(No Model.)

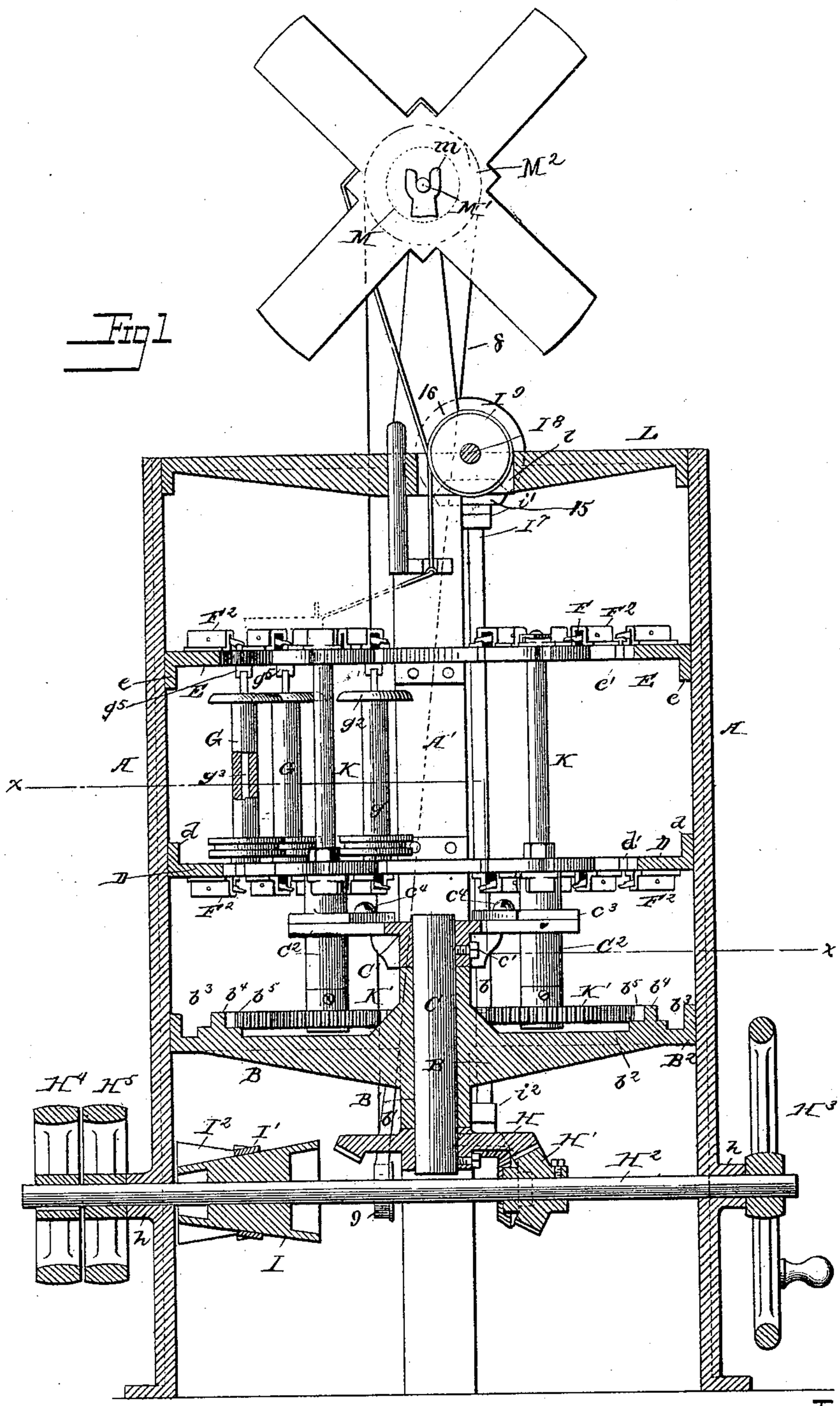
2 Sheets—Sheet 1.

