No. 827,130. PATENTED JULY 31, 1906.

S. W. WARDWELL.

TAKE-UP FOR LOOMS.

APPLICATION FILED DEC. 6, 1901. RENEWED DEC. 28, 1905.

2 SHEETS—SHEET 1.

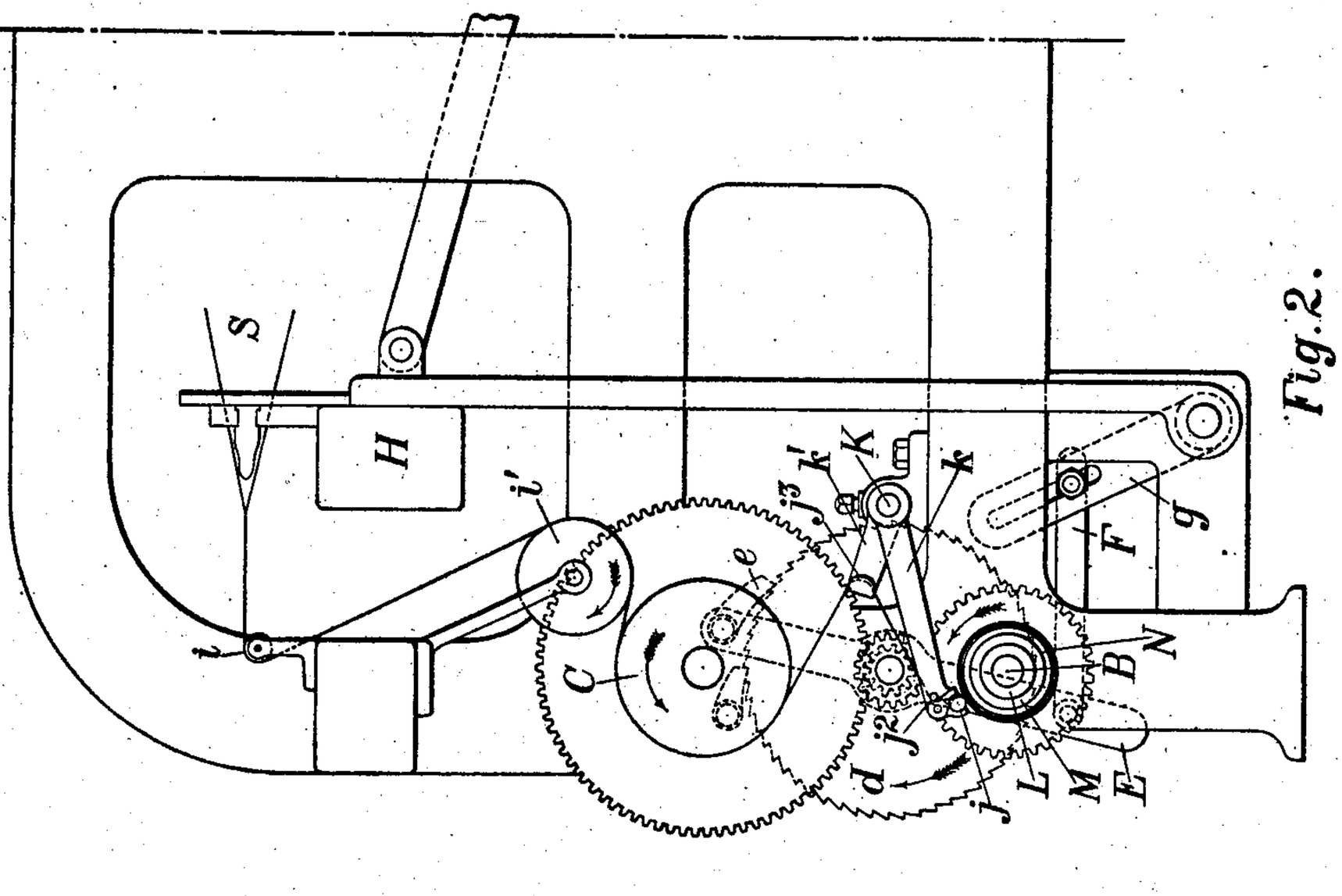

Fig. 2.

