(No Model.) 2 Sheets—Sheet 1.

T. A. LEE.

MACHINE FOR MAKING TENSION RODS.

No. 539,139. Patented May 14, 1895.

Fig. 1.

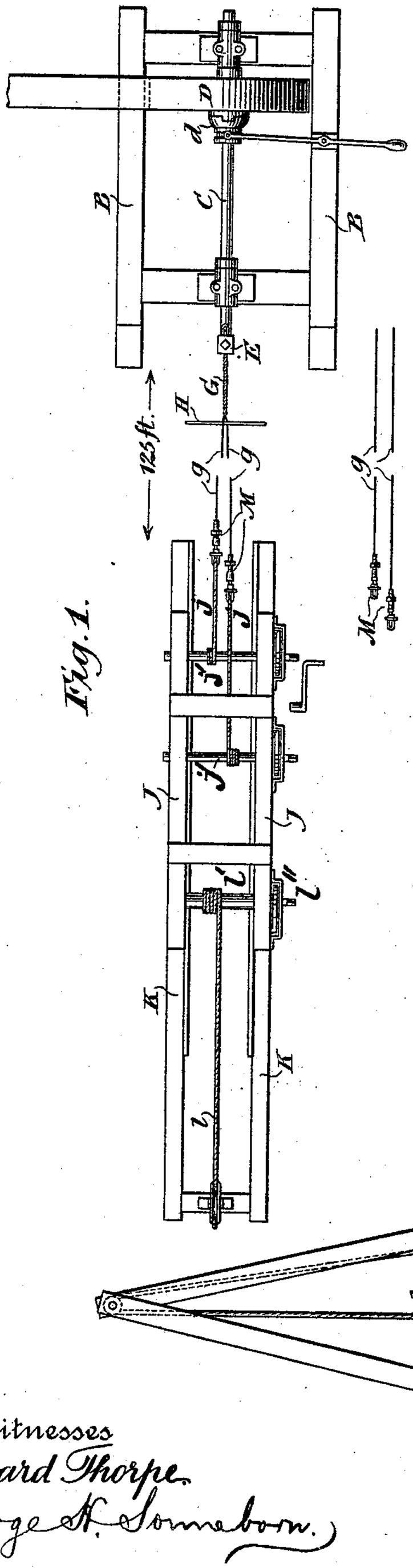

Fig. 2.

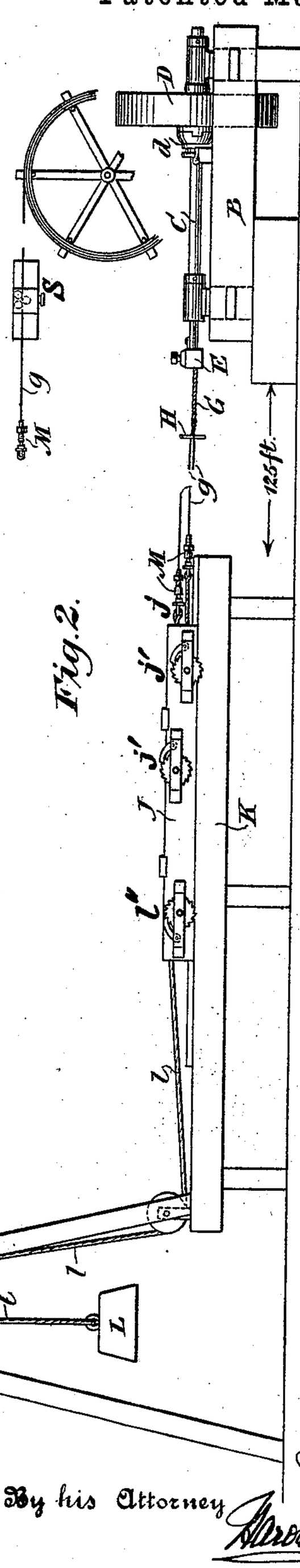

Fig. 2a.

Witnesses
Edward Thorpe.
George H. Somborn.

By his Attorney
Harold Bruce

Inventor
Thomas A. Lee

(No Model.) 2 Sheets—Sheet 2.

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Fig. 4.

