

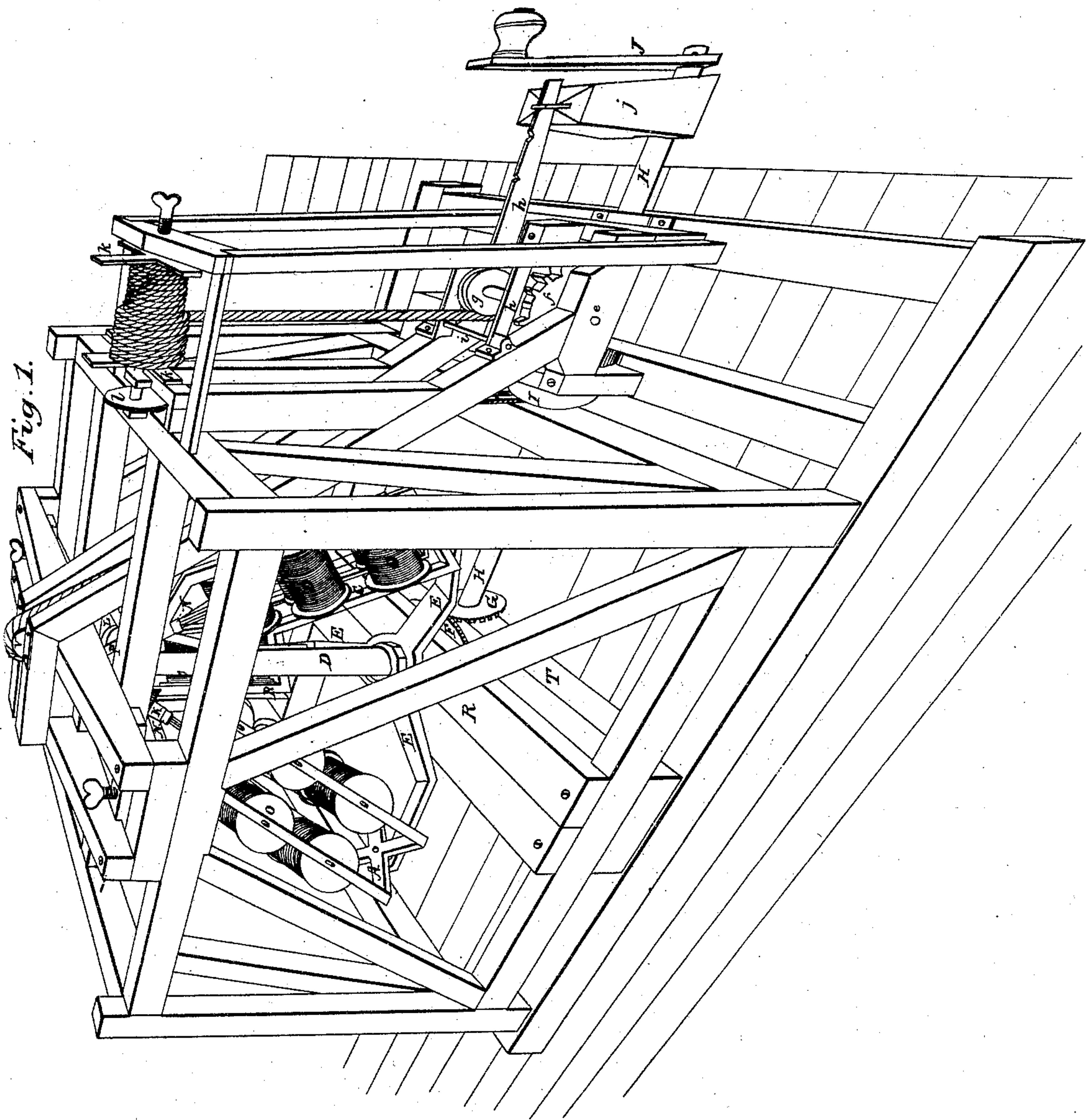
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*B. Morison.
Rope Mach.*

N^o 6,176

Patented Mar. 13, 1849.