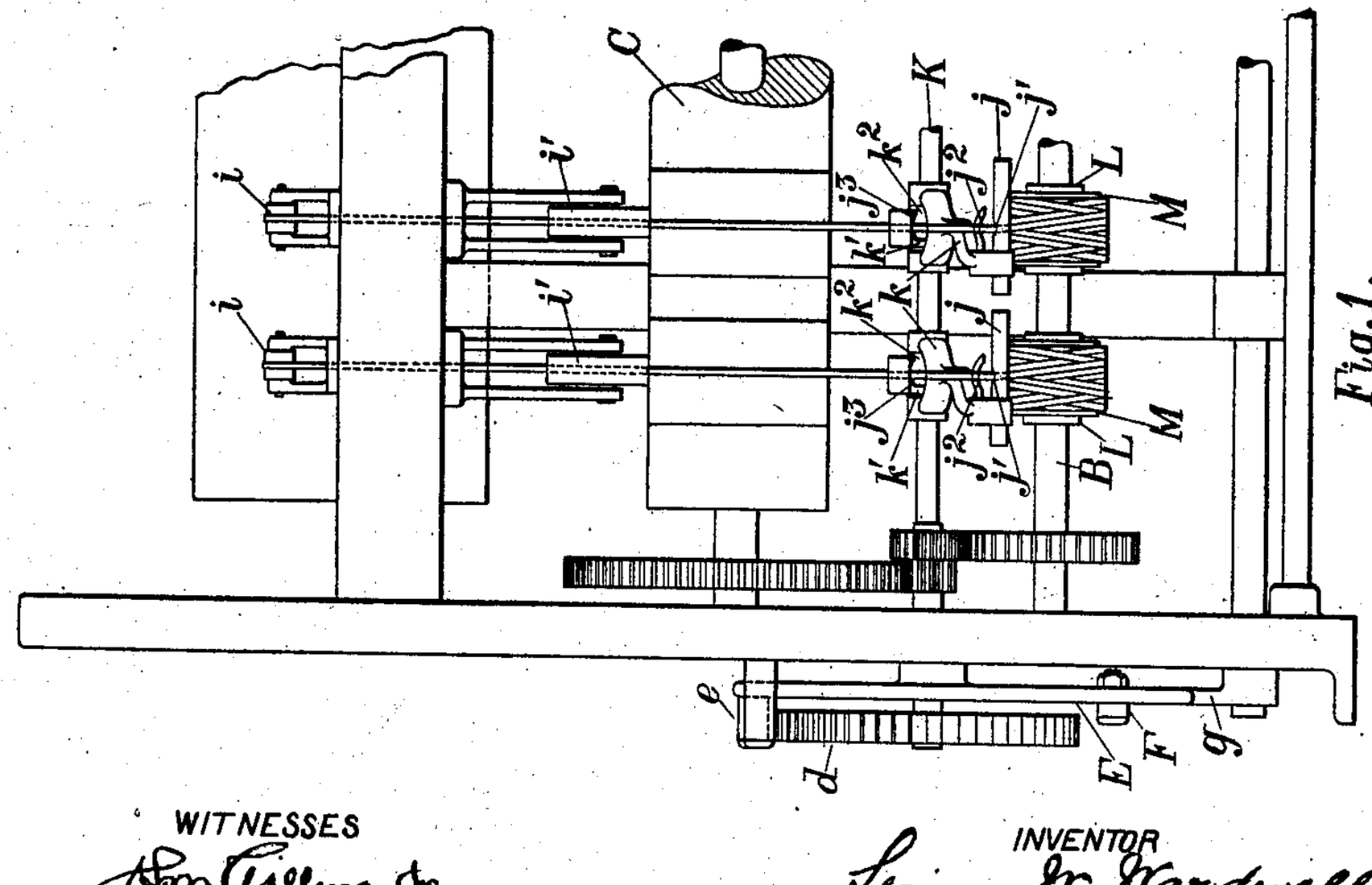

Fig. 1.

