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SPINDLE

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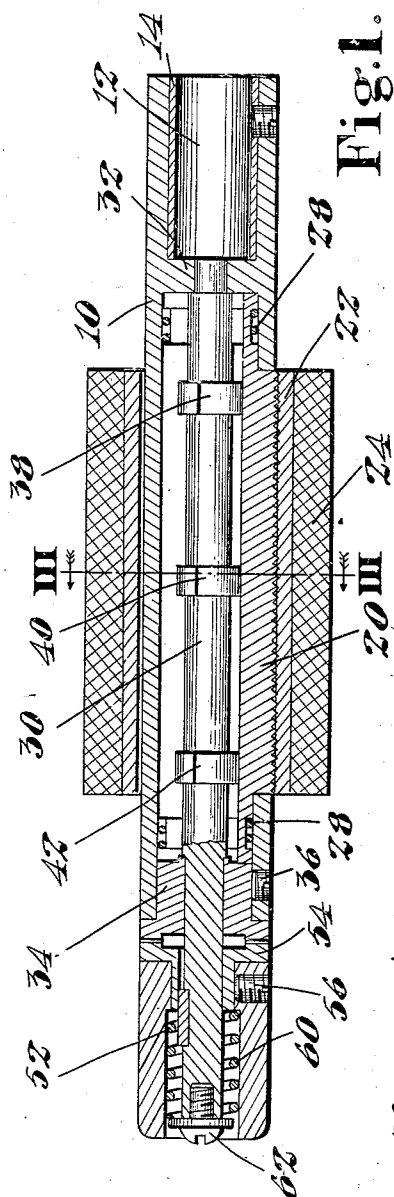


Fig. 1.

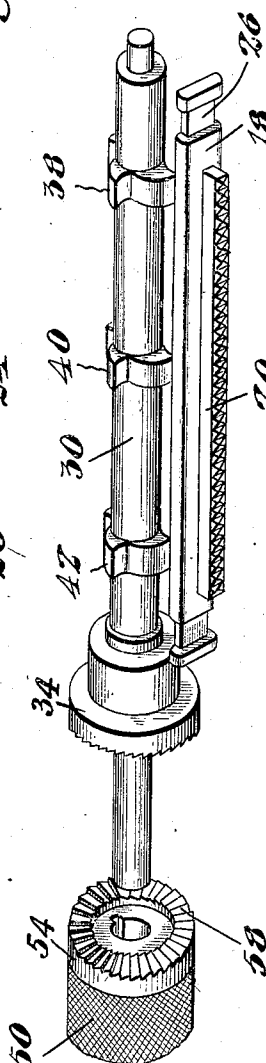


Fig. 2.

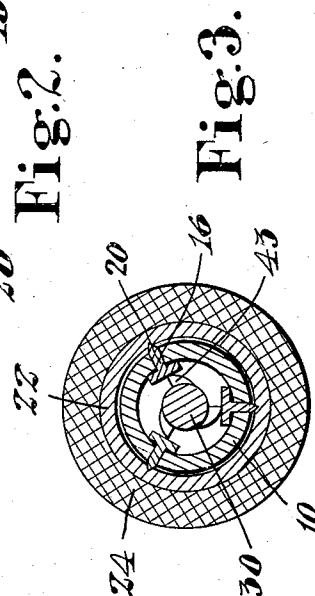


Fig. 3.

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SPINDLE

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This invention relates to improvements in spindles for cops, cones, tubes, bobbins and the like and is herein illustrated in a spindle for a winding machine adapted to hold paper tubes thereon to support yarn or the like wound around the tubes.

In various textile machines, such as winding machines, one body such as a rotatable supporting spindle is provided for holding other bodies such as the tubes, cones, or bobbins upon which the thread or yarn is wound. These spindles are secured to power-driven apparatus by means of which they may be rotated to turn the tubes to wind the thread. The tubes must be removed and replaced frequently, so that a saving of even a few seconds in the operations of removing and replacing the tubes is important. If these operations are made easy by constructing the apparatus so that the tubes fit too loosely, there will be slippage between the tubes and the spindles and improper tension of the thread and generally poor winding will result.

