W. DUCHEMIN.

Bobbin-Winders for Sewing-Machines.

No. 196,202. Patented Oct. 16, 1877.

Fig. 3

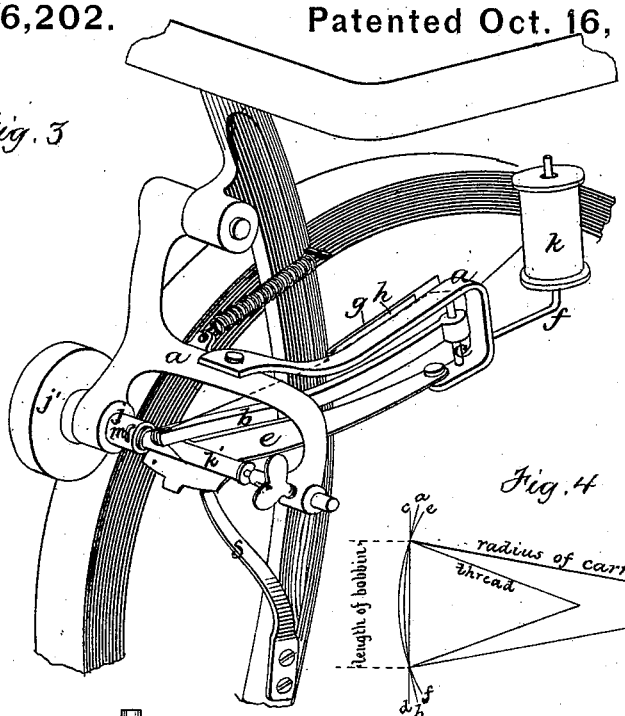


Fig. 4

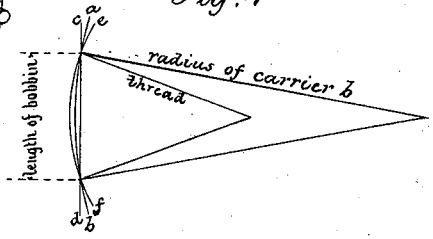


Fig. 2.

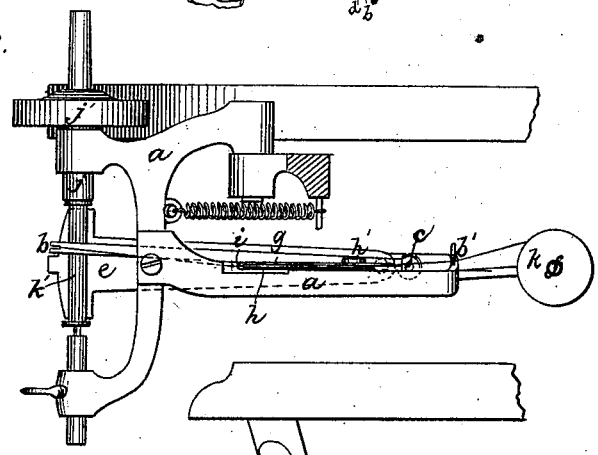
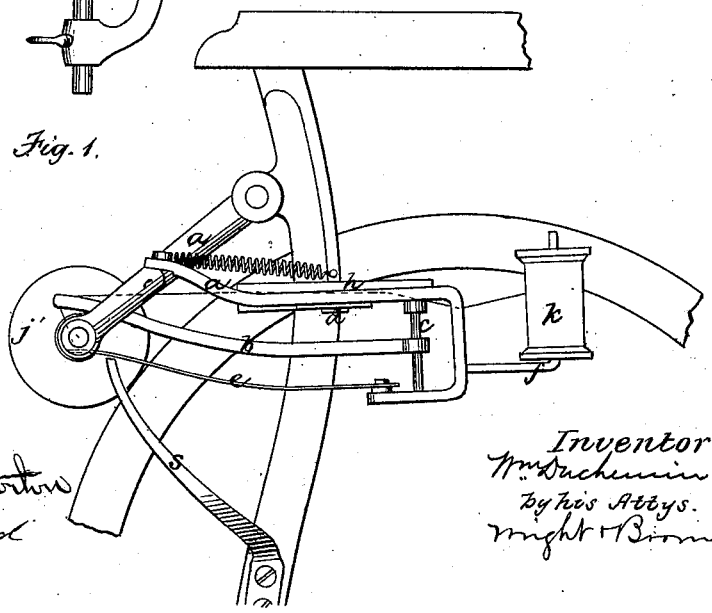


Fig. 1.



Witnesses.

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WILLIAM DUCHEMIN, OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN BOBBIN-WINDERS FOR SEWING-MACHINES.

Specification forming part of Letters Patent No. **196,202**, dated October 16, 1877; application filed April 27, 1877.

To all whom it may concern:

Be it known that I, WILLIAM DUCHEMIN, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain Improvements in Bobbin-Winders, of which the following is a specification:

Figure 1 represents a side view of my improved bobbin-winder. Fig. 2 represents a top view of the same. Fig. 3 represents a perspective view. Fig. 4 represents a diagram, showing the governing principle of my improved device.

The object of this invention is to produce a cheap and simple bobbin-winder, that will wind cord or thread of any kind automatically when under tension, said cord or thread being its own graduator, and that will do its work without any attention from the operative excepting to apply and remove the bobbin.

To this end my invention consists, first, in the application to the bobbin-holding frame of a bobbin-winder of devices for applying tension to the thread, and two peculiarly-arranged thread-guides, one fixed and the other vibratory, adapted, in connection with the tension-devices, to deliver the thread to the bobbin automatically.

It consists, secondly, in the means employed for stopping the winding operation when the bobbin is full, all of which I now proceed to describe.