WITNESSES

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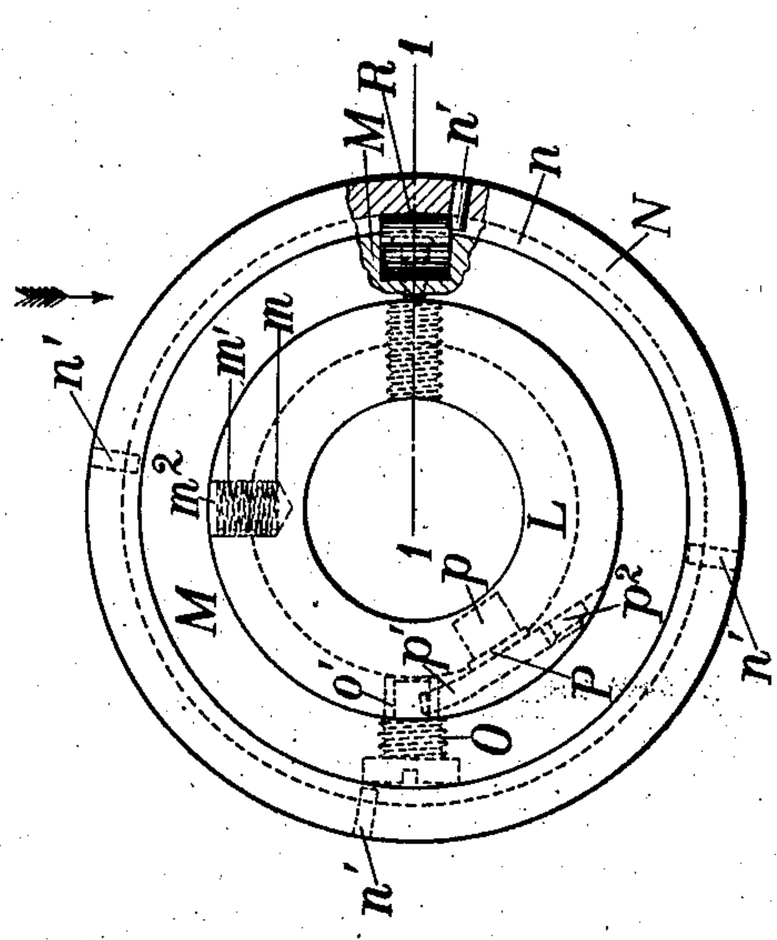
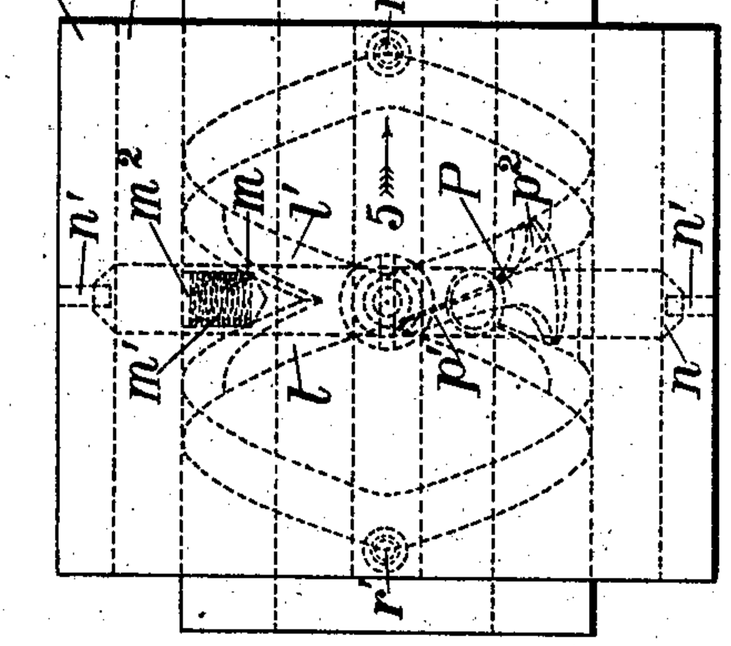


Fig. 3.