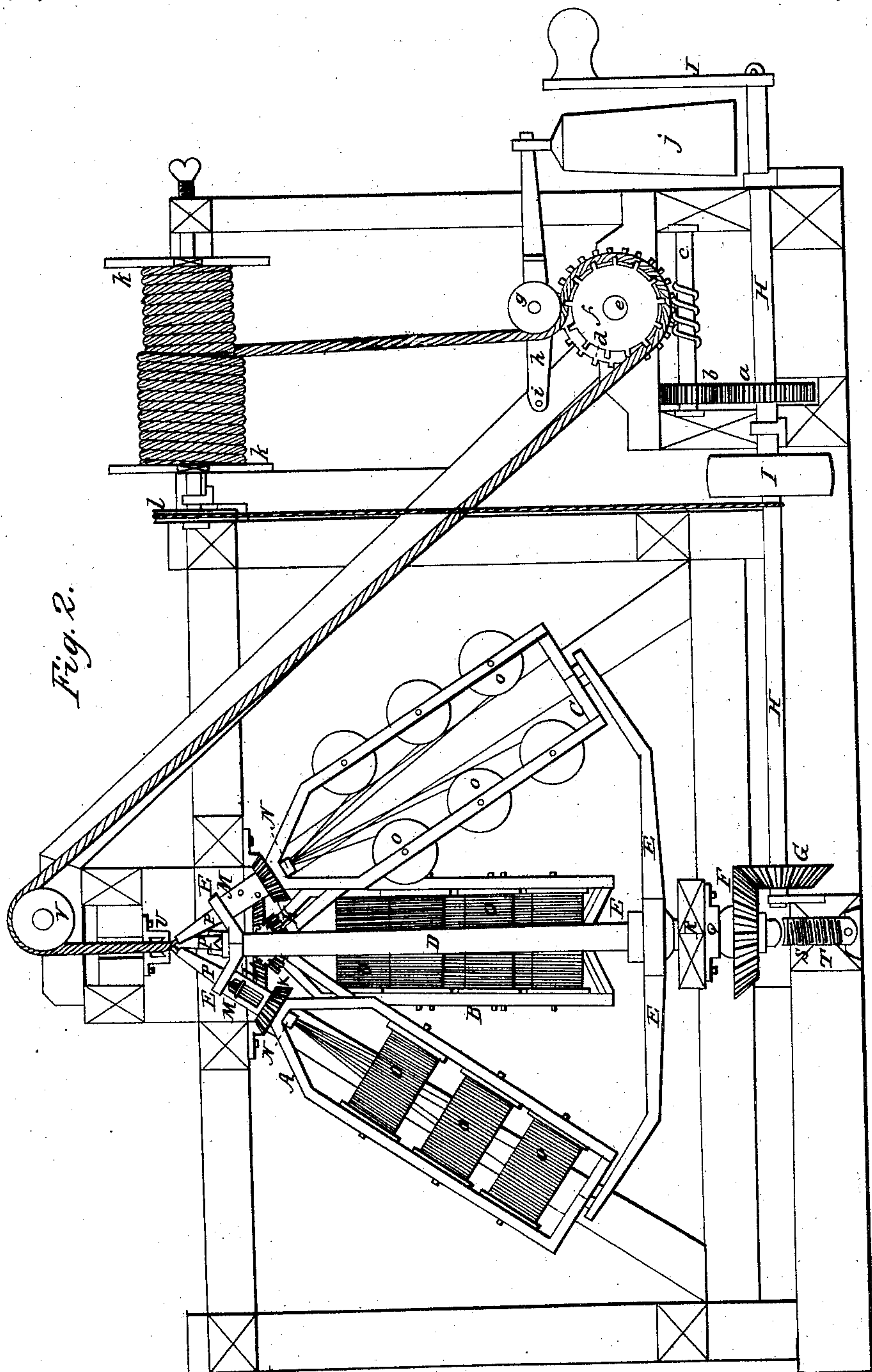
Fig. 1.



