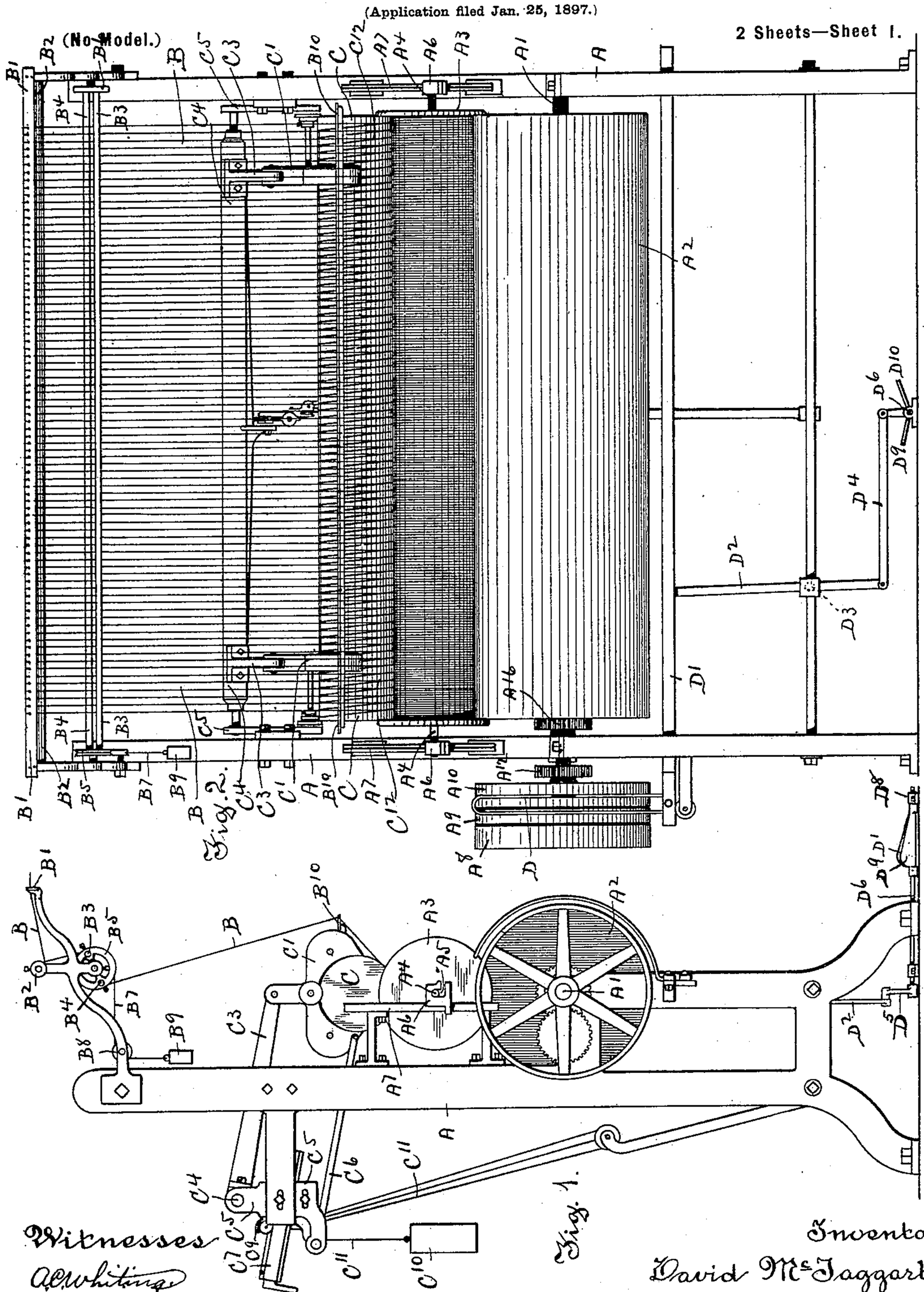
No. 631,876. Patented Aug. 29, 1899.

D. McTAGGART.

WINDING MACHINE.

(Application filed Jan. 25, 1897.)

(No Model.) 2 Sheets—Sheet 1.



