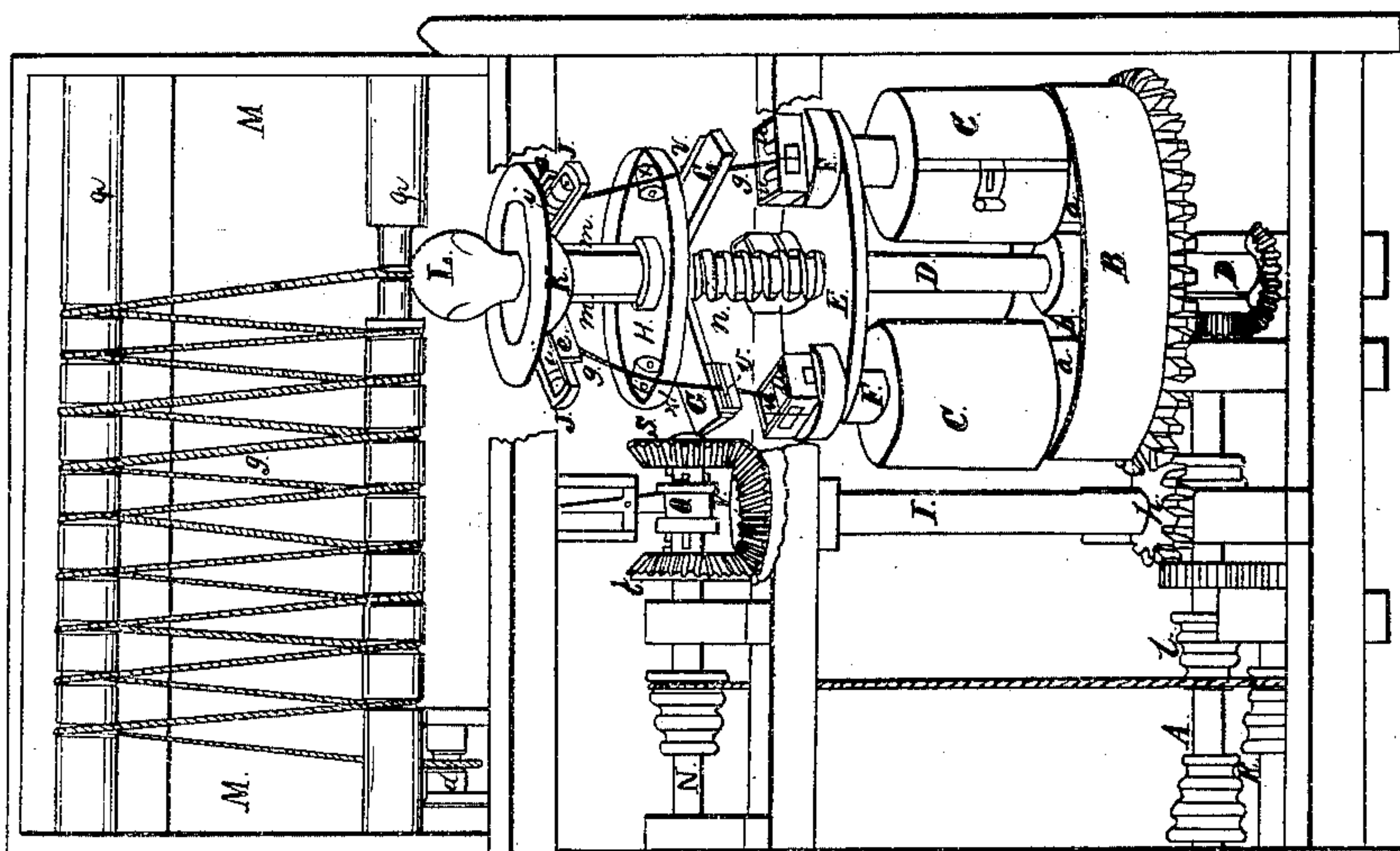


*Harris, Stott, & Richmond.*  
*Cordage and Rope Mach.*

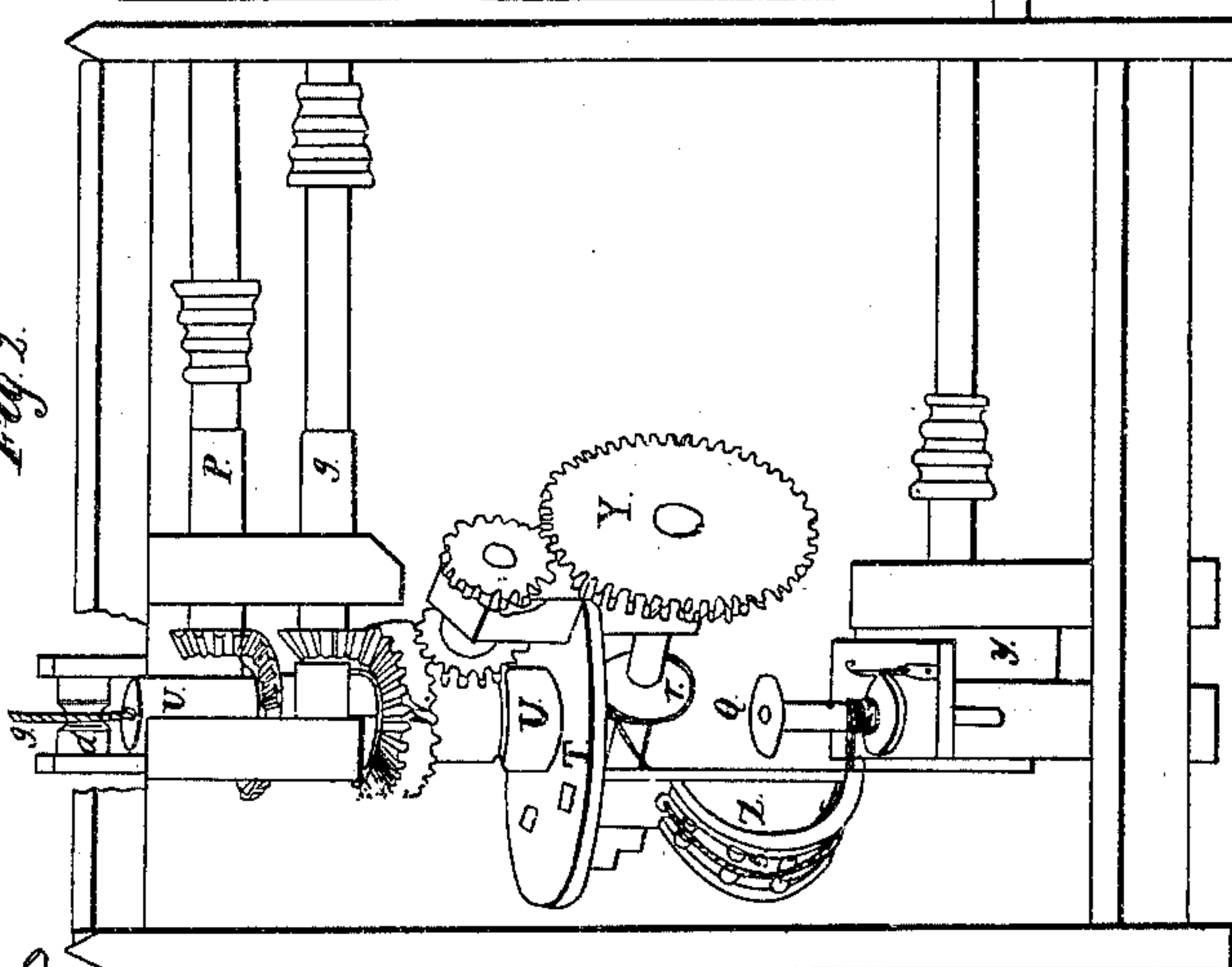
*Nº 11,863.*

*Patented Oct. 31, 1854.*

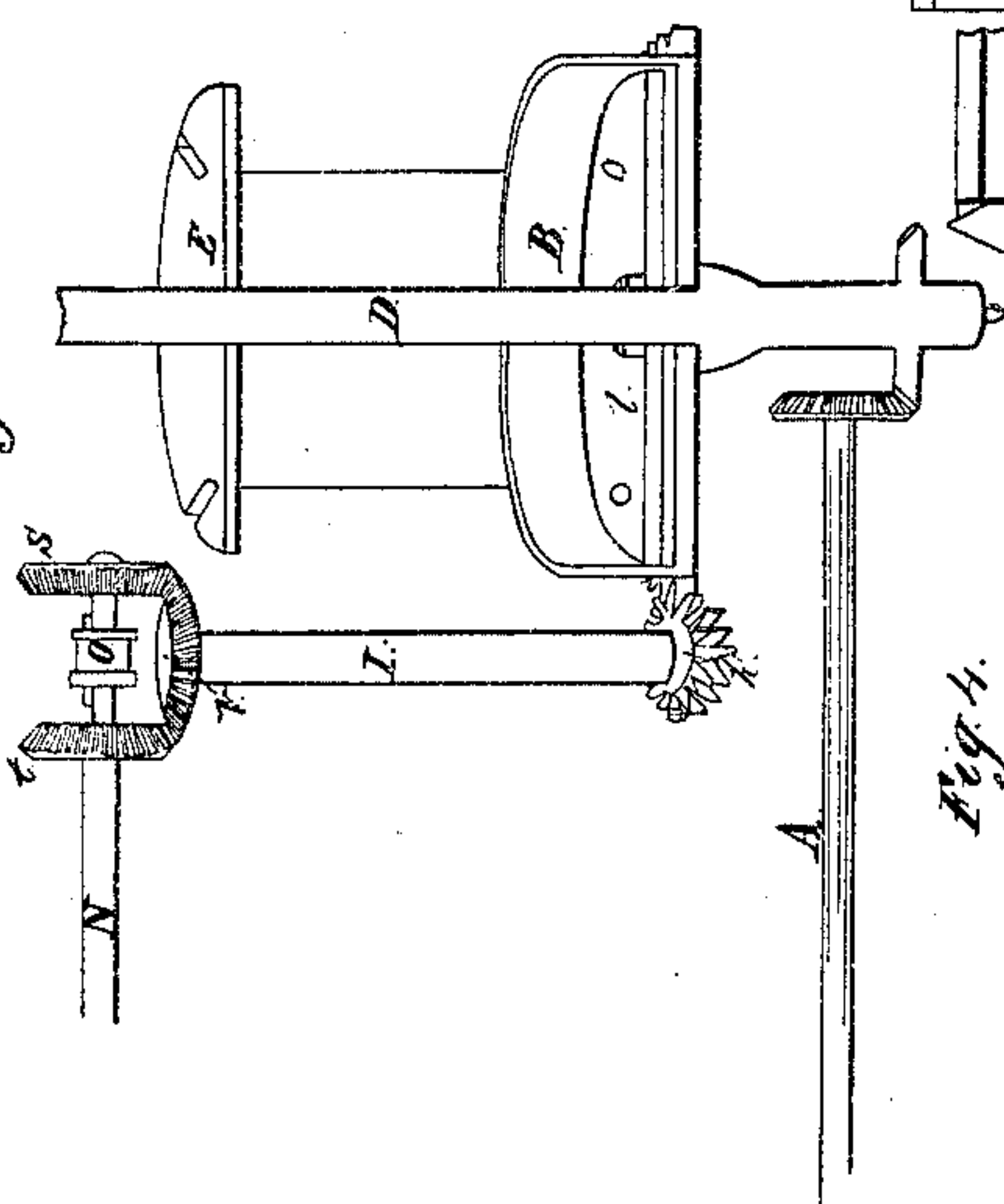
*Fig. 1.*



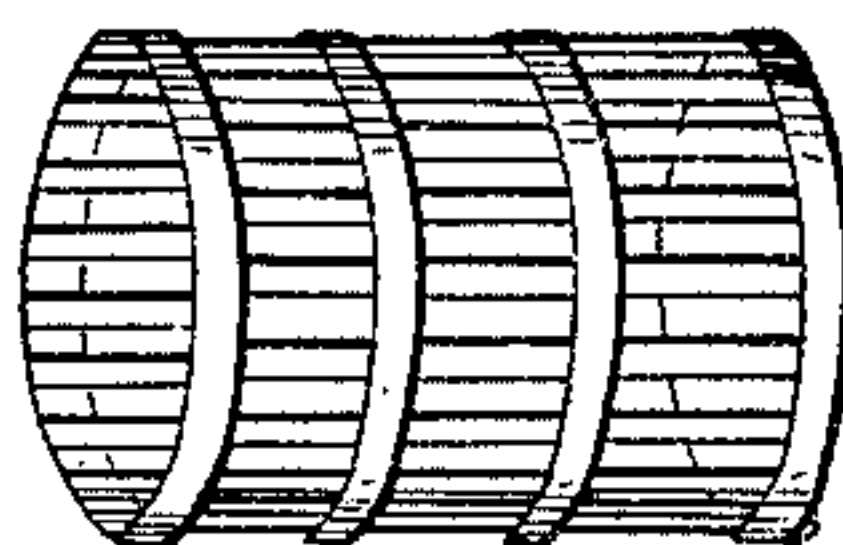
