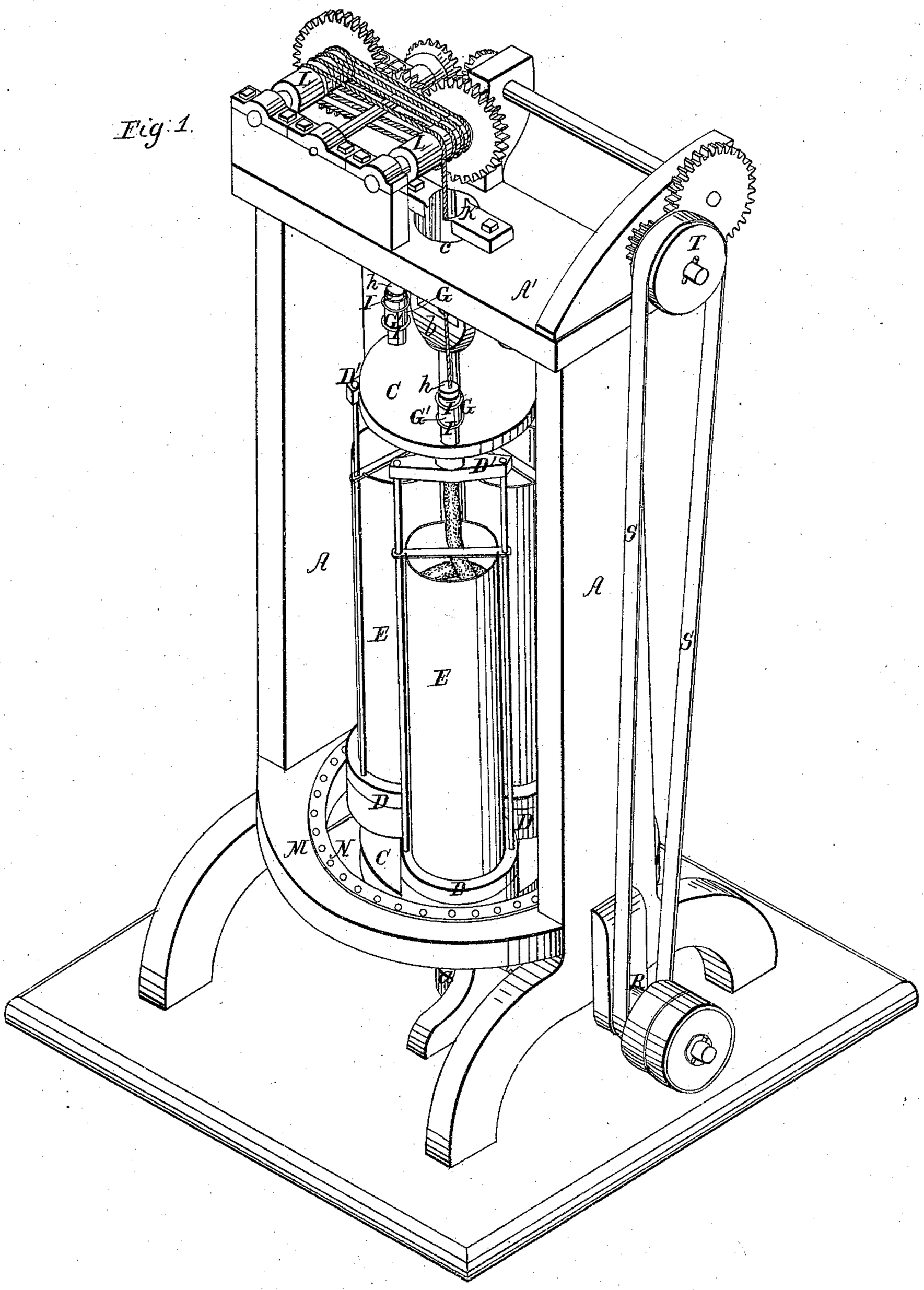
Sheet 1, 2 Sheets.

J. P. Arnold.

Cordage Mach.

No. 16,867. Patented Mar. 24, 1857.

Fig: 1.



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Sheet 2, 2 Sheets.

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Fig: 2.