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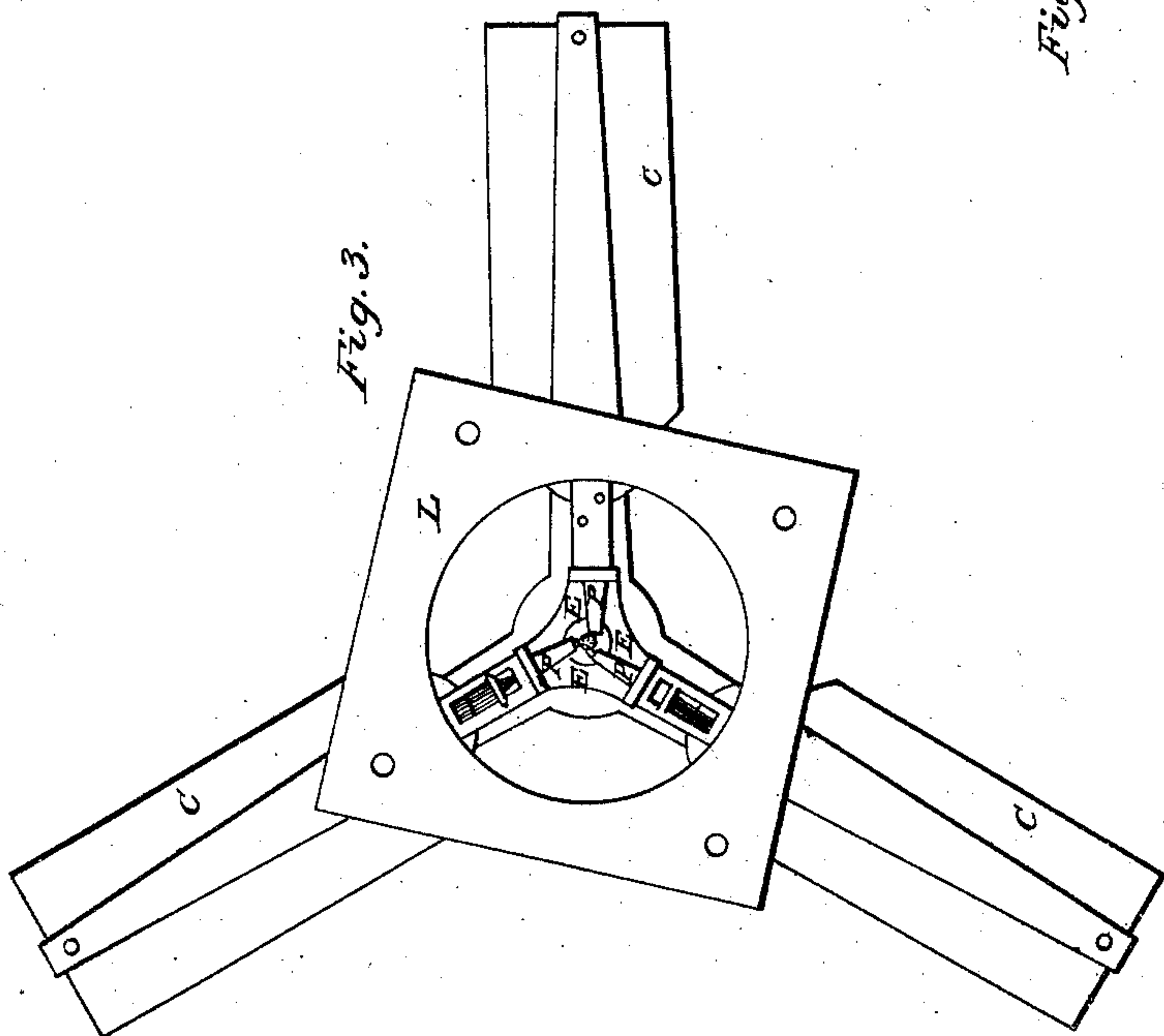
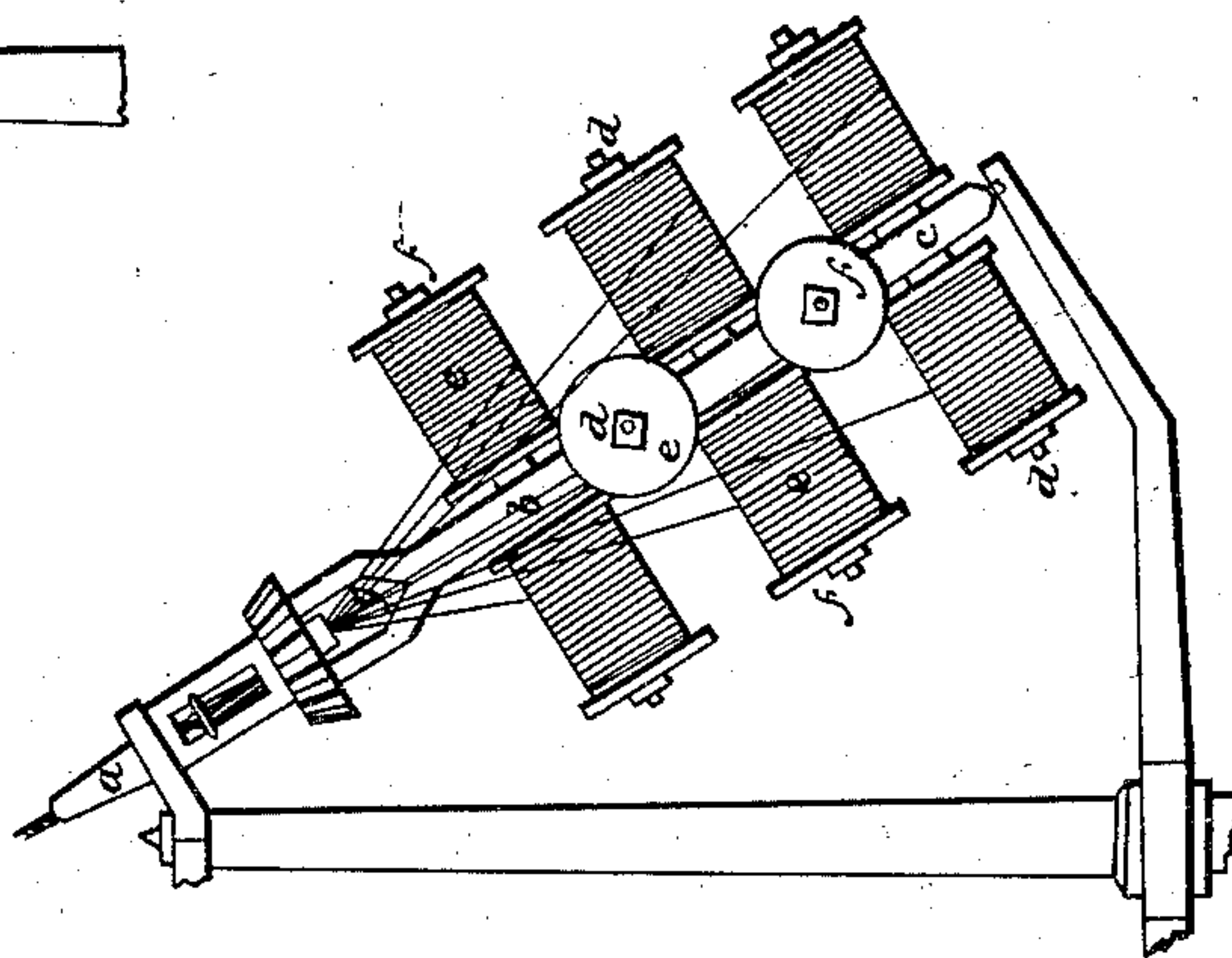