One object of the invention is to provide an improved spindle to and from which a paper tube or the like may be easily applied and removed and upon which the tube will be securely held.

In order that tubes may be easily applied to such spindles the diameter of the spindle is made slightly less than the internal diameter of the tube to prevent undue friction between the two as the tube is applied or removed. On the other hand, the whole object of the spindle is rotatively to support the tube so that the tube may be driven by power, applied to the spindle, and accordingly there must not be slippage between the two such as would cause imperfect winding of the thread or yarn. Arrangements have been provided which provide friction members upon the spindle for gripping the inside of the tube but such friction members necessarily increase the difficulty of applying and removing tubes. Accordingly, an important feature of the invention resides in a driving connection between two bodies in which projectible gripping members in one body are positively expelled by a cam within said mem-

bers into engagement with the other body, and, when released, are resiliently retracted evenly and in parallel relation.

Still another feature of the invention resides in novel manually-operable actuating means for causing the expulsion of the gripping members in such a spindle and for holding them in expelled position. In the illustrated construction, the spindle is made up of a hollow body slotted for the reception of elongated, rigid, gripper members which may be expelled into engagement with the inside of a tube. An actuating device having cams for engagement with these gripper members is illustrated as located inside the body and provided with a handle which is of the same external diameter as the spindle body and thus does not interfere with the application or removal of a tube. The handle shown is manually movable rotatively to push out the gripper members and axially by a spring to bring into engagement complementary ratchet teeth upon the body of the spindle and the handle.

In the drawings,

Fig. 1 is a longitudinal section through a spindle constructed in accordance with my invention and showing a paper tube wound with thread supported thereon;

Fig. 2 is an exploded view showing the movable operating parts of the device removed from the body of the spindle; and

Fig. 3 is a transverse section on the line 3-3 of Fig. 1.

The device illustrated in the drawings shows a form of spindle which is especially adapted for holding a cylindrical pasteboard, paper, or wooden tube, but the principles of the invention may readily be applied to spindles for holding bobbins or for holding cones. The spindle comprises a hollow body 10 of aluminum, to reduce the weight of the rotating parts, and this body is provided with a socket 12 having a steel bushing 14 by means of which the spindle may be mounted upon the driven member of a winding machine or the like. The body 10 is made hollow throughout the greater part of its length and is slotted at 16 at three points spaced equally around the periphery

of the body. Gripper bars 18 having heads from which project toothed ribs 20 are positioned within the body with said ribs 20 extending through the slots 16 and are adapted to be expelled to press said toothed ribs into engagement with the inside of a tube 22 upon which ultimately thread or yarn 24 will be wound. The gripper bars 18 are recessed at each end at 26 to receive contractile springs 28 by means of which the teeth 20 of the gripper bars are drawn inside the body of the spindle when it is desired to apply or remove a tube.

For the positive expulsion of the gripper bars a shaft 30 has been provided inside the hollow body 10 of the spindle, which shaft is journaled at one end in a transverse partition 32 and at the other end in a steel filler 34 held in position within the neck of the spindle by a set screw 36. Upon the shaft 30 are provided cams 38, 40 and 42 which are distributed along the length of the shaft so as to bear evenly upon elongated gripper bars to force the toothed portions 20 of each into gripping engagement with the inside of a tube 22. Each cam member comprises three similar projections 43 to cooperate with the equally spaced gripper bars 18, and when the shaft 30 is rotated the gripper bars are positively pressed outwardly into engagement with the tube with a pressure which is equally distributed around the circumference of the spindle and along its length.