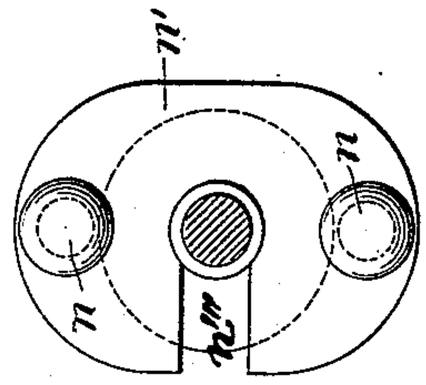


Fig. 3.

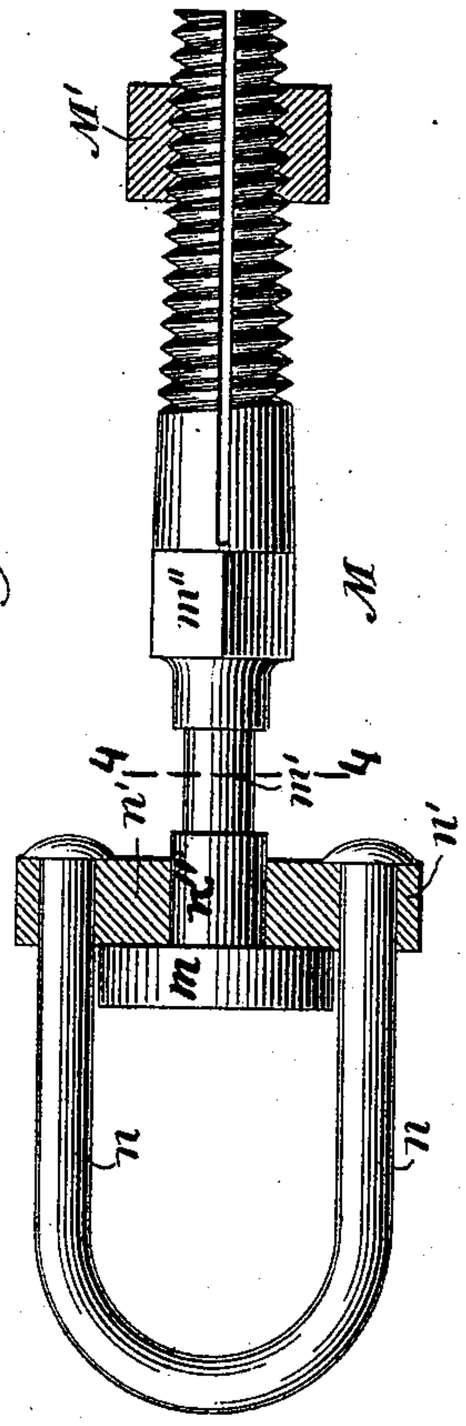


Fig. 6.

