Aug. 9, 1932. D. C. ROBSON 1,871,391

STRAND WORKING MACHINE

Filed Feb. 19, 1929 3 Sheets-Sheet 1

Fig. 1.

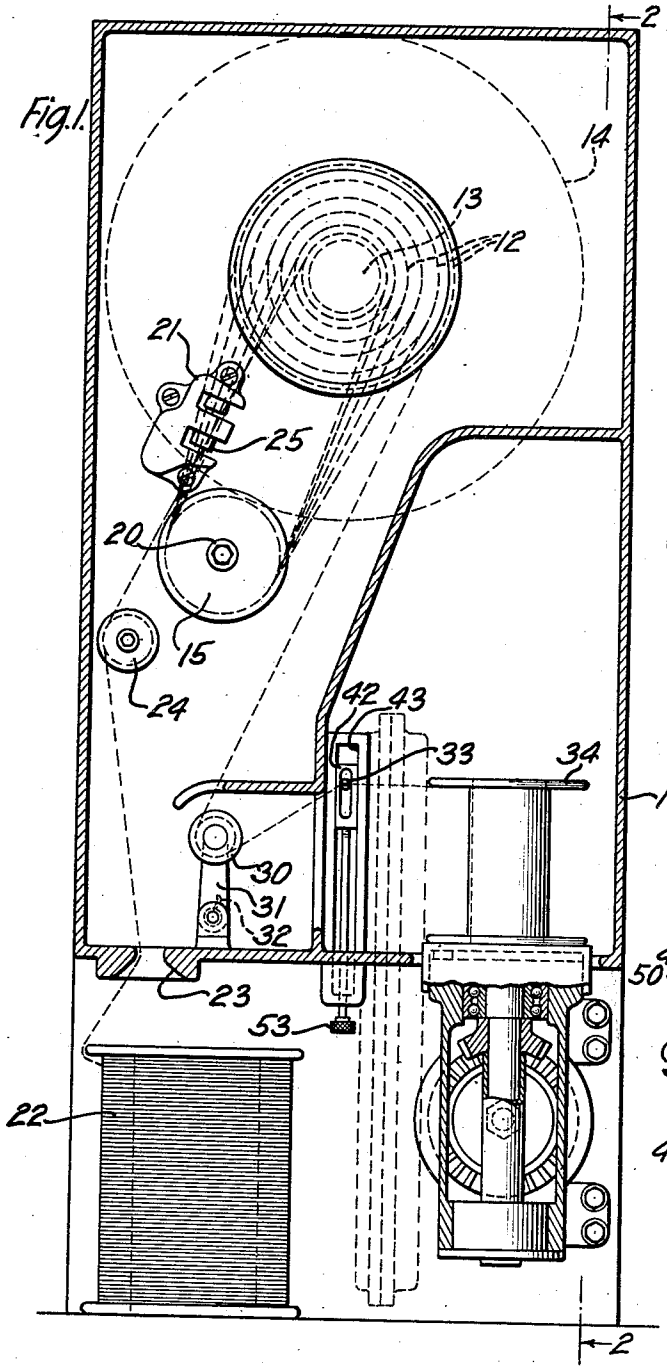


Fig. 8.

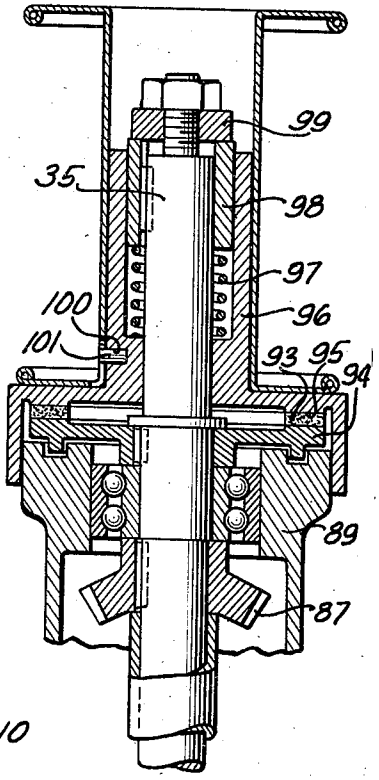
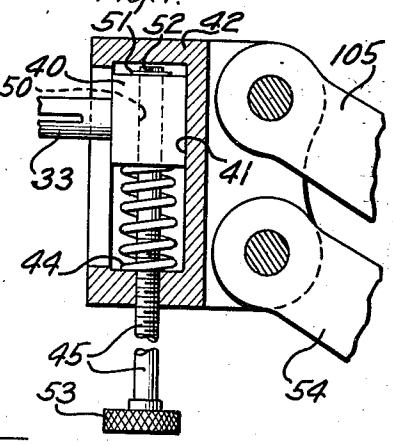


Fig. 7.



