine and either free to swing transversely to the flyer and weighted for reverse movement as the flyer rotates or positively driven reversely to the flyer with the same result, both constructions being common in this type of machine, this reverse rotation being about one rotation to each revolution of the flyer and acting to prevent or regulate the torsion on the individual wires, as usual in such machines. The flyer is shown as driven from the shaft 15, which drives the draw-off rolls through a train of spur gears 17, and drives the flyer through a reversible bevel gear train 18, shaft 19, extending through the length of the machines and gears 20 acting through the usual change gearing in gear box 21. From the flyer head, the wires as laid up are shown as passed through the usual squeezer 22 to the draw-off mechanism after being laid up on the core, *a* being the core, *b* the wires from the wire supply spools and *c* the completed rope. The machine is shown as producing a rope X made of six wires *b* with core *a*, but it will be understood that this is only for illustration and that the invention is applicable in connection with the production of rope of any number of wires. The machine as thus far described is the same as a common type of horizontal machine and may be of any other common or suitable construction.

Referring now to the features especially embodying the present invention, the wires *b* from the wire supply spools are led over the central guide sheaves or rolls 1 and then outward to the periphery of the frame and over fixed guide sheaves or rolls 2, as usual in such machines. The core *a* is shown as led from the last spool axially through the head to the closing devices, as usual. With the fixed guide rolls 2 are associated, in accordance with the present invention, guide rolls 3 rotatable transversely to the wire, two sets of such pairs of rolls 2, 3 being shown, one near the spool and the other at the

frame or flyer head. These rotatable guide rolls 3 receive one or more loops of the wires wound about them, so that the rotation of these rolls positively controls the torsion on the wires. These rolls 3 are carried by forked arms 4 mounted to rotate in frame supports 5, and these arms are carried by sleeves 23 extending longitudinally of the machine and through which the wires *b* pass and at the head of the frame or flyer these sleeves 23 are rotated to actuate the rolls 3 by a train of gears 24 driven from the central shaft of the flyer. It is found in practice that the positive control of the wires by the rolls 3, as described above, secures a positive control of the wires in respect to torsion otherwise caused by friction on the rolls 2 and aids in the production of a rope of exactly the characteristics desired and securing better service and greater durability of the rope under the conditions for which it is designed. The rotation of the rolls 3 will usually be about one rotation reversely to the spool carrying frame to each rotation of the frame, as shown by the gearing in Figure 8, but it will be understood that this may be varied in accordance with the operation of the machine and the characteristics desired in the rope.

What I claim is:

1. In a machine for making wire rope, the combination with the spool carrying frame and wire supply spools carried thereby, the rope closing means and draw-off mechanism, and means for producing relative rotation between the frame and rope closing means to lay up the wires helically, of devices between the wire supply spools and closing point positively holding said wires against rotation on their axes independently of said devices while permitting the longitudinal movement of the wires, and means for rotating said devices to rotate the wires on their own axes with respect to said spool carrying frame for controlling the torsion of the wires positively.

2. In a machine for making wire rope, the combination with the spool carrying frame and wire supply spools carried thereby, the rope closing means and draw-off mechanism, and means for producing relative rotation between the frame and rope closing means to lay up the wires helically, of devices at a plurality of points between the wire supply spools and closing point positively holding said wires against rotation on their axes independently of said devices while permitting the longitudinal movement of the wires, and means for rotating said devices to rotate the wires positively on their own axes with respect to said spool carrying frame for controlling the torsion of the wires.

3. In a machine for making wire rope, the combination with the spool carrying frame and wire supply spools carried thereby, the rope closing devices and draw-off mechanism, and means for producing relative rotation between the frame and rope closing devices to lay up the wires helically, of wire guides over which the wires pass from the spools to the frame head, said wire guides including separate guide rolls for the respective wires adapted to carry one or more turns of the wires, and means independent of the wires for rotating said rolls in the frame to rotate the wires on their own axes for controlling the torsion of the wires.

4. In a machine for making wire rope, the combination with a rotating frame and wire supply spools carried thereby, of wire guides over which the wires pass from the spools to the frame head, said wire guides including separate guide rolls for the respective wires adapted to carry a plurality of turns of the wires, and means independent of the wires for rotating said rolls in the frame to rotate the wires on their own axes for controlling the torsion of the wires.

5. In a machine for making wire rope, the combination with a horizontal rotating flyer and wire supply spools mounted in said flyer in spool frames rotatable concentrically and reversely to the flyer for controlling torsion of the wires as they pass from the spools, of wire guides over which the wires pass from the spools to the flyer head, said wire guides including separate guide rolls for the respective wires adapted to carry one or more turns of the wires, and means independent of the wires for rotating said rolls in the flyer to rotate the wires on their own axes for controlling the torsion of the wires.

6. In a machine for making wire rope, the combination with a horizontal rotating flyer and wire supply spools mounted in said flyer in spool frames rotatable concentrically with and reversely to the flyer for controlling torsion of the wires as they pass from the spools, of devices between the wire supply spools and closing point positively holding said wires against rotation on their own axes independently of said devices while permitting the longitudinal movement of the wires, and means for rotating said devices to rotate the wires positively on their own axes with respect to said flyer for controlling the torsion of the wires.

7. In a machine for making wire rope, the combination with a horizontal rotating flyer and wire supply spools mounted in said flyer in spool frames rotatable concentrically with and reversely to the flyer for controlling torsion of the wires as they pass from the spools, of devices at a plurality of points between the wire supply spools and closing point positively holding said wires against rotation on their own axes independently of said devices while permitting the longitudinal movement of the wires and means for rotating said devices to rotate the wires positively on their own axes with respect to said flyer for controlling the torsion of the wires.

8. In a wire rope machine, the combination with a spool carrying frame and wire supply spools carried thereby, the rope closing devices and draw-off mechanism, and means for producing relative rotation between the frame and rope closing devices to lay up the wires helically, of fixed guide rolls 2 on which the wires are led through the machine, of guide rolls 3 adjacent to rolls 2 and adapted to carry a plurality of turns of the wires to rotate the wires on their own axes for controlling the torsion of the wires.

9. The method of laying up wires in making wire rope which comprises feeding the wires forward, laying them up helically by giving them a movement of revolution about the rope axis, and, while laying them up helically, regulating their torsion by gripping them positively between the wire supply and the laying up point and by such gripping imparting to said wires positively a planetary motion and preventing rotational movement, with respect to the point or points of gripping, of the wires on their own axes between the place where they are so gripped and the laying up point while allowing their longitudinal movement.

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