*Fig. 2.*



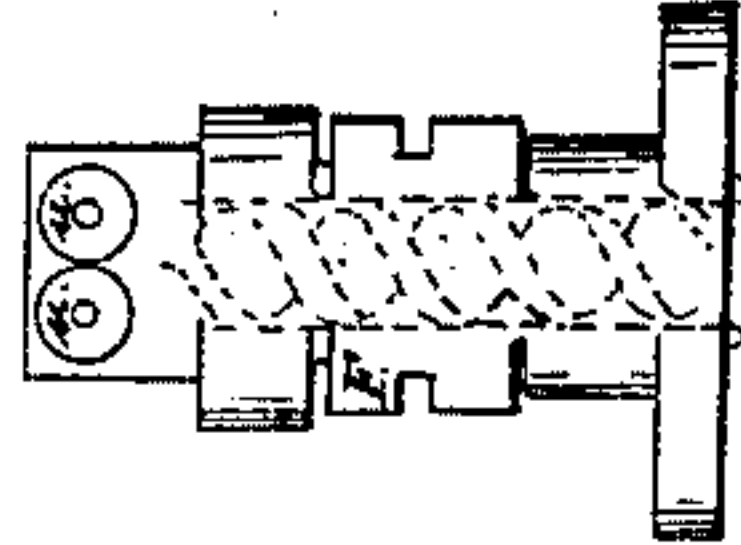
*Fig. 3.*



*Fig. 4.*



*Fig. 5.*





# UNITED STATES PATENT OFFICE.

JOHN HARRIS, OF LANSINGBURG, AND JOHN B. STOTT AND GALEN RICHMOND, OF TROY, NEW YORK.

## IMPROVEMENT IN MACHINERY FOR MAKING ROPE AND CORDAGE.

Specification forming part of Letters Patent No. 11,863, dated October 31, 1854.

*To all whom it may concern:*

Be it known that we, JOHN HARRIS, of Lansingburg, and JOHN B. STOTT and GALEN RICHMOND, of the city of Troy, and all of the county of Rensselaer and State of New York, have invented a new and Improved Method of Manufacturing Cordage and Rope; and we do hereby declare that the following is a full and exact description thereof, reference being had to the drawings accompanying and to the letters and figures marked thereon.