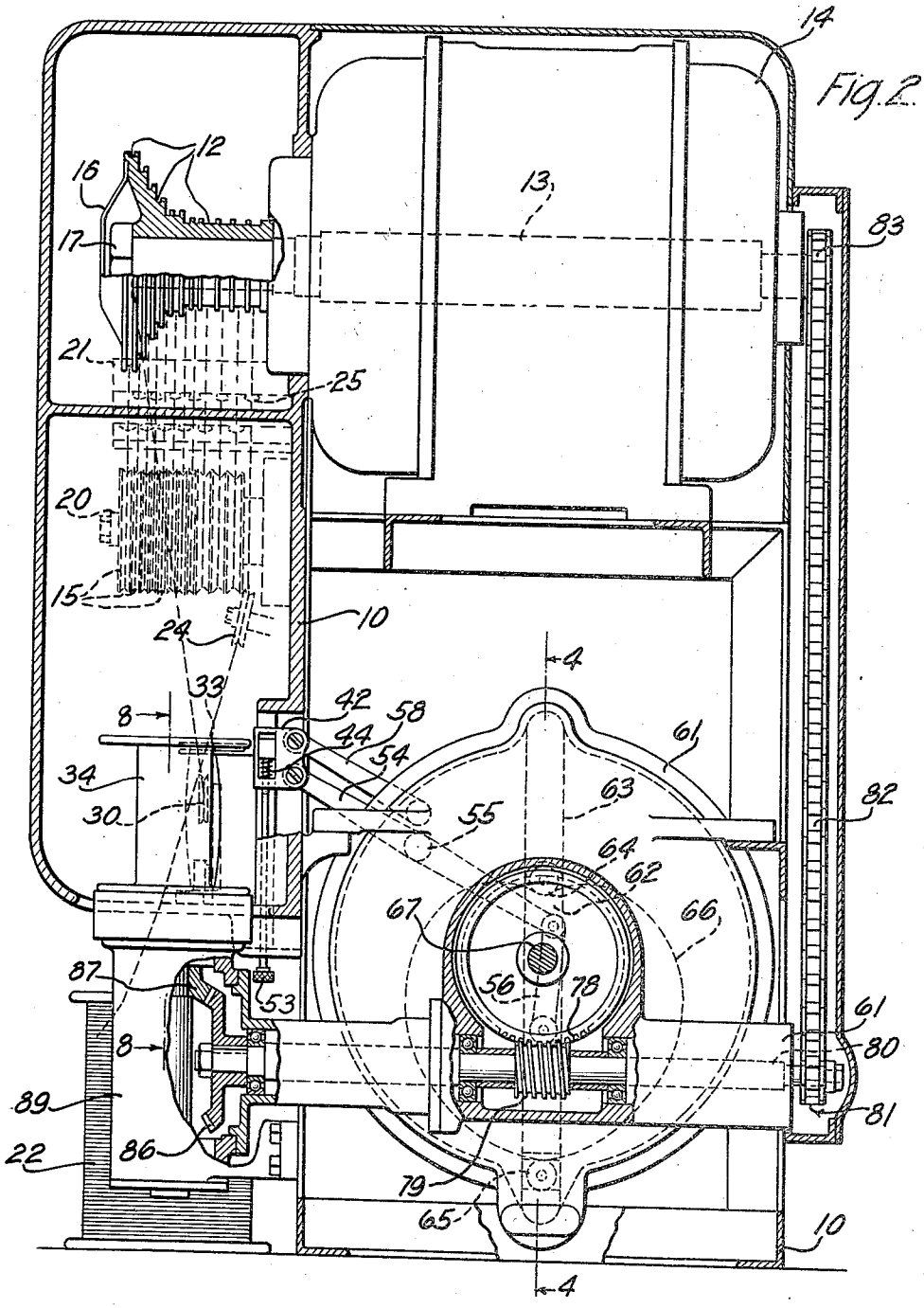
Inventor
Duer C. Robson
By Hallaman Atty.

