(No Model.) 2 Sheets—Sheet 1.

A. FORNANDER.

MACHINE FOR MAKING AND COVERING CORD.

No. 306,911. Patented Oct. 21, 1884.

Fig. 1.

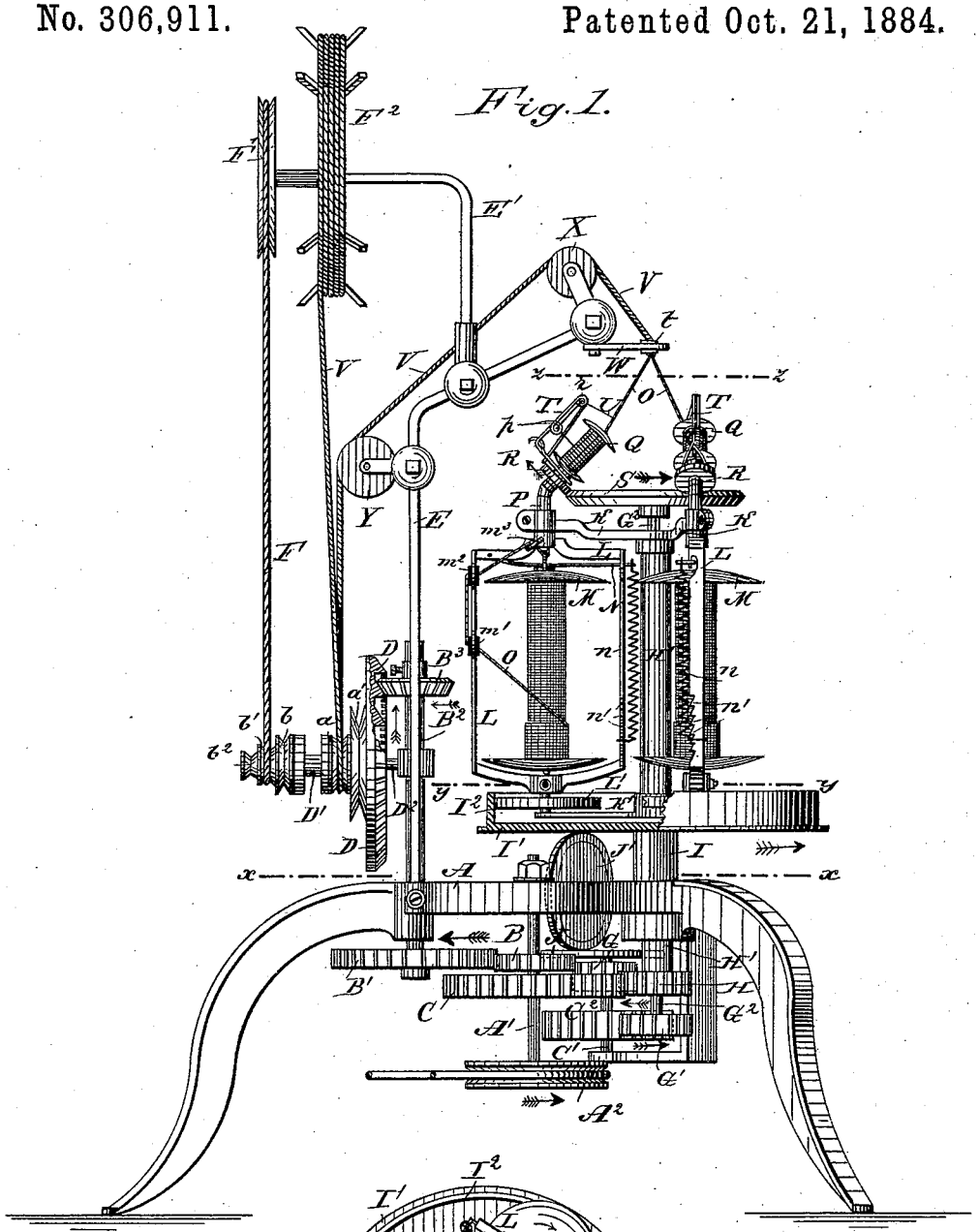
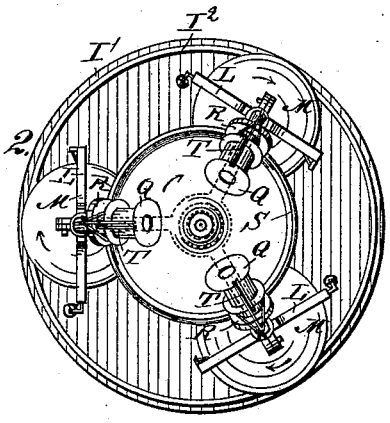


Fig. 2.