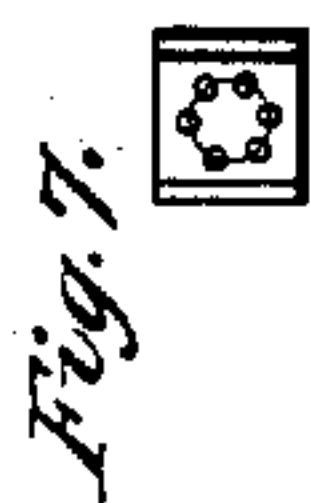
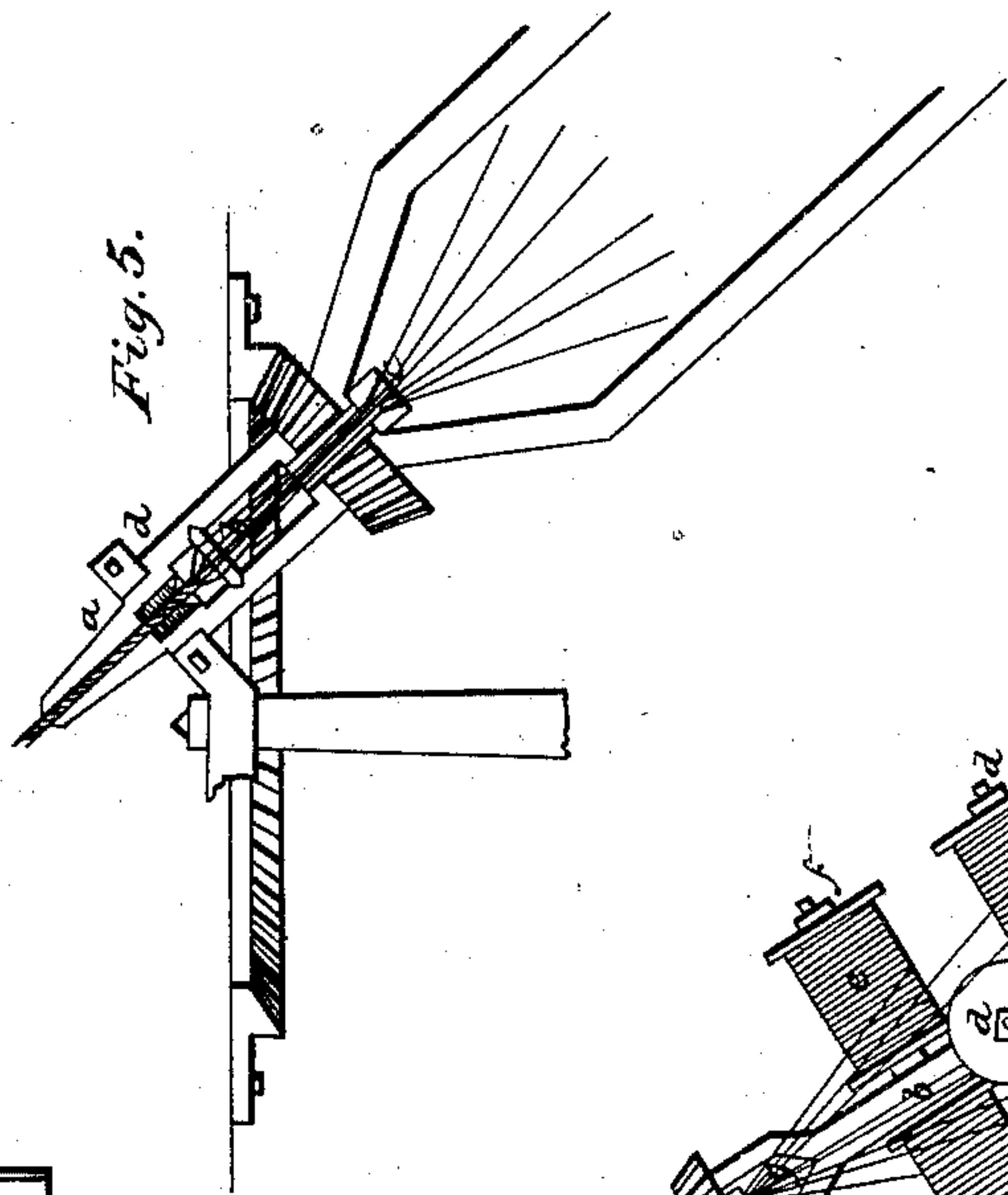
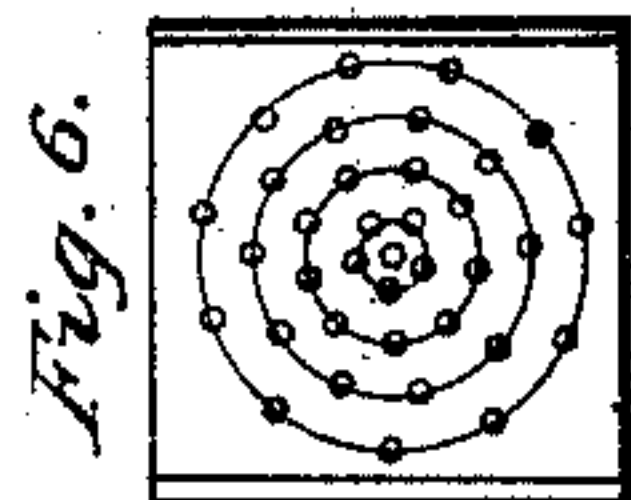
