(No Model.) 2 Sheets—Sheet 1.

J. WIGGINS.

BOBBIN BUILDER.

No. 496,548. Patented May 2, 1893.

Fig: 1.

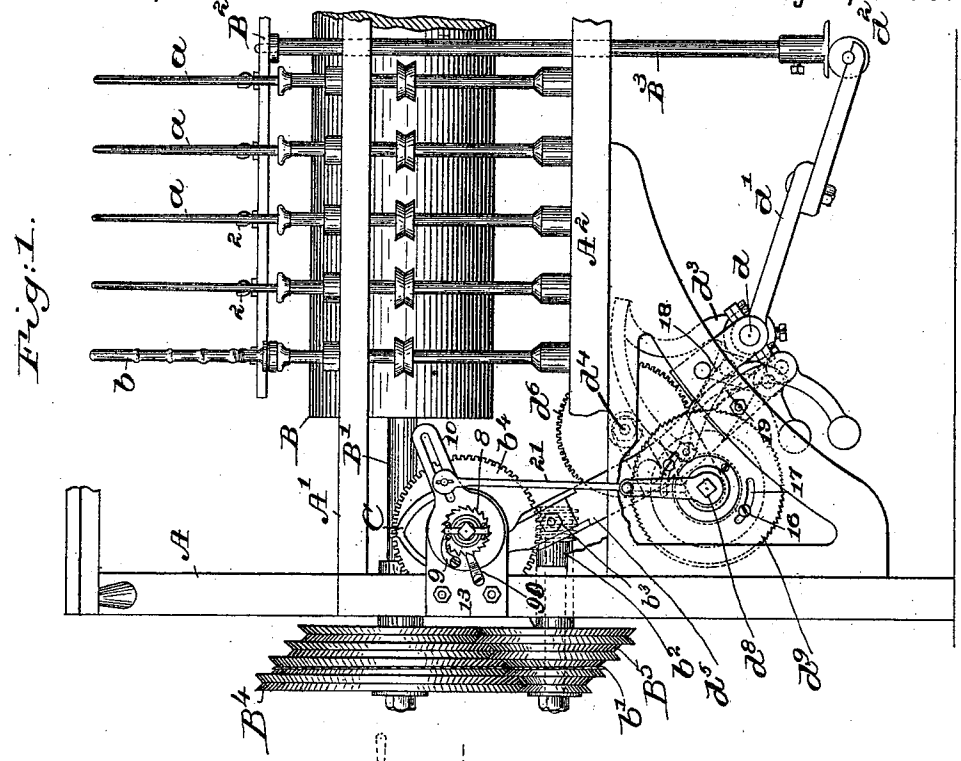
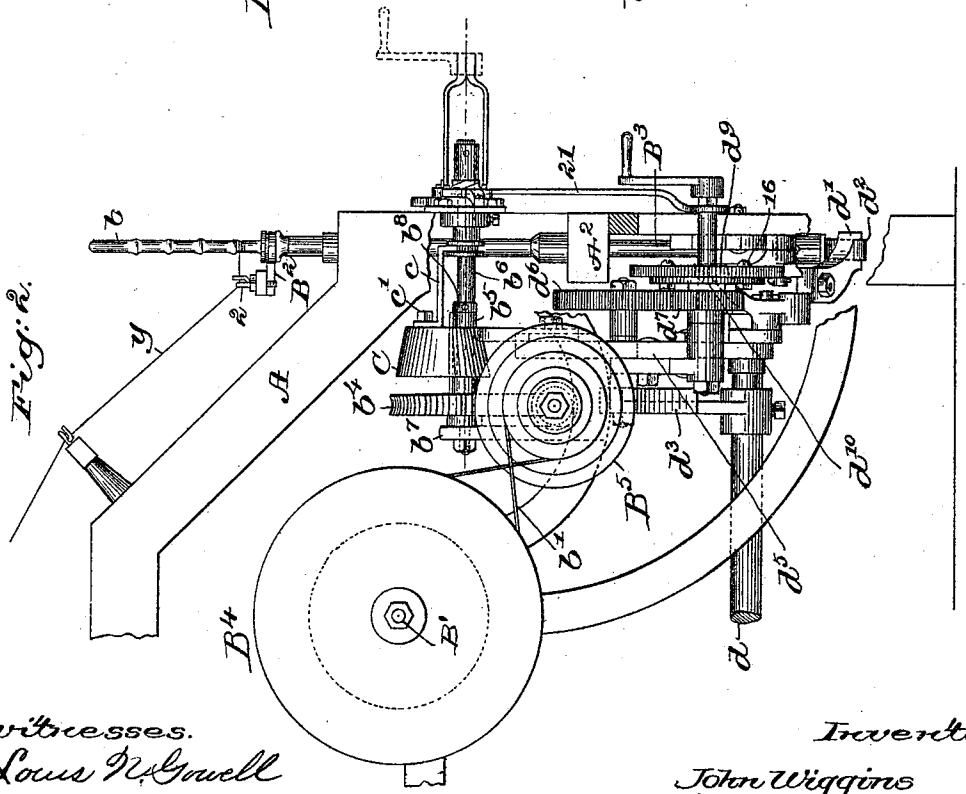


