

W. FINLAY.
 ROPE MAKING MACHINE.
 APPLICATION FILED APR. 29, 1910.

1,030,235.

Patented June 18, 1912.

4 SHEETS-SHEET 1.

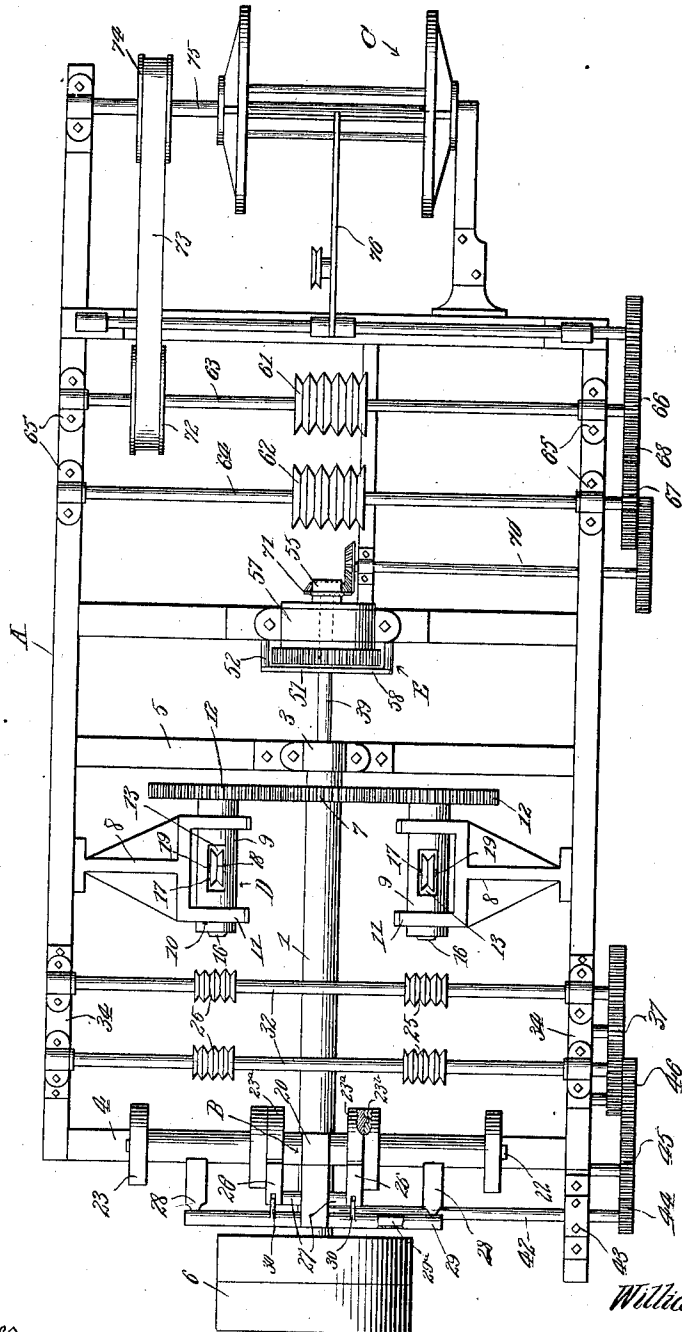


Fig. 1.