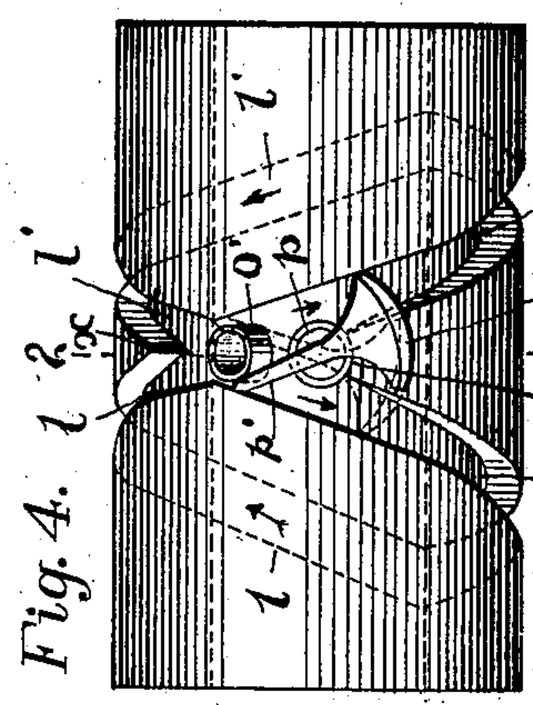


Fig. 4.

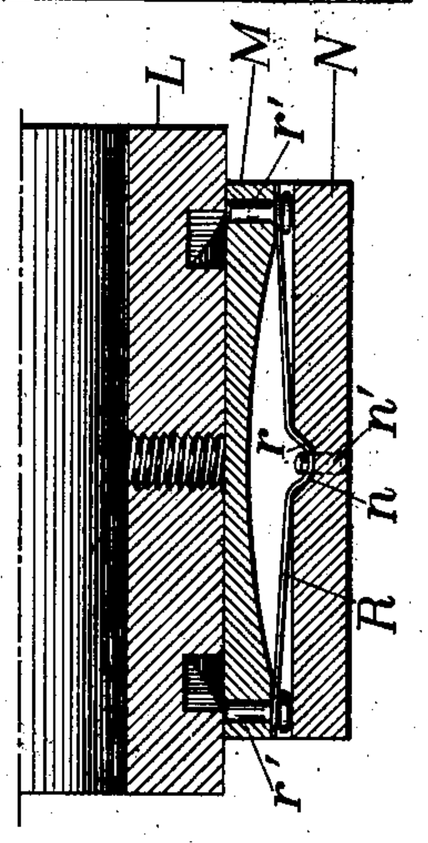


Fig. 5.

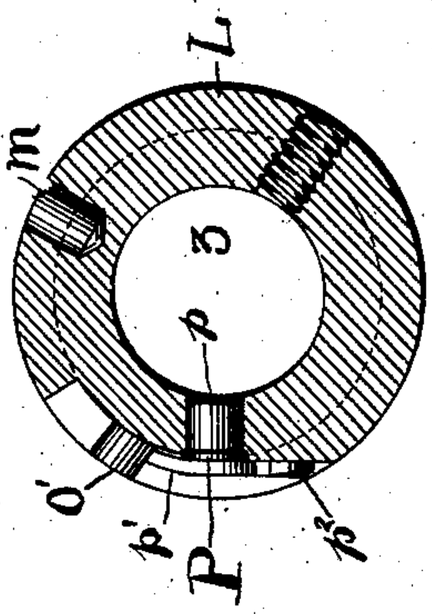


Fig. 7.

Fig. 6.

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TAKE-UP FOR LOOMS.

No. 827,130. Specification of Letters Patent. Patented July 31, 1906.

Application filed December 6, 1901. Renewed December 28, 1905. Serial No. 293,678.

To all whom it may concern:

Be it known that I, SIMON W. WARDWELL, a citizen of the United States, residing at Providence, in the county of Providence and State of Rhode Island, have invented a new and useful Take-Up for Looms, of which the following is a specification.

My invention relates to take-up devices for looms, and especially for "narrow-ware" or "webbing" looms, which produce tapes, ribbons, and similar narrow fabrics.

The object of my invention is to produce a device for winding the fabric on the loom as fast as it is woven in a compact self-sustaining package without rolling, twisting, or otherwise defacing or impairing the quality of the fabric.