I have shown my improvements applied to the ordinary bobbin-winder used with the Howe machine.

In the drawings, *a* represents the bobbin-holding frame, which is adapted to be pivoted to the frame or leg of the sewing-machine, and is provided with the driving-shaft *j* and pulley *j'*, the latter bearing on the fly-wheel of the machine, as usual.

g h represent tension-plates, which are secured to the frame, and are adapted to exert any desired degree of pressure on the thread as it passes from the spool *k* to the bobbin *k'*, the thread passing between said plates.

i represents the stationary thread-guide, which is located on the frame *a* in rear of the bobbin. The guide *i* is preferably composed of an orifice made in the bent end of the tension-plate *g*, although it may be composed of an eye or loop attached to the frame *a*, if desired.

b represents the vibrating guide, which consists of a lever pivoted to the frame *a* at a point in the rear of the fixed thread-guide and the bobbin. The guide *b* is adapted to swing freely in a plane parallel with the bobbin, and its swinging end projects over the bobbin, and is provided with a groove, through which the thread passes. The radius of the vibrating guide *b* is greater than the intervening space between the fixed guide *i* and the vibrating guide, for reasons which will be explained.

The guide *i* is preferably made adjustable, in such manner that the space between it and the vibratory guide may be increased or diminished. In the present case the adjustment of the guide *i* is effected by moving the plate *g* longitudinally on the frame *a*.

e represents a spring-plate, which is pivoted to the frame *a*, and is adapted to bear with a yielding pressure against the thread on the bobbin, and to be displaced and forced downward by the accumulation of thread.

s represents an arm, rigidly attached to the frame of the sewing-machine, and adapted to come in contact with the plate *e* when the latter is pressed downward.

To set the machine in operation, the thread is passed from the spool *k* under the bent wire *b'* on frame *a;* thence between the tension-plates *h* and *g* through the fixed guide *i;* then into the slot or groove in the end of the vibrating guide *b*, and under the clutch *m*, said clutch being on the extreme end of driving-shaft *j*. The bobbin is then placed in position, the outer end of the spring-plate *e* between its flanges, and against its central stem or shaft, and the pulley *j* is brought to bear on the fly-wheel of the sewing-machine, thus setting the winding mechanism in motion, when, the tension on the thread being greater than the friction of the vibrating guide *b*, the thread traces regularly back and forth, leading the guide *b*, the friction of which is just sufficient to lay it compactly. As the winding proceeds, the plate *e*, by the action of the thread, is forced downward, and, when the bobbin is full, comes in contact with the stationary arm *s*, placed on the frame of the sew-

ing-machine for that purpose, and lifts the driving-pulley from the fly-wheel, and the bobbin remains stationary until wanted, when it is removed and another placed in position.

The governing principle of the winding mechanism is as follows: Having fixed on the length of the vibrating guide, an arc of a circle, *a b*, is drawn, having a radius equal to the length of the vibrating carrier. A straight line, *c d*, is then drawn that will intersect the arc *a b* at two points, the distance between which is equal to the distance between the flanges of the bobbin to be wound upon. A smaller arc of a circle, *e f*, is then drawn, in such a manner that it will cut through the intersecting points of the arc *a b* and line *c d*, and leave the space between the arcs *a b* and *e f* equal to the space between the line *c d* and the arc *e f* at a point midway between the intersecting points, as shown in Fig. 4, the center on which the arc *e f* is drawn, being the point where the fixed guide *i* should be located. This arrangement equalizes the difference of angles caused by winding on a straight bar from a guide that moves in the arc of a circle, and gives the thread to the bobbin while the vibrating guide is traversing a given space, as regularly as though it were delivered by a guide moving in a line parallel with the bar or bobbin.

The arm or carrier *b* cannot pass the space prescribed, for the following reasons: The thread, being delivered from the center of a smaller circle than that of which the vibrating guide *b* is the radius, tightens the instant said guide passes the prescribed space. The tightening of the thread causes the guide *b* to move in the opposite direction. It will be seen, therefore, that the tighter the tension is made to draw on the thread, the better the winding operation will be performed.

The length of the guide *b* from the center of its pivot to the inner end of the groove that receives the thread is equal to the radius of the arc *a b*. The proper place for the fixed guide *i* is the center of the circle of which the line *e f* is an arc.

By varying the space between the fixed guide *i* and the vibrating guide *b*, the apparatus is adapted to wind bobbins of different lengths, the length of the arc in which the guide *b* traverses being proportioned to the distance between the guides *i* and *b*.

I claim as my invention—

1. A bobbin-winder consisting of the bobbin-holding frame *a*, provided with tension devices *g h*, fixed thread-guide *i*, thread-guide or carrier *b*, adapted to be vibrated by the thread, and pivoted in the rear of the fixed guide *i*, whereby the radius of the guide or carrier *b* is made longer than the intervening space between the guides *b i*, as set forth.

2. In combination with a bobbin-winder composed of a bobbin-holding frame, *a*, adapted to be pivoted to the frame of a sewing-machine, and having a friction-pulley which bears upon the fly-wheel of the machine, and automatic devices, substantially as described, for guiding the thread to the bobbin, the spring-plate *e*, adapted to be displaced by the accumulation of thread on the bobbin, and a projection, *s*, on the frame of the sewing-machine, adapted to co-operate with the plate *e* in stopping the winding operation.

3. The adjustable guide *i*, combined with the bobbin-holding frame *a* and vibratory guide *b*, substantially as and for the purpose specified.

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

WM. DUCHEMIN.

Witnesses:

CARROLL D. WRIGHT,

C. F. BROWN.