No. 680,210. Patented Aug. 6, 1901.

P. J. WESTPHAL.

WINDING MACHINE.

(Application filed July 6, 1900.)

(No Model.) 2 Sheets—Sheet 1.

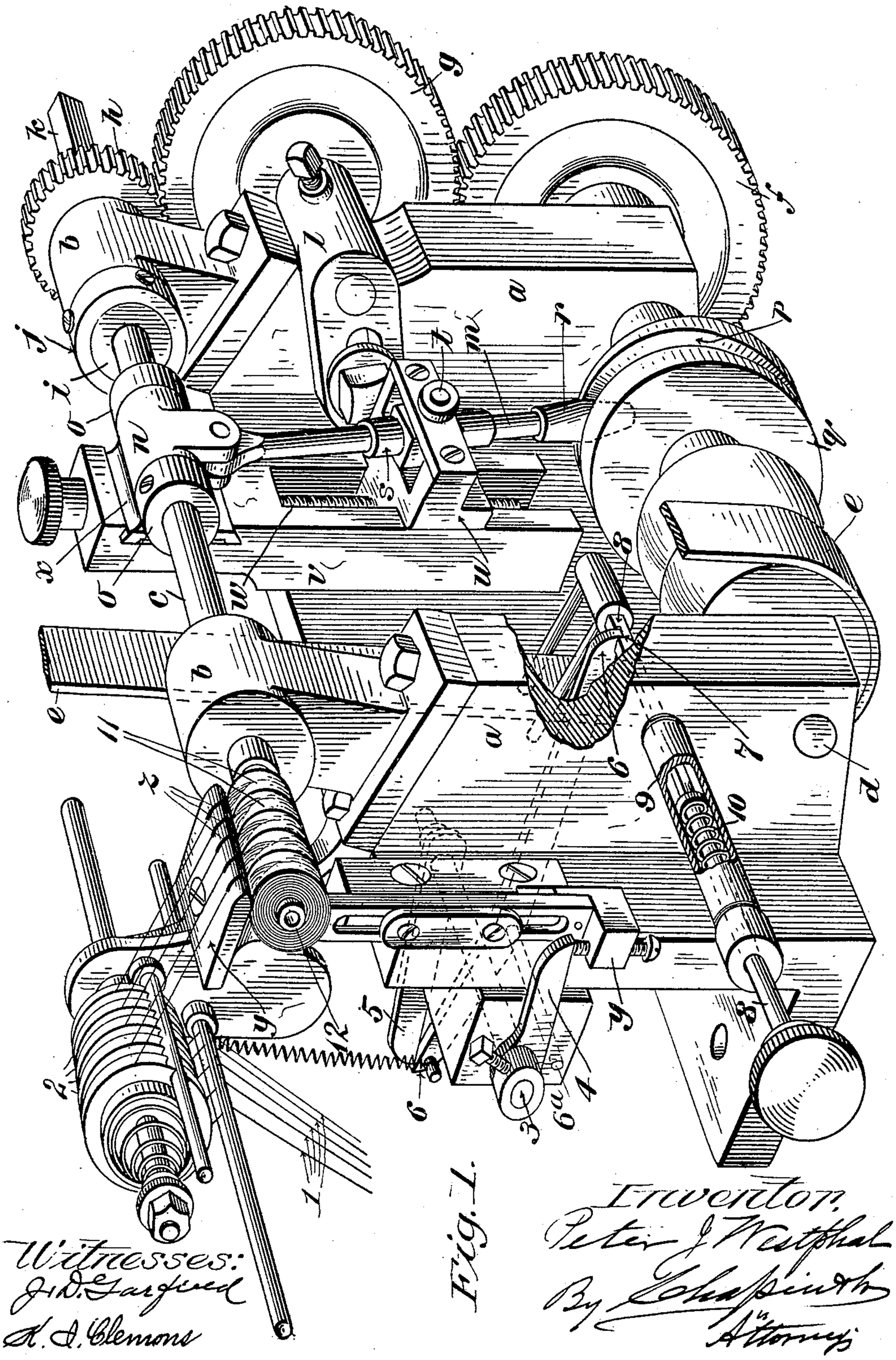

Fig. 1.

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Fig. 2.