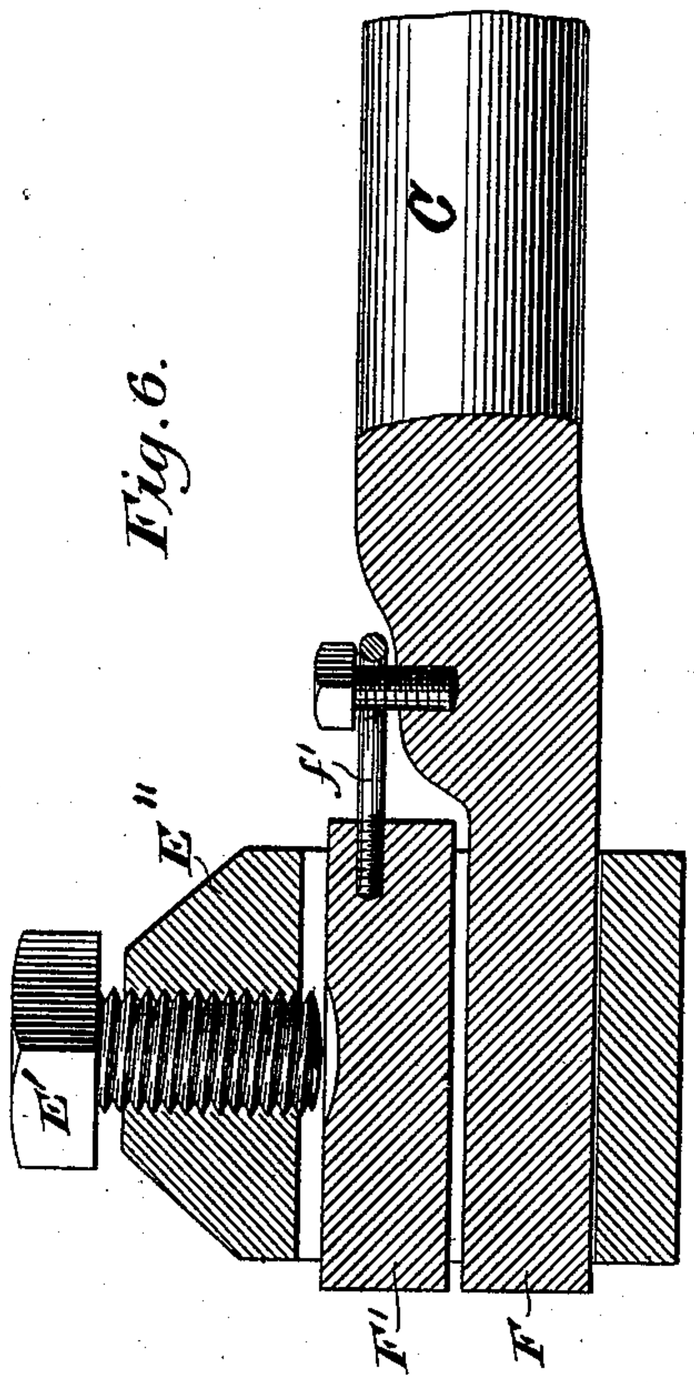
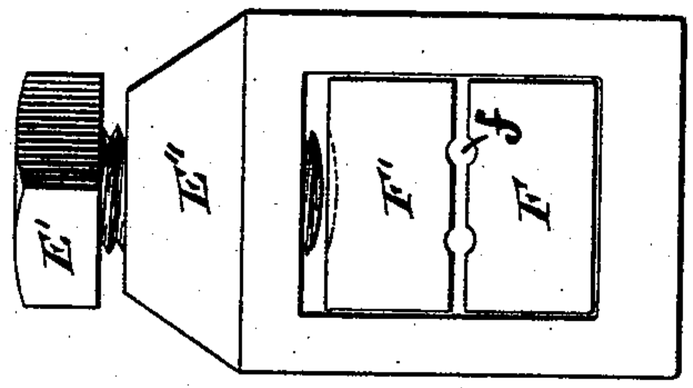


Fig. 5.



Witnesses
Edward Thorpe
George H. Somebody.

Inventor
Thomas A. Lee.
By his Attorney
Harold Sinney

UNITED STATES PATENT OFFICE.

THOMAS A. LEE, OF NEW YORK, N. Y.

MACHINE FOR MAKING TENSION-RODS.

SPECIFICATION forming part of Letters Patent No. 539,139, dated May 14, 1895.

Application filed June 1, 1894. Serial No. 513,197. (No model.)

To all whom it may concern:

Be it known that I, THOMAS A. LEE, of the city, county, and State of New York, have invented certain new and useful Improvements in Machines for Making Tension-Rods for Use in Concrete and Like Materials, of which the following is a description, referring to the accompanying drawings, which form a part of this specification.

In patents of the United States numbered 505,664, dated September 25, 1893, and numbered 513,794, dated January 30, 1894, both granted to me, I have set forth the construction and use of tension rods for strengthening concrete, cement, tile-work, and like constructions, the object of the inventions being to produce rods with very large cement engaging surface whereby, when embedded in cement, concrete, or other materials, and in conjunction with floor blocks or other tile work used in the construction of fire-proof floors, roofs, ceilings, walls, area walks, partitions, and the like, these rods may contribute greater strength than is possible with the cement or tile-work alone. In numerous other patents, some already granted to me, and some about to be granted, I have explained the various combinations of such rods and tile-work, which I find of advantage in fire-proof construction. Therefore I will only briefly, in this description, mention the form of the rod to be produced by the machine which is the subject of this patent.

My twisted or spiral tension rods, in their various forms, consist of two or more strands or bars of comparatively stiff wire or small rods, spirally laid together. In some instances I employ spreaders to separate the strands of the rod at intervals and in this manner increase the cement engaging area of the rod. In other instances I employ buttons or washers projecting around the rod for the same purpose. In still other instances I employ strips, either holding the rods apart to cause them to act as spiral ribs, or having edges projecting to form spiral ribs. For general use, however, I have found that a two-strand rod of the necessary strength, and twisted to the proper pitch, without spreaders or buttons, possesses the necessary requirements for ordinary use.

