W. R. Dutcher.

Cord & Rope Mach.

No. 14,938. Patented May 20, 1856.

Fig. 3.

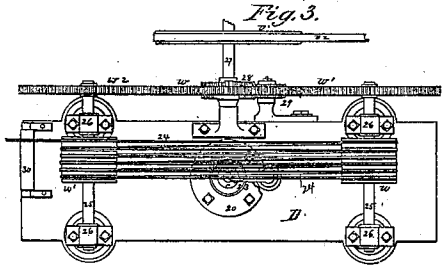

Fig. 2.

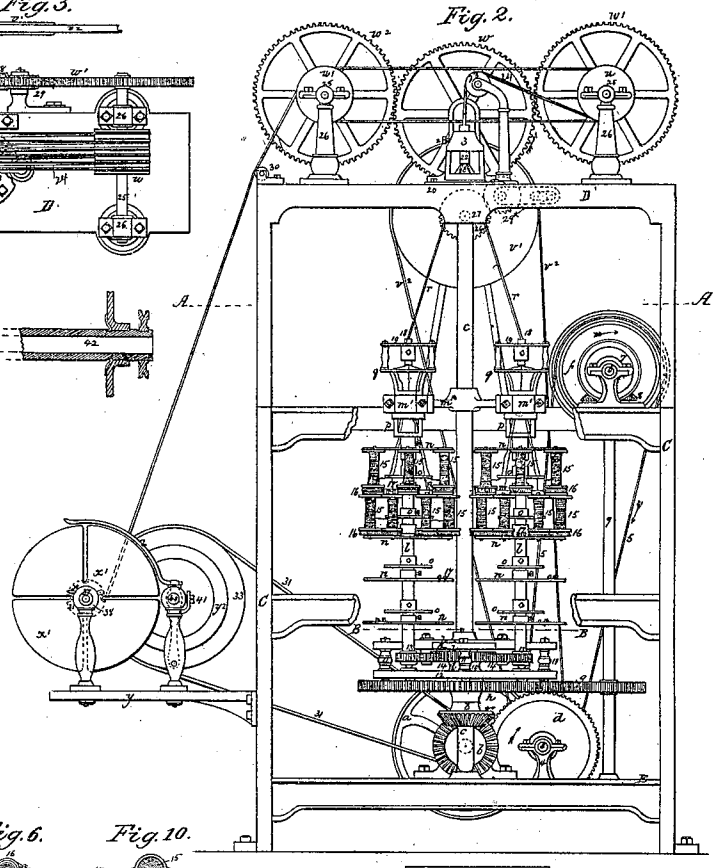

Fig. 9.

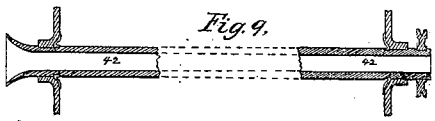

Fig. 5.

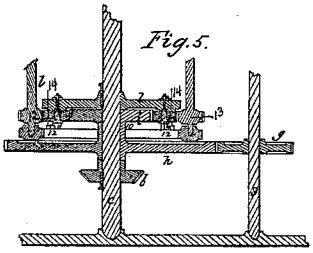

Fig. 8.

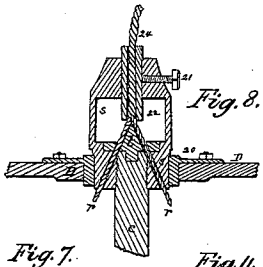

Fig. 6.

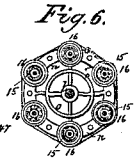

Fig. 10.

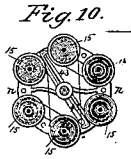

Fig. 7.

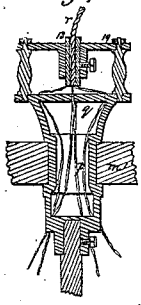

Fig. 11.

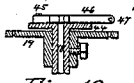

Fig. 12.