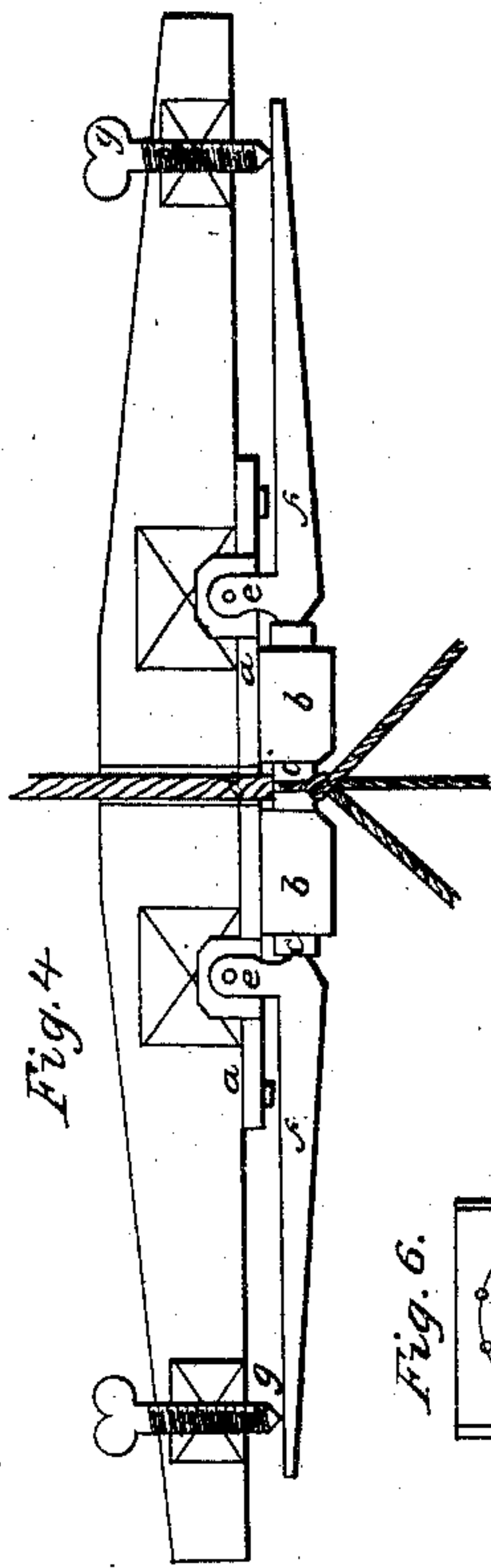
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UNITED STATES PATENT OFFICE.