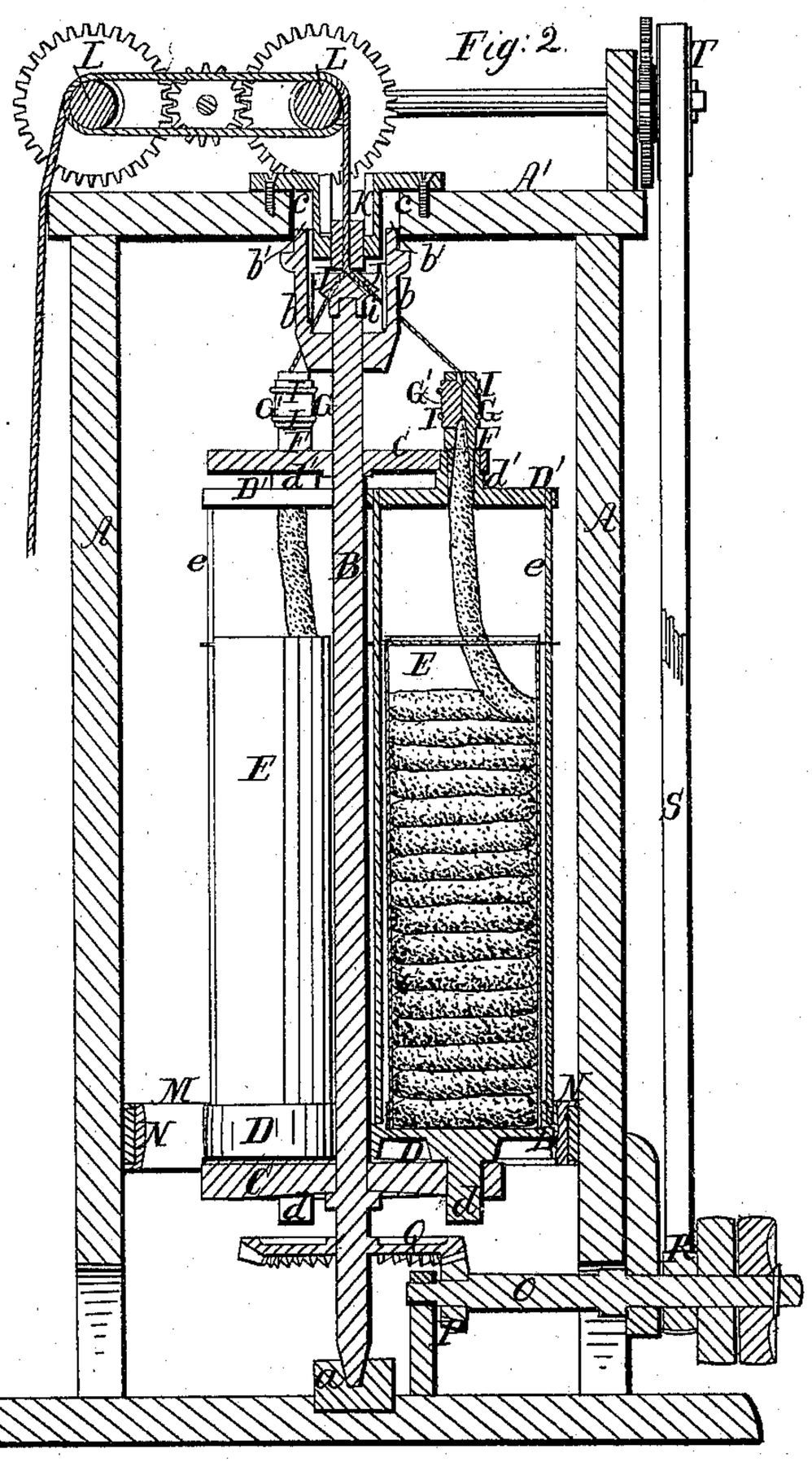


Fig: 3.

