

J. O. McKEAN.
WINDING MACHINE.
APPLICATION FILED AUG. 7, 1913.

1,126,809.

Patented Feb. 2, 1915.

Fig. 2.

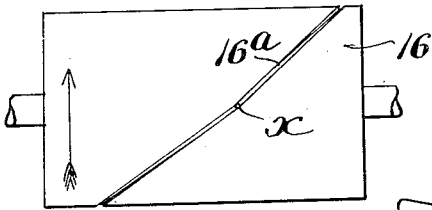
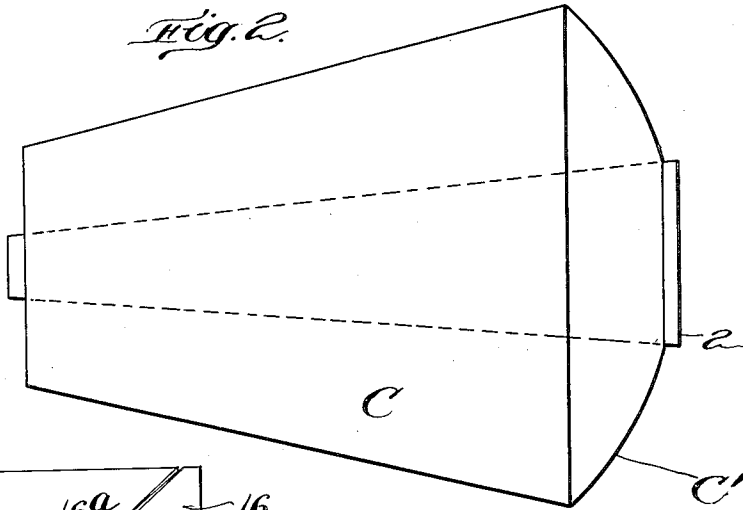


Fig. 3.

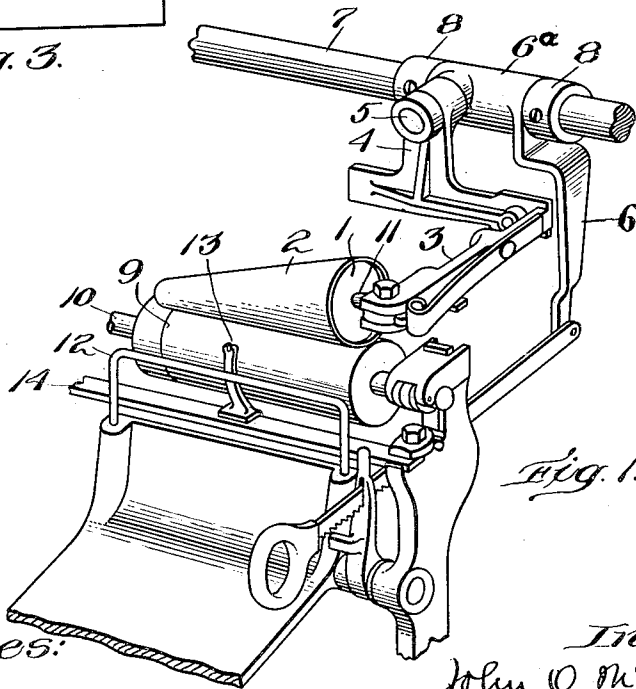


Fig. 1.

Witnesses:

*Joseph T. Brennan
Mary A. O'Brien.*

Inventor:

*John O. McKean
by Michael, Chadwick & Kent,*

attys.

UNITED STATES PATENT OFFICE.

JOHN OLIPHANT MCKEAN, OF WESTFIELD, MASSACHUSETTS, ASSIGNOR TO FOSTER MACHINE COMPANY, OF WESTFIELD, MASSACHUSETTS, A CORPORATION OF MAINE.

WINDING-MACHINE.

1,126,809.

Specification of Letters Patent.

Patented Feb. 2, 1915.

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To all whom it may concern:

Be it known that I, JOHN O. MCKEAN, a citizen of the United States, residing at Westfield, 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.