BENJAMIN MORISON, OF HARRISBURG, PENNSYLVANIA.

IMPROVEMENT IN ROPE-MACHINES.

Specification forming part of Letters Patent No. 6,176, dated March 13, 1849.

To all whom it may concern:

Be it known that I, BENJAMIN MORISON, of Harrisburg, in the county of Dauphin and State of Pennsylvania, have invented a new and useful Improvement in Cordage or Rope Machines; 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 a part of this specification, in which—

Figure 1 is a perspective view; Fig. 2, a vertical longitudinal section; and Figs. 3, 4, 5, 6, 7, and 8 are sections representing different parts of the machine.

The nature of my invention consists in placing the revolving reels which contain the yarns at an inclination toward each other at their upper ends and causing them to revolve upon their axes by means of a bevel-pinion secured upon each reel near its upper end and working within or on the inner and under side of a concave stationary bevel-wheel while they are being carried round in a contrary direction by the vertical revolving shaft and projecting arms upon which the reels are secured; in providing each of the reels with a changeable tube, adjusting-plate, and press-block, whereby certain regularity in the relative lay of the yarns and a cylindric form hardness in the twist of the strands immediately before entering into mutual combination are more perfectly attained; in the substitution of a sliding spring-nipper for the purpose of holding and giving smoothness and tension to the cord or rope while it is being drawn through the same; in the peculiar manner of constructing a reel, and in the substitution of a series of different-sized drawing-wheels with grooved projections in place of a grooved roller and change-wheels for drawing the various sizes of rope through the machine.

To enable others skilled in the art to make and use my machine, I will proceed to describe more at large its construction and operation.

A B C, Figs. 1 and 2, are three reels secured at an inclination toward each other at their upper ends (say at an angle of thirty-three degrees to the shaft, or at such an angle as the strands have in a well-made rope) upon a vertical shaft D, and revolving each upon its own axis in arms E E E, extending from and permanently secured to the shaft. The shaft D

has also secured upon it near its lower end a horizontal miter cog-wheel F, which connects with a vertical miter cog-wheel G, secured upon a horizontal revolving shaft H, which, by means of a band-wheel I or by extension, connects with a winch J or other driving power, and thus revolution is given to the shaft D, which by its arms carries round the reels. Near the upper end of each reel is a bevel-pinion K K K, each of which has the same number of teeth and works within or on the under and inner side of a concave stationary wheel L, which has about three and a half or four times as many teeth as each pinion, so that during each revolution of the shaft D the reels will revolve upon their own axes in a contrary direction three and a half or four times.

In the shaft of each reel, just above the pinion, an opening is left for the introduction of an adjusting-plate, which has concentric rings of holes in it for the yarns to pass through as they are drawn up through the press-block N, which is held within a hole made in the shaft of the reel and passing from below the pinion to the open space above.

Within or attached to the frame of the reels are bobbins O O O, containing the yarns, which are secured upon skewers or arms, so as to revolve upon their axes.

At the upper end of each reel a tube P P P is inserted and secured by a screw or otherwise, having a polished uniform hole or bore through its center, trumpet-shaped at its lower end and communicating with the open space below. These tubes are each made precisely of the same length and bore and extend from the same distance just above the adjusting-plates in a line with the center of the reels upward until they almost meet together, there being space enough between them, however, to allow of their being taken out and others of a different bore substituted, as occasion may require. The press-blocks N N N and the adjusting-plates M are also made so as to be withdrawn and others of a different bore substituted, so that cordage or ropes of different thicknesses may be made from the same reels by simply changing the tubes, adjusting-plates, and press-blocks.

The number of reels may be increased or diminished in constructing the machine, as it may be intended for making cordage or ropes

of a greater or less number of strands. The whole is placed within a strong and suitable frame, so as to revolve upon the shaft D, which is held in a vertical position by means of the pinions on the reels, in combination with the concave stationary wheel, in connection with a collar or bearing Q, which is secured to a cross-piece R of the frame. Around on the shaft at this part there is a shoulder which presses against the collar while the machine is making rope; but when not so in use the extreme lower end of the shaft comes in contact with and rests upon a bearing S, which is screwed in a vertical position into a cross-piece T, which forms part of the frame.

Immediately above the focus of the tubes a sliding spring-nipper U is secured to the frame, through which the rope passes as it is combined or laid from the reels.