Aug. 9, 1932. D. C. ROBSON 1,871,391

STRAND WORKING MACHINE

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Fig. 2.



Inventor
Duer C. Robson
By H. Mattison - Att'y.

Aug. 9, 1932. D. C. ROBSON 1,871,391

STRAND WORKING MACHINE

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Fig. 4.

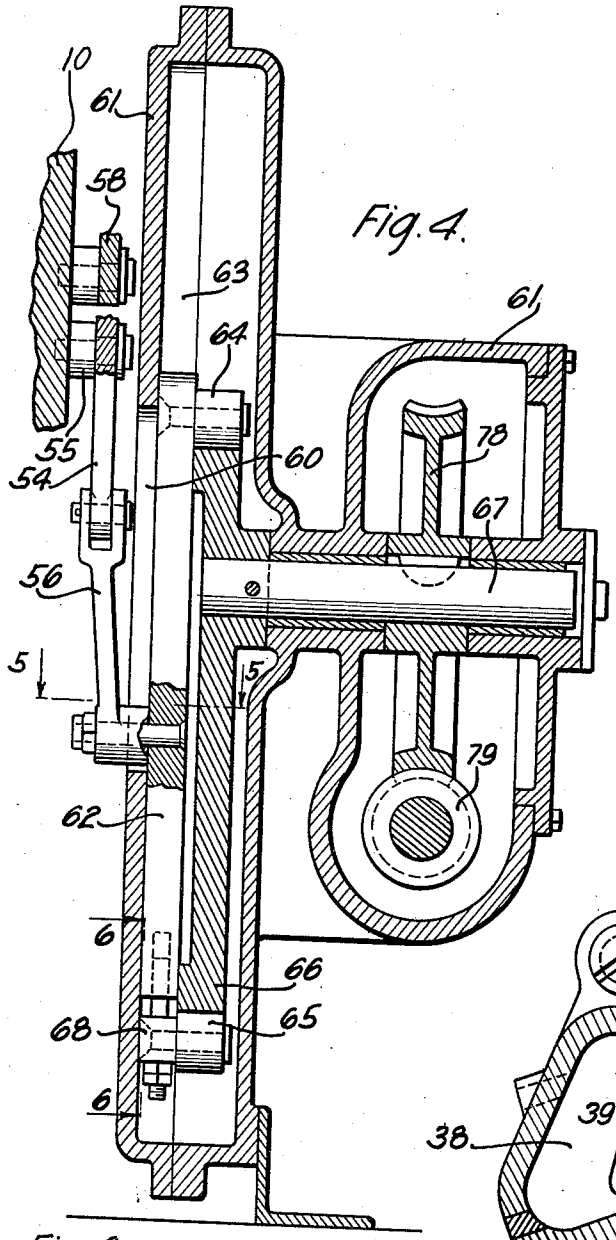


Fig. 5.

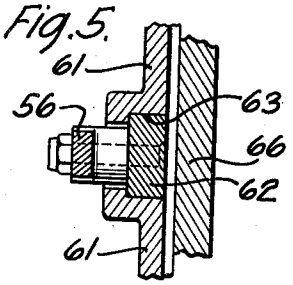


Fig. 3.

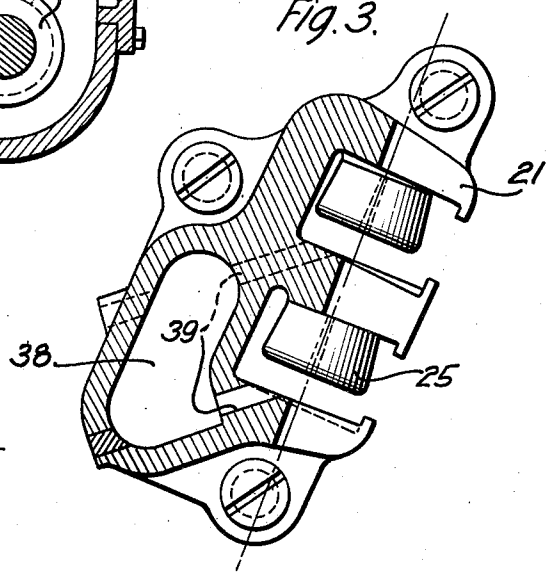
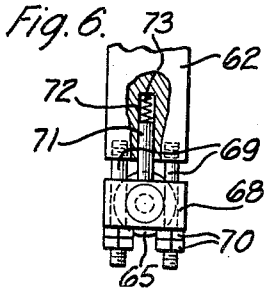


Fig. 6.