Fig: 2.



Witnesses.
Louis M. Gruell
Fred S. Gruell

Inventor.
John Wiggins
by Crosby & Gregory Attys

(No Model.) 2 Sheets—Sheet 2.

J. WIGGINS.

BOBBIN BUILDER.

No. 496,548. Patented May 2, 1893.

Fig: 3.

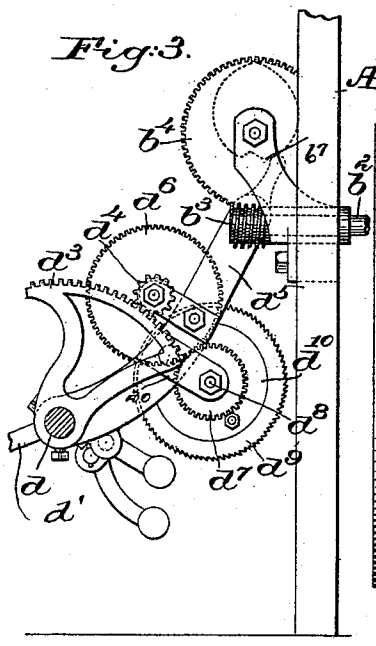


Fig: 4.

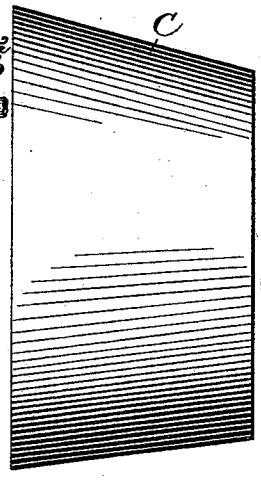


Fig: 5.

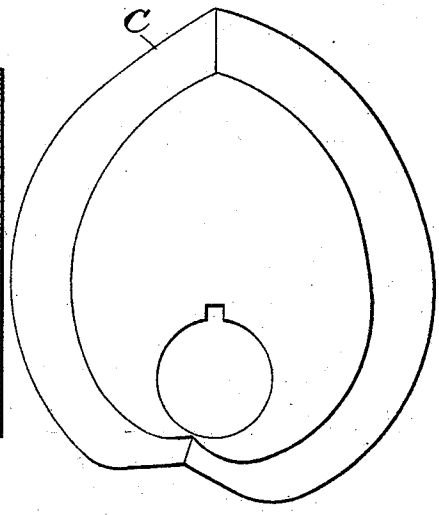


Fig: 6.

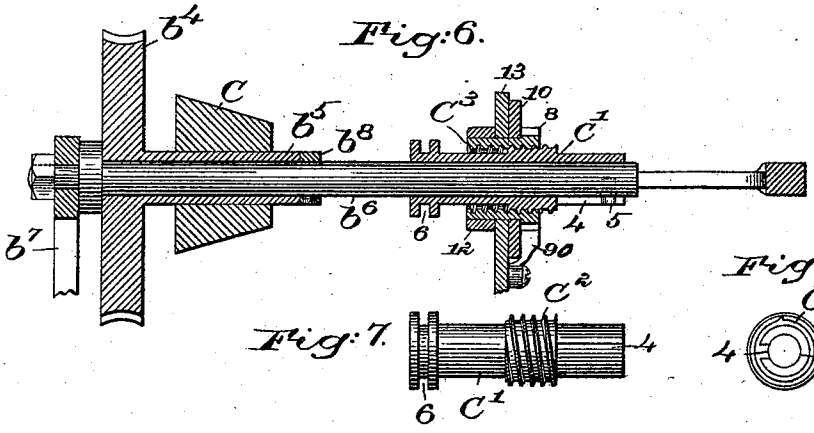
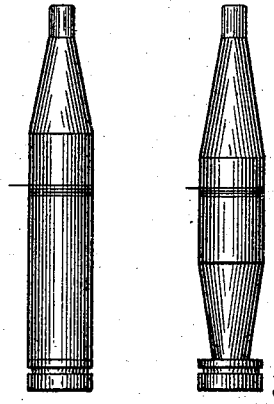


Fig: 7.