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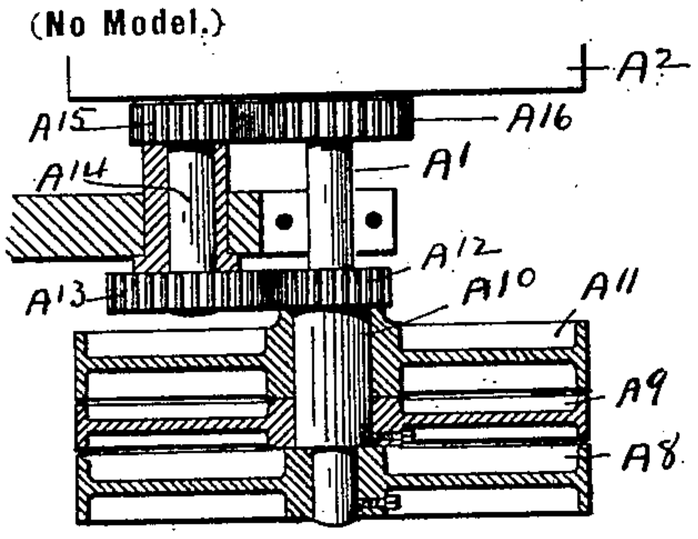


Fig. 3.

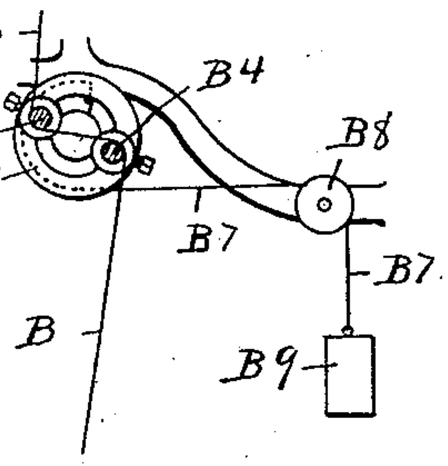
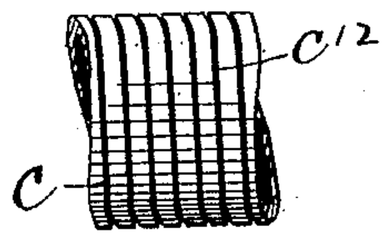


Fig. 4.

Fig. 5.



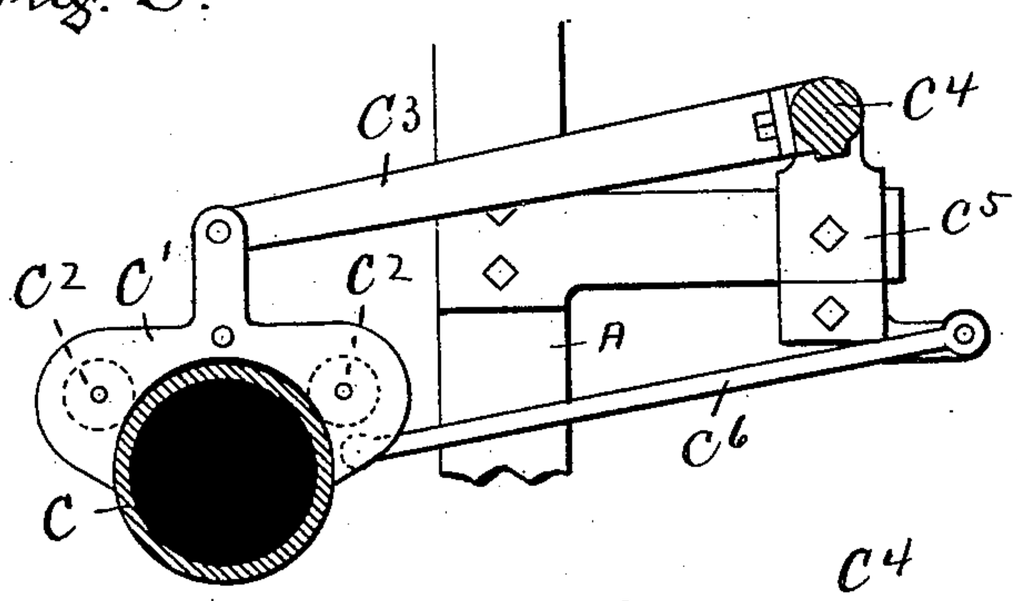


Fig. 7.

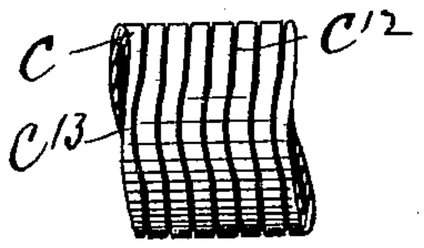


Fig. 6.