The nature of our invention consists in providing a disk or table with a broad rim (called the "friction-rim") extending above the surface, the disk being supported by and revolving independently and in either direction on a collar or hub near the bottom of a vertical or upright shaft. Above this disk and within the rim is placed a circular table attached to and revolving with the vertical shaft. (Called the "case-table.") On the top of this table stand three or more cases, revolving on their own centers by friction against the friction-rim in the opposite direction to that of the shaft, around and with which they revolve in a circle, the office of these cases, containing the "sliver," being to twist the separate strands and that of the shaft to give the "back twist," or to "lay up" and consolidate the strands into a single cord when brought together at the top. The strands are all "rubbed" separately, both dry and wet, at the same time by passing between brushes fitted for the purpose attached to the arms of the dry and wet spiders connected together and sliding vertically on the shaft. The spiders being pressed by a spiral spring coiled around the shaft up against a stationary cam-wheel above the upper spider, by the revolution of the shaft and spiders they are pressed down by the cams and a vertical reciprocating motion given, producing the desired effect on the strands.

Our invention also consists in inclosing the sliver within a tube running to the twisting-rollers, so that the said sliver shall not be exposed to the air between the case and the rollers, as such exposure is found to produce the breaking of the sliver when the spindle revolves with considerable velocity.

To enable others skilled in the art to make

and use our said invention, we proceed to give a more particular description of construction and operation, reference being made to the following drawings, viz:

Figure 1 is a front view of the machinery and arrangements for twisting and laying up the strands and for stretching and drying rope; Fig. 2, a rear view of the arrangements for finishing and reeling the rope; Fig. 3, spiral or auger tube through which the sliver passes from the cases enlarged; Fig. 4, the cage into which the sliver is coiled inclosed in the cases enlarged; and Fig. 5, a sectional drawing through the center of the shaft D and friction-rim B, showing the clutch and its effect on the rim B.

A is the driver-shaft in a horizontal position, giving motion by a miter-gear to the upright shaft D.

B is the friction-rim, a broad rim encircling the cases C, the bottom of which is supported by and turns independently of the upright shaft D on a hub near the bottom of the shaft D and is made to rest or revolve in either direction by the action of the gear *h* at the foot of the shaft I, and the motion of shaft I is controlled by the position of the clutch O, which clutch, when turning between and disconnected from both the gears S and *t*, leaves the shaft I, and consequently the friction-rim B, at rest. When the clutch is connected to the gear S, the motion of the rim is with that of the shaft D; but when connected to the gear *t* the rim B revolves in the opposite direction to that of the shaft D, the cases revolving at all times (when the shaft D is in motion) in the same direction without regard to the motion of the friction-rim B.

D is the upright shaft, having a hub or flange near the bottom, on which the friction-rim B is supported and turns independently of the shaft, and, being driven by the driver-shaft A, it revolves, giving the back-twist or lay-up motion at top and consolidates the separate strands into one cord or rope, bearing with it in its revolutions the dry and wet spiders, the size-bowl, the top table, the case-table, and cases C, which turn in the opposite direction to that of the shaft D.

*b* is the case-table on which the friction-rollers *a* and cases C stand, and is firmly at-



tached to and revolves with the upright shaft D just above the bottom of the friction-rim B, within which rim it revolves independently of the rim.

*a* represents the friction-rollers, equal in number to that of the cases C, (to which they are attached,) and having journals at the bottom turning in boxes which are pressed by springs against the friction-rim, and being placed in a circle near the periphery of the case-table they revolve on their centers by friction against the rim B in the opposite direction to that of the shaft D, and their speed is modified by the speed and direction of the friction-rim B.

C represents three or more cases with broad doors to admit the cages, (see Fig. 4,) out of which the strands are drawn through the auger-tubes at the top and twisted by the motion given them by the friction-rim B, being attached to and revolving with the friction-rollers *a*, the cages contained in said cases C terminating in tubes leading to the friction-rollers for the purpose of delivering the sliver to the rollers without exposure to the atmosphere.

E is the top table, keyed to the upright shaft D and having slots converging from the periphery toward the center, in which the necks of the cases C (regulated by set-screws) slide to give the friction-rollers *a* the proper pressure against the rim B.

F is the neck of the cases C, adjusted in slots in the top table, in which is a spiral or auger tube, (see Fig. 3,) in passing through which the sliver, though uneven, is reduced and molded into suitable form for twisting into strands.