Fig: 8.

Fig: 9. Fig: 10.



Witnesses.
Fred S. Gruenbaf.
Louis N. Lancell.

Inventor:
John Wiggins.
by Crosby & Gregory Attys.

UNITED STATES PATENT OFFICE.

JOHN WIGGINS, OF FRANKLIN, MASSACHUSETTS, ASSIGNOR OF ONE-HALF TO THE SAXON WORSTED COMPANY, OF SAME PLACE.

BOBBIN-BUILDER.

SPECIFICATION forming part of Letters Patent No. 496,548, dated May 2, 1893.

Application filed July 5, 1892. Serial No. 438,958. (No model.)

To all whom it may concern:

Be it known that I, JOHN WIGGINS, of Franklin, county of Norfolk, State of Massachusetts, have invented an Improvement in Bobbin-Builders, of which the following description, in connection with the accompanying drawings, is a specification, like letters and figures on the drawings representing like parts.

Bobbin builders as now ordinarily constructed are adapted to wind the yarn from the base of the bobbin upwardly on the barrel of the bobbin for a distance determined by the length of the wind, such length being controllable according to the work to be done, and the bobbin having been started the length of the wind is uniform until the bobbin has been filled. In this class of machine the second layer of yarn is started just a little higher than the first layer and is stopped a little higher upon the bobbin than the first layer, and successive layers so applied result in the winding of a bobbin so as to leave a considerable space between the lower end of the mass of yarn on the bobbin and the head of the bobbin. In my experiments to improve this class of machine I have discovered that I may utilize this waste space and add many additional yards of yarn, substantially one third more, to each bobbin, and besides the great saving resulting from this additional amount of yarn put on the bobbin, I also build a more compact and better bobbin than has heretofore been possible.

In accordance with my invention the heart or cam device instrumental in actuating the traverse is so made that in addition to its rotation it may be moved laterally to bring into operation portions thereof of increasing diameter so that the throw of the traverse lever bearing on the heart may be increased while any predetermined number of layers of yarn are being wound in conical form, for the foundation of the bobbin from a substantially uniform point or level, as for instance the head of the bobbin, upward.

Prior to my invention I am not aware that a bobbin building machine has ever been produced in which the so-called heart is also of conical form and in which the conical surface by co-operating with the transverse lever gives to said lever an increasing throw as the bobbin is being filled. The bobbin employed by me is of that class having a flanged head.

It is customary to wind yarn on bobbins having truncated or conical bases, and the layers of yarn follow the incline of the conical base layer after layer.

In my invention I work on the principle of first winding on the bobbin a mass of yarn which in shape resembles the conical base, and while this base is being wound the upward movement of the traverse is gradually increasing while the downward movement of the traverse is continued to the head of the bobbin until the base has been built out substantially to the periphery of the head, and this done the subsequent movements of the traverse are substantially uniform in length until the bobbin has been filled.

My invention in bobbin winding machines consists essentially in the combination with a traverse rail, its guides and traverse lever, of a cone-shaped heart adapted to actuate the traverse gradually for a greater distance in its upward throw until the space between the barrel and periphery of the head of the bobbin has been filled and to thereafter move the traverse for substantially uniform distances, until the bobbin has been wound.

Figure 1, in front elevation represents a sufficient portion of a bobbin winding machine with my improvements added to enable my invention to be understood. Fig. 2, is a left-hand end elevation of the machine shown in Fig. 1, the frame work being somewhat broken away. Fig. 3, is a detail showing the traverse lever as acting upon the heart cam and some of the gears instrumental in actuating the traverse rail. Figs. 4 and 5, show the conical heart device in two views greatly enlarged. Fig. 6, is a longitudinal section of the devices surrounding the heart shaft, and instrumental in giving to it longitudinal movement; Fig. 7, a detail of the worm-sleeve; Fig. 8, a right-hand end view of said worm-sleeve. Fig. 9, shows a bobbin wound by my improved machine, and Fig. 10, a bobbin of the shape which would be produced by the old form of heart.