Inventor
Duer C. Robson
By Hal Patterson Atty.

Patented Aug. 9, 1932 1,871,391

UNITED STATES PATENT OFFICE

DUER CYRUS ROBSON, OF CHICAGO, ILLINOIS, ASSIGNOR TO WESTERN ELECTRIC COMPANY, INCORPORATED, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK

STRAND WORKING MACHINE

Application filed February 19, 1929. Serial No. 341,262.

This invention relates to strand working machines, and especially to machines involving winding and distributing apparatus therefor.

The primary object of the invention is to provide an efficient and compact strand working machine having a winding and distributing apparatus of simple and durable construction.

In accordance with the general features of the invention, a wire drawing machine is provided in which the integral drawing capstans are mounted directly on the motor shaft and the idler sheaves are positioned in an offset relation thereto. The wire from the supply spool within the housing of the wire drawing machine is drawn upwardly through the dies and the offset arrangement of the capstans and sheaves provides space for a vertical take-up spindle which is driven by a chain and sprocket mechanism from the rear end of the motor shaft. A heart-shaped cam, operated from the same chain and sprocket drive, carries pivoted members for actuating a reciprocatory slide which has an adjustable forked arm for engaging and distributing the wire on a spool rotated by the vertical take-up spindle.

It is believed that a complete understanding of the invention may be had from the following description when taken in conjunction with the accompanying drawings, in which

Fig. 1 is a front elevational view, partly in section, of a wire drawing machine embodying the features of the invention;

Fig. 2 is a partial sectional view thereof taken on line 2—2 of Fig. 1;

Fig. 3 is an enlarged detailed view, partly in section, of the die holder showing the inverted wire drawing dies;

Fig. 4 is an enlarged sectional view of the cam mechanism taken on line 4—4 of Fig. 2;

Fig. 5 is a fragmentary sectional view of a portion of the cam mechanism taken on line 5—5 of Fig. 4;

Fig. 6 is a detailed view of the adjustable cam roller taken on line 6—6 of Fig. 4;

Fig. 7 is an enlarged fragmentary view of the structure for adjusting the forked distributing arm, and

Fig. 8 is an enlarged fragmentary sectional view taken on line 8—8 of Fig. 2 showing the take-up spindle.

Referring now to the drawings in which like reference numerals designate similar parts throughout the various views, a framework 10 (Figs. 1 and 2) is provided for housing the wire drawing apparatus which includes a plurality of integral capstans 12—12 of different diameters rigidly mounted on a shaft 13 of a motor 14. Supported below the capstans 12—12 in offset relation thereto are a plurality of sheaves 15—15 independently and rotatably mounted on a horizontally disposed shaft 20 suitably secured to the framework 10. Mounted between the capstans and the sheaves is a die holder 21 also suitably secured to the framework. It is to be noted that a cover 16 is secured to the outer vertical wall of the largest capstan 12 to prevent any possibility of the wire passing through the wire drawing machine becoming entangled on the hexagonal nut 17 which is used to secure the captans 12—12 to the motor shaft 13.

A supply of wire to be reduced in diameter is carried by a supply spool 22 suitably mounted in the lower left hand corner of the wire drawing machine (Fig. 1). The wire is directed from the supply spool 22 through a bell mouth opening 23 in the framework 10, over pulley 24, through a first reducing die 25, and then wound around the rear capstan 12 of smallest diameter. The wire is then passed downward and under the rear sheave 15, up through the next reducing die, around the next capstan 12, and under the next sheave, etc., until it is finally drawn down to the desired diameter by the last reducing die. From the final reducing die the drawn wire passes around the capstan 12 of the largest diameter and thence downward under a guide pulley 30 which is rotatably mounted in the pivoted arm 31 maintained under a constant counter-clockwise tension by a torsion spring 32. From the pulley 30 the wire passes between a pair of prongs of a forked distributing arm 33 and then to a take-up spool 34

mounted on a vertical spindle 35 which is driven by mechanism to be described.

As clearly illustrated by Fig. 3, the wire drawing dies are inverted and the wire is drawn upward therethrough. The die holder 21 is provided with a chamber 38 which is connected to a supply of wire drawing compound under pressure (not shown) and to a plurality of passageways 39—39 for directing the wire drawing compound into the mouths of the wire drawing dies.