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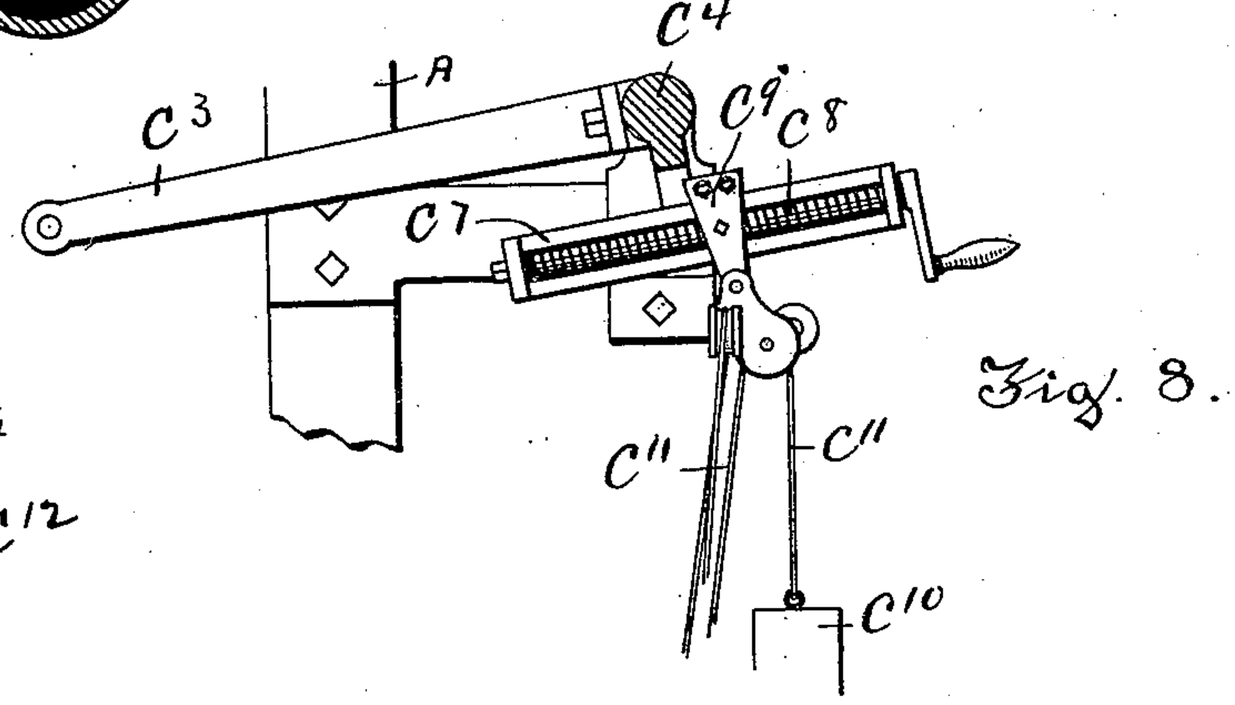

Fig. 8.

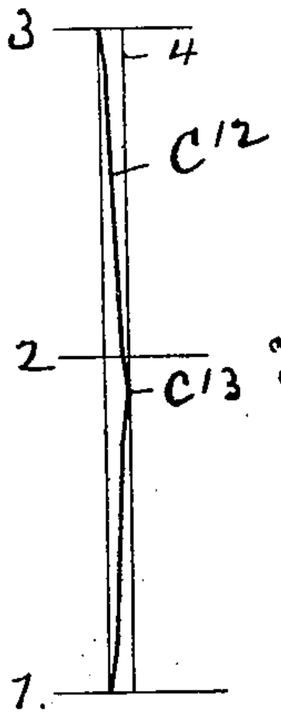

Fig. 9.

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UNITED STATES PATENT OFFICE.

DAVID McTAGGART, OF WORCESTER, MASSACHUSETTS.

WINDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 631,876, dated August 29, 1899.

Application filed January 25, 1897. Serial No. 620,684. (No model.)