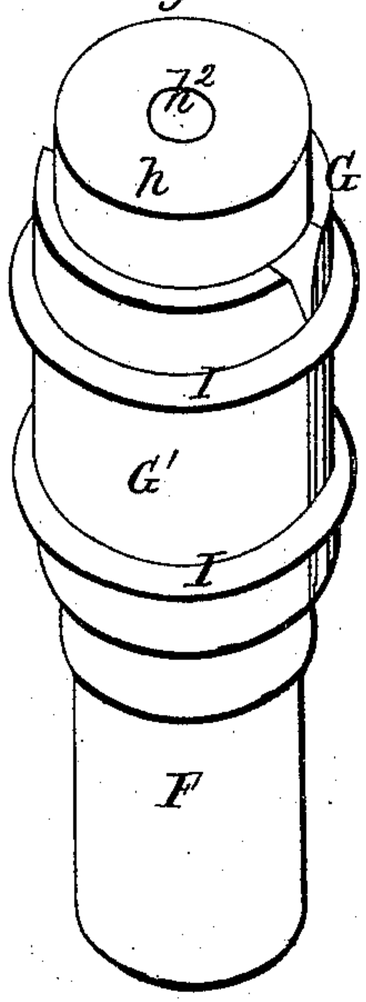


Fig: 4.

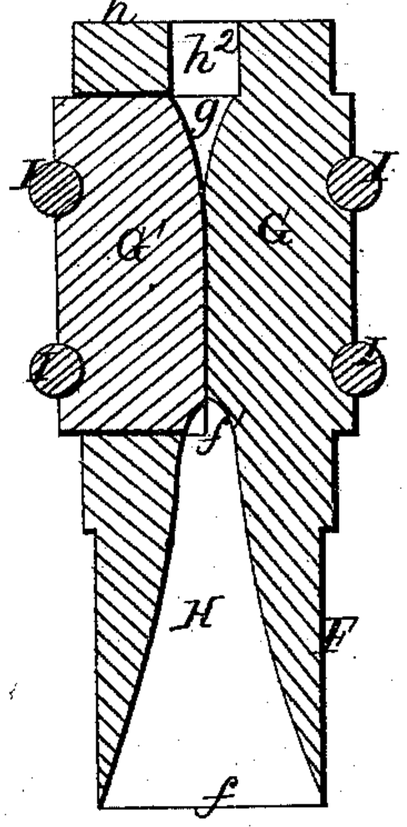


Fig: 6.

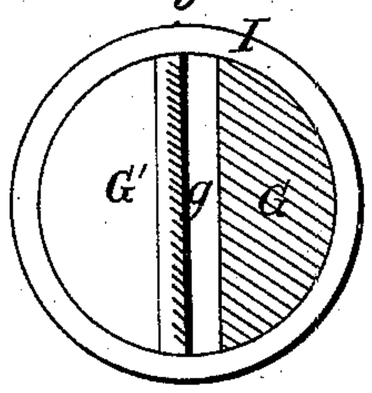
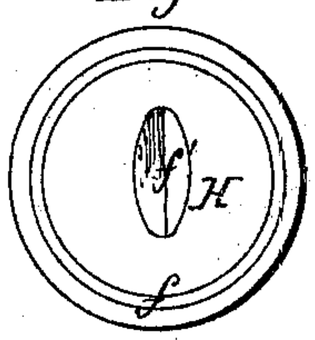


Fig: 5.



UNITED STATES PATENT OFFICE.

JAMES P. ARNOLD, OF LOUISVILLE, KENTUCKY.

IMPROVEMENT IN CORDAGE-MACHINES.

Specification forming part of Letters Patent No. **16,867**, dated March 24, 1857.

To all whom it may concern:

Be it known that I, JAMES P. ARNOLD, of Louisville, in the county of Jefferson and State of Kentucky, have invented certain new and useful Improvements in Cordage-Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, which make part of this specification, and in which—

Figure 1 represents a perspective view of a cordage-machine embracing my improvements. Fig. 2 represents a vertical section of the same. Fig. 3 represents a perspective view of the nippers and nose-tube detached from the fliers. Fig. 4 represents a vertical section of the same in order to show the face of the jaws of the nippers, the arrangement of the circular springs, and the form of the opening through the nose-tube. Fig. 5 represents a plan of the nose-tube inverted, and Fig. 6 represents a plan of the nippers.