The machine which forms the subject of this patent consists of simple clamping and rotating devices for laying up the rods or wires which form my tension rods, either with or without any twist in the individual wires. Briefly, the machine is composed of two parts: one, a rotating clamping device for twisting the rods together; the other, a tension device provided with a movable carriage and swivels to permit the free turning of the individual wires or rods which compose my tension rod and to permit the shortening as the wires are laid spirally together.

The details of this machine will be better understood from the accompanying drawings which illustrate one preferred embodiment of it, in a simple but somewhat crude form.

Figure 1 is a plan view showing the parts of the machine, the long extent of twisted and untwisted rod between the two extremities being broken away. Fig. 2 is a side elevation of the same. Fig. 2ª is an illustration of one form of finished rod. Fig. 3 is a detail view, partly in section, of the swiveling device. Fig. 4 is an end view of the swivel, the clamp being cut off, on the line 4 4 of Fig. 3. Fig. 5 is an end view of the rotating clamp which twists the tension-rod, and Fig. 6 is a longitudinal section of this clamp.

Throughout the figures like letters of reference indicate like parts.

In Fig. 1 at the lower right-hand portion is shown the reel from which the wires or strands of my rods may be unwound and straightened by drawing them through the straightener S. This straightener may consist of the three rolls adjustable at will to counteract the curvature of the wire *g* as it comes off of the reel. The wire is drawn out in lengths of about one hundred and twenty-five feet, and cut off. A swiveling device M is attached to the end of each. Two or more of these wires *g* are then firmly clamped in place in the rotating clamp E turning with the shaft C which is mounted in the frame B, and driven by a band pulley or other motive power D. A clutch *d* is employed to connect and disconnect the shaft at will. At the other end of the rod, preferably about one hundred and twenty-five feet distant, is located the tension and swivel portion of the machine. Upon a frame K is mounted the traveling slide or carriage J. This carriage J is provided with a

tension weight L and cord or rope *l* tending to draw it away from the clamp E. The swivels M clamped to the end of the rods *g* are each secured by ropes *j* to the shafts *j'* and by means of a hand crank and pawl-and-ratchets, as shown, the slack upon the individual rods may be adjusted, more or less of the ropes *j* being taken up around the shafts *j'* to equalize the tension on the several rods *g* at starting. When the straight rods or wires *g* are first put in place, the carriage J should be at the far end of its travel. The weight L, which then rests upon the ground, may be lifted slightly and the rope *l* put in tension by means of the shaft or drum *l'* and its pawl and ratchet *l''*. The tension upon the several rods or wires *g* is then equalized as before indicated, and the machine is ready to start. A hand bar or pipe H is employed between the strands of wire to regulate the twisting of the rods; and when the clutch *d* has been thrown and the machine started the hand bar or pipe H is moved slowly to the left (in the figures), as the twisted portion G of my tension rod is formed behind it.

The swivels M permit the free turning of the individual wires or strands *g*, so that the wire is made up in a manner insuring the greatest possible strength and stiffness with the least initial strains; and, as the twisting of the tension rod shortens the length, the carriage J is drawn to the right raising the weight L. When the rod has been entirely twisted, the rotation of the shaft C is stopped, the clamp E and swivels M disconnected, and the finished rod cut into lengths as required for the different spans of floor in which it is to be employed. A portion of finished rod is shown in Fig. 2ª about half size. For use in small structures, such as partitions and ceilings, the size shown in this figure may be employed.

For convenience in handling and sureness in operation, I have devised the forms of swivels and clamps shown in Figs. 3, 4, 5 and 6. The rotary clamp E is shown in Figs. 5 and 6. The end of the shaft C is wrought, or otherwise formed, into one rectangular jaw F of the clamp. The other jaw of the clamp, F', is formed of a rectangular block as shown, and the two jaws are placed within a box E'', the loose block or jaw F' being retained loosely in position by the eye *f'* and screw stud, as clearly shown in Fig. 6. Great power is required of these rotary clamps, and I therefore provide a large and strong clamping screw E' which extends through one face of the box E'' and bears against a slightly recessed portion of the upper face of the follower member or jaw F' of the clamp. In this way a very firm and quickly manipulated clamping device is obtained. To increase its reliability and the firmness of its grip upon the wires *g*, I thread, roughen, mill, or otherwise form the curved surfaces or dies between which the rods are clamped, but this is of course a matter of mere detail. The use of such clamp enables a workman to quickly secure or remove the ends of the several members of my tension rod. At the other end of the machine the swiveled clamps may be equally quickly manipulated. The rotary portion of one of these swivels is clearly shown in Fig. 3. The clamping mechanism consists of the cored and split taper-threaded screw M and nut M'. The base portion of this screw is provided with a square or hexagonal nut *m''* which may be grasped in a wrench while the nut M' is being screwed up or unscrewed. The end of a wire or rod *g* is thrust into the bore of the taper-threaded screw clamp, and the nut M' screwed up, firmly clamping the rod.