To all whom it may concern:

Be it known that I, DAVID McTAGGART, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented a new and useful Improvement in a Winding-Machine, of which the following is a specification, accompanied by drawings forming a part of the same, in which—

Figure 1 represents a side elevation of a winding-machine embodying my invention. Fig. 2 is a front view. Fig. 3 is a detached view of the driving-pulleys and a back gearing by which the winding-beam is driven. Fig. 4 is a vertical sectional view through the parallel take-up rods for taking up the slack in the strands which are being wound. Figs. 5 and 6 represent sections of the pressure-roll provided with V-shaped grooves into which the strands are conducted as they are being wound, said grooves being arranged obliquely to the axis of the roll, so the strands contained therein will be traversed along the winding-beam. Figs. 7 and 8 represent certain parts of the rocking framework by which the pressure-roll is supported, and Fig. 9 is a diagrammatic figure illustrating the disposition of the V-shaped grooves in the pressure-roll.

Similar letters refer to similar parts in the different figures.

My present invention relates particularly to that class of winding-machines which are designed to wind several strands, each taken from a single bobbin, side by side upon a common winding-beam; and it has for its objects to provide means for controlling the tension upon the strands between the bobbins and the winding-beam, so that any undue tension applied to a strand in excess of its tensile strength will cause it to break nearer the bobbin than the winding-beam, to provide means for taking up a limited amount of slack which may occur in the strands during the process of winding, to provide means for applying a pressure to the strands as they are being wound upon the winding-beam, to provide means for imparting a traverse motion to the strands as they are laid upon the winding-beam, and to provide a mechanism for driving the winding-beam whereby the inertia of the rotating parts is gradually overcome in starting and stopping the machine, and these objects are accomplished through the mechanism hereinafter described.

Referring to the drawings, A denotes the framework of the machine, in which a shaft A′ is journaled. The shaft A′ carries a drum A^2, upon which the winding-beam A^3 rests and is driven by its contact with the drum. The winding-beam A^3 is held in place by inserting its gudgeons A^4 in slots A^5, formed in blocks A^6, which are capable of sliding upon the vertical rods A^7, held by the frame. The drum A^2 is driven by a belt through the mechanism represented in detail in Fig. 3 and comprising a belt-pulley A^8, attached to the end of the shaft A′, a belt-pulley A^9, attached to a sleeve A^{10}, turning loosely on the shaft A′, and a belt-pulley A^{11}, turning loosely on the sleeve A^{10}, said belt-pulleys being arranged side by side so the belt can be shifted from one to the other. The sleeve A^{10} carries a pinon A^{12}, engaging a gear A^{13}, attached to an intermediate shaft A^{14}, journaled in the frame of the machine and carrying a pinion A^{15}, which engages a gear A^{16}, attached to the shaft A′, the gears being so proportioned that when the drum A^2 is driven through the belt-pulley A^9 and intermediate gearing it will be driven at a less rate of speed than when driven through the belt-pulley A^8, and consequently when the drum A^2 is driven through the belt-pulley A^8 the pulley A^9 will be driven at a higher rate of speed than the pulley A^8. When the machine is started, the driving-belt is shifted from the loose pulley A^8, passing over the face of the pulley A^9, which causes the drum A^2 and pulley A^8 to be rotated at a lower speed, thereby gradually overcoming the inertia of the machine and causing the belt to be shifted upon the pulley A^8 when the pulley is running. When the machine has stopped, the driving-belt is shifted from the loose pulley A^8 to the loose pulley A^{11}, passing over the face of the intermediate pulley A^9, which is running at a higher speed, thereby causing the belt to act as a brake upon the pulley A^9 and partially stopping the machine before the belt is carried upon the loose pulley A^{11}.

The strands B to be wound are taken from individual bobbins in the usual manner, but not shown in the drawings, and are conducted through an overhead guide-plate B′ and carried once around a roll B^2, journaled in the frame of the machine, for the purpose hereinafter set forth. From the roll B^2 the strands are carried between parallel rods B^3 B^4, held at their ends in disks B^5 B^6. The disks B^5 and B^6 are provided with gudgeons or trunnions on the sides opposite the parallel rods B^3 B^4, which are journaled in the framework, with their axes in alinement and passing midway between the parallel rods B^3 B^4. The disk B^5 has its periphery scored to receive a cord B^7, wound partially around the disk and carried over a roll B^8, supported on a fixed stud. A weight B^9 is suspended by the cord B^7 to rotate the disks and hold the parallel rods B^3 B^4 against the opposite sides of the strands B. While the strands are being wound, their tension exerted against the rods B^3 B^4 is sufficient to counterbalance the weight B^9; but in case the winding-roll is reversed and the tension removed from the strands B the weight B^9 will then act to rotate the rods B^3 B^4 and take up the slack in the strands. The strands B are conducted from the take-up rods B^3 B^4 to a guide-plate B^{10}, provided with a series of eyes or notches in the usual manner, which serves to hold the strands equidistant and deliver them to the winding-beam A^3. Resting upon the strands as they are wound upon the barrel of the winding-beam A^3 is a metallic pressure-roll C of suitable length to be inserted between the heads of the winding-beam and held in claws C′ C′, which inclose slightly more than one-half the periphery of the roll, so the pressure-roll may be lifted off the winding-beam by the elevation of the claws C′. The periphery of the pressure-roll bears against a friction-roll journaled in the claws and denoted by the broken lines C^2, Fig. 7, so the pressure-roll may turn freely by its contact with the strands as they are wound upon the winding-beam. The claws C′ are pivotally connected with the ends of levers C^3, which are attached at their opposite ends to a rocking shaft C^4, journaled in brackets C^5 C^5, supported by the frame of the machine. Links C^6 are pivotally connected with the brackets C^5 and the claws C′ in order to hold the claws in a parallel position as the shaft C^4 is rocked.