The form of structure employed and the manner of its application to the loom and of its operation are fully described in the following specification and illustrated in the accompanying drawings, of which—

Figure 1 is a front view of a portion of a loom, showing my improved take-up attachment and its relation to the loom mechanism. Fig. 2 is an end view of the same; Fig. 3, a side view of the tube and carrying device detached from the loom; Fig. 4, an end view of the same; Fig. 5, a part section on the line 1 1, Fig. 4, looking in the direction indicated by the arrow; Fig. 6, a side view of the cam L, showing the roll o' in its groove; Fig. 7, a section on the line 2 2, Fig. 6, looking in the direction indicated by the arrow 4, showing the roll o' engaging the switch P.

Figs. 1 and 2 show in part a loom of usual form with its shuttle mechanism at S, the sand-roll or take-up roll C to take up the fabric as it is woven, and the winding-shaft B, to which the take-up roll C delivers the fabric and which winds the latter into packages to be transferred from the loom to other operations, as rewinding and packing for shipment. For convenience I shall in this specification designate the loom fabric as "tape."

The mechanism and connections whereby the take-up mechanism is operated are doubtless familiar, but will be briefly recited. The sand-roll C and the winding-shaft B are rotated from the rocking "lay" H through the ratchet-wheel d and the pawl e. The latter is carried on the lever E, mounted concentric with the ratchet-wheel d and connected with the lay H through the connecting-rod F and the slotted arm g. The latter is slotted to permit adjustment of the connecting-rod F on the arm g, and thereby the speed of the sand-roll and of the winding-shaft. By varying the position of the connecting-rod F the pawl e is caused to rock through a greater or smaller arc, thus varying the number of teeth on the ratchet-wheel engaged by said pawl.

My invention relates particularly to the devices carried on the winding-shaft B, on which the tape is directly wound and which I for convenience designate as "tube-carriers." The tube-carrier (shown in detail in Figs. 3, 4, 5, 6, and 7) comprises a sleeve M to support and to retain the tube N, on which the tape is wound, and a cam L, rigidly secured to the winding-shaft and carrying the sleeve M, to which it imparts a movement of rotation and of reciprocation, as will be hereinafter described. The cam, as stated above, is rigidly secured to the winding-shaft, and in its periphery is cut a helical groove or track, which in one convolution accomplishes its extreme extent in one direction, then reverses, and crossing itself at x returns to the point from which it started. The sleeve M, mounted on the cam L, is maintained in frictional engagement therewith by means of the washer m^2, of leather or other effective material, pressed against the inner surface of the sleeve M by the spring m', which, with the washer, is mounted in the pocket m in the surface of the cam L. Carried in the sleeve M midway between its ends is the stud-screw O, whose extremity, formed cylindrically for a bearing or journal, extends into the groove or track in the cam L. On the journal end of this screw is mounted the roll o', which fits the groove in the cam L. When the cam is rotated within the sleeve M, the roll, following its groove, imparts to the sleeve M a movement of reciprocation on said cam. That the roll may not at the crossing x of the groove be diverted from its proper course the switch P is introduced. (More clearly shown in Figs. 6 and 7.) The switch is of substantially wedge shape, comprising a tongue p', a head p^2, and a pivot-stem p, by which it is mounted in the body of the cam.

The cam L rotates in the direction indicated in Fig. 7 by the arrow 3. When unrestrained by the tension of the tape being wound, the sleeve M rotates freely with the cam L and has no movement of reciprocation. When, however, the tape is attached to the tube N to be wound, the rotation of the sleeve M, on which the tube is mounted,

is restrained and limited by the rate of delivery of the tape, so that the cam rotates within the sleeve L, causing the roll o' to travel in its groove. The pressure against the roll is from that side of the groove to which the tongue of the switch is swung, as shown by the full lines in Fig. 6. With the switch in the position indicated in this figure its spreading head extends across the portion l of the groove, and as the cam rotates the roll o' makes contact with the head p^2 of the switch and, swinging it on its pivot, throws it into the position indicated by the dotted lines in Fig. 6. The roll o' travels along the portion l of the groove to the end of its traverse, when it enters the reverse portion l' of the groove and travels back to the crossing x, where the switch P again guides it along its proper course; and having passed the crossing it again engages the head p^2 of the switch to throw it back into the position indicated by the full lines of Fig. 6, ready to again guide the roll o' along the portion l of the groove and prevent its being diverted therefrom into the portion l' of the groove at the crossing x.