My invention relates to winding machines such as are used to wind yarn and the like onto a quill or core, and particularly to winding machines of that class which produce conical cops having the well known self binding "open" wind. Machines of this class have heretofore been so constructed that the completed cop was made with a practically square butt end, that is, with a base end whose surface was perpendicular with relation to the axis of the cop, or substantially so. In winding a conical cop the surface speed at the small end or top is materially less than the surface speed at the large end or base. Therefore, in machines of this class wherein the thread guide reciprocates lengthwise of the cop with a uniform motion as is customary, the pitch or angular relation of the convolutions with respect to the axis of the cop at the small end is much greater than the pitch at the base or large end. As the thread guide of the machine travels toward the large end of the cop the convolutions are laid progressively more nearly at right angles relatively to the axis of the cop until the base end of the cop is reached whereupon the thread guide reverses its direction of movement and travels back toward the small end of the cop. When the thread guide reverses at the base of the cop there is a momentary dwell of the thread guide during which the yarn is laid onto the corner of the cop for a substantial distance at practically a right angle relatively to the axis of the cop before the thread guide starts the yarn on its next spiral toward the small end. It will thus be seen that each spiral winding of the cop that is laid thereon by movement of the thread guide toward the base is connected with the next spiral winding that is laid by movement of the thread guide toward the small end of the cop, by a strand or portion which lies along the corner or peripheral edge of the cop for a substantial distance.

Heretofore this structural peculiarity of the base of a conical "open wind" cop combined with the perpendicular, or substantially perpendicular, relation of said base with the axis of the cop, has resulted in imperfect and insecure winding at said base. The imperfection in the winding was due to the fact that in practice it is impossible for the thread guide to lay each spiral-connecting portion in exactly the position upon the previously laid yarn beneath it that it should occupy, the portion being laid may be carried slightly beyond or slightly short of the exact position it should occupy. Sometimes, also, the tension on the yarn displaces convolutions along the butt edge or core corner. If carried beyond its proper position not only does the spiral-connecting portion become a "float" upon the base end of the cop through its being free to sag toward the axis, but the subsequently laid yarn above it is not properly supported and is free to sag toward the axis and produce floats or looseness. Likewise a yarn laid short of its proper position at the butt would not properly support subsequent yarn deposited in proper position, which consequently, would be loose, and being under some tension when laid, would draw down across the base of the cop. In either case the result is that the base structure is affected through looseness, and loose threads or floats are formed across the base surface of the cop. Such imperfections are very objectionable as, in the process of unwinding, the thread lying across the base tends to lift the cop as it is drawn off, thereby putting a sudden strain upon the yarn which results in breakage and snarling of the thread or yarn.

The object of my present invention is to obviate the objections above noted.

In my improved machine the cop is surface driven through a rotating drum as usual, but the delivery of the yarn to the cop during the winding operation is controlled automatically so that the base end of the cop is caused to grow in diameter at a faster rate than the small end thereof with the result that as the winding progresses the relation of the axis of the cop with the axis of the driving drum is varied in two respects, viz., it is shifted bodily away from

the driving drum and its angular relation with the latter is increased. This shifting of the cop is effected by the force generated by the yarn as it is wound onto the cop or, in other words, by the growth of the cop, and the main feature of my invention consists in providing the machine with means to utilize this force to control the angular movement of the cop relatively to the driving drum whereby the spiral-connecting portions of the yarn are caused to be laid in shelved relation, thus producing a cop having a crowned base end wherein each spiral-connecting portion occupies a position slightly back of that beneath it. As herein shown this means consists of a movably supported cop holder that is automatically adjusted as the winding operation progresses, by the angular movement of the cop which is produced through the unequal growth of the latter at its ends, so that as the cop grows, and its conicity increases, it is moved endwise in the direction of its base, by the automatic adjustment of its holder.

In the accompanying drawings: Figure 1 is a perspective view of a portion of a winding machine constructed in accordance with this invention; Fig. 2 is a side view of a cop such as would be produced by the machine shown in Fig. 1; and Fig. 3 is an elevation of the thread guide actuating cam.