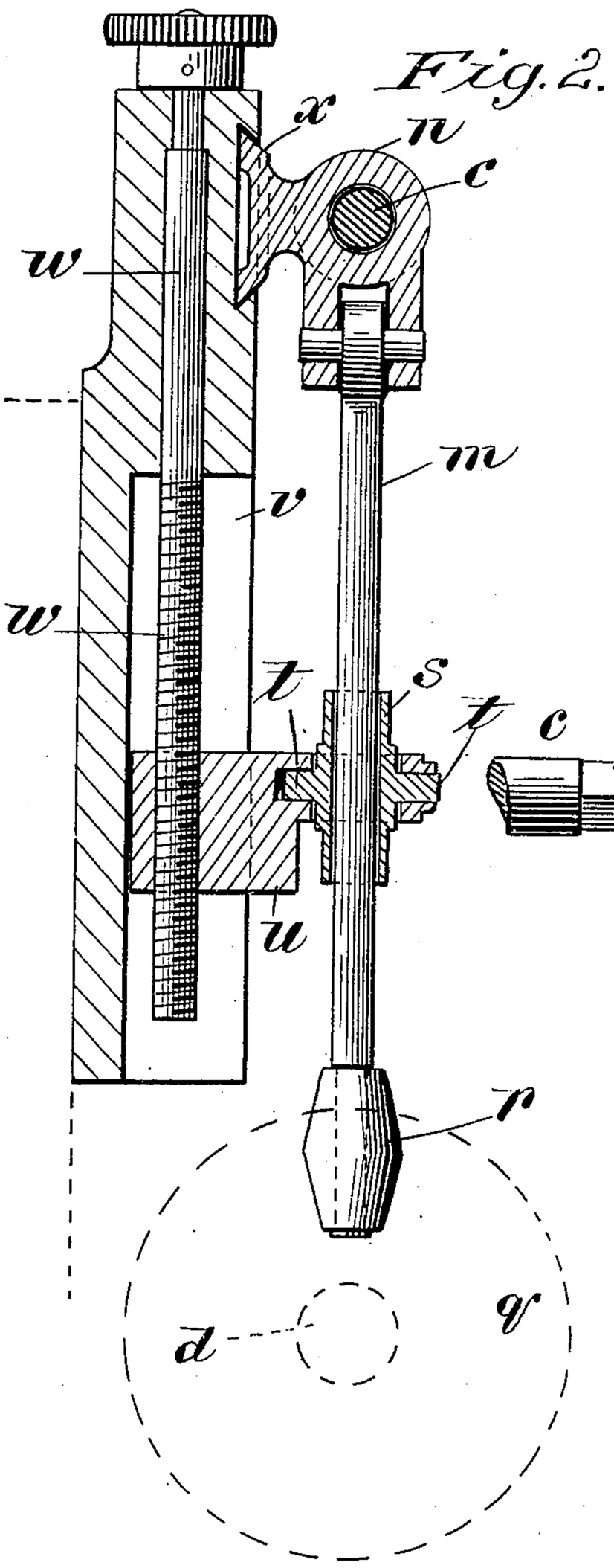


Fig. 3.