In the periphery of the sleeve M is cut a longitudinal groove or narrow depression, preferably of the form indicated in Fig. 5, which extends the length of the sleeve. Extending longitudinally across this depression is a spring R, secured to the sleeve M by the pins r' r', and at a point intermediate the ends of the spring is a projection r, made by suitably forming the spring. This spring serves to secure detachably to the sleeve M the tube N, on which the tape is wound. The tube N is made of wood or other material with an internal annular groove n intermediate its ends, corresponding in position with the projection r on the spring R. At suitable intervals in the groove there are projections, as indicated in Figs. 3, 4, and 5 by the pins n'. The projection r of the spring R engages the groove n to prevent the tube from moving longitudinally on its sleeve and also engages one of the pins n' to drive the tube rotatively.

The winding-shaft B, on which the tube-carrier is mounted, is made in several sections, suitably coupled together to be rotated as one shaft, but with each section removable, so that the completed packages may be readily removed. Each section supports a plurality of the tube-carriers, so that, to prepare the winding-shaft for winding, the tubes to be mounted on the mid-portion of each section must be passed over the tube-carriers near the ends, and likewise when the winding of the packages is completed the latter must be removed in the same manner. This is readily accomplished, as the spring R, while strong enough to retain the tube N in place during the winding, is not so strong as to prevent the passage of the tubes for application or for removal.

To properly deposit the tape in position on the surface of the package, it is essential that the guide, whereby it is laid, bear at all times against said surface. The guide in question is a rod j, having a groove j', through which the tape is guided and which prevents it from lateral movement during the winding. The extended portions of the rod on either side of the groove serve to press and hold flat the tape already wound. This rod or guide j is mounted in the end of an arm k, which in turn is mounted on the rod K to rock thereon so that the guide may be pressed at all times against the surface of the package and swing with the increasing diameter of the package. That the guide and its arm may be as compact as possible, the guide is so set into the side of the arm that the latter does not fully surround it, so that the guide may bear with its full length upon the package. The arm k is restrained from movement along the rod K by the hub k^2 of an arm k', the extremity of which is formed as a guide j^3, under which the tape passes before it reaches the guide j. The guide j^3 is made adjustable about the shaft K and is to be located in such relation to the guide j that the latter is maintained in contact with the surface of the package by the tension of the tape passing from the guide j^3 over an intermediate guide j^2 and under the guide j.

The operation of my improved device is as follows: The tape passes from the shuttle or weaving mechanism at S, over the guide-roll i and under the guide-wheel i', to the sand-roll C, which rotates in the direction indicated by its arrow, Fig. 2. Drawn by its adhesion to the sandpaper surface of the roll C the tape is delivered under the guide j^3, over the guide j^2 at the extremity of the arm k, and under the guide j to the tube-carrier. The shaft B is driven at a speed which insures a reciprocating movement of the package at its smallest diameter, or, in other words, at a speed such that were the tube on which the tape is wound rigidly secured to its shaft the rate of surface speed of the tube or of the package would materially exceed the linear speed of the tape as delivered from the weaving. As the tube is not thus rigidly attached, but can slip with its carrier on its cam, its movement of rotation is retarded and limited by the delivery of the tape, and hence it has a combined motion of rotation and reciprocation, and as the guide j remains stationary the tape is laid in openly-coiled helices, forming a self-sustaining package in which the number of turns made by the tape in the length of the package gradually decreases with its increasing diameter. That this is the case is due to the gradually-changing speed relation between the cam L and the package wound on the tube N, due to uniform lineal rate of delivery of tape and to gradual increase of diameter of the package. When the winding is first commenced, there is the least amount

of slip between the cam L and the sleeve M. Hence at this stage of the winding the two rotate most nearly at the same speed, and the sleeve reciprocates but slowly, making, for instance, one traverse movement in one direction during two rotations. As the package increases in diameter the sleeve rotates more slowly, and there is a greater difference in the relative speeds of rotation of the cam and sleeve, and consequently a more rapid movement of reciprocation of the sleeve M, so that at one stage of the winding the package will make one traverse movement in one rotation and a half, then in one rotation, and so on, depending on the ultimate diameter of the finished package.