Suspended beneath the rocking shaft C^4 and transversely thereto is a bar C^7, having a screw C^8 journaled therein and having a track for a sliding block C^9, which is provided with a nut engaging the screw C^8, so the rotation of the screw will cause the block C^9 to be moved along the transverse bar C^7 and from one side to the other of the rocking shaft C^4. The weight C^{10} is applied by means of cords C^{11} to exert a downward pulling strain upon the sliding block C^9, so that when the sliding block C^9 is moved to the inner end of the transverse bar C^7 the weight C^{10} will rock the shaft C^4 and carry the pressure-roll C down upon the strands as they are wound upon the winding-beam and compressing them between the pressure-roll and the barrel of the winding-beam; but when the sliding block is moved to the outer end of the transverse bar C^7 the weight C^{10} will be exerted to rock the shaft C^4 in the opposite direction and raise the pressure-roll C off the winding-beam.

The pressure-roll C is provided with a series of shallow V-shaped grooves C^{12}, each groove passing entirely around the roll and at an oblique angle with the axis of the roll, the pitch of each groove being equal to the distance between the strands and the number of grooves being equal to the number of strands. The strands B as they are delivered from the lower guide-rail B^{10} to the winding-spool are held at the proper angles to bring them in contact with the surface of the pressure-roll, so that each one of the strands will lie in a corresponding V-shaped groove, and as the pressure-roll C rotates a traversing motion will be given to each of the strands along the winding-spool C^{13} equal to the pitch of the V-shaped grooves. A slight dwell is given to each strand at the end of its traversing movement, so that it will be wound a short distance at each end of its traversing movement in a line at right angles with the axis of the winding-spool.

Fig. 5 represents the V-shaped grooves C^{12} on that portion of the pressure-roll which imparts the traversing movement to the strands—that is, the grooves in the roll are so disposed that when the strands have been traversed to the right they will be laid upon the winding-beam in a straight line at right angles with the axis of the beam for a short distance before they are traversed to the left and at the end of the traversing movement to the left they will be similarly laid in a straight line before the traversing movement to the right takes place, thereby causing the strands to stay in place as they are laid upon the winding-beam, and Fig. 6 represents the V-shaped grooves on that portion of the roll where the strands are wound at right angles with the axis of the spool. The V-shaped grooves are so disposed on the surface of the roll that the period of dwell does not occur on diametrically opposite sides of the pressure-roll, but are arranged at unequal divisions of the pressure-roll, as illustrated in Fig. 9. The traversing motion of the strands in one direction is accomplished while the roll rotates a little more than one-half of a revolution and the reverse traversing motion of the strands is accomplished while the roll is rotated a little less than one-half of a revolution. This inequality in the disposition of the V-shaped grooves prevent

the strands from being traversed on the winding-spool in the same path during two successive rotations of the pressure-roll.

The driving-belt is conducted to the pulleys through a belt-eye D, attached to a sliding shipper-bar D′, which slides in ways in the frame A and is pivoted to one end of the lever D^2. The lever D^2 is pivoted upon a fixed stud at D^3 and is connected at its lower end by a link D^4 with a vertical arm D^5, attached to a rocking spindle D^6, journaled on the floor. A triangular plate is attached to and extends transversely above the spindle, serving as a foot-rest and shipper-plate for an attendant by placing the heel upon the apex D^8 of the plate and swinging the foot to the right or left over the wings D^9 D^{10}, rocking the spindle D^6 in one direction or the other, and thereby actuating the sliding shipper-bar D′.