E. E. PIERCE.

ROPE MAKING MACHINE.

No. 365,094. Patented June 21, 1887.

Fig 1



Attests:
W. H. H. Knight
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attys

(No Model.)

2 Sheets—Sheet 2.

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Fig 2.

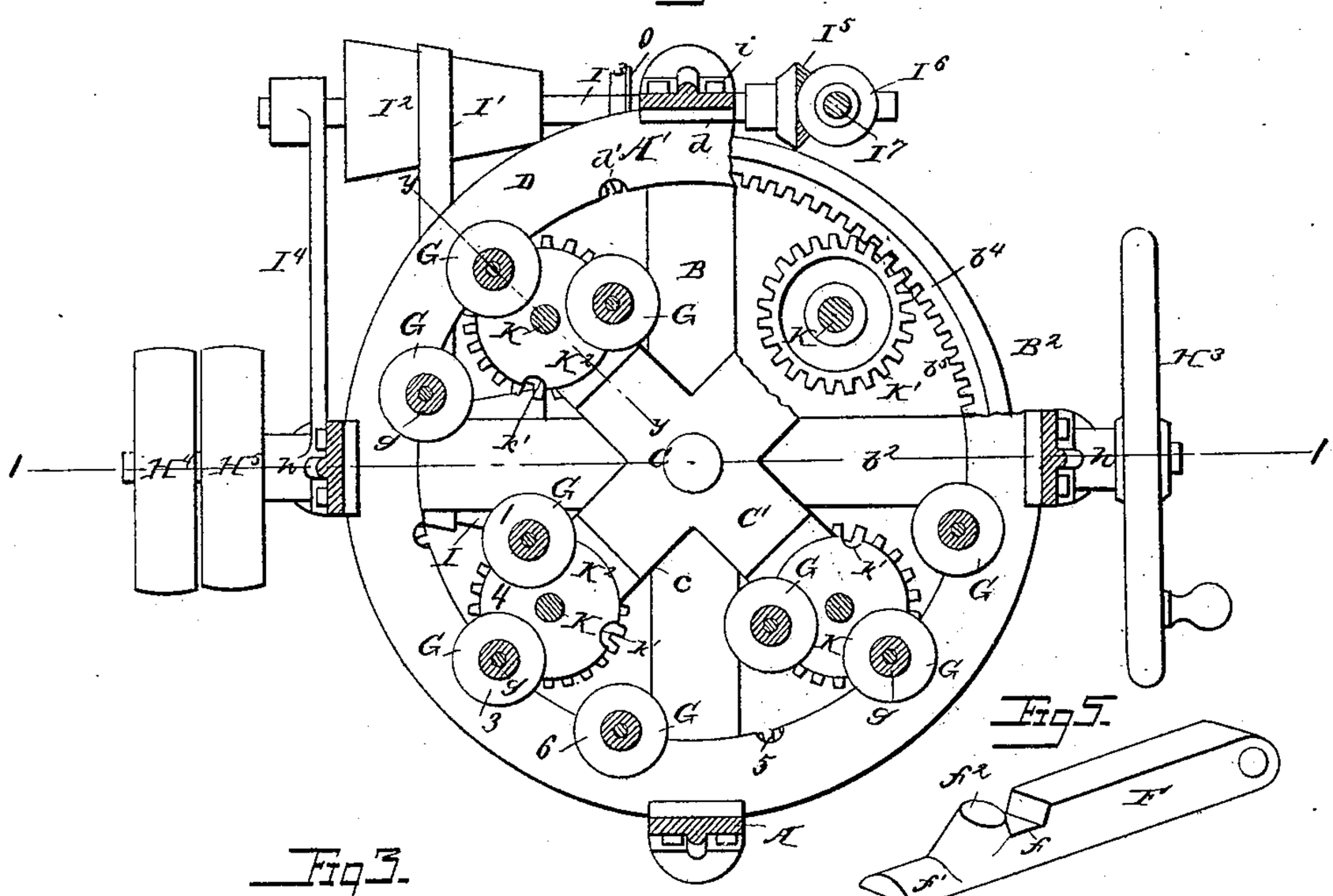


Fig 3.