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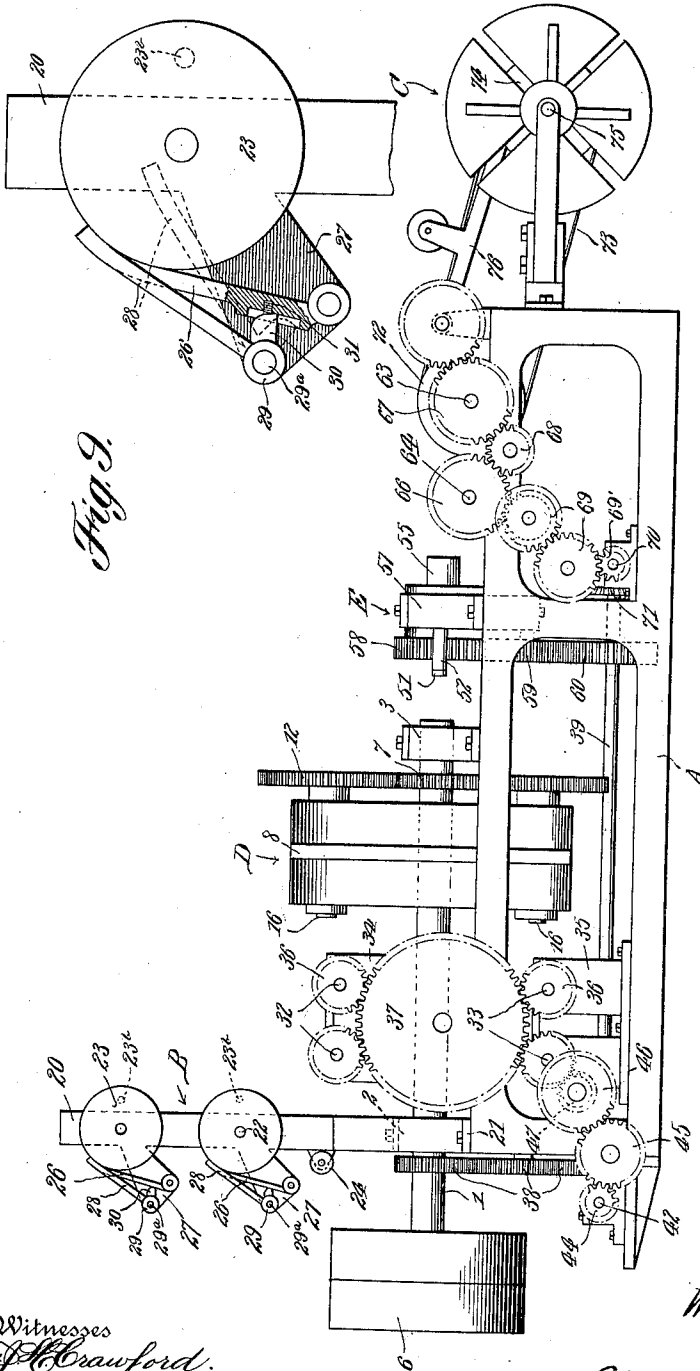


Fig. 1.

Fig. 2.

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4 SHEETS—SHEET 3.

Fig. 4.

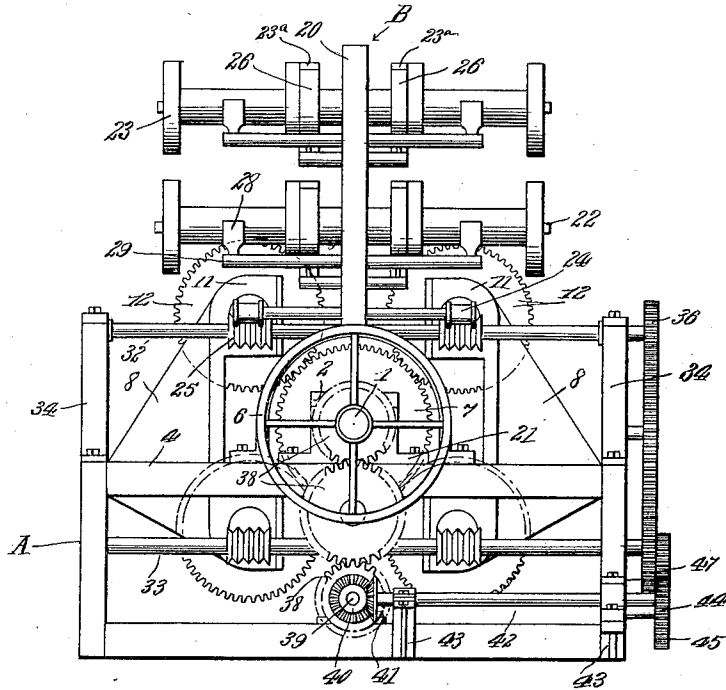
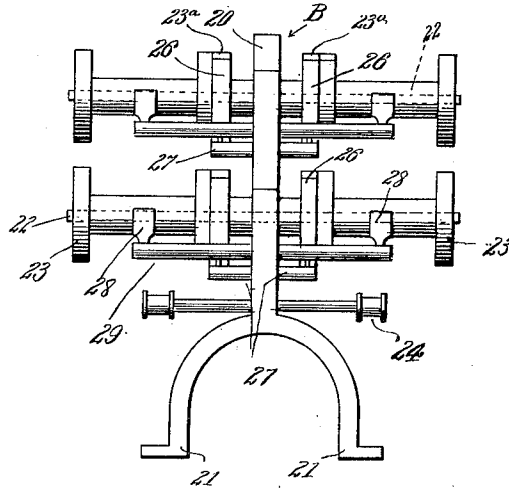


Fig. 3.