The roll B^2 is journaled to rotate freely, so the movement of the strands B as they are wound upon the winding-roll will rotate the roll B^2 with but little increase in the tension of the strands. The surface of the roll B^2 is slightly roughened to resist the slipping of the strands on the roll. The roughening of the surface of the roll B^2 may be accomplished by any known method. One plan adopted by me is to make the roll B^2 of metal and knurl or mill its surface, so as to cause the strands B to cling slightly to the roll, and another consists in forming the roll of wood and covering its surface with a coating of fine emery, attached by glue or sizing to the surface of the roll. The function of the roll B^2 is twofold: first, whenever an undue strain is placed upon any of the strands by reason of their being caught or held at the bobbin the bight of the strands upon the roll will cause the strain to be distributed between the roll and the bobbins, so that in case the strain exceeds the tensile strength of a strand the breakage will occur between the roll B^2 and the bobbin, and, second, by roughening the surface of the roll B^2, so as to prevent the slipping of the strands, the length of all the strands fed to the winding-roll becomes uniform, as the movement of each strand toward the winding-roll is controlled by the rotation of the roll B^2, and at each rotation of the roll each of the strands B is fed to the winding-roll a distance equal to the periphery of the roll B^2.

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

1. In a winding-machine, the combination with a winding-beam, of a take-up consisting of a pair of disks provided with gudgeons, or trunnions on one side journaled in the framework of the machine and having their axes in alinement, a pair of parallel rods between which the strands are conducted connecting said disks on the sides opposite said gudgeons, said rods being arranged on opposite sides of the axes of said disks, a cord wound upon one of said disks and a suspended weight attached to said cord exerting a force to rotate said disk and wind up the strands by the rotation of said parallel rods about the axes of said disks, substantially as described.

2. The combination with the shaft of a winding-beam, of a driving-pulley attached to said shaft, a sleeve journaled on said shaft, a pulley running loosely on said sleeve, an intermediate pulley attached to said sleeve, all three of said pulleys being of uniform diameter, a pinion attached to said sleeve, a gear attached to the beam-shaft, an intermediate connecting mechanism between the gear attached to the beam-shaft and the pinion attached to the sleeve consisting of a shaft parallel with the beam-shaft, provided with a pinion engaging the gear on the beam-shaft and provided with a gear engaging the pinion on said sleeve, whereby the inertia of the warp-beam is overcome by the contact of the driving-belt with said intermediate pulley in starting the warp-beam and whereby the momentum of the warp-beam is overcome by the contact of the driving-belt with said intermediate pulley in stopping the warp-beam, substantially as described.

3. The combination with the shaft of a winding-beam, of a driving-pulley attached to said shaft, a sleeve journaled on said shaft, a pulley running loosely on said sleeve, an intermediate pulley attached to said sleeve, all three pulleys being of the same diameter, an intermediate connecting mechanism between the warp-beam shaft and said sleeve whereby rotary motion imparted to said intermediate pulley will be communicated in the same direction and at a lower speed to said warp-beam shaft and whereby rotary motion imparted directly to said warp-beam shaft through the pulley attached thereto will be communicated in the same direction and at a higher speed to said intermediate pulley, whereby the driving-belt in crossing said intermediate pulley will gradually overcome the inertia of the warp-beam in starting and will gradually overcome the momentum of the warp-beam in stopping, substantially as described.

4. In a winding-machine the combination of a winding-beam, means for rotating said beam, a pressure-roll arranged to rest upon the strands as they are wound upon said beam and having a series of parallel grooves obliquely disposed upon its periphery, and means for varying the pressure of said roll upon the strands, substantially as described.

5. In a winding-machine the combination with a winding-beam and means for rotating said beam of a pressure-roll resting upon the strands as they are wound upon said beam and rotated thereby, said pressure-roll having a series of parallel grooves in its periphery disposed obliquely to the axis of the roll, substantially as described.

6. In a winding-machine, the combination with a winding-beam and means for rotating said beam, of a roll having a series of parallel grooves disposed obliquely to the axis of said roll whereby the strands are traversed on said winding-beam, the periphery of said grooved roll having the same speed as the speed of the strands as they are wound upon the beam, means for supporting said roll and means for conducting the strands between the beam and the grooved roll, substantially as described.

Dated this 22d day of January, 1896.

DAVID McTAGGART.

Witnesses:
RUFUS B. FOWLER,
M. C. PRICE.