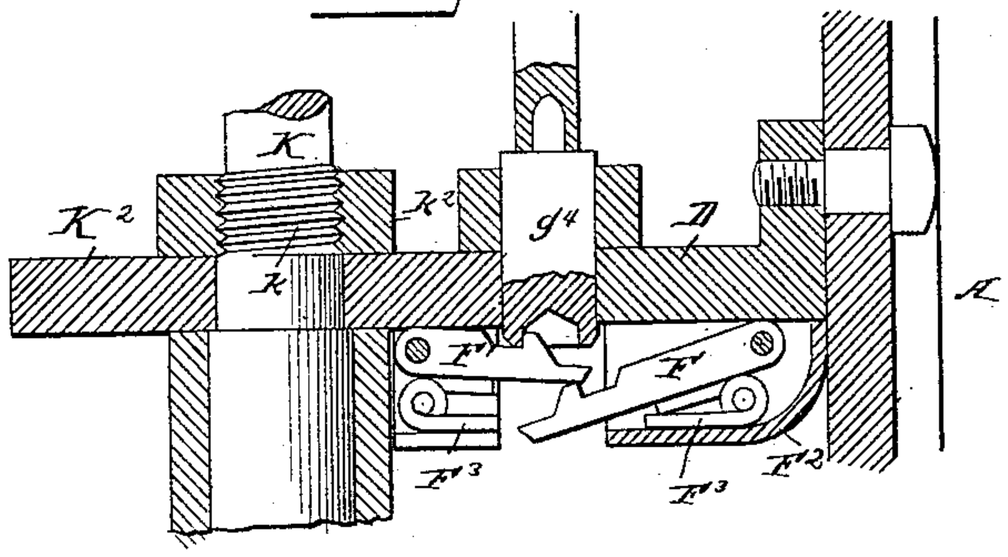


Fig 4.

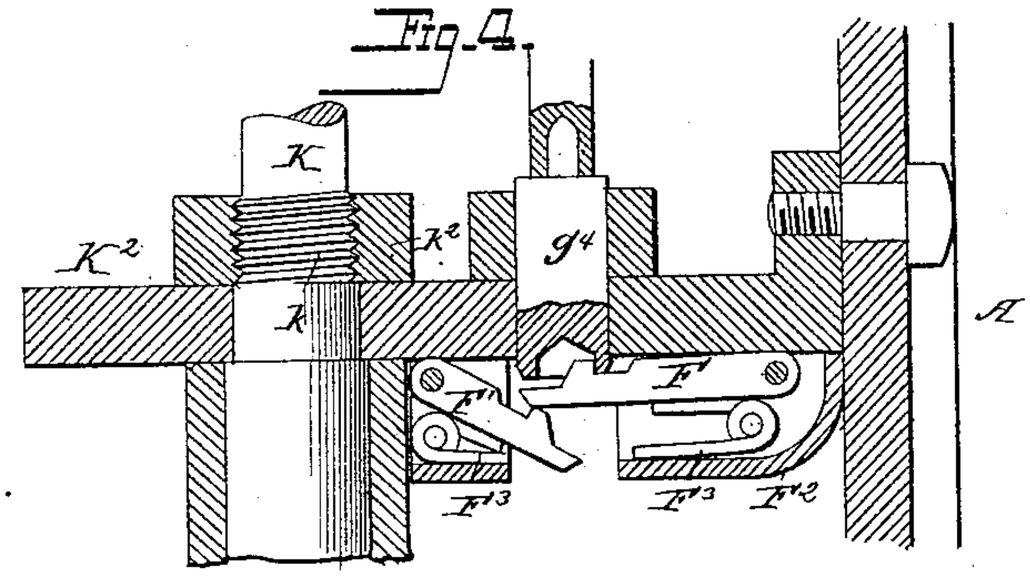


Fig 5.