My invention relates to that class of cordage-machines in which two or more strands are twisted in the same machine independently of each other and then combined by being twisted together to form a cord. In these machines a central revolving shaft has attached to it at convenient distances apart two circular plates or two sets of radial arms, near the periphery of which and generally in both plates or arms are the bearings of a set of fliers and spindles. A tube enters the nose of the fliers or an orifice in one of the plates in a line with the axis of the flier. The opening in the tube at its inner extremity is circular and trumpet-mouthed, gradually contracting toward its outer end, to which is attached the fixed jaw of a pair of nippers, the movable jaw of which slides on guides and yields only in one direction, and that perpendicular to its face. The motion of rotation of the fliers on their own axes is communicated to them by their motion of revolution around the central shaft either by means of gearing or any other convenient mode. The strand passes from the can or bobbin within the flier through the nose-tube and enters the jaws of the nippers, which grasp it to prevent the twist from extending through to the strands below, and also to equalize the tension on the different strands in order to produce smooth and firm cordage. From the form given to the nose-tube, and also from the yielding of the nippers only in one direction, these functions are but imperfectly performed. The nose-tube compresses the strand to a circular form instead of flattening it, that it may enter more readily the jaws of the nippers, and the nippers, yielding to any inequalities—such as knots in the strand—momentarily relax their grasp and allow the twist to extend through the conical tube, as the circular opening presents no resistance to the turning of the roving within it and the extending of the twist into the roving in the can, by which means it becomes entangled, knotted, and broken, causing great wastage.

The object of my improvements is to remedy the before-mentioned defects in cordage-machines; and my invention consists, first, in the tube through which the roving passes to the nippers, the upper part of which below the nippers being oval instead of circular in form, by which the roving is flattened, so that it enters more readily the jaws of the nippers and is prevented from turning in the tube and the twist from extending to the roving in the can.

My second improvement consists in beveling the face of the upper part of the jaws of the nippers, by which the twist given to the roving is gradually slackened as it enters the jaws of the nippers, which aids in preventing its passing through the nippers.

My third improvement consists in constructing the nippers so that one of the jaws will open in any direction, by which means its grasp is maintained without binding the roving during the passage of knots and other inequalities through the nippers.

Upon reference to the accompanying drawings the construction and operation of my improved cordage-machine will more fully appear.

Two standards A, forming the sides of the frame of the machine, are connected at the top by a cross-plate A′, and between the standards and resting in a step *a* is a vertical shaft B, to which is attached, near its upper end, a stirrup *b*, the top of which is a hollow cylinder *b′* and forms the upper journal of the shaft B, which turns in a bearing *c* in the cross-plate A′. Attached to this shaft B are two parallel circular plates C, at convenient

distances apart, to accommodate a set of fliers, which are arranged around the shaft and turn in holes near the periphery of the plates C. A stud *d* projects from the foot of each flier and forms the lower journal for it, the nose *d'* for each flier forming the upper.

The bottom D of the flier, which is cylindrical, constitutes the pulley by which motion of rotation is given to it, and is hollowed out on its upper side to receive a can E for holding the roving. This can is prevented from turning on the foot D of the flier by a cross-bar, which enters notches in the upper edge of the can and slides up and down on rods *e*, connecting the foot D with the top bar D' of the flier.

A nose-tube F, to conduct the roving from the can, enters and fits closely the nose of the flier. At the base *f* the opening in this tube is circular and is gradually contracted and flattened toward the outer end *f'*, Fig. 4. Attached to the outer end of this tube and on one side is the semi-cylindrical fixed jaw G of a pair of nippers, the movable jaw G' of which rests upon the other side of the top of the tube. The long axis of the orifice H in the tube is in a line with the face of the nippers and just enters the base of the jaws. From this point and for about two-thirds of its length the face of both jaws is perfectly plain without any groove, the opening of the nippers alone forming an aperture for the passage of the roving. The face of the upper part of the nippers is beveled off, leaving a triangular opening *g* between the jaws when closed. A circular cap *h*, with a hole h^2 in the center, is attached to the top of the fixed jaw as an upper guide for the roving through the nippers. The movable jaw G' of the nippers is held in position and retained against the fixed jaw G by two ring-springs I, which surround both jaws and fit into grooves made to hold them near the top and bottom. These springs admit of the movable jaws opening in any direction.