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4 SHEETS—SHEET 4.

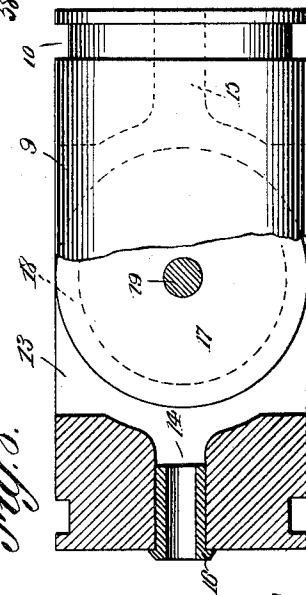
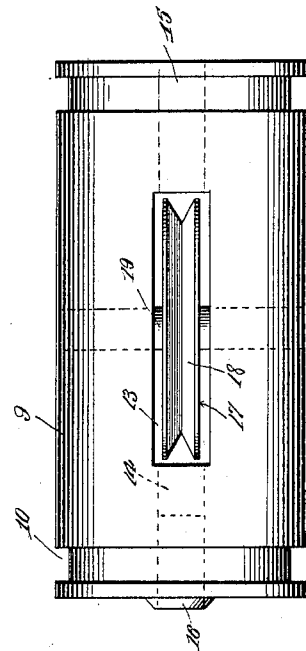
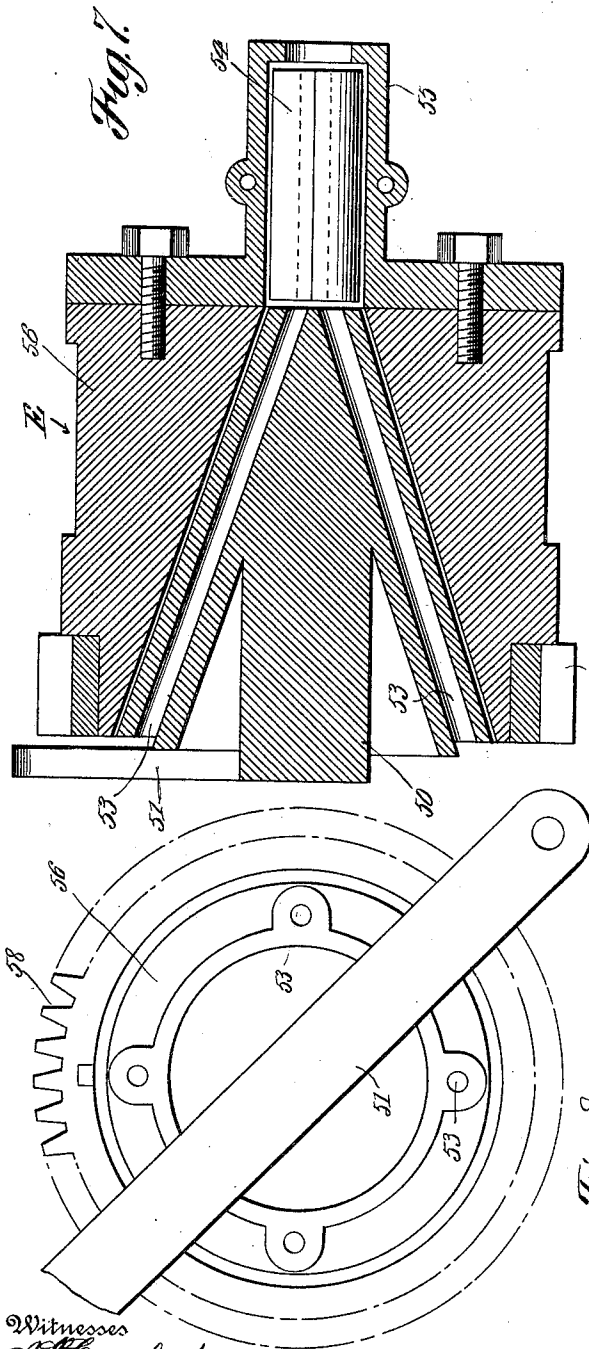


Fig. 8.

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UNITED STATES PATENT OFFICE.

WILLIAM FINLAY, OF XENIA, OHIO.

ROPE-MAKING MACHINE.

1,030,235.

Specification of Letters Patent.

Patented June 18, 1912.

Application filed April 29, 1910. Serial No. 558,343.