The frame-work A, the bolster rail A′, the step rail A^2, the spindles *a* having whirls to be driven by bands on the driving drum B,

fast on the drum-shaft B′, the traverse rail B^2 having usual eyes 2 for the yarn y to be wound upon the bobbins b, the lifting rods B^3 carrying the traverse rail, are and may be all as usual in bobbin winding machines. The drum-shaft B′ in practice derives its motion from a suitable counter-shaft. This drum-shaft has upon one end of it, as represented, a conical set of sheaves B^4 which by belt b' co-operating with, as represented, a second set of conical sheaves, B^5 rotates a worm-shaft b^2 having at its inner end a worm b^3 which engages and rotates a worm-gear b^4 fixed to a sleeve b^5, mounted loosely upon a stud b^6 supported in a stand b^7, erected upon the frame-work, the said sleeve being prevented from moving longitudinally by means of a suitable collar b^8, shown best in Fig. 6, fast upon the said stud. The sleeve referred to has feather-splined upon it my improved conical heart C. The stud referred to, at a short distance from the conical heart, is surrounded loosely by a sleeve C′ provided with a worm C^2 and hence designated a worm-sleeve, said worm-sleeve having a slot, as at 4, to receive a pin 5, projecting from the stud, said slot and pin connection enabling the sleeve to be slid upon the stud, but preventing its rotation thereon. This worm-sleeve has at one end a collar provided with an annular groove 6 in which is entered one end of a finger c represented best in Fig. 2, and connected by a bolt c' to the small end of the conical heart. The worm C^2 engages a nut C^3 provided at its outer or right-hand end, see Fig. 6, with ratchet teeth 8 which are engaged by a pawl 9, fast upon a pawl carrier 10 the back motion of the ratchet teeth 8 being prevented by a detent 90. The nut C^3 is free to revolve in a suitable bearing formed in a stand 13, the nut at the rear side of the stand having fast upon it a collar 12, so that the nut is prevented from moving longitudinally, but may be rotated freely by the pawl. In action, as the pawl carrier is moved, as will be described, the nut will be rotated and acting upon the worm of the sleeve C′ will draw the said sleeve longitudinally off to the right in Figs. 2 and 6 and will slide the conical heart in unison with it but yet not interfere in the least with the rotation of the heart with the sleeve b^5. The extent to which the heart may be slid to the right as stated is controlled by the length of the worm, the nut on its rotation running off the end of the worm.

The frame-work has suitable bearings to support the rock-shaft d of the builder motion, said rock-shaft having fast upon it a lifting lever d' represented as provided with a roller d^2 of usual construction to bear upon a shoe or projection at the lower end of the lifting rod B^3. This shaft also has fast upon it a toothed sector d^3, and I will now proceed to describe how this sector will have given to it movements of different length in order to provide for the different lengths of traverse for the particular part of the bobbin being wound. The teeth of the sector d^3 are engaged by a pinion d^4 fast upon a short shaft mounted in a stand bolted to the traverse lever d^5, the upper end of which is acted upon directly by the conical heart. This lever d^5 is fulcrumed loosely upon the shaft d referred to. The shaft to which the pinion d^4 is fastened has also secured to it a gear d^6 which engages a pinion d^7 fast on a short shaft d^8, the latter also carrying a disk d^{10}, to which is adjustably connected by bolts 16 in slots 17 a ratchet wheel d^9 with which co-operate two detents 18, 19, shown chiefly by dotted lines in Fig. 1, said detents being mounted loosely upon studs fixed with relation to the frame-work, the detents having suitable counter-balancing arms properly weighted to normally keep the detents pressed against the teeth of the ratchet wheel, two detents being employed to insure finer adjustments and prevent any possible backward movement of the ratchet wheel, as it is well understood by mechanics.

The shaft d^8 referred to and to which the ratchet wheel is indirectly connected as described, has its bearing in a suitable stand 20, also bolted to and partaking of the movements of the lever d^5.

The shaft d^8 is surrounded at one end by a link 21, adjustably connected by a pin and slot connection with the pawl carrier 10, so that as the lever d^5 is vibrated by the conical heart the pawl carrier has given to it one movement during each rotation of the heart cam, the extent of the said movement being more or less according to the point at which the link 21 is connected with the pawl carrier.