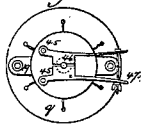

Fig. 4.

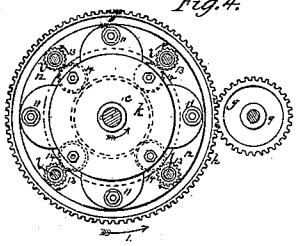

Fig. 1.

Witnesses.

Philip Jordan

Samuel W. Gerrell

Inventor.

William R. Dutcher.

UNITED STATES PATENT OFFICE.

WILLIAM R. DUTCHER, OF TROY, NEW YORK, ASSIGNOR, BY MESNE ASSIGNMENTS, TO HARVEY CHURCH, OF SAME PLACE.

IMPROVEMENT IN MACHINERY FOR MAKING ROPE AND CORDAGE.

Specification forming part of Letters Patent No. **14,938**, dated May 20, 1856.

To all whom it may concern:

Be it known that I, WILLIAM R. DUTCHER, of Troy, in the county of Rensselaer and State of New York, have invented, made, and applied to use certain new and useful Improvements in Machinery for Making Rope and Cordage; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawings, making part of this specification, wherein—

Figure 1 is a plan of the machine at and below the line A A of Fig. 2, and Fig. 2 is an elevation of the machine complete. The other figures are separately referred to, and similar marks of reference indicate the same parts.

The nature of my said invention consists of certain improvements based upon Letters Patent granted to Messrs. Harris, Stott, and Richmond on October 31, 1854, for machinery for the same purpose.

My improvements relate, first, to a peculiar arrangement of gearing and parts sustaining and rotating the creels; second, to a means for regulating the tension of the warp forming the strands; third, to the construction of the blocks used to lay up the strands; fourth, to the construction of the cap used to lay up the strands into rope, and lastly, to the means for leading the warps from the bobbins to form the strands, thereby causing the same to run off the bobbins more uniformly.

In the drawings, a horizontal shaft 1 is supported in journals on the frame C of the machine and driven by competent power through pulleys or wheels *a a*, and on the inner end of the shaft 1 miter-gearing *b b* communicates motion to a vertical shaft *c*, set at the bottom in a step on the cross-piece E of the framing, and at the top this shaft is supported in a framing D and acts to lay up the rope in the manner hereinafter specified. This vertical shaft *c* also carries the creels or frames of bobbins forming the strands of the rope, and as said creels revolve with the shaft *c* and also the strands *r r*, which lay up to form the rope, the said creels have to revolve at an increased speed in the opposite direction to said shaft *c*, in order to give said strands the necessary twist. The motion to revolve said creels is communicated as follows, reference being had to the arrows indicating the direction of revolution: On the shaft 1, near the miter-wheels *b*, a pinion 2 is fitted, gearing to a wheel *d* on a second shaft 3 in journals 4 4 and carrying a cone of pulleys *e e*, with a belt 5 to a similar cone of pulleys *f f* on a horizontal shaft 6, by means of which pulleys the speed of the shaft 6 can be regulated and also the parts taking motion therefrom. On this shaft 6 is a pair of miter gear-wheels 7 7, fitted adjustably on said shaft, so that either one can be brought into gear with a wheel 8 on a vertical shaft 9 to drive the same in either direction, according to which of the gears 7 is brought in contact with said wheel 8. This shaft 9 is stepped at the bottom on the cross-piece E and fitted with a wheel *g*, gearing to a large wheel *h*, that sets loosely, so that it can revolve on the shaft *c*, and said gear-wheel *h* is formed with a sleeve 10, extended upward (see vertical section, Fig. 5) and provided with another gear-wheel *i* beneath a plate or disk K, attached firmly to and revolving with the main shaft *c* and carrying the short columns 11 11 below said disk, which sustain and rotate the ring 12, that is provided with steps receiving the lower ends of the vertical shaft *l*, carrying the creels and bobbins, which shafts *l* are also sustained by and revolve in journals on the ends of arms or a spider-frame *m*, keyed onto the main shaft *c*. On the shafts *l*, near their lower ends, small pinions 13 are provided, gearing to intermediate pinions 14, fitted on studs on the under side of the bottom plate *k*. On reference to Fig. 4, which is a sectional plan of the gearing below the line B B, it will be seen that while the main shaft *c* and creels revolve in the direction (as a whole) of the arrow 1 the creel-shafts *l* themselves turn on their axes in the direction of the small arrows. Hence if the large wheel *h* and wheel *i* were stationary the creel-shafts, bobbins, and the strands formed from them would be twisted in the correct direction in consequence of the intermediate pinions 14. Therefore if the large wheel *h* be propelled in the same direction as the main shaft, but slower than the same, the strands formed from the creels will not be twisted as much as if the wheel *h* were stationary, and the faster said wheel *h* be rotated in this direction by speed-