WITNESSES:

Otto Beyer

C. Sedgwick

INVENTOR:

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ATTORNEYS.

(No Model.) 2 Sheets—Sheet 2.

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Fig. 3.

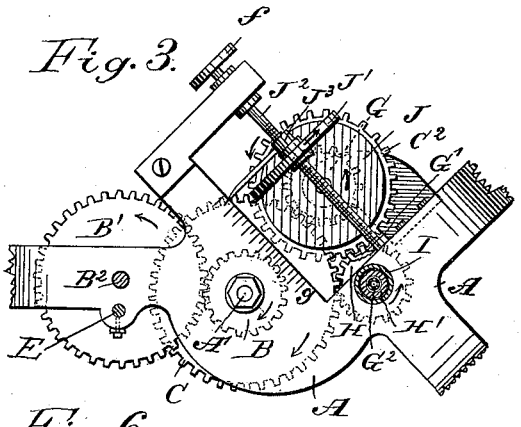


Fig. 4.

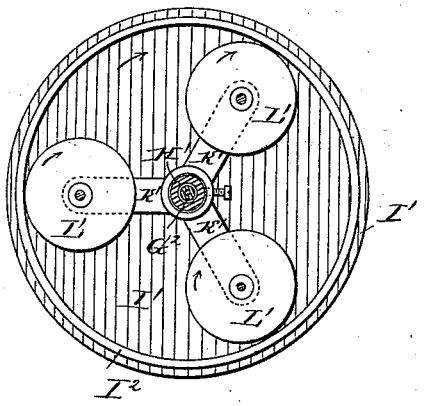


Fig. 6.

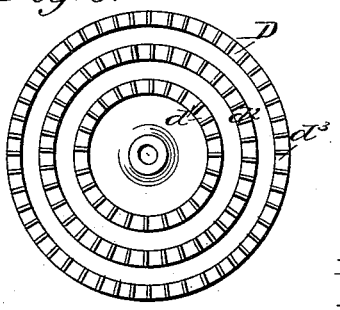


Fig. 5.

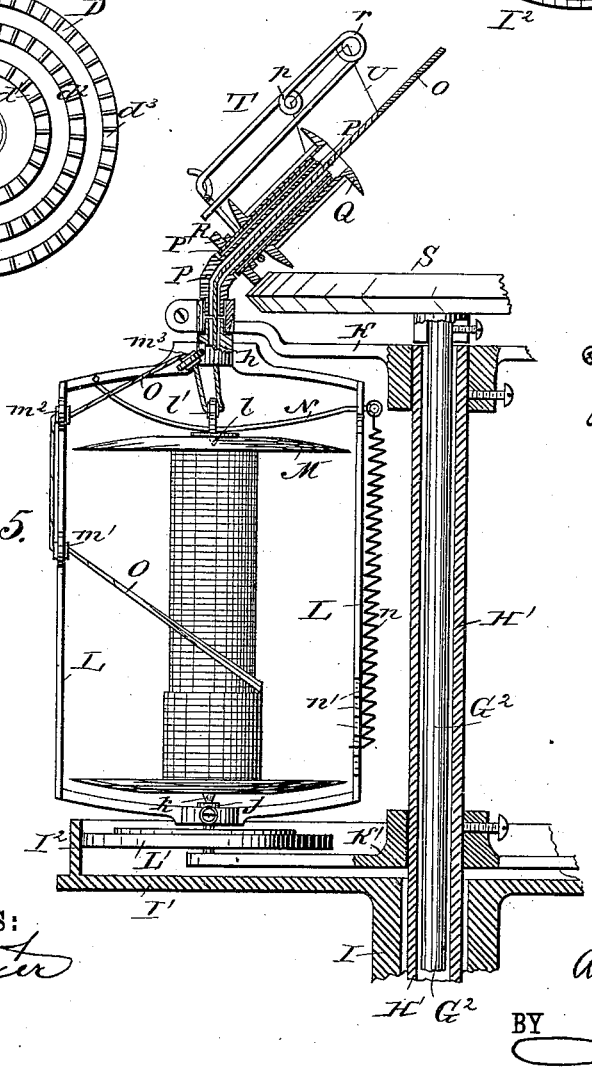
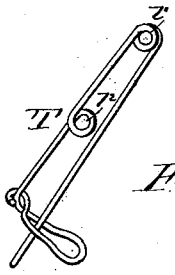


Fig. 7.