*n* is the spiral spring encircling the upright shaft D and pressing the wet spider J (being connected to the dry spider G) against the stationary cam K, giving a vertical reciprocating motion to both the spiders for the purpose of wet and dry rubbing the strands before being combined.

G is the dry spider, having arms equal in number to that of the cases diverging from a collar or ring around the upright shaft D, to which ring the upper end of the spiral spring is attached.

*v* is the dry rubber bristles or wire brushes, attached to the arms of the spiders G, between which the separate strands pass, and by the reciprocating motion given by the action of the spiral spring *n* and the cam K the strands are divested of shives, &c., before being sized.

H is the size-bowl, encircling the shaft D and confined to the top of the spider G and guided by the feather to prevent its turning on the shaft D.

*x* represents the size-rollers covered with flannel to absorb and distribute the paste, hung on puppets and projecting a little beyond the rim of the bowl, so that in passing

up to the wet rubbers the strands may become sufficiently sized.

*e* represents the wet rubbers, similar to the dry rubbers, attached to the arms of the wet spiders to distribute the paste or size and smooth the strands before being "laid up."

J is the wet spider, in form like the dry spider, having friction-rollers *i* on the top of the arms, which, being pressed up by the spiral spring *n* against the stationary cam-wheel K, the spiders receive a reciprocating motion by the revolution of the shaft D.

*i* represents the little friction-rollers between the arms of the spider J and the stationary cam-wheel K.

K is the stationary cam-wheel, encircling the shaft D near the top and confined to the frame of the machine, giving the spiders when revolving (being pressed up by the spiral spring *n*) a vertical motion by which the wet and dry rubbing is performed.

L is the lay-up top, the apex of the shaft D or point where all the strands being equally twisted are united and laid up into a single cord by the revolutions of the shaft D, which are opposite to those made by the cases C, by which the strands are twisted.

*m* represents three small rods standing in a triangle around the shaft D to connect together the wet and dry spiders and size-bowl H, all of which slide together on the shaft D, being guided by a feather on the shaft.

*u* represents the little spinning-rollers placed in the square cases above the spiral tubes, between which the strands are passed out to receive their twist.

*g* represents the red lines marking the course of the strands and ropes.

*d* is a pulley to pass the cord from the drying-box, Figs. 1 and 2.

M is the drying-box, a shallow box covering the top of the machine, having two parallel shafts or pulleys *g* extending from end to end, onto which the cord is received from the lay-up top L, and passing around the pulleys many times the cord is stretched and dried by forcing heated air in at an aperture at one end of the box and out through small holes in the others, and being dried in its passage through the box it passes down over the pulley *d* into the upright tube U. (See Fig. 2.)

U is the upright tube through which the cord is drawn from the box M.

P is the upper rear shaft, turned by the pulley *l* on the driver-shaft A and turning by bevel-gear the tube U to give the rope the desired twist after being dried.

W is the double bevel-gear, turned on the tube U by the middle shaft *g*, which receives its motion from the pulley on the driver-shaft A.

T is the table attached to the bottom of the tube U, with which the draw-off pulley *r* and the winder Z are connected and revolve.



Y is a large gear at the periphery and at right angles with the table T and on the shaft with and turning the draw-off pulley *r*, being connected with and turned by the double bevel-gear W.

*r* is the draw-off pulley under the table T, around which the rope is drawn from the tube U and passed onto the winder Z.

Z is the winder, in form like a capital D, suspended under and revolving with the table T, on the outside of which the rope is drawn from the draw-off pulley *r* at the top, and passing over the little pulleys is returned at the bottom at right angles to the reel, around which it is wound.

Q is the reel, standing under the center of the tube U on a table raised or lowered by a cam or otherwise, and the cord is distributed onto the reel by the winder Z.

*y* is the cam moved by the driver-shaft A to raise and lower the reel.

Although no modification is made in the speed of the upright shaft D, which is the lay-up motion and which is derived directly from the driver-shaft A, but as sliver requires much more twist than yarn already spun and as the different materials of which ropes are made require different degrees of twist it becomes very necessary so to regulate the speed of the cases C, from which the twist is given to the strands, as to accommodate it to every class of material. The method by which we give, while the machine is in motion, the proper relative twist to the strand and the cord when laid up, acting as a regulator to the machine, seems to require a more particular and separate description.