V is a grooved pulley, over which the rope is drawn from the bobbins by means of a combination of wheels with an endless screw connecting with the driving-shaft H, viz: *a* is a spur-wheel secured upon the driving-shaft H, which works in another spur-wheel *b*, secured upon another horizontal shaft *c*. On this shaft is a spiral or endless screw, which drives another spur-wheel *d*, which is secured upon a shaft *e*, which has also secured upon it a series of wheels *f* of different diameters and with grooved projections adapted to the different sizes of ropes intended to be made upon the same machine. Just above this series of wheels is a grooved pulley *g*, which revolves upon an axle secured within the arms of a branched lever *h*. This lever turns upon a bolt *i*, which connects it with the frame. The projecting end of this lever has notches cut in it, and from one of these a weight *j* is suspended. Above this drawing part of the machine a sliding reel *k k* is made to revolve by means of a cord, which passes over a grooved pulley *l*, secured upon its axle, and down under the driving-shaft H.

Having thus given a general description, I will now proceed to describe more minutely several parts of the machine. Besides the inclination which the reels have toward each other at their upper ends, as before described, they each have a lateral inclination to that side of the rope which receives the strand from the tube, as is shown at P P P, Fig. 3—that is to say, if a right line should be drawn lengthwise through the center or axis of either reel C and continued it would be in the center of its strand, and also onward to that side of the rope upon which it is being laid. This proper direction of the reels is given by simply turning the upper arms E E E (which are of one piece) a little to the right or left, in accordance with whichever way the rope is to be twisted before screwing the nut down firmly upon it. The degree of inclination will vary with the various sizes of rope to be made. The concave stationary wheel L is cast in one piece

and permanently screwed or bolted to the frame in a horizontal position.

Fig. 4 represents a vertical longitudinal section of the sliding spring-nipper, with the strands as combining and passing through the same. *a a b b* is a plate with projections made of cast metal in one piece, the projections *b b* having a hole or tube lengthwise through each on a line with each other, and within which two changeable nipper-blocks *c c*, of hard metal, are nicely fitted so as to slide truly and freely therein, having each at its inner end a vertical groove polished and adapted to the curve of nearly the semi-circumference of the intended rope and made trumpet-shaped at the lower side, so that any inequalities of the rope may find easy entrance therein between the two nipper-blocks. Turning upon pins as fulcras, secured in the upper projections of the plate at *e e*, are two spring-levers *f f*, which press against the nipper-blocks *c c* by the power of two thumb-screws *g g* acting near their extreme ends. These levers are made with a sufficient degree of elasticity to yield to the pressure of any great inequality which might be upon the rope and which would not pass through the grooves between the blocks unless the latter could yield more space. The plate of this sliding spring-nipper is bolted securely in a horizontal position to the under side of cross-pieces of the frame, so that the center of the curves of the trumpet-shaped grooves in the nipper-blocks shall be precisely in a perpendicular line with the center of the vertical shaft upon which the reels are inclined.

Fig. 5 is a section of one of the reels, in combination with the concave stationary driving-wheel, and *a* represents its tube as screwed into the shaft or upper journal of the reel, with a strand as passing through it, twisted down near to the adjusting-plate *b*. *c* represents the press-block, by which the yarns are concentrated as they are drawn off the bobbins, and which should be of such a bore as will cause a sufficient degree of pressure to the yarns to prevent them from being drawn through the adjusting-plate with unequal speed. On the shaft of each reel, at its intersection with the upper arms, there is a shoulder *d*, which bears against the lower side of the arms while the machine is making rope and which keeps the reels at their proper height.

Figs. 6 and 7 represent two different sizes of the adjusting-plate, the smaller one having six holes, they being as many as are required for making the best towing-lines for canal-boats. For larger ropes a proportionally greater number of holes will be required, and these holes should be in concentric circles, with a due proportion in each circle, increased according to the circle's distance from the center and equidistant from each other in the same circle. These plates should be made sufficiently thick to allow each of the holes

therein to be made trumpet-shaped on both the upper and under sides of the plate, perfectly smooth throughout, and somewhat larger than the yarns, so that any inequalities on the latter may pass through them freely.

Fig. 8 represents a more simple mode of constructing the reels. *a b c* is a shaft having the changeable tube, adjusting-plate, and press-block, with the pinion, all arranged and secured as in the first-described mode; but instead of an outer frame-work to support the bobbins, the shaft is made continuous in a right line to its lower journal. Through this shaft cylindrical arms *d d d* are secured at nearly right angles with the shaft, and upon which the bobbins *e e e* revolve and are secured, and a proper degree of friction applied by means of burrs *f f f*, which are screwed up against the bobbins. A washer of thick leather should intervene between the bobbins and shaft, and also between the bobbins and burrs. The arms upon which the bobbins revolve should be placed spirally in regard to each other, so that the yarn from each bobbin may pass freely and without mutual interference up to the press-block through an opening left in the shaft at *g*. The reels constructed upon either plan should be made of such a size as will admit whatever number of bobbins may be required, and this number will increase in proportion to the increase in the diameter of the rope to be made. Such a degree of friction should be applied to each bobbin as will cause moderate tension to the yarn as it is drawn up to the press-block. The reel frames or shafts and arms should be made of iron, as also the main shafts, arms, pinions, wheels, pulleys, levers, and the sliding spring-nipper, excepting the nipper-blocks, which should be made of steel hardened and polished at the grooves. The tubes and adjusting-plates should also be made of steel or case-hardened iron, and the parts in contact with the strands or yarns should be polished. All the bearings in which the journals revolve should be made of brass. The bobbins may be made of wood, and for a large machine the frame also should be made of hard wood firmly framed and braced together, but for a small machine, such as would be required for making cordage or ropes of one inch in diameter or less, may be made in a simple arch form of cast-iron.