Fig 6.

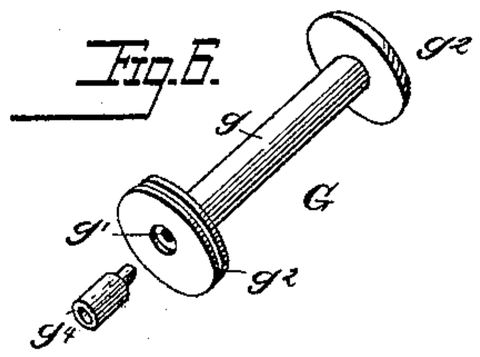
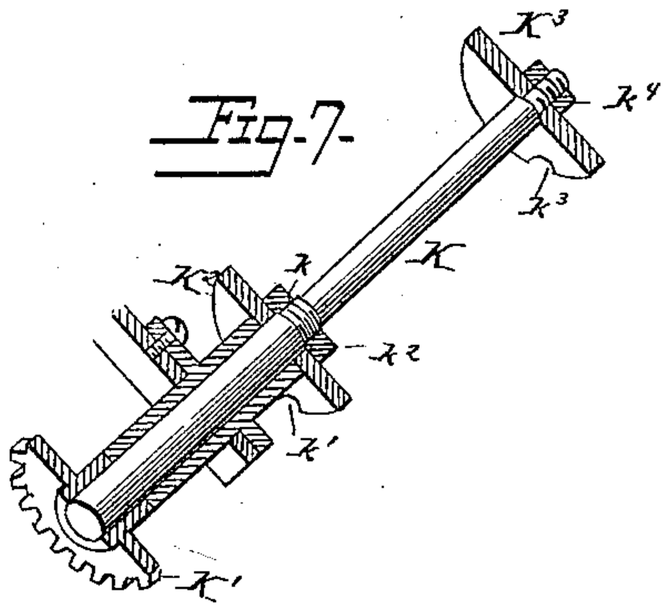


Fig 7.



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Inventor:

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UNITED STATES PATENT OFFICE.

ERASTUS E. PIERCE, OF NEW BRIGHTON, PENNSYLVANIA.

ROPE-MAKING MACHINE.

SPECIFICATION forming part of Letters Patent No. 365,094, dated June 21, 1887.

Application filed April 15, 1886. Serial No. 198,976. (No model.)

To all whom it may concern:

Be it known that I, ERASTUS E. PIERCE, a citizen of the United States, residing at New Brighton, county of Beaver, and State of Pennsylvania, have invented certain new and useful Improvements in Rope-Making Machines, of which the following is a specification.

My invention relates to improvements in rope-making machines; and the novelty consists in the provision, in a machine of the class named, of means for holding the strand-carrying spools firmly in engagement with the devices by which they are operated at points above and below said spools, of means for automatically moving said spools forward in step-by-step motion in such manner that adjacent spools shall pass and repass each other continuously to impart an interlocking twist to the strands in the finished rope, and of means for increasing or diminishing the speed of the feed mechanism, as desired. These several ends I attain substantially by and in the means and manner hereinafter set forth.

In the drawings, in which similar letters of reference denote similar parts, Figure 1 represents a central vertical section, partly in elevation, through a rope-making machine constructed in accordance with my invention. Fig. 2 is a horizontal section thereof on the line *x x* of Fig. 1, showing in a broken plan view the revolving spool-carrying spider and parts of the mechanism below said spider. Figs. 3 and 4 are enlarged detail sectional views taken on line *y y*, Fig. 2, showing one of the strand-carrying spools and the means employed to hold it in engagement with the rotating spider and stationary rings, respectively. Fig. 5 represents a perspective view of one of the spool-holding latches detached from the machine. Fig. 6 represents in perspective a detached detail view of one of the strand-carrying spools, together with the means employed to hold it in position on the machine. Fig. 7 represents in perspective a detached detail sectional view of one of the strand-spool-carrying shafts, its disks and operating-gear.