ing the parts through the cone of pulleys *e f* the slower the creels will revolve and the less twist there will be in the strands; but if the miter-gears 7 be so set as to revolve the wheels *h i* in the opposite direction to the main shaft *c* the twist on the strands will be greater in proportion to the speed of said wheels *h i*. By this arrangement the extent of twist to the strands can be regulated to any desired amount, and that without any variation in the construction of the parts.

The creels themselves are formed of any desired number of rings *n*, attached to each shaft *l* and fitted with holes, through which the pins of the bobbins 15 are inserted, and the number of bobbins placed in each creel is to be such as to form the desired size of strand and roping or cordage. To receive the bottom of the bobbins, I provide small metallic or other suitable disks 16, with a pin entering the end of the bobbin, so that they turn together, and each disk has a groove around its edge, into which groove a wire or cord is passed as the said disks stand in the circular form in the ranges of the creels, (see Fig. 6,) and one end of said wire is attached to the ring *n* and the other adjusted by a tightening-screw 17, so that any desired amount of friction can be applied to prevent the yarn or sliver running off the bobbins too freely, and said yarn is led beneath and up through small guide-rings *o*, which prevent the same becoming entangled.

By reference to Fig. 10 it will be seen that large-sized bobbins may be inserted in place of those shown in Figs. 2 and 6, or the same-sized bobbins may be brought into less space by simply replacing the ring *o* by arms 43, with holes on the ends, and leading the yarn through these holes in the manner shown. Thereby the yarn is allowed to run freely off the bobbins, and by providing an extra hole in the next arm above the yarns from the separate ranges of bobbins are led off separately to the lay-up block, and the creels are thereby condensed and rendered far easier to drive and less expensive to manufacture.

Each of the creel-shafts *l* extends vertically to a little below the journal *m'* and is fitted into a hollow gudgeon *p*, open at the sides below the bearings and fitted with arms above carrying a lay-up block *q*. (Shown sectionally in larger size, Fig. 7.) This lay-up block is provided with the required number of holes to pass the warps or yarns an equal number through each hole, so as to lay the same up uniformly into the strand, as all these yarns or warps pass through a tube 18, sustained by columns and a cross-bar 19 above the center of the lay-up block *q* and on the line of center of the shaft *l*. The tubes of these lay-up blocks can be taken out of their respective supports on releasing the set-screws and others substituted, with larger or smaller holes through them, according to the required size of strands, and the tension of the strand itself is regulated by the distance between the lay-up block *q* and pipe 18, for if said pipe be brought closer to the lay-up block more power will be required to draw the strand through, and consequently the tension will be greater.