1 represents a mandrel adapted to have forced upon it a conical cop-shell or quill 2 onto which the yarn is wound into a cop, said mandrel being rotatably secured to a spindle 11. Spindle 11 is connected at one end with the outer end of an arm 3 made with an upward extension 4 pivoted loosely upon a stud 5 projecting radially from the hub 6^a of a lever 6. The lever 6 is loosely mounted upon a rod 7 forming part of the frame of the machine, between two collars 8, 8, that are fixed to said rod 7. The mandrel 1, spindle 11 and arm 3 constitute a cop holder that is pivotally mounted on rod 7 so that it and the cop supported by it can swing toward and from a cop driving drum 9 fixed to a shaft 10 journaled in bearings on the frame of the machine. The drum 9 serves as a rest for the cop and is continuously driven through the usual means, not shown, connected with shaft 10, the frictional engagement of the surface of the drum with the surface of the cop serving to cause the drum to rotate said cop.

The yarn that is being wound into a cop passes from the supply over a rest 12 and through a thread guide 13 to the cop. Thread guide 13 is slidably mounted upon a supporting and guiding bar 14, fixed to the frame of the machine. Thread guide 13 is reciprocated on bar 14 by a cam 16 as the cop is rotated and as the latter increases in diameter the cop support yields

upwardly. Cam 16 is so formed that in winding a conical cop the thread guide is slowed as it approaches the base end of the cop, thus increasing the amount of thread drawn by the cop, over what it would be if the thread guide was uniformly actuated, and in this way the diameter of the larger end of the cop is caused to grow more rapidly than the smaller end and therefore as the winding operation progresses the cop holder will be swung on stud 5, and since arm 3 and the cop carried thereby are below the stud 5, it follows that as the cop grows it will be shifted bodily endwise relatively to thread guide 13 and drum 9, and in a direction toward the base of the cop. This causes the thread guide 16 to lay each spiral-connecting portion slightly back of the preceding spiral so that as a whole, the spirals occupy a shelved or sloping relation along the edge or corner of the butt or base of the cop. This results in producing a crowned or convex end C' on the base or large end of the cop C, whose surface is disposed at an obtuse angle with relation to the body of the cop and within which the spiral-connecting portions are laid in shelved relation. By having the length of extension 4 properly proportioned any desired crowned effect and shelved relation may be secured. In the form of my invention herein shown the axis of the drum 9 and spindle 11 are substantially equidistant from rod 7 and the plane which they jointly occupy would be intersected by the axis of stud 5, if extended, at a point above spindle 11 and about midway of the length of the cop. The member 6 is made as a lever in order that it may be connected with and be controlled by the usual automatic stop mechanism which it is not necessary to here describe.

The slot 16^a of cam 16 is not of uniform pitch but is designed to accelerate the speed of the thread guide at and about the point of the conical cop and to reduce the speed of the thread guide at and about the base of the cop. The object of this arrangement is to decrease the amount of yarn laid at the point of the conical cop and relatively increase the amount of yarn laid at the base of the conical cop with the result that the cop increases in conicity as it grows. The thread guide 13 is provided with the usual tang or cam roll, not shown, which projects into the slot 16^a of cam 16. If we imagine the point *x* in the cam slot of Fig. 3 to be the tang of the thread guide, and that the point of the conical cop being wound points to the left, the cam revolving in the direction of the arrow, it is obvious that the tang will move to the left in the direction of the small end of the cop at a continuously accelerating rate of speed and when it reaches the limit of its movement in that direction

and reverses it will move to the right toward the large end of the cop at a gradually diminishing rate of speed.

What I claim is:

- 5 In a cop winding machine, the combination of a cop driving drum, a cop holder consisting of a hub pivotally supported on an axis parallel with the axis of the driving drum and a lever at one end pivotally
10 mounted upon the hub so as to rock on an axis perpendicular to the axis of the hub and the driving drum and which intersects the axis of the cop intermediate the ends of the latter, said lever depending from the

hub and then extending toward the base of the cop and over the drum to position the cop over the drum; a thread guide; means to actuate the thread guide more slowly when opposite the base of the cop than when opposite the point; all organized as
20 and for the purposes set forth.

Signed by me at Westfield, Mass., this 4th day of August, 1913.

JOHN OLIPHANT MCKEAN.

Witnesses:

ALICE C. BREEN,
E. T. FOWLER.