In carrying out my invention I employ a series (preferably four) of uprights or supporting-legs, A A′, to and by which the several elements comprised in the machine are bolted and supported. I arrange said uprights at equal-spaced distances from each other, as shown.

B designates a spider provided with a hollow center, having bosses *b b′* formed upon its upper and lower surfaces, respectively, to form a bearing, B′, wherein is journaled a rotatable shaft, C, the function of which will be presently explained.

The arms b^2 of the spider B are ribbed upon their lower surfaces, as shown, and are at their outer ends secured to or made integral with a ring, B^2, having in alignment with said arms b^2 its upper surface provided with lugs b^3, that are bolted to the uprights A and A′, and a projecting annular flange, b^4, provided upon its inner surface with gear-teeth b^5, for a purpose hereinafter to be described.

D E designate flat rings, each of which is provided upon one surface, at the outer edge thereof, with lugs *d e*, whereby they are secured by screws, at predetermined distances apart and above the spider B, to the legs or supports A A′, as shown. Each of said rings is provided upon its inner edge with semicircular detents *d′ e′*, that operate, in conjunction with spring-latches F F′, to hold strand-carrying spools G in stationary positions, as hereinafter described.

H designates a bevel gear-wheel mounted upon the lower end of the shaft, that is engaged and operated by a bevel gear-pinion, H′, mounted upon the main or driving shaft H^2, which is journaled in bearings *h*, formed therefor in the opposite supports, A, near the lower ends thereof. Motion is imparted to the shaft H^2 either by a hand-wheel, H^3, or pulley H^4, secured, respectively, upon opposite ends of said shaft. H^5 designates a loose pulley mounted upon the shaft beside the pulley H^4.

I designates a cone-shaped band-pulley that is mounted upon the shaft H^2 adjacent to one of the uprights A, and connected by a belt, I′, with a similar cone-pulley, I^2, mounted upon a short counter-shaft, I^3, that is journaled at one end in a bracket, I^4, projecting laterally from one of the uprights A, and at its opposite end in a bearing, *i*, formed on one of the supports A′, near the lower end thereof. The counter-shaft I^3 is provided at one side of the support A′ with a bevel gear-wheel, I^5, that engages with and rotates a similar bevel gear-

wheel I⁶ mounted upon the lower end of a vertical shaft, I⁷, journaled in brackets *i' i²*, that project from the support A'. The upper end of the shaft I⁷ is provided with a bevel gear-wheel, 15, similar to the wheel I⁶, that engages a gear-wheel, 16, mounted upon one end of the shaft I⁸, that carries the feed-roll I⁹, which latter operates in a slot, *l*, formed at or near the middle of a bar, L, which extends from one to the other of the supports A at the tops thereof.

M designates a rope-reel mounted upon a shaft, M', loosely hung in notches *m*, formed in the upper ends of the supports A', which are extended upwardly for this purpose. The shaft M' is provided with a pulley, M², connected by a cross-belt, 8, with a similar pulley, 9, upon the counter shaft I³, or the main driving-shaft, as described, whereby to rotate the reel M. I provide the upper end of the rotatable shaft C with a spider, C', preferably having four arms, *c*, (but which may, if desired, be provided with any requisite number,) and secure said spider in position on said shaft by a set-screw, *c'*. I provide each of the arms *c*, near its outer end, with an aperture, to receive elongated boxes C², which are provided with laterally-projecting lugs or ears *c*³, that bear upon and are secured to the arms *c* by screws *c*⁴.