R is a short shaft by the side of the driver-shaft A, from which it receives its motion, and by a conical pulley gives to a like pulley on the neutral shaft above it a greater or less degree of speed, as the case may require.

N is the neutral shaft, near the end of which, standing parallel and turning right and left on the shaft, are two miter-gears S and *t*, both meshing into a similar gear V, placed horizontally on the top of the perpendicular shaft I, either of which parallel gears may be confined by the clutch O to the shaft.

O is the clutch sliding on the shaft N and guided by a feather to confine either of the miter-gears S and *t*.

S is the miter-gear at the end of the shaft N, which when confined to the shaft by the clutch O turns the shaft I to the left and the rim B in the same direction with the shaft D, retarding the speed of the cases C and giving less twist to the strands.

*t* is the miter-gear near the middle of the shaft N, which when confined to the shaft by the clutch O turns the shaft I to the right and the rim B in the opposite direction to the shaft D, giving more speed to the cases C and more twist to the strands.

I is the perpendicular shaft, standing between and receiving its motion from the miter-gears S and *t*, and conveying a direct or retrograde motion to the rim B.

V is the miter-gear at the top of the shaft I between the gears S and *t*.

*h* is a small straight gear on the foot of the shaft I, meshing into the gear on and turning the friction-rim B in either direction, as may be required, to increase or diminish the speed of the cases C, and consequently the twist of the strands.

*To regulate the twist.*—When only a slight variation in the twist is required, it may be done by changing the band or belt which connects the shafts R and N from one end to the other of the conical pulleys, so as to increase or retard the speed of the shaft N. If greater alteration is wanted and less twist is required, the gear S on the shaft N is confined by the clutch O, when the shaft I will revolve to the left and the rim B in the same direction with the upright D, retarding the speed of the cases C and giving less twist to the strands; but if more twist (as in the use of sliver) be required the gear *t* is confined by the clutch O, the shaft I turns to the right, and the rim B in the direction opposite to the shaft D, by which the speed of the cases C and the twist of the strands are greatly increased, the intermediate degrees of speed between the extremes being given by the action of the conical pulleys, as above directed.

*The process of spinning or twisting the strands and laying up the rope.*—The machine being arranged as above specified, the cages supplied with sliver or yarn and confined in the cases C, and the strands united at the lay-up top and the driver-shaft in motion, turning the upright shaft D, which is the lay-up motion, in one direction, and the cases which twist the strands being turned on their centers by the friction-rim B in the other direction, (the twist being regulated as hereinbefore directed,) the strands now pass up between the brushes attached to the dry spiders and are sized by the size-rollers and smoothed in their passage through the wet brushes by the action of the spiral spring on the shaft D below the dry spider, which spring presses the spiders up against the cam K, and a vertical reciprocating motion is continually given, and the strands being rubbed and sized in their passage are united and laid up by the back twist of the shaft D, and entering the drying-box at the top of the machine the cord is passed many times over pulleys from side to side of the box and dried by a current of heated air passing through it. The cord is then drawn down through the upright tube U, which revolves and adds the necessary back twist to the rope after being dried. It is then drawn out by the draw-off pulley *r* and passed on to the winder Z, which



swings around and distributes the rope onto the reel, which stands on a platform in the center of its gyrations.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. The arrangement of the gears *s* and *t* upon shaft *h*, in combination with the clutch *O* and shaft *I*, so that by changing the position of the clutch we increase, retard, or arrest the motion of the friction-rim *B* and reverse these motions instantly, in the manner described.

2. The spider *G*, arranged and constructed substantially as described, in combination with the cam *K* and the spiral spring upon the shaft to give it a revolving motion to rub the strands, for the purposes described.

JOHN HARRIS.  
JOHN B. STOTT.  
GALEN RICHMOND.

In presence of—

A. H. SHELDON,  
GEO. H. SHELDON.