To all whom it may concern:

Be it known that I, WILLIAM FINLAY, a subject of the King of Great Britain, residing at Xenia, in the county of Greene and State of Ohio, have invented new and useful Improvements in Rope-Making Machines, of which the following is a specification.

This invention relates to rope machines of that type in which the forming of the strands, and the laying of the same into cable or rope is accomplished in one continuous operation.

The invention has for one of its objects to improve and simplify the construction and operation of machines of this character so as to be highly effective and successful in operation, capable of producing a superior product and requiring considerable less power to drive the parts than is customary in this class of machine.

Another object of the invention is the provision of an improved twister for imparting the desired twist to the strands, the twister being of such design that the usual fliers, fly carriers and differential gears are dispensed with so that the calculations for producing any desired twist can be materially simplified, higher speed attained with less horse power, and the cost of manufacture will be considerably reduced.

Another object of the invention is the provision of an improved head and tube carrier for laying the strands into rope.

A further object is the employment of simple and effective driving means for the various operating parts, whereby friction driving gears will be dispensed with, and the strand and rope capstan rollers can be driven in unison and change of speed readily effected by the substitution of proper pinions.

With these objects in view, and others as will appear as the description proceeds, the invention comprises the various novel features of construction and arrangement of parts which will be more fully described hereinafter and set forth with particularity in the claims appended hereto.

In the accompanying drawings, which illustrate one embodiment of the invention:— Figure 1 is a plan view of the machine. Figure 2 is a side view thereof. Figure 3 is an elevation of the bobbin-rack end of the machine. Figure 4 is a front view of the bobbin rack showing the drag devices. Figure 5 is a

plan view of the twister. Fig. 6 is a side view thereof, portions in section. Fig. 7 is a longitudinal section of the head and tube carrier for forming the laid rope. Fig. 8 is an end view of Fig. 7. Fig. 9 is an enlarged view with portions in section of the drag or tensioning device for a supply bobbin.

Similar reference characters are employed to designate corresponding parts throughout the several views.

Referring to the drawings, A designates the frame of the machine which is provided at one end with a bobbin rack B, and at the opposite end with a reel C for receiving the finished product and in front of the bobbin rack is arranged a twister mechanism D, by which the strands from the bobbins are twisted, and in front of this mechanism B is the head E for forming the laid rope.

Extending longitudinally of the machine is a central driving shaft 1, which is mounted in bearings 2 and 3 on the cross beams 4 and 5 of the frame A, and on the outer end of the shaft are pulleys 6 for the driving belt. This shaft is provided with a gear 7 near its inner end which serves to drive the various twisters, of which there are four shown in the present instance. These twisters are arranged at diametrically opposite points with respect to the shaft 1, and are arranged in pairs, one pair on each side of a vertical plane passing centrally through the machine, and each pair of twisters are mounted in a bracket 8 secured to the sides of the frame A. Each twister consists of a cylindrical body 9 having annular grooves 10 at its ends to rotate in bearings 11 on the brackets 8, and connected rigidly to the front end of the body 9 is a gear wheel 12 that meshes with the central gear wheel 7. As all the twister gear wheels mesh with the common drive wheel 7 on the main shaft 1, the twisters will all rotate in the same direction. The body 9 of the twister has a central chamber 13, from which extend aligned passages 14 and 15 arranged coincident with the axis of rotation, and in the outer end of the passage 14 is a nipple or thimble 16 which guides the strand in entering the twister. In the chamber 13 is mounted a pulley 17 that has a peripheral groove 18 for receiving the strand to form a guide therefor and cause the same to receive the required twist. This wheel or pulley 17 is mounted to rotate on an axle 19 extending transversely to and cutting the

axis of the twister body. By means of this pulley, the strand passing through the twister will ride over the pulley, which not only revolves on its own axis, but rotates bodily with the twister. In other words, the pulley or wheel 17 forms a guide located eccentrically to the axis of the twister, and this guide travels in a circle concentrically to the twister so that the fibers forming the strand passing through the twister will be twisted. The form which the strand takes in passing around one side of the pulley 18 has a very important bearing on the twisting action. It will be noted that the strand passing from the guide 14 over the pulley 18 and to the passage 15 assumes an elliptical or parabolic curve, the radius of the pulley being the minor axis of such ellipse. By reason of this, the strand has its fibers twisted only in one direction, as the strand can turn on its axis. If the strand, in passing from the passage 14 to the passage 15, Fig. 8, assumed a triangular form, a reverse twist would be imparted to the fiber so that the twisting action would not be as effective with a twisting device having the roller 18. The chamber 13 is open at opposite sides of the body so as to expose the wheel 17 and thereby facilitate the passing of the strand through the twister when preparing the machine for operation.