K designates vertical shafts, which are journaled at their lower ends in the boxes C², and are provided below said boxes with gear-wheels K', the teeth of which engage the gear-teeth formed upon the inner surface of the annular flange *b*⁴, by which said shafts are rotated. I preferably form the portions of the shafts K within the boxes C² of greater diameter than the upper ends thereof, whereby shoulders *k* are formed at the upper ends of said boxes, upon which rest circular disks K², that are provided upon their peripheries, at spaced distances, with semicircular detents *k'*, for a purpose hereinafter set forth. The bodies of the shafts K immediately above the disks K² are provided with screw-threads to receive burrs or nuts *k²*, that bear upon the upper surface of the disks K², to hold them securely in position. I shoulder the upper ends of the shafts K, securing thereto disks K³, having detents *k³*, similar to those of the disks K². Nuts or burrs *k⁴* hold the disks in position.

It will be observed that the disks K² K³ are placed and operate in the planes of the rings D and E, respectively, that the edges of said disks bear against the edges of said rings, and that as said disks are rotated the detents *k' k³* therein coincide with the detents *d' e'* of said rings D E.

The strand-carrying spools G each consist of a body, *g*, having an axial bore, *g'*, and projecting flanges *g²*. Said spools are held and rotate upon vertical shafts *g³*, that extend between short cylindrical blocks *g⁴ g⁵*, having diameters equal to those of the detents *d' e'* and *k' k³* of the rings D E and disks K² K³, respectively, and are alternately held within the detents of said rings and disks by latches F F', which are pivoted within boxes F², secured to said rings D and E, and disks K² K³ near the detents therein. Each of said latches F F' is provided near its free end, upon one surface, with cut-away portions *f f'*, whereby a projecting stud, *f²*, is formed, that engages with a cup-shaped recess formed in one end of the block *g⁴* or *g⁵* of the strand-spools. I preferably bevel the side edges of the latches F F' near their outer ends, for a purpose hereinafter set forth.

F³ designates springs placed below the latches within the boxes F², that normally hold said latches in planes parallel with the rings D E and disks K² K³.

By reference to the drawings it will be observed that the ring D and lower disks, K², are provided with latches upon their lower surfaces, while the corresponding upper ring, E, and disks K³ have latches upon their upper surfaces. It will be understood that this arrangement of parts permits the free rotation of the several strand-carrying spools, while insuring that said spools be securely held in proper position.

While I have shown the latches F F' as placed upon imaginary radial lines that extend through the detents of the rings D E and disks K² K³, respectively, I yet do not wish to confine myself to this exact arrangement of said parts, inasmuch as said latches may be arranged at an angle to said imaginary lines and properly fulfill their function.

In Fig. 1, at the right, I have shown the spools G removed from their carrying-disks for the purpose of exposing parts otherwise hidden.

The operation of my improvement is as follows: The spools G are first filled with strands and placed upon their axial shafts *g³*, the ends of which are connected to the upper and lower blocks, *g⁴ g⁵*, respectively, and said blocks placed in proper position in the detents of one or the other of the rings or disks, as shown in Fig. 2. Motion is now imparted to the rotating spider C', carrying forward the shafts K, which are by the engagement of their gear-wheels K' with the teeth of the spider B rotated, thereby causing the disks K² K³ to alternately withdraw and deposit a spool from and in the detents of the rings D E—as, for instance, the forward rotation of the disk 4, Fig. 2, will withdraw the spool 3 from the rings D E, deposit the spool 1 in the next succeeding detent 5 and withdraw the spool 6 deposited by the preceding disks, continue in like manner to withdraw and deposit alternate spools from and in the detents of said rings D and E, the latches F F' operating to alternately engage and release said spools. It will be observed that the spools are successively carried to new positions on the rings D E, that thereby an interlocking twist is imparted to the cord.

By reference to Figs. 3 and 4 the position of said latches F F' at the moment of the en-

gagement or release of a spool thereby will be apparent. The first named, Fig. 3, represents a spool held in engagement with the disks by a latch, F′, thereon having passed above the latch F of the rings, and thereby pressed said latch down below that first named and out of engagement with the spool. In Fig. 4 the spool is shown as held within one of the detents of the rings D E, the latches F thereon above the latches F′ of the disks. It will be understood that the ends of latches opposite empty detents of either of the rings or disks will pass above the ends of latches holding spools in position, the inclined upper surfaces of said latches facilitating such operation.