At the end adjacent to the square or hexagonal portion *m''* is a head *m*, neck *n''* and smaller neck *m'*. The neck *n''* fits a central perforation in a plate *n'* secured to the U-bolt *n*. The head *m*, and neck *n''* turning within and against the plate *n'* form the swivel portion of the device, but the clamp may be readily disconnected from the plate by thrusting it through the plate to the reduced portion or neck *m'* which may pass out of the slot or cut *n'''*; Fig. 4, entirely disconnecting the clamp from the plate *n'* and its U-bolt *n*. The U-bolt *n* is secured to the end of a rope *j*, as clearly seen in Fig. 1, and forms the permanent attachment and tension head for the several swivels and for successive strands or wires *g* employed in conjunction with it. There is therefore one U-bolt and swivel plate *n'* for each rope *j*, but there are several sets of the swiveled screw-threaded clamps. This permits the following operation of my whole machine, each man having his own work to do in a manner which necessitates no waiting for the others and not more than five men being required: One man attaches a swiveled clamp to the end of the reeled wire and draws it through the straightener to its full length, then returns, cuts off the wire, secures another swivel, and repeats the operation. He is preferably provided with special means for securing the swivel over his shoulder or to his person while drawing out the wire. A second man is employed at the far end (or left-hand end in the figure) to put the swivels into their plates *n'*, adjust the tension, signal to the engineer to start, and after the rod is twisted, remove the tension, disconnect the swivels from the end of the rods so that they may be returned to the first man, and remove that end of the bar from the machine. While the rod is being twisted, he cuts the finished bars into the required lengths. Two men are constantly employed on the guide bar or pipe H guiding the wires throughout the operation of twisting and then walking back to the clamp for the next twist. The engineer operates the clutch *d* to stop and start the device, and introduces or removes the tension rod, or its several wires, into and out of the clamp E.

By this system of operation I have found that some six thousand feet of finished rod per day of ten hours may be readily produced by my machine.

I have now described the construction and operation of my machine. I have omitted certain minor details and the enumeration of many modifications that may be made by mere skill in the art without departing from the principles of my invention, because to set these forth at length would obscure rather than make clear the more essential features of the device.

I claim, however, and desire to secure by these Letters Patent, together with all such modifications as may be introduced by mere mechanical skill and with only the limitations and restrictions expressed or implied, the following:

1. In combination in a rod making machine and for the purposes described, a rotary clamping device E, means for giving rotation to the said device, a traveling carriage or tension device J, two or more swiveled clamps secured thereto, means for applying tension to the said carriage or tension device, and means for adjusting one or more of the said swiveled clamps to equalize the tension, substantially as set forth.

2. In a rod making machine, and for the purposes described, a rotary clamping device E, means for giving rotation to the said clamping device, a tension device, means for securing two or more rods thereto, and means for individually adjusting or equalizing the tension upon such rods, substantially as set forth.

3. In combination in a tension device, for the purposes described, a stationary frame or support K, a sliding carriage or frame J, a weight and other connections for drawing the said carriage in one direction, and thereby providing tension, two or more clamping devices for retaining the ends of the several wires or strands of a tension rod, and means for relatively adjusting the said clamping devices to equalize the tension upon the several wires or strands, substantially as and for the purposes set forth.

4. A combined swivel device and clamp for the purposes described, consisting of a plate, block, or piece, n', with means for securing a rope or other tension attachment thereto, and a clamping device provided with a head m, neck n'', and reduced portion or neck n', the said neck n'' fitting and swiveling in the piece, n', and the said piece being provided with a slot n''' permitting the withdrawal of the said reduced portion or neck m', whereby the clamping device may be detached in the manner described.

In testimony whereof I have hereunto set my hand, at New York, in the county and State of New York, this 31st day of May, A. D. 1894.

THOMAS A. LEE.

Witnesses:
GEO. H. SONNEBORN,
E. M. MEINKE.