As it is intended that this machine should be used for making metallic or wire ropes, as well as ropes or cordage of vegetable or animal materials, it becomes the more important that those parts subject to friction from the material used in the rope should be made of hard and durable metal. I do not limit the number of reels nor the number of bobbins upon each reel to be used on this machine, as it is obvious that any number from two to six reels or from one to over one hundred bobbins on each reel may be used, if so required.

Having thus described the construction of my machine, I will proceed to describe its

mode of operation. The bobbins having been wound full of yarn and properly placed in the reels, the ends of the yarns on the bobbins of each reel are carried together through the press-block, then separated, and each one passed through its appropriate hole in the adjusting-plate, and then twisted slightly together and drawn through the tube. After each reel has been thus rigged the strands are all twisted slightly together by the hand and passed through between the grooves of the nipper-blocks, thence up over the pulley and down under or over (as the twist may require) the appropriate drawing-wheel and round the same until it is brought under the grooved pulley on the weighted lever, and thence to the winding-reel, where it is secured by an overlap. The spring-levers of the nipper being now screwed down until a sufficient degree of pressure is applied to polish and stretch the rope (as it is drawn through between the nipper-blocks) and the weight on the lever of the drawing apparatus moved sufficiently far out toward the end of the lever to insure against the rope's slipping on the grooved projections of its drawing-wheel, the machine is ready for action. The power is now applied to the main driving-shaft by a band, winch, or otherwise, and simultaneous motion thus given to the various moving parts of the machine, regularly twisting the strands, laying the rope, polishing and stretching it, and finally coiling it away upon a reel.

It is intended, generally, to make the machines large enough to hold bobbins containing on an average about a thousand yards of yarn. When a bobbin runs nearly out of its supply of yarn, it is taken out and another full one substituted and the loose end of its yarn joined to the remaining end of the former one, the slack taken up by turning the bobbin, and so on with each bobbin as its supply of yarn runs nearly out or a sufficient length of rope is made. Should it be required to make a different-sized rope upon the same machine, appropriate-sized nipper-blocks, tubes, plates, and press-blocks are to be substituted and a rope placed on a larger or smaller one of the series of drawing-wheels, as the rope required is to be of a larger or smaller diameter or of a softer or harder twist.

As to the above-described machine I make no claim to the one general principle involved in the combination of a drawing and stretching apparatus, with reels revolving on the planetary system for the purpose of making cordage or ropes, inasmuch as a machine involving that general principle has been in use in England for several years; nor do I claim to have invented the tubes, adjusting-plates, or press-blocks, individually considered, but confine myself to the following specific claims as being new and useful improvements upon the English rope-machine, viz:

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

1. The placing each reel at such an inclina-

tion toward the point of "laying" or combination as that its whole axis shall be in a direct line with its strand after it leaves the tube and is beginning to be combined, and so that the tubes of the respective reels shall be almost in contact at their upper ends just immediately below the nipper-blocks, the tube on each reel being a part of and a direct continuation of the axis of its respective reel.

2. The placing of the reels also at a suitable angle of inclination from the right or left of the rope, so that the strand as drawn out of each tube, has a direction toward the outside of the rope—viz., should a right line be drawn lengthwise through the center or axis of either reel and continued it would be in the center of its strand also onward to that side of the rope upon which it is being laid and from which the tube recedes when carried round upon the vertical shaft.

3. The use of a concave stationary driving-

wheel connecting with the reels by pinions above the bobbins for giving the necessary counter motion to each reel as they are carried round by the vertical or main shaft.

4. The two thumb-screws and elastic levers, substantially as herein described, in combination with the tubes arranged as above described, for giving the nipper-blocks a more steady and regular pressure or grasp upon the rope.

5. The application of the adjusting-plate between the press-block and tube, the same being secured by means of the mortise or opening through the shaft and the grooves therein within which it is made to slide, substantially as herein described.

BENJ. MORISON.

Witnesses:

W. KLINE,

HENRY GILBERT.