Any desired means may be employed to maintain tension of the strands while the machine is in operation.

Without limiting myself to the exact construction described herein, I claim and desire to secure by Letters Patent—

1. The combination, with the spool-supporting rings and spool-carrying devices of a rope-making machine, of a series of locking-latches secured in fixed positions to hold the spool-shafts against the rings, and a second series of latches mounted upon the spool-carriers in position to engage the fixed latches, and also the spool-shafts, to lock the latter to the carriers, substantially as described.

2. In a rope-making machine, a support, rings secured thereto and provided with detents, and locking-latches, in combination with rotatable disks and disk-carrying shafts and driving-gear, said disks having peripheral detents and provided with locking-latches, substantially as described.

3. In a rope-making machine, the combination of a supporting-frame, rings secured thereto and provided with detents, and locking-latches pivoted to said rings, with strand-spool-carrying disks, disk-carrying shafts, and driving-gear therefor, said disks having detents and locking-latches pivoted to said disks and adapted to engage strand-carrying spools, with axial shafts having recesses to receive said latches, substantially as described.

4. In a rope-machine, a supporting-frame, a stationary spider having an annular geared flange integral therewith and an apertured center, a rotatable shaft, C, journaled in said spider and provided at its opposite ends, respectively, with a rotatable spider, C′, and bevel-gear H, driving-shaft H², and bevel-pinion H′, shafts K, journaled in said rotatable spider and provided with gear-wheels K′, and disks K² K³, having peripheral detents $k' k^3$, in combination with strand-carrying spools G and spring-pressed latches F and F′, and rings D and E, substantially as described, for the purpose set forth.

5. In a rope-making machine, rings D E, having detents and spring-pressed latches F, rotatable disks K² K³, having peripheral detents and spring-pressed latches F′, in combination with a support, a stationary spider, a shaft journaled therein, a rotatable spider secured to said shaft, shafts K, journaled in said rotatable spider, and provided with gear-wheels K′, said gear-wheels and a geared flange secured to said support to rotate the shafts and disks carried thereby, to bring said latches F F′ successively into engagement with strand-carrying spools, substantially as described.

6. In a rope-machine, a series of latches, F and F′, having upward projections f^2 and cut-away portions $f f'$, boxes F², and springs F³, in combination with disks K² K³, rings D and E, strand-carrying spools having removable blocks $g^4 g^5$, provided with cup shaped recesses to receive said latches, rotatable spider C′, shafts K, journaled therein, gear-wheels K′, secured to said shafts, and stationary geared flange b^4 to move said spools in forward direction, substantially as described.

7. In a rope-machine, a main driving-shaft having power-wheels H³ H⁴ and cone-shaped speed-changing pulley I, in combination with counter-shaft I³. having cone-shaped pulley I² and belt I′, bevel gear-wheel I⁵ to engage bevel-gear I⁶ of the feed-roll-operating shaft I⁷, said gear I⁶, shaft I⁷, and bevel-gears 15 and 16, feed-roll I⁹, and a series of strand-carrying spools, and mechanism, substantially as described, for imparting motion to said spools, as and for the purpose specified.

8. In a rope-machine, supports A A′, stationary spider B, attached thereto and provided with a geared flange, b^4, and an apertured center, a vertical rotatable shaft, C, having bevel gear-wheel H, bevel gear-wheel H′, spider C′, having rotatable shafts K, provided with disks having detents and gear-wheels K′, spools G, and latches F, in combination with stationary rings, as D E, having detents $d' e'$, and the main operating-shaft H², substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ERASTUS E. PIERCE.

Witnesses:
W. C. DUVALL,
A. E. F. HANSMANN.