Figs. 11 and 12 show a section and plan of a variation in the lay-up block, which becomes necessary with yarn or strands that are uneven or knotty, in order to prevent said knots sticking in the tube 18; but in this figure this tube is larger than the strand, passing the same freely, and on the upper end of this tube a disk or plate 44 receives the screws 45, attaching the spring-jaws 46, and these jaws open and shut freely by moving on the screws 45, and into each of said jaws, over the center of the tube 18, semicircular notches are formed and beveled off at top and bottom, so as to form when set together an adjustable spring-tube to bind onto and hold the strand with the necessary power as it runs through the same, but yielding for any knots or inequalities to pass through with the strands, and the amount of force applied to keep these jaws together is regulated by a rod and set-nut 47, applied to the ends of the springs on the jaws. It will be thus seen that each strand is properly laid together and twisted by the revolution of the creel, in the manner before described, and the strands themselves are led into the lay-up cap on the end of the main shaft and formed into rope, as next set forth.

On the cross-frame D is a ring-flange 20 passing through said frame and forming the journal-box for the main shaft *c*, and screwed onto the end of said shaft *c* is the lay-up cap *s*, fitting the inside of the flange 20, and also formed with a recess in its upper end to receive the cap-piece or cone *t*, that is made movable, so that different-sized cones can be substituted, and in this cone grooves are formed of the required size passing to holes through the cap *s*, that receive and pass the strands *r*, and in consequence of the shaft *c* rotating in the reverse direction to the twist of the strands *r* and at a slower speed the rope is formed at the apex of the cone *t* before mentioned, and in order to make the rope of a uniform size and evenly laid I provide a hollow tube 22, with a bell-shaped mouth setting over the cone *t* and passing off the rope as it is formed. This tube 22 is supported in a socket 21 and secured by a set-screw, by which the tube can be removed and another substituted with a different-sized hole adapted to the given size of rope or cordage.

The rope or cordage is stretched and drawn away from the machine in the following manner: A small pulley *v* on the shaft 3 communicates by a belt v^2 rotation to the pulley *v'* and shaft 27, supported in suitable bearings and having a movable wheel or pinion 28 near the frame D gearing to an adjustable

pinion 29, set on a sliding gudgeon on the frame D, and by changing this pinion 28 the relative speeds can be proportioned, so as to draw the rope or cordage off with a faster or slower motion as it is made. This pinion 29 gears into a wheel w, set on a gudgeon attached to an arm on the frame D, and said wheel w turns two wheels w' and w^2, set on shafts 25 in journals on the upper end of columns 26 26, and on said shaft are grooved drums u and u', around which the rope or cordage is wound and by their speed in proportion to the amount of rope made by the machine, so the same will be stretched and the strands drawn compactly together. The rope or cordage 24 passes out of the lay-up tube 22 over a roller or sheave 23 to the said drum u, and from the drum u' the said rope passes over a long friction-roller 30 to the apparatus for winding the rope or cordage into a coil, which apparatus is constructed as follows:

A belt 31 from a pulley 32 on the shaft 1 communicates motion to a wheel 33 and pinion 34, driving the gear-wheel 35 and shaft 36 of the winding-reel. This reel is made with a metallic head x on the shaft 36 and a similar head x' on a movable shaft 37, that is so fitted in a box 38 that the same can be slid along to confine and rotate a wooden block z' by means of square lugs on the ends of said shafts 36 37 entering recesses in the ends of said block z', the shaft 37 being held in place to confine the said block by means of a locking-piece 39 entering a groove therein. The reel and parts attached are supported on the frame y on the side of the main frame c, and to give facility for tying the coil of rope or cordage the heads x x' are provided with radial slots (see Fig. 2) in which the cording of the bale is tied up, the same having previously been inserted through the coil in grooves on the sides of the block z'.

In order to wind the rope or cordage regularly on the reel, I make use of a slotted traveler z, that moves back and forth on the guide-rod and shaft 40 in consequence of a button 41 traveling in an endless screw-thread cut on said shaft 40, and this shaft is rotated with the speed required, according to the size of rope, by conical grooved pulleys y' y^2 banded together.