WITNESSES:

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ATTORNEYS.

UNITED STATES PATENT OFFICE.

ALFRED FORNANDER, OF BROOKLYN, NEW YORK, ASSIGNOR TO LEOPOLD REMACLE, OF SAME PLACE.

MACHINE FOR MAKING AND COVERING CORDS.

SPECIFICATION forming part of Letters Patent No. 306,911, dated October 21, 1884.

Application filed October 21, 1882. (No model.)

To all whom it may concern:

Be it known that I, ALFRED FORNANDER, of Brooklyn, in the county of Kings and State of New York, have invented a new and Improved Machine for Making and Covering Cords, of which the following is a full, clear, and exact description.

The object of my invention is to provide a new and improved machine for twisting and covering the several strands of a cord with silk or some other material and then twisting the twisted and covered strands together to form a cord; and to this end the invention consists in the peculiar construction and arrangement of parts, as hereinafter fully described, and pointed out in the claims.

Reference is to be had to the accompanying drawings, forming part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a front elevation of my improved machine for twisting and covering the several strands of a cord and twisting the covered strands together, parts being broken out and shown in section. Fig. 2 is a plan view of part of the same on the line *z z*, Fig. 1. Fig. 3 is a sectional plan view of the same on line *x x*, Fig. 1. Fig. 4 is a sectional plan view of the same on line *y y*, Fig. 1. Fig. 5 is a detail sectional elevation of a part of the same on an enlarged scale. Fig. 6 is a detail elevation of the cog-wheel for transmitting motion to the cord-wheel. Fig. 7 is a perspective view of the winding and tension device for the spools on which the silk or covering threads are wound.

The entire machine rests upon a base-plate, A, which is preferably provided with a series of legs.

On the lower end of a journaled vertical shaft, A′, projecting from the under side of the plate A, is rigidly mounted a driving or belt pulley, A^2. On the same shaft A′ are rigidly mounted cog-wheels B and C, of which the former, B, engages with a cog-wheel, B′, on the lower end of a vertical shaft, B^2, having a vertically-adjustable bevel cog-wheel, B^3, mounted thereon, the said bevel cog-wheel engaging with one of three concentric circular rows of teeth, d' d^2 d^3, on a disk, D, which is rigidly mounted on a sleeve, D′, mounted on a horizontal shaft, D^2, projecting from the vertical shaft B^2. A series of pulleys, a a' b b' b^2, of different diameters, are rigidly mounted on the sleeve D′, and over one of the pulleys b b' b^2 a cord or driving belt, F, passes, which passes over a driving-pulley, F′, which is connected with a reel, F^2, on which the completed cord is wound. The cog-wheel C on the shaft A′ engages with a cog-wheel, G, on a vertical shaft, C′, journaled in a bracket on the under side of the plate A, and the said wheel C also engages with a cog-wheel, H, rigidly mounted on the lower end of a vertical tubular shaft, H′, which passes through a vertical sleeve, I, journaled in the plate A, and on the upper end of which sleeve I a circular horizontal plate, I′, is centrally mounted, the said circular plate being provided with an upwardly-projecting vertical rim or flange, I^2.

On the vertical shaft C′ a cog-wheel, C^2, is rigidly mounted below the cog-wheel G, and engages with a cog-wheel, G′, rigidly mounted on the lower end of a vertical shaft, G^2, which passes through the tubular shaft H′. A horizontal frictional disk, J, is mounted on the upper end of the shaft C′, and on the said friction-disk the edge of a friction-wheel, J′, rests. The wheel J′ is loosely mounted between two fixed collars on the screw-sleeve J^3, through which sleeve the horizontal screw-shaft J^2, journaled in projection of the plate A, passes, whereby the said wheel is free to turn on its axis, but is prevented from moving longitudinally thereon. A hand-wheel, *f*, is secured to the outer end of the shaft J^2, and a graduated scale, *g*, is provided on an adjoining straight edge of the plate A. The lower surface of the circular plate I′ rests upon the edge of the friction-wheel J′.