The wire distributing apparatus comprises the forked distributing arm 33, an enlarged end 40 of which is slidably mounted in a rectangular opening 41 of a member 42 reciprocable in a guideway 43 (Figs. 1 and 7) of the framework 10. The distributing arm 33 is normally urged toward the top of the rectangular opening 41 by a helical spring 44 intermediate the lower surface of the enlarged end 40 of the arm 33 and the lower end of the rectangular opening 41 and surrounding a rod 45 threaded into the member 42. Centrally located through the enlarged end 40 of the distributing arm is a vertical bore 50 through which the upper end of the rod 45 extends. The rod is maintained in operative position with the enlarged end 40 by a washer 51 and a cotter pin 52. By turning a knurled knob 53 in the lower end of the rod 45 it will be readily seen that the travel of the distributing arm can be closely adjusted within predetermined limits to allow for variations in the lengths of take-up spools and thus expedite the accurate distribution of the finished wire thereon.

The member 42 carrying the forked distributing arm 33 is reciprocated by a lever 54 (Figs. 2 and 4) operatively associated therewith and pivoted at 55 to the framework 10. Pivoted at the other end of the lever 54 is a bifurcated arm 56 which has an extremity extending through a slot 60 in a housing 61 and which is pivoted to a slide 62 (Figs. 4 and 5) mounted in a guideway 63 within the housing. Another lever 58 having its ends pivoted to the member 42 and the housing 61, respectively, is provided for maintaining the member 42 in an upright position. At both ends of the slide 62 are mounted rollers 64—65 for engaging a heart-shaped cam 66 rigidly secured to a shaft 67 suitably journaled in the housing 61. The lower roller 65 is adjustably mounted on a block 68 (Fig. 6) which slidably engages pins 69—69 provided with stop nuts 70—70 and threaded into the lower end of the slide 62. Integral with the block 68 is a plunger 71 extending into a bore 72 in the end of the slide 62 and abutting a compression spring 73 positioned therein. Upon turning the nuts 70—70 the lower roller 65 may be adjusted to allow for any wear in the camming edge of the heart-shaped cam 66 and thus assure positive contact between the rollers 64—65 and the camming edge at all times.

Rotation of the cam shaft 67 is accomplished through a worm wheel 78 keyed thereto meshing with a worm 79 integral with a horizontal shaft 80 (Fig. 2) suitably journaled in the housing 61 and having a sprocket 81 which is driven by a sprocket chain 82 engaging a sprocket 83 secured to the rear end of the motor shaft 13. Secured to the forward end of the horizontal shaft 80 is a bevel gear 86 which meshes with a bevel gear 87 (Fig. 8) keyed to the vertical spindle 35 suitably journaled in a casing 89 secured to the framework 10. Also keyed to the spindle 35 is a disk 94 having a frictional member 93 secured thereto for engaging a friction surface 95 of a drum 96 rotatably mounted on the spindle 35. Friction surface 95 is maintained in engagement with the frictional member 93 of the disk 94 by a compression spring 97 surrounding the spindle 35 and interposed between a portion of the drum 96 and a collar 98 slidably keyed to the spindle. The compressive force of the spring 97 is controlled by a nut 99 threaded on the upper end of the spindle 35 and bearing against the upper surface of the collar 98. A bayonet slot 100 in the periphery of the drum 96 is provided for engaging a pin 101 on the take-up spool 34 to effectively lock the spool to the drum.

By means of the take-up mechanism described when the tension on the wire being wound thereon exceeds a predetermined amount, the drum will slip on the spindle to thereby allow for the driving of the take-up spool at various speeds to compensate for the varying diameters of the spool as the wire is wound thereon.

In operating the wire drawing machine the motor 14 is connected to a source of electrical energy (not shown), whereby the integral capstans 12—12 are directly driven to effect the drawing of the wire through the dies and its guidance through the prongs of the forked distributing arm 33 to the take-up spool 34 by means of the apparatus hereinbefore described. The driving of the shaft 80 through sprockets 81 and 83 and chain 82 from the rear end of the motor 13 serves to rotate the take-up spool through gears 86—87, spindle 35, disk 94, and drum 96. Since the worm wheel 78 meshes with the worm 79 integral with the rotating shaft 80, the shaft 67 secured to the worm wheel and the heart-shaped cam 66 is rotated. The engagement of the rollers 64—65 with the camming edge of the cam 66 causes the reciprocation of the slide 62 and the arm 56, whereby the lever 54 is oscillated or rocked about its pivot 55. The oscillation of the lever 54 moves the member 42 and the forked distributing arm 33 in a reciprocatory movement. The lever 58 having its ends pivoted to the member 42 and

housing 61, respectively, is provided to better effectuate the reciprocation of the member 42 in an upright position. From the foregoing description it is apparent that as the finished wire is delivered to the take-up spool, the reciprocation of distributing arm 33 causes the wire to be wound in uniform layers.