In practice the detents are normally in engagement with the teeth on the ratchet plate d^9. The operator will see that the cone-shaped heart is in its normal position to the left and that the upper end of the lever d^5 bears upon the small end of the conical heart. The spindles having been provided with bobbins and the yarn ends duly attached thereto, the machine will be started and the conical heart will move the lever d^5 and cause the pinion d^4 to traverse the rack d^3, and were it not for the fact that the ratchet d^9 is held by the detents 18, 19, the pinion d^4 would rotate and leave the sector d^3 at rest; but the ratchet being restrained from rotation the pinion d^4 engaging the sector causes the said sector to turn and with it the rock-shaft d and the arm d' to effect the movement of the lever d' and of the traverse rail. In the movement of the arm d^5, it moves the shaft d^8 having its center of motion outside of or somewhat distant from the pivotal point of the lever d^5, and the detents engaging the ratchet d^9 cause it to be turned somewhat at each stroke of the upper end of the lever d^5 toward the center of the heart, such movement of the ratchet turning the shaft d^8 and through the pinion d^7, gear d^6 and pinion d^4, turning the sector d^3, so that the said sector, in addition to its movements imparted to it by the pinion d^4 in the movements of the lever d^5 as before described, has

also imparted to it a slow rotary motion so that the outer end of the lever d' is made to descend not quite so low and the upper end ascend a little bit higher during each movement of the sector.

As so far described if the conical heart had only a motion of rotation the yarn would be wound upon the bobbin and the yarn load would present substantially the outline represented in Fig. 10; but to fill out fully the lower end of the bobbin by yarn from the barrel of the bobbin substantially out to the periphery of the bobbin head, as shown in Fig. 9 I have provided that the conical heart have a motion longitudinal upon the stud b^6 so that the additional throw imparted to the lever d^5 due to the increased diameter of the heart in the line of the cone will give to the sector d^3 a longer motion, in fact a motion long enough to overcome the gradual rising motion referred to and cause the traverse to lay the yarn at each descent of the traverse rail down to the head of the bobbin for such a number of layers as shall effect the filling with yarn of the barrel of the bobbin out to the periphery of the head as in Fig. 9, and thereafter the longitudinal motion of the conical heart is arrested by the pin 5 and all traverse movements thereafter, until the bobbin is completed, will be of substantially uniform length, changing, however, so that each successive descent is a little bit less, and each successive ascent a little bit higher, until the bobbin has been filled up.

I have not shown the spools or yarn masses for supplying the bobbins with yarns as they are not of my invention, and I have in the drawings represented but one of the spindles as provided with a bobbin.

I may use headed bobbins of any usual shape or material.

Believing myself to be the first to employ in a bobbin winding machine a cone-shaped heart, this invention is not limited to the exact mechanism shown for imparting longitudinal movement to the heart nor to the exact devices intermediate the heart and the traverse rail to impart to it movements to effect the winding of the yarn upon the bobbin in the manner described so as to fully fill the barrel of the bobbin out to the periphery of the head.

It will be obvious to those conversant with textile processes that the greater the quantity or length of yarn which can be wound upon a bobbin of a given size, the more economical all subsequent operations through which the yarn may be made to pass.

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

1. In a bobbin-winding machine, a traverse rail, a traverse lever, and an intermediate lever and connections to transmit a gradual rising motion to the traverse, combined with a conical heart cam, means to rotate such cam and thereby effect the said gradual rising motion, means to reciprocate such heart cam longitudinally and overcome such gradual rising motion, and means to arrest the reciprocation of the heart cam and continue its rotary motion, whereby a mass of yarn is first wound in the shape of the conical base, thereafter the base filled out to the periphery, and thereafter the bobbin wound full, substantially as described.

2. In a bobbin winding machine, a traverse lever; a conical heart to act on said lever; means to rotate said heart; a worm sleeve; connections between the said sleeve and heart; a nut surrounding said sleeve; and means to rotate the said nut whereby the worm sleeve may be moved longitudinally to effect the longitudinal movement of the conical heart with relation to the traverse lever; combined with a lifting lever, and gearing intermediate said traverse lever and said lifting lever, to operate, as and for the purpose set forth.

3. In a bobbin winding machine, the following instrumentalities, viz:—a conical heart cam; means to rotate and reciprocate it; a traverse lever actuated thereby and carrying a pinion, and a ratchet wheel; and gearing intermediate said pinion and ratchet wheel, combined with a sector, a connected lifting lever, and a detent normally in engagement with said ratchet wheel and adapted at times to effect the partial rotation of the ratchet wheel and pinion, as and for the purposes set forth.

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

JOHN WIGGINS.

Witnesses:
JOHN B. DUNN,
WALTER J. LADD.