Should the yarn made use of to form the strands be irregular or require rubbing down, the same is to be done by rollers or smooth surfaces between which the strands r pass, and said rubbing-surfaces are to be mounted on arms or a spider-frame setting around the shaft c between the frame D and the spider m, and to this frame a vertical vibrating or jigging motion is to be given as the said shaft and rubbing-surfaces revolve by any suitable cam, as in the patent of Harris, Stott, and Richmond, before referred to. Some characters of yarn and strands require sizing before being laid up into rope, and to accomplish this purpose I make use of a suitable vessel or receptacle for the size attached around the shaft c near its upper end, and through the bottom of said vessel tapering tubes of elastic material, such as india-rubber, are inserted and secured in place, and through these tubes and the body of sizing above their upper ends the strands are passed to the lay-up cap, and in this case the rope requires drying before it is wound up into a coil, and for this purpose I introduce a drying and ironing tube between the roller 23 and drum u or in any other convenient place. Said tube is made as shown in larger size in Fig. 9, and is slightly larger at one end than the other and bell-mouthed, so as to pass the rope freely, and as the rope is drawn through said pipe 42 the same is revolved in suitable bearings by a band or otherwise at the same time that hot air or steam is supplied to the outside of said tube within a suitable casing. Thereby the said rope or cordage is dried and smoothed down to a handsome and perfect finish.

I do not claim the wheels 7 and 8 and other gearing for giving a larger or smaller amount of twist to the strands, as this is the subject of the before-mentioned patent; neither do I claim rubbing down or sizing the yarn.

I do not claim regulating the tension of warps or strands by means of a wire or cord in a grooved disk; neither do I claim a belt or strap running around bobbins as they stand in a circular range for the purpose of rotating such bobbins; neither do I claim a revolving tube passing the strands, nor a plate or lay-up block through which the strands pass; but I am not aware that a pipe has ever before been fitted above each lay-up block in such a manner as to regulate the tension of the yarn by adjusting said pipe nearer to or farther from the said lay-up block.

I do not claim the grooved cone t, as this has been used in rope-walks and machinery; also, a tube has been used in connection with such cone. Therefore I do not claim the same, but limit my claim, as hereinafter specified, to the peculiar construction of the parts.

I do not claim leading the yarn or sliver off to one side of the inclosing can, but where bobbins are made use of there must be sufficient distance between the bobbin and the hole through which the yarn passes to allow said yarn to pass off freely. Hence in cases where the yarn is led toward the center of the circular range of bobbins that range has to be so large to provide for the above requirement that the machines become heavy and cumbersome. Therefore I lead off the yarns toward the opposite side of the range to where the bobbin stands, which provides sufficient distance to cause the yarn to run off with a uniform tension from the top and bottom of the bobbins, and thereby said bobbins can be brought into less space. The holes in the arms thus do not become regulators of the tension by their size, but provide for the yarn

being drawn off in such a manner as not to be varied in its tension by any varying angle of the yarn in passing off the bobbin.

What I claim, and desire to secure by Letters Patent, is—

1. The arrangement of the gear-wheels *h* and *i*, pinions 13 and 14, plate *k*, and ring 12 for sustaining and revolving the creel-shafts *l*, as specified.

2. The adjustable friction-wire or cord passing around in the disks of the circular ranges of bobbins, thereby simultaneously regulating all the yarns in each range to precisely the same tension, substantially as specified.

3. The adjustable tube 18 over the center of the lay-up block *q* for the purpose of regulating by its proximity to said lay-up block the tension of the various yarns composing the strands, as specified.

4. The construction of the lay-up cap *s* on the end of the shaft *c*, fitted to receive the movable cone *t* and adjustable tube 24 in the manner specified, so that the tube and cone can be conveniently changed to adapt the parts to laying up different-sized rope or cordage.

5. Leading the yarn off from the bobbins to a hole or guide on the arms 43, or their equivalents, on the opposite side, or nearly so, of the circular ranges of bobbins in the creel, for the purposes and substantially as specified.

In witness whereof I have hereunto set my signature this 18th day of March, 1856.

WILLIAM R. DUTCHER.

Witnesses:

PHILIP JORDAN,

LEMUEL W. SERRELL.