Within the stirrup *b* and attached to the top of the central shaft P is a conical laying-block J, in which the holes *i* for the passage of the strand radiate from the apex of the cone and incline in the direction of the top of the nippers. Above the laying-block and projecting through the cylindrical foot of the stirrup *b* within a short distance of the top of the laying-block J is a stationary tube K for conducting the strands after they are twisted together to a set of take-up reels L, which are supported in bearings attached to the cross-plate A' of the frame. The motion of rotation of the fliers on their own axes is communicated by means of a circular ring M, attached to the frame and surrounding the flier-pulleys. The inside of this ring is made elastic by a cushion N, of rubber or other elastic material, and forms an elastic and yielding track, which presses against the pulleys D adequate force to give sufficient adhesion to insure their rotation on their own axes in all parts of their circuit of revolution around the central shaft.

A horizontal driving-shaft O under the machine has attached to it a bevel-wheel P, which gives motion to a corresponding wheel Q, attached to the vertical shaft B. Near the outer extremity of the driving-shaft O is a pulley R, which gives motion by a band S to a pulley T on the end of a stud, which by means of a train of gearing gives motion to to the the take-up reels L. The rotation of the central shaft B gives motion of revolution to the fliers, the pulleys D of which, from their adhesion to the elastic track, give motion of rotation to the fliers on their own axes. The roving passes from the can through the nose-tube *d'* to the nippers, thence through the nippers and the hole in the cap *h* to the laying-block. Between the upper part of the nippers and the laying-block the first twist is given to the roving by the rotation of the fliers. After passing through this laying-block the different strands of roving are united and again twisted by the rotation of the shaft B and form the cord. Thence it passes through the tube K to the reels L, around which it is wound backward and forward several times, so that its friction on the grooves in the reels shall be sufficient to maintain a constant strain on the cord and insure a regular take-up. The roving in passing through the tube is condensed to an oval shape, by which it enters with less resistance the jaws of the nippers, and is also prevented from turning in the tube and the twist from extending below into the can, by which the roving is prevented from being entangled, knotted, or broken. In passing through the jaws of the nippers the roving becomes flattened, and during the passage of knots and other inequalities the nippers open wider at one point than at another on account of the position of the springs, which allow the movable jaw to open in any direction. The knot in its passage through the nippers forms a movable fulcrum, around which the jaw rocks, and closes upon the roving either above, below, or on one side of the knot, depending upon the position of the knot in relation to the springs. Thus the grasp of the nippers is effectually maintained upon the roving in all positions of the knot within the nippers, by which the twist is prevented from extending on the roving through the nippers. As there is no groove in the face of the nippers, the small parts of the roving are held firmly and the tension upon the strands equalized, preventing the roving from being slack-twisted in these parts and the formation of uneven cordage by the slackened strand winding around and projecting beyond the others. The triangular-shaped opening between the jaws of the nippers assists in preventing the twist of the roving from extending through the nippers from the impediment it presents to the turning of the flattened roving. Near the top of the nippers this opening is of suf-

ficient width for the roving to twist without obstruction; but from that point to the apex of the triangle the gradually-contracting sides of the nippers present increased resistance to the turning of the roving; hence it follows that the twist is in a measure prevented from descending, and its liability to extend on the roving through the nippers is much diminished.

In place of the elastic ring springs of rubber on the nippers, steel or other ring springs may be used, or four spiral springs attached to the jaws would allow the movable jaw of the nippers to have all its present movements, which are opening from either side or from the top or bottom as though it was hinged at those points, and also opening parallel to the face or diagonally.

Having thus described my improved cordage-machine, I do not claim the nose-tube with the conical opening the outer end of which is circular. Neither do I claim the movable jaw of the rotary nippers arranged with lateral guides on which it slides in a direct line only from and toward the fixed jaw and is pressed against the fixed jaw by means of a spring, as I am aware that the nose-tube and nippers constructed in this manner are found in the cordage-machine of Slaughter and Perry, and also in other machines; but

What I do claim, and desire to secure by Letters Patent, is—

1. Flattening the outer end of the nose-tube, for the purpose described.

2. The wedge-shaped opening between the faces of the upper portion of the jaws of the nippers, as described.

3. Constructing the movable jaw of the rotary nippers so that it can yield in any direction, as described.

In testimony whereof I have hereunto subscribed my name.

JAS. P. ARNOLD.

In presence of—

F. SOUTHGATE SMITH,

WM. D. BALDWIN.