At the upper end of the tubular shaft H′, and directly above the plate I′, two series of arms, K K′, respectively, project radially and horizontally from the side of said tubular shaft and into the ends of the said arms, the upper tubular pivots, *h*, and the bottom pivots, *j*, of flier-frames L, pass.

On each lower pivot, *j*, a friction-wheel, L′, is rigidly mounted, the periphery of which wheel is in contact with the inner surface of the flange I^2 of the plate I′. Each flier-frame L is adapted to receive a spool, M, which is to contain the material from which the body of the strands of the cord is to be made, the

said spool being provided with a bottom stud or pintle, *k*, which rests in a recess in the top of the pivot *j*. A disk, *l*, provided with a downwardly-projecting pintle or stud, is placed on the top of the spool M, and is pressed on the same by a curved rod, N, on which the disk *l* is secured. One end of the rod N is secured to the flier-frame L, and the other is attached to the upper end of a spiral spring, *n*, the lower end of which can be secured on one of the series of teeth, *n'*, on one of the vertical bars of the flier-frame L. The flier-frame L is provided with three porcelain or glass eyes, m' m^2 m^3, and a like eye, *l'*, is formed on the disk *l*, through which eyes the strand O passes before passing through the tubular pivot *h*. The rod N and the spring *n* serve as a tension device, as will be more fully described hereinafter.

On the end of each arm K a bent tube, P, is secured directly above the tubular pivot *h*, and the said tube is inclined upward at an angle of about forty-five degrees toward the central axis of the shaft G^2. A sleeve, P', adapted to receive a spool, Q, is mounted loosely on the bent tube P, and is provided at its lower end with a friction-wheel, R, the edge of which rests against the beveled edge of a large horizontal friction-disk, S, which is rigidly mounted on the upper end of the shaft G^2. A winding and tension-spring frame, T, is attached to each sleeve P', near the lower end of the same, and extends parallel with the said sleeve and rotates therewith. The frame T is made of spring-wire, forming two parallel shanks, of which the outer—or the one that is farthest from the spool or sleeve—is attached to the sleeve P', at the lower end of the same, has a loop or eye, *p*, formed at or near the middle, and another loop or eye, *r*, at the end of the frame T, from which loop or eye *r* the inner shank extends back toward the lower end of the sleeve P', as shown in Figs. 5 and 7. The inner or lower end of the inner shank of the frame T is free. The silk U or other covering material or threads on the spool Q passes through the loop or eye *p*, from there through the loop or eye *r*, and from there to the strand O, which it surrounds. The several strands O, after being covered, pass through an eye, *t*, at the end of an arm, W, of a standard, E, on the plate A. From the eye *t* the completed cord passes over guide-pulleys X Y on the standard E, and then over one of the pulleys *a a'* and to the reel F^2, which is journaled on an arm, E', of the standard E.

I have shown a machine for three spools, M, but more can be arranged on the machine, if desired.

The operation is as follows: The pulley A^2 is rotated in the direction of the arrow, and the cog-wheels B and C, on the same shaft with the pulley, will be rotated in the same direction. The cog-wheel B rotates the cog-wheel B' and the shaft B^2 in the direction of the arrow. By means of the cord F the reel F^2 is rotated in such a manner that it winds the cord V on the same. The cog-wheel C rotates the cog-wheel G in the direction of the arrow, whereby the friction-disk J will be rotated in a like direction. The cog-wheel C rotates the cog-wheel H, the sleeve H', and the arms K K' thereon in the direction of the arrow, and the cog-wheel C^2 rotates the cog-wheel G', the shaft G^2, and the friction-disk S thereon in the direction of the arrow, and the said friction-disk S rotates the friction-wheels R in the direction of the arrow. The strands O are thus twisted by the revolving of the flier-frame, and the silk or other covering material is wound from the revolving spools Q on the strands O, which are thus covered, and the twisted and covered strands O are then twisted together to form the cord V by the revolving of the disks carrying the flier frame, the said disk being revolved from the tubular shaft H'. It will thus be seen that the strands are twisted and covered and the twisted and covered strands twisted together to form the cord in one operation, and the completed cord is wound on a reel. If the friction-wheel J' rests upon the middle of the friction-disk J, the said friction-wheel will not be revolved, nor will the plate I' be revolved, and the fliers L revolved upon their several axes at the normal or medium speed. If the friction-wheel J' is moved toward the disk J nearest the hand-wheel *f*, the plate I' will be rotated from left to right—that is, in the inverse direction of the movement of the arms K K'—and the result will be that the fliers L will rotate very rapidly and more twist will be given to the strands O before they are combined, and as the revolutions of the shaft H' are constant, if the adjustable bevel-wheel B^3 is moved up or down on the shaft B^2 to engage with either of the sets of teeth *d'*, d^2, or d^3 of the disk D, so that the reel F^2 will revolve slower or faster, the cord will be twisted more or less compactly, as more or less twists together of strands O are in a certain length of the cord. If the friction-wheel J' is so adjusted that it will be near that edge of the screw-shaft J^2 farthest from the hand-wheel *f*, the plate I will be rotated in the same direction as the arms K K', and consequently the fliers L will be rotated very slowly, and less twist will be given to the strands O if the pitch of the strands in the cord is to be greater or less. The beveled cog-wheel B^3 must be adjusted to engage with the teeth *d'*, d^2, or d^3, so that the reel F^2 will be revolved faster or slower. The operator is thus enabled to make cords having any desired number of twists per inch. Plain cords can be made as well as cords of different colors. The springs *n* press the disks *l* on the spools M and prevent the said spools from rotating so rapidly that too much of the material is unwound. When the thread U passes from the upper part of the spool to the eye or loop *p*, it forms an angle at its bends, and the friction affords so much resistance that the loop end of the tension-frame T will be drawn slightly toward the disk S by the thread U. Thereby the free

