May 9, 1961 E. J. HERBST 2,983,455

BOBBIN WINDER MECHANISM FOR SEWING MACHINES

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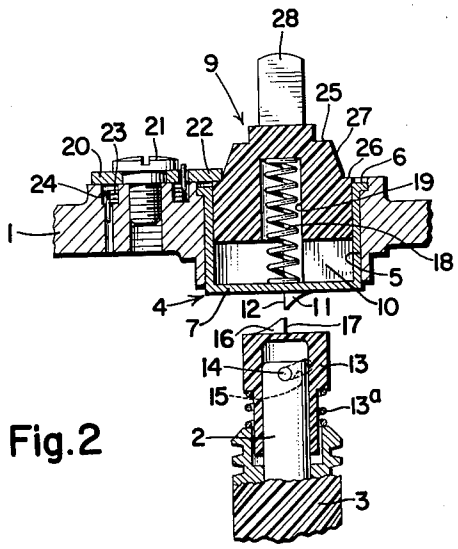

Fig.2