Heretofore the product of the loom has been generally wound in flat rolls or disk-shaped packages, formed by winding the tape on itself in a flat spiral coil without any traverse motion of the package or of the guide which delivers the tape to the winding. When the fabric was of material width and woven plain, little difficulty was experienced; but very narrow tapes, and especially those woven in pattern, form an unstable package, which when of material diameter breaks down, causing the yarn to become tangled, twisted, and otherwise injured. Pattern-tapes are particularly difficult to wind, because the pattern-weave is more or less raised and the successive layers, placed directly one over the other, do not lie flat, and hence are more readily displaced. With my improved take-up the tape is maintained flat, so that creases and wrinkles are obviated. The package produced is self-sustaining, so that there are no kinks or snarls to be straightened out before the material can be rewound for packing.

I do not herein claim any of the features herein shown and also shown and claimed in my application for Letters Patent filed March 3, 1902, Serial No. 96,532.

Without limiting myself to the precise construction or arrangement shown, I claim—

1. In a winding device for narrow-fabric looms the combination with the tape-winding shaft having a motion of rotation only, of a tube susceptible of being reciprocated and rotated thereon, means for reciprocating and rotating said tube, and a fabric-guide opposed to the cylindrical surface and supported to swing away from the axis of said tube.

2. In a winding device for narrow-fabric looms the combination with a winding-shaft having a motion of rotation only, of a tube reciprocating and rotating thereon, devices for reciprocating said tube, and for rotating it at a gradually-decreasing speed while the speed of the winding-shaft remains uniform.

3. The combination in a winding device with rotary shaft, of a tube on which the package is wound carried and rotated thereby, and means for imparting to said tube a movement of reciprocation upon the shaft.

4. The combination in a winding device, of a winding-shaft adapted to rotate only, a tube reciprocating thereon, means for reciprocating said tube, and a guide for the tape wound, opposed to the cylindrical surface of the tube and supported to swing away from its axis.

5. The combination in a winding device, of a winding-shaft, a tube mounted thereon and rotated thereby and means whereby the said shaft imparts a movement of reciprocation to the tube in addition to its movement of rotation.

6. The combination in a winding device, of a winding-shaft, a reciprocating tube on which the tape is wound, a sleeve to support and carry the tube and a cam whereby the sleeve and tube are both rotated and reciprocated, concurrently.

7. The combination in a winding device, of a rotating shaft, a cam L, a sleeve M reciprocated by the cam, a tube N serving as a support or core for the package wound and adapted to fit sleeve M and easily detachable therefrom, and means for retaining and driving said tube in conjunction with sleeve M.

8. The combination in a winding device, of a winding-shaft having a motion of rotation only, a tube N on which the package is wound, means for reciprocating said tube on the winding-shaft, and devices for rotating it and for retaining it in such a manner as to be easily detachable therefrom.

9. The combination in a winding device, of a winding-shaft, a cam L fixed thereon, a reciprocating sleeve M, a tube N held on and easily detachable from said sleeve M, and a roll o', rotatable on a projection extending from the sleeve M into a groove in cam L, to reciprocate the former by engagement with said groove.

10. The combination in a winding device with a rotary shaft, of a cam L fixed thereon, a helical groove $l\ l'$ in said cam, extending from a point near one extremity once around its periphery to a point near the opposite extremity and back again to the starting-point, at a uniform pitch throughout, and crossing itself at the center of the cam, a reciprocating sleeve M on said cam, means for rotating said sleeve, a tube N supported and driven by sleeve M, a roll o' rotatable in groove $l\ l'$ on a stud projecting from said sleeve, and a switch P having a member p' for effectually maintaining the roll in its proper groove-section, and preventing it from being diverted to the other groove-section at the crossing x of the groove-sections.