end of the inner shank of the tension-frame T will be raised from the edge of the spool Q, which can thus rotate freely; but when the thread passes from the lower end of the spool through the eye or loop *p* there is less friction and resistance, and the thread U will not draw the loop end of the tension-frame T toward the disk S. The free end of the inner shank of the frame T presses against the edge of the spool and prevents the same from rotating too rapidly.

If desired, gear-wheels can be used throughout in place of friction-wheels.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination, with the tubular shaft H′, means for operating the same, the arms K K′, and the flier-frames L, of the revolving plate I, provided with flange I², the friction-wheel L′, the friction-wheel J′, and means for operating the said wheel J′, substantially as herein shown and described.

2. The combination, with the tubular shaft H′, of the arms K K′, the flier-frames L, the wheels L′, the revolving plate I′, the friction-disk J, the friction-wheel J′, and devices for rotating the same, and the shaft H′, substantially as herein shown and described, and for the purpose set forth.

3. The combination, with the tubular shaft H′, of the arms K K′, the flier-frames L, the wheels L′, the revolving plate I′, the friction-disk J, the friction-wheel J′, the screw-shaft J², and devices for rotating the friction-disk J and the shaft H′, substantially as herein shown and described, and for the purpose set forth.

4. The combination, with the tubular shaft H′, having arms carrying spool-holding flier-frames, of the shaft G², the sleeve I, the plate I′, the wheels L′ on the flier-frames, the cog-wheels B and C, the shaft A′, the driving-pulley A², the cog-wheels H G′ G C², the friction-disk J, the friction-wheel J′, and devices for winding material around the strands of fibrous material on the spools in the flier-frame, substantially as herein shown and described, and for the purpose set forth.

5. The combination, with the tubular shaft H′, having arms carrying flier-frames adapted to contain spools, of the shaft G², the friction-disk S on the same, the inclined tubes P on the ends of the upper arms on the shaft H′, the sleeves P′, the friction-wheels R on the said sleeves, the winding and tension frames T, attached to the sleeves P′, and devices for rotating shafts H′ and G² in opposite directions, substantially as herein shown and described, and for the purpose set forth.

6. The combination, with the flier-frame L, provided with notches *n′*, of the disk *l*, the rod N, secured to the flier-frame and to the disk, and the spring *n*, secured to the free end of the rod N and engaging with the notches of the flier-frame, substantially as herein shown and described.

7. The combination, with a revolving spool-holding sleeve P′, of the frame T, provided with a loop, *p*, at the middle of the outer shank, and a loop, *r*, at the free end of the frame at the junction of the shanks, substantially as herein shown and described, and for the purpose set forth.

8. The combination, with the shafts B² D² and the reel F², of the adjustable bevel-wheel B³ on shaft B², the disk D on shaft D², provided with concentric rows of teeth *d′ d² d³*, the sleeve D′, provided with a series of pulleys, and means for operating the reel from one of the pulleys of the sleeve, substantially as herein shown and described.

ALFRED FORNANDER.

Witnesses:
OSCAR F. GUNZ,
C. SEDGWICK.