The bobbin rack B consists of a standard 20 having feet 21 bolted to the end of the frame A, and on this standard are fixed spindles 22 for receiving the bobbins 23, there being four shown in the present instance. The strands from the bobbins pass over guide rollers 24 mounted on the rack and from these rollers the strands pass over capstan rollers 25 located between the rack and twisting mechanism D. The bobbins 23 that contain the strands from which the rope is made are retarded so as to impart the desired tension to the strands by means of drags 26 pivotally mounted in brackets 27 on the standard 20. These drags are adapted to bear on pulleys 23^a that are connected with the inner ends of the bobbins by means of pins 23^b on the pulleys that engage in sockets in the ends of the bobbins, and they bear on the peripheries of the pulleys with a varying tension controlled by the varying diameter of the bobbins as the strands are fed off. For this purpose, the drags are controlled by fingers 28 mounted on tubular rock shafts 29, secured to the standard 20 and the fingers are arranged so that each will bear on a bobbin and as each finger changes its position as the strand is taken off, the cam 30 on the part 29 diminishes the tension of the spring 31 that presses on the drag, thus allowing the bobbins to increase their speed according to the change in their diameter and giving a uniform tension to the strands at all times.

When the machine both forms the strand and makes the rope at one operation, the drag device is not required as the tube which forms the strand will give a sufficient tension between the twister and capstan rollers.

The capstan rollers over which the strands pass from the bobbin rack to the twisters are arranged in pairs in line with each twister. Extending transversely to the machine are two upper and two lower shafts 32 and 33, the upper shafts being journaled in bearings 34 on the top of the frame A, while the shafts 33 are mounted in bearings 35 on the sides of the frame A at the bottom. All the roller shafts have pinions 36 that mesh with a large gear wheel 37 so that all the capstan rollers will rotate in the same direction and at the same speed since the pinions are of the same diameter. The capstan rollers are driven from the shaft 1 by a gearing 38 between the shaft 1 and a secondary shaft 39 located vertically below the main shaft and on this shaft 39 is a miter gear 40 that meshes with the miter gear 41 on a transverse shaft 42 that is journaled in bearings 43. On the outer end of the shaft 42 is a small gear or pinion 44 which is connected by an idler 45 with a gear wheel 46 that has a pinion 47 which meshes with one of the gear wheels 36 on one of the lower shafts 33. It will thus be seen that the capstan rollers are positively driven from the main shaft 1 as are also the twisters.

Referring now to the combined head and tube carrier E it will be obvious that instead of revolving the head as in other types of machine to keep in line with the changing positions of the bobbins and fliers, it remains stationary, and the tube carrier revolves. Thus, as shown in Figs. 7 and 8, the conical head 50 is secured to a cross piece 51 that is fastened to the frame A by bolts 52, Fig. 1, and on the head are the guide passages 53 through which the twisted strands pass to the rope tube 54 which is mounted in and rotates with a box 55 on the tube carrier 56, the latter being in the form of a hollow body surrounding the head and rotatable in a bearing 57 on the frame A. This carrier 56 has gear teeth 58 that mesh with an idler 59 on the frame A, which idler in turn meshes with a gear wheel 60 on the secondary shaft 39.

Between the device E for laying the strands and the reel C are rope capstan rollers 61 and 62 mounted on shafts 63 and 64 respectively that extend across the machine at one end and are journaled in bearings 65. On these shafts are gear wheels 66 and 67, and by means of an idler 68 the latter gear wheel drives the former in the same direction as itself, and the gear wheel 66 is driven from the secondary shafts 39 by a train of

gear wheels 69, one of which is mounted on a shaft 70, and is connected by miter gears 71 with the shaft 39. It will thus be seen that the rope capstan rollers are also positively driven and by proper proportioning the gears, the rope capstan roller can rotate in unison with the strand capstan roller, and any speed of rotation can be obtained by changing the speed ratios of the gearing. On the shaft 63 is a pulley 72 around which passes a belt 73 that rotates a pulley 74 on the shaft 75 of the rope reel C, the winding of the rope in layers being effected by a traveling guide 76 of the usual construction.