11. The combination with a cam, of a sleeve rotating thereon and adapted to support a cop-tube, a continuous helical groove twice surrounding the periphery of said cam

and extending from one extremity to the other and back again, crossing itself midway between the said extremities, a projection on the sleeve to engage said groove to reciprocate the sleeve, and means to prevent the engagement of the projection with that part of the groove crossing the part engaged, during its passage through the crossing-point.

12. The combination in a winding device with a rotary shaft, of a cam fixed thereon, a sleeve rotated and reciprocated by the cam, a tube adapted to slide freely on the sleeve, a spring held in a longitudinal recess on the sleeve, a centrally-located projection on the spring adapted to fit a corresponding annular groove on the inner surface of the tube to retain the latter longitudinally, and capable of being disengaged therefrom by said pressure on the tube to release it, and pins protruding into the groove at frequent intervals of its circumference and fastened therein to engage the spring to rotate said tube.

13. The combination with a rotary tube-holder, of a tube fitting thereon, a spring to retain said tube, and projections on the interior of the tube to engage said spring to rotate the tube.

14. In a winding device the combination with a winding-shaft, of a cam L fixed thereon and rotated thereby, a sleeve M on the cam, connections between the cam and the sleeve M to both rotate and reciprocate the sleeve, and a coiled spring held in a radial pocket m in cam L and adapted to engage a disk m^2, fitting the opening of said pocket, to press it into contact with the inner surface of sleeve M to rotate the latter, allowing it to slip to accommodate its rate of rotation to the rate of delivery of the tape to the winding-shaft.

15. In a winding device the combination with a winding-shaft, of a cam fixed thereon, a tube-carrying sleeve reciprocated thereby, and a spring held by the cam and bearing on said sleeve to frictionally engage the latter to cause its rotation with the cam, while allowing it to be retarded in its rotation by the action of external resistance.

16. In a winding device the combination with the winding-shaft, of a cam fixed thereon and rotated thereby, a sleeve reciprocating on the cam, a tube supported and driven by the sleeve, connections between said sleeve and the cam whereby the former is rotated at a speed less than that of the cam, dependent on the delivery of the material to the package wound, and decreasing to maintain for said package a uniform peripheral speed, and devices whereby the variations in speed of said sleeve and the cam causes a reciprocatory movement of said sleeve.

17. In a winding device the combination with a winding-shaft, of a cam fixed thereon, a tube-supporting sleeve on said cam, connections between the cam and sleeve whereby the latter is rotated and reciprocated, a guide j for the material, supported by an arm k pivoted to a stationary shaft K to allow its oscillation away from the axis of the package wound, a hook j^2 on said arm, an auxiliary guide j^3 on a second arm k' on the shaft K, and means for adjusting the auxiliary guide j^3 to cause the material passing through it to bear on the hook j^2, to press the guide j against the surface of the developing package during the winding, and for fastening said arm k' to prevent longitudinal movement of arm k on shaft K.

18. The combination in a winding device of a rotating cam, a sleeve supported on the cam, means to drive the sleeve rotatably through frictional engagement with the cam, and means to cause the reciprocation of the sleeve on the cam by retarding its speed of rotation with relation to that of the cam.

19. The combination in a winding device, of a rotating cam, a sleeve supported on the cam, means to drive the sleeve rotatively through frictional engagement with the cam, means to reciprocate the sleeve on the cam by retarding its speed of rotation with relation to that of the cam, and tubes rotated and reciprocated from said sleeve to receive the material wound.

20. The combination with the weaving mechanism of a narrow-ware loom, of a winding tube, friction driving devices for rotating the tube to the extent permitted by the rate of production of the fabric, and means for moving the tube longitudinally, substantially as described.

21. The combination with the weaving mechanism of a narrow-ware loom, of a winding-tube, friction driving devices for rotating the tube to the extent permitted by the rate of production of the fabric, and means for reciprocating the tube longitudinally at an increasing rate of speed as the cop increases in size.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

SIMON W. WARDWELL.

Witnesses:

HERBERT F. CLARKE,

GEORGE S. ARMSTRONG.