It will be understood that the embodiment of the invention herein described and illustrated is merely a convenient and useful form of the invention which is capable of many other modifications without departing from the spirit and scope of the invention as defined by the appended claims.

What is claimed is:

1. In a strand working machine, a housing having a plurality of angularly disposed sides and a septum extending between contiguous and opposite sides to divide the housing into two compartments and containing an aperture connecting the compartments, a capstan rotating on a horizontal axis positioned in one of the said compartments, a sheave having a horizontal axis positioned in the same compartment and obliquely offset with respect to the capstan, means for working the strand intermediate the capstan and sheave, a take-up means vertically positioned in the second compartment to receive and dispose of a strand coming from the capstan through the aperture in the septum, and strand supply means positioned outside of and underneath the housing.

2. In a strand working machine, a housing having a plurality of angularly disposed sides and a septum extending between contiguous and opposite sides to divide the housing into two compartments and containing an aperture connecting the compartments, a capstan rotating on a horizontal axis positioned in one of the said compartments, a sheave having a horizontal axis positioned in the same compartment and obliquely offset with respect to the capstan, means for working the strand intermediate the capstan and sheave, a take-up means vertically positioned in the second compartment to receive and dispose of a strand coming from the capstan through the aperture in the septum, strand supply means positioned outside of and underneath the housing, and a friction clutch having the take-up means mounted thereon and cooperating therewith for controlling the speed of the take-up means.

3. In a strand working machine, a housing having a plurality of angularly disposed sides and a partition extending between opposite and contiguous sides to divide the interior thereof into two compartments, a capstan rotating on a horizontal axis positioned in one of said compartments, a sheave having a horizontal axis positioned in the same compartment along side of said capstan, means intermediate the capstan and the sheave for working the strand, a take-up means vertically positioned in the second compartment, means for actuating the capstan and take-up means, and means located adjacent said partition connected with the actuating means and operable in response thereto for uniformly distributing the strand upon the take-up means.

4. In a strand working machine, a housing having a plurality of angularly disposed sides and a partition extending between opposite and contiguous sides thereof to divide the housing into two compartments, a capstan rotating on a horizontal axis positioned in one of said compartments, a sheave having a horizontal axis positioned in the same compartment along side of said partition and obliquely offset with respect to the capstan, means intermediate the capstan and the sheave for working the strand, a take-up means vertically positioned in the second compartment, a friction clutch having the take-up means mounted thereupon and cooperating therewith for controlling the speed of the take-up means as strand is wound thereon, a reciprocable means for uniformly distributing the strand upon the take-up means, and a common means for actuating the capstan, take-up means, and the distributing means.

5. In a strand working machine, a housing having a partition extending between opposite and contiguous sides to divide the housing into two compartments and containing an aperture connecting the compartments, a capstan rotating on a horizontal axis positioned in one of said compartments above said septum, a sheave having a horizontal axis positioned in the same compartment along side of said partition and obliquely offset with respect to the capstan, means intermediate the capstan and the sheave for working the strand, a take-up means positioned in the second compartment, an adjustable tensioning means having the take-up means mounted thereupon and cooperating therewith for controlling the speed of the take-up means as strand is wound thereon, means for actuating the capstan and take-up means, a reciprocable distributing means adjacent the aperture in the partition for receiving the strand therethrough from the capstan and uniformly laying the strand upon the take-up means, and a cam connected with the actuating means and operable in response thereto for reciprocating the distributing means.

6. In a strand working machine, a housing having a partition extending between opposite and contiguous sides to divide the housing into two compartments and containing an aperture connecting the compartments, a capstan rotating on a horizontal axis positioned in one of said compartments, a sheave having a horizontal axis positioned in the same compartment and obliquely offset with

respect to the capstan, means intermediate the capstan and the sheave for working the strand, a vertical shaft positioned in the second compartment, a tensioning means rigidly affixed to the vertical shaft, a take-up means mounted upon the tensioning means and cooperating therewith for controlling the speed of the take-up means as strand is wound thereon, a reciprocable member receiving the strand from the capstan through the aperture in the partition and uniformly distributing the strand upon the take-up means, means for actuating the take-up means and the capstan, and means operatively connected with actuating means for operating the reciprocable member.