In order that no tools may be required for the spindle, so that the operator may apply a tube and lock it in place very quickly and simply and may as readily unlock the device to remove the tube, there is provided a combined actuating and locking handle 50 which is splined to the shaft 30 by means of a key 52 which engages a keyway in a steel sleeve held at one end of the handle 50 by means of a set screw 56. The outer surface of the handle 50 may be knurled to help the operator to grip it, even while rotating. On this sleeve and upon the filler 34 are provided complementary ratchet teeth 58 by means of which the actuating handle 50 may be locked in adjusted position. In order that the handle may be unlocked to rotate the shaft 30 and as readily locked again, it is mounted for axial movement upon the shaft 30 and is normally held in engaging locked position by means of a spring 60 surrounding the shaft within a recess of the handle and positioned between the bottom of the recess and a screw 62. Inasmuch as this handle is of the same diameter as the outside of the spindle body 10 and constitutes an extension thereof, it forms no obstruction to the ready removal or application of tubes.

In the use of the device, the actuating handle 50 is rotated to move the projections 43 of the cams away from the gripper members 18 so that the springs 28 will draw said

grippers back into the body of the spindle. The tube is then slipped over the handle and the body of the spindle, and the operator is enabled, by a quick turn of the handle 50, to cause the positive expulsion of the toothed portions 20 of the gripper members 18 to force them into the inside of the pasteboard tube. There is thus no chance for slippage and the handle 50 is automatically locked in adjusted position as the spring 60 forces the complementary ratchet teeth 58 into interlocking engagement. It will be noted that a tube shorter than the length of the spindle does not need to be mounted at the bottom of the spindle, as is common in some devices of the prior art, but may be supported at substantially any part of the length of the spindle because of equal expulsion of the gripper members both lengthwise and circumferentially of the spindle.

Having thus described my invention, what I claim is:

1. A rotatable member for supporting a body having a tube-like passage, for rotation therewith, comprising gripping members adapted to be expelled into engagement with said body, resilient means for retracting said gripping members, a cam within said gripping members for expelling said gripping members, a handle splined to said cam and engageable with said body, and means for locking said handle upon contact of the handle with said body.

2. A rotatable spindle for supporting tubes comprising a body provided with expandable gripping members, manually operable means for expanding said gripping members and holding them in expanded position, said means having an operating handle which is movable axially and rotatively with respect to said body, means for connecting said handle to said expanding means effective to operate the expanding means upon movement of the handle in one direction, and means for securing said handle against further movement upon movement thereof in another direction effective to hold said gripping members in expanded relation.

3. A rotatable spindle for tubes comprising a hollow body provided with peripheral openings, gripping members extending out through said openings, an actuating device within the body for expelling said members, a manually operable handle for said actuating device, and ratchet means for locking said handle to said body in a plurality of adjusted positions.

4. A spindle comprising a hollow body, projectible gripping means associated with said body, a rod within the body having members associated therewith for projecting said gripping means into engagement with a tube, and an operating handle slidably engaging said rod and arranged to turn the rod to project the gripping means, said spin-

dle body and said handle having locking devices upon their adjacent surfaces.

5 5. A rotatable spindle for supporting tubes comprising a body provided with expandible gripping members, a manually operable handle carried by said spindle having means for expanding said gripping members, adjacent surfaces of said body and said
10 handle being toothed, and resilient means normally holding said toothed handle against said toothed body.

6. A rotatable spindle for supporting a tube comprising a slotted body, gripping
15 members adapted to be expelled through the slots of the body into engagement with a tube, a cam shaft within the body for positively expelling said gripping members, a handle splined to said shaft to turn the same,
20 ratchet locking means for said handle, and a spring within the handle tending to slide it into locked position.

7. In combination, a body, and means for effecting a driving connection between said
25 body and another body so that they may be rotated together by power applied to one body, one of said bodies surrounding the other, said means comprising gripping members, positioned in the first-mentioned body and projectible into engagement with the other
30 body, a cam adapted to be rotated to effect the projection of the gripping members, an operating member for said cam slidable along its axis of rotation, and coöperating serrated locking surfaces on said operating
35 member and one body whereby sliding movement of the operating member is effective to lock said cam in a plurality of positions.

In testimony whereof I have signed my name to this specification.

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