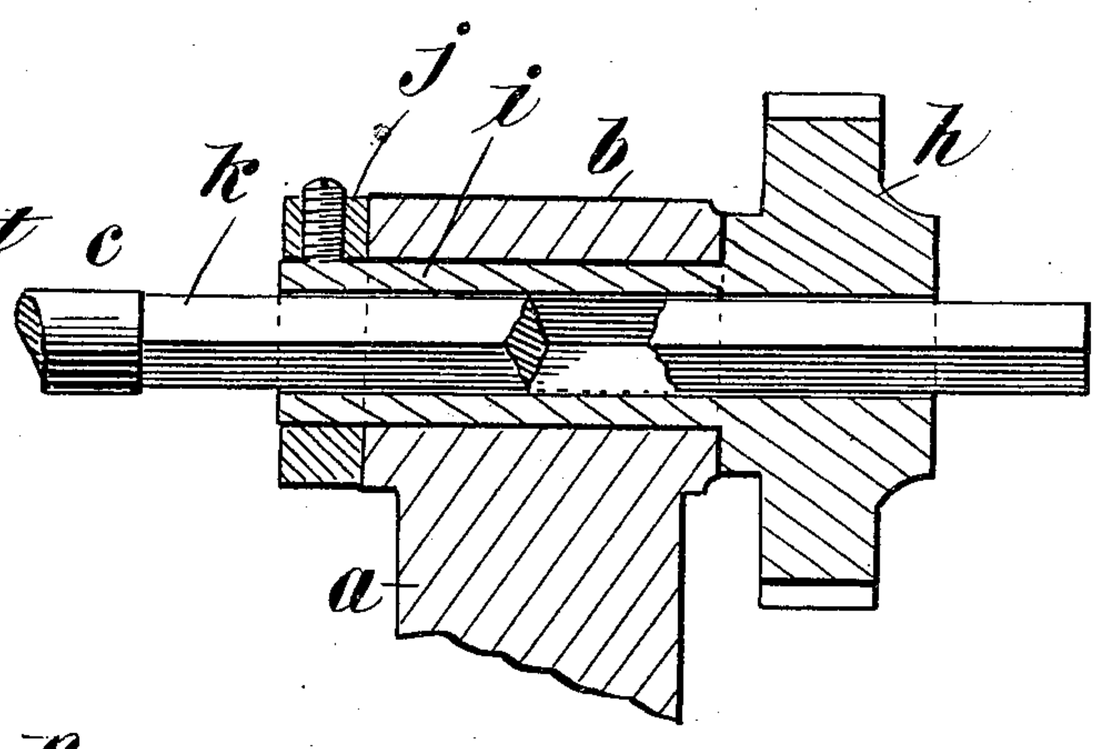
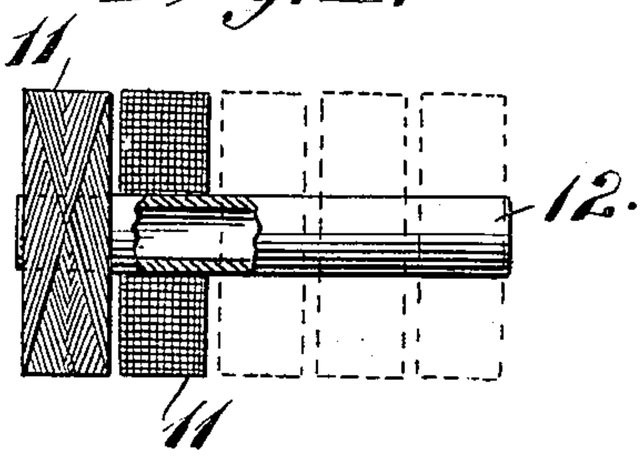


Fig. 4.



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UNITED STATES PATENT OFFICE.

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WINDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 680,210, dated August 6, 1901.

Application filed July 6, 1900. Serial No. 22,700. (No model.)

To all whom it may concern:

Be it known that I, PETER J. WESTPHAL, a citizen of the United States of America, residing at Holyoke, in the county of Hampden and State of Massachusetts, have invented new and useful Improvements in Winding-Machines, of which the following is a specification.

This invention relates to winding-machines for thread and other filaments, one object of the invention being to improve the construction of machines of this class whereby the bobbins may be wound with greater speed than is possible with machines now known and without chafing the thread and whereby such types of bobbins as shuttle-bobbins may be so built up as to prevent them from breaking down after they are completed.

A further object of this invention lies in minor improvements in the construction of the machine embodying the above novel features.

The invention consists in the construction fully hereinafter described, and pointed out in the claims.

In the drawings forming part of this specification, Figure 1 is a perspective view, partly broken away, of a machine embodying my invention. Fig. 2 is a detail view, in sectional elevation, of the spindle-operating lever. Fig. 3 is a longitudinal sectional view of one of the spindle-bearings. Fig. 4 is an elevation and section of one type of bobbin wound on this machine.