From the foregoing description taken in connection with the accompanying drawings, the advantages of the construction and of the method of operation will be readily apparent to those skilled in the art to which the invention relates, and while I have described the principle of operation of the invention, together with the device which I now consider to be the best embodiment thereof, I desire to have it understood that the device shown is merely illustrative and that such changes may be made when desired as are within the scope of the claims.

What I claim as new and desire to secure by Letters Patent is:—

1. The combination of a plurality of twist-ers relatively fixed to each other and spaced around a common axis, means for mounting each twister to rotate on its own axis, capstan rollers disposed in line with each twister and rotatable on fixed axes extending transversely to the axis of rotation of the twister, and bobbins arranged with their axes parallel with the capstan rollers and from which the latter draw the strands and a strand-laying device into which the twisted strands from the twister pass.

2. The combination of four twist-ers fixed with respect to each other and arranged stationary around a common axis, means for supporting the twist-ers to rotate on their own axes, shafts extending transversely to the axes of the twist-ers, capstan rollers on each shaft and each arranged in line with the twister, and bobbins arranged with their axes parallel with the capstan rollers and from which the latter draw the strands, fixed bearings in which the shafts are mounted, means for turning the shafts, means for rotating the twist-ers, and a strand laying device arranged to receive the twisted strands from the twist-ers.

3. The combination of four twist-ers, fixed bearings in which the twist-ers are mounted to turn on their individual axes, two pairs of shafts extending transversely to the axes of the twist-ers and each pair of shafts being disposed in line with a pair of twist-ers, capstan rollers mounted on the shafts in

alinement with the twist-ers, and bobbins arranged with their axes parallel with the capstan rollers and from which the latter draw the strands, a gearing for turning all the shafts in the same direction, and a gearing for turning all the twist-ers in the same direction.

4. The combination of a frame, brackets secured to the sides of the frames and extending inwardly, a pair of twist-ers arranged with their axes parallel and spaced apart in each bracket, the twist-ers being arranged about a common axis, a gear wheel on each twister, a driving gear wheel meshing with the first-mentioned gear wheel, a plurality of capstan rollers arranged in alinement with the axis of each twister and having their axes transverse to the latter and arranged for turning the capstan rollers.

5. The combination of a frame, an upright rack at one end, horizontally-disposed bobbins on the rack, drags operating on the bobbins, a set of capstan rollers for the strand from each bobbin, said rollers being disposed with their axes parallel with the bobbins, a twister arranged in proximity to each set of capstan rollers to receive the strand direct therefrom for imparting a twist to the fiber, and a laying device for receiving the strands directly from the twist-ers.

6. The combination of a frame, a bobbin rack at one end thereof, horizontally-disposed bobbins on the rack, capstan rollers for drawing the strands from the bobbins, twist-ers receiving the strands directly from the capstan rollers, a laying device receiving the strands directly from the twist-ers, and capstan rollers drawing the rope through the twist-ers and laying device and arranged directly adjacent the latter, the strand-drawing and rope-drawing capstan rollers having their axes parallel and the laying device and twist-ers having their axes parallel and transversely to the axes of the capstan rollers.

7. A twister comprising a body rotatable on its axis and having passages at opposite ends and in the axis of rotation through which the strand passes, and a peripherally grooved wheel located between the passages and having its axis located in line with the passages and transversely thereto, the grooved wheel being of such diameter that the strand extending from one passage to the other is held in the form of an elliptical bight by the said roller whereby the strand can turn on its axis in twisting.

8. A twister comprising a body mounted to rotate on a central axis and having in its end alining axial entrances and exit passages for the strand to be twisted, and means carried by the body and located between the passages for holding the strand

in the form of an elliptical bight whereby the fibers of the strand are twisted only in one direction.

9. A twister comprising a rotatable body
5 through which the strand passes axially and a movable support mounted in the body and causing the portion of the strand lying within the body to take the form of an elliptical bight whereby the fibers are twisted
10 and the strand is permitted to rotate on its axis while twisting.

10. In a machine of the class described, a twister including a rotatable body through which the strand passes axially, and a pulley
15 mounted in the body with its axis coincident with and transverse to the axis thereof, and means exterior to the body for draw-

ing a strand therethrough, and mechanism for rotating the body and means independently.

11. In a machine of the class described, the combination of a stationary head having converging strand passages, a rotatable body encircling the head, means for driving the body, and a rope tube arranged in line
25 with the meeting ends of the passages and connected with the said rotatable body to rotate therewith.

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

WILLIAM FINLAY.

Witnesses:

GEORGE PAGE,
A. H. FINLAY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."