7. In a strand working machine, a housing having a partition extending between opposite and contiguous sides to divide the interior thereof into two compartments, a capstan rotating on a horizontal axis positioned in one of said compartments, a sheave having a horizontal axis positioned in the same compartment and obliquely offset with respect to the capstan, means intermediate the capstan and the sheave for working the strand, a take-up means mounted in the second compartment, a motor mounted at back of capstan and connected directly thereto for the actuation thereof, a member for distributing the strand uniformly upon the take-up means, a reciprocable support for the distributing member, adjustable means for varying the reciprocable movement of the member, a cam located beneath said motor, a lever having one end engaging the reciprocable support and the opposite end engaging the cam, and means operatively connected with said motor for rotating the cam to operate the support for causing a uniform distribution of the strand upon the take-up means and for actuating the take-up means.

8. In a strand working machine, a housing having a partition extending between opposite and contiguous sides to divide the interior thereof into two compartments, a capstan rotating on a horizontal axis positioned in one of said compartments, a sheave having a horizontal axis positioned in the same compartment and obliquely offset with respect to the capstan, means intermediate the capstan and the sheave for working the strand, a shaft vertically positioned in the second compartment, a disc keyed to the shaft, a friction material affixed to the disc, a drum mounted on the shaft and engaging the friction material, a take-up means rigidly secured to the drum, means secured to the shaft for varying the amount of engagement between the drum and the friction material for controlling the speed of the take-up means as strand is wound thereupon, means for actuating the capstan and the take-up means, and a reciprocable member connected with the actuating means and operable in response thereto for uniformly distributing the strand upon the take-up means.

9. In a strand working machine, a housing having a partition extending between opposite and contiguous sides to divide the interior thereof into two compartments, a capstan rotating on a horizontal axis positioned in one of said compartments, a sheave having a horizontal axis positioned in the same compartment and obliquely offset with respect to the capstan, means intermediate the capstan and the sheave for working the strand, a shaft vertically mounted in the second compartment, an adjustable friction clutch mounted upon the shaft, a take-up means secured to the friction clutch, a horizontal shaft connected with the vertical shaft, a worm integral with the horizontal shaft, a worm wheel engaging the worm, a cam shaft having the worm wheel mounted thereupon, a pivoted lever having one end connected with the cam, a reciprocable support connected with the opposite end of the lever, and a distributing member mounted in the support, means for varying the amount of reciprocation of the support, means for actuating the capstan and the horizontal shaft to rotate the take-up means and to operate the distributing member for uniformly laying the strand upon the take-up means.

10. In a strand working machine, a housing having a partition extending between opposite and contiguous sides to divide the interior thereof into two compartments, a capstan rotating on a horizontal axis positioned in one of said compartments, a sheave having a horizontal axis positioned in the same compartment and obliquely offset with respect to the capstan, means intermediate the sheave and the capstan for working the strand, a take-up means mounted in the second compartment substantially beneath the capstan, means mounted at the back of the capstan for the actuation of the capstan and take-up means, and a reciprocable distributing means mounted at the back of the take-up means directely beneath the actuating means and operatively connected with the latter for uniformly laying strand upon the take-up means as the strand passes from the capstan.

11. In a strand working machine, a housing having a partition extending between opposite and contiguous sides to divide the interior thereof into two compartments, a capstan rotating on a horizontal axis positioned in one of said compartments, a sheave having a horizontal axis positioned in the same compartment and obliquely offset with respect to the capstan, means intermediate the capstan and the sheave for working the strand, a take-up means vertically mounted in the second compartment, a friction clutch having the take-up means mounted thereupon and cooperating therewith for controlling the speed of the take-up as the tension on the

strand being wound thereupon exceeds a predetermined amount, means for actuating the capstan and the take-up means, a member associated with the take-up means for distributing the strand thereupon, means connected with the actuating means and operable in response thereto for reciprocating the member, and means associated with the member for varying the amount of reciprocation thereof.

In witness whereof, I hereunto subscribe my name this 6 day of February, A. D. 1929.

DUER CYRUS ROBSON.