Referring to the drawings, in a suitable frame *a* in bearings *b* there is mounted a spindle *c*, this spindle being rotated by means of a driving-shaft *d*, driven by a suitable belt *e*. On the end of said shaft is a gear *f* in mesh through the medium of an intermediate gear *g* with the gear *h*, which is connected directly with the spindle *c*. The character of this connection between the gear *h* and the spindle *c* is such that the spindle may have a free reciprocatory endwise movement axially of said gear and be rotated by the latter. The nature of this connection between the gear *h* and the spindle *c* is shown in Figs. 1 and 3, and consists in constructing the gear *h* with a long hub *i*, which extends through the bearing *b* and has a collar *j* secured to the inner end thereof, whereby said gear is secured against endwise motion in said bearings. The end of the spindle *c* which passes through said gear and its hub is squared, as shown at *k*, the said squared portion of the spindle being of greater length than the bearing thereof within the hub of the gear *h*, the latter having a square hole through it to receive said shaft. By means of this construction it is obvious that the rotation of the driving-shaft *d* will impart rotary movements to the spindle and that the latter may at all times be moved endwise in its bearing. The second bearing of said spindle opposite to that in which the squared end lies is of the ordinary construction, and beyond this second bearing the spindle is turned down to a smaller diameter to receive a tube of paper or other suitable material or a spool on which the thread is to be wound. The intermediate gear *g* is hung on a stud in a swinging yoke *l*, said yoke being also adjustable on its axis, to the end that when either the gear *h* or the gear *f* is changed and one of another size applied for the purpose of changing the speed of the spindle *c* the yoke *l* may be adjusted to effect the meshing of the gear *g* with said other gears. Means are provided for imparting to the spindle an adjustable reciprocatory endwise movement, said means consisting of an arm *m*, the upper end of which is pivotally secured to a sleeve *n*, within which the spindle may rotate and be held in a certain position relative to the ends of the latter by the collars *o*. The lower extremity of the arm *m* enters a cam-groove *p* in the cam *q*, said lower end being provided with a roller *r*, which tapers from each end thereof toward the center, the diameter of the roller at the center being such as to fit the cam-groove *p* freely. In its operative position on the arm *m* the center of this roller *r* is preferably just below the periphery of the cam *q*. The object of tapering this roller is to prevent the latter from binding within the cam-groove *p* as said lever swings on its fulcrum in the plane of the axis of said driving-shaft *d*. This fulcrum consists of a sleeve *s*, provided with trunnions *t*, (see Fig. 2,) said sleeve being supported on said trunnions on a vertically-movable block *u*, adapted to be raised and low-

ered in a suitable slide *v* by a screw *w*, which is provided with a suitable head, whereby it may be rotated. Obviously a change in the position of the fulcrum of the arm *m* relative to its end will cause the endwise movement of the spindle *c* in its bearing to vary, and sufficient range of movement for the said fulcrum is provided whereby any desired length of bobbins may be wound on the spindle.

On such classes of work as necessitate a high speed of rotation for the spindle, and hence very rapid vibratory movements of the arm *m*, it is preferable that the sleeve *n* should be supported, and hence in the upper end of the slide *v* a transverse groove or slideway may be formed having undercut edges within which a suitably-formed base part *x* of the sleeve *n* may enter. This construction is clearly shown in Figs. 1 and 3. Thus supported the movements of the sleeve, however rapid they may be, will not impart any transverse vibration to the spindle.

A guide *y* is mounted on the frame of the machine in such position that the forward edge thereof, which is provided with the slits *z*, will lie vertically over the center of the end of the spindle on which the thread is wound. These threads are here indicated by the numeral 1, each strand being provided with a suitable tension 2 and, passing around the latter, are led through the slits *z* of the thread-guide. The latter is vertically movable on the machine, as shown in Fig. 1, and the weight thereof will normally rest on the cop-tube or spool on which the thread is to be wound. As the thread builds up the guide is thereby raised, and by means of this rising movement of the thread-guide a stop-motion is operated, whereby the driving-belt *e* may be shifted from the tight to the loose driving-pulley on the shaft *d*. This stop-motion consists of a post 3, supported by one end in the frame of the machine and adapted to be rotated. On one end of said post is an arm 4, which is in engagement with the thread-guide *y*. Near the opposite end of said post is an arm 5, adapted to bear on the end of a pivoted lever 6, whose opposite end extends back toward and overlaps the shipper-rod 8 and lies in a notch 7, cut in said rod. Within a tube 9, through which this shipper-rod passes, is located a spring 10, which is compressed when the rod 8 is moved endwise to throw the belt *e* onto the tight pulley, which is the one on which the belt is shown in Fig. 1. With the belt *e* on the tight pulley the notch 7 will be in position to receive the end of the pivoted lever 6, and the latter will hold the shipper-rod 8 against endwise movement. As the thread-guide rises, moved by the increasing diameter of the bobbin, the engagement of the arm 4 with said guide will effect the oscillation of the post 3, which will cause the arm 5 to depress the end of the lever 6 pivoted at 6^a and raise the opposite end of the latter out of the notch 7, whereby the shipper-rod 8 will be released, and the spring 10 may then force the belt *e* over onto the loose pulley. Any other stop-motion, however, may be substituted for the one constructed as herein described, this particular device being shown as one of simple and effective construction for arresting the motion of the machine when the bobbin has attained the desired diameter. The top plate of the guide *y* is made removable, whereby one having a greater or less number of thread-slits *z* may be substituted therefor.

While this machine is well adapted to the winding of thread on a bobbin of any dimension, either on a spool or a tube, it is especially adapted to the winding of the shuttle-bobbins 11. (Shown in Fig. 4.) A shuttle bobbin or cop of this description may be wound by providing the machine with gears therefor of suitable diameter. These are wound with a very quick traverse motion and are built up on a tube 12 and have no supparts for their opposite ends. It is therefore essential that the movements of the machine on which these are wound should be such that the two ends of these bobbins shall be as nearly as possible at right angles to the axis of the latter. In thread-winding machines as heretofore constructed, in which the thread-guide has had the reciprocatory movement and the spindle a rotary movement in a fixed plane, it has been found impracticable to wind bobbins of this class without a considerable per cent. of the total breaking down into a tangled ball, because of the fact that the bobbin is not properly built up, which is due, first, to vibrations set up by the rapid motion of the thread-guide, and, second, to a variation of tension, which is due to the sweep of the thread-guide from side to side. Furthermore, a rapidly-reciprocating thread-guide will roughen the thread, and the passage of a knot over said guide will almost invariably break the thread. In this machine, however, the spindle has imparted thereto endwise movements during the rotation thereof, and the thread-guide is adapted to bear on the thread as it is wound onto the spindle, said guide being permitted to move vertically with the increase of diameter of the bobbin, the slits *z* in said guide being always in line with the tensions 2. By this means the thread passes directly from the lower edge of the slits in the thread-guide onto the surface of the bobbin, and it is found in practice that this lays the thread so much more accurately than it can be laid by means of a guide rapidly vibrating from side to side and that by the present construction there is scarcely any variation between the bobbins, and the loss from the breaking down of bobbins is inappreciable. Furthermore, it has been found in practice that the passage of a knot from the tension over the stationary guide-plate, as herein described, takes place without breaking the threads and that the bobbins when completed on this machine have the same bright appearance as water-finished thread, and, furthermore, thread

wound into bobbins over the stationary guide, as herein described, is never roughened.

Having thus described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

1. The combination in a thread-winding machine, of a driving-shaft, a cam thereon, a spindle, driving connections between the latter and the driving-shaft, means of connection between said spindle and said driving connections whereby said spindle may be rotated, means for moving said spindle endwise during its rotation, a sleeve on said spindle, an arm one end of which is pivotally secured to said sleeve, and the opposite end of which engages with said cam, a fulcrum for said arm between its ends, and means for shifting said fulcrum, substantially as described.

2. In a winding-machine, a driving-shaft, a spindle parallel therewith, connections between said shaft and spindle whereby the latter may be rotated at different speeds, a sleeve on said spindle, an arm pivotally connected with said sleeve and extending toward the driving-shaft, a cam on the latter with which said arm engages, a vertically-movable block, a sleeve on said arm pivotally supported on said block for oscillation in the plane of the axis of the driving-shaft, means for moving said block vertically, and means restraining the sleeve on said spindle from endwise movement thereon, substantially as described.

3. In a winding-machine, a driving-shaft, a spindle, gear connections between said shaft and spindle for rotating the latter, a sleeve on said spindle having a sliding connection with the frame, as described, an arm connected with said sleeve by one end, a movable fulcrum for said arm, a cam on the driving-shaft with which the opposite end of said arm engages, whereby said spindle has imparted thereto endwise movements; a tight and loose pulley on said shaft, a spring-actuated shipper-rod, a vertically-movable thread-guide, a stop-motion actuated by the latter and adapted to release said shipper-rod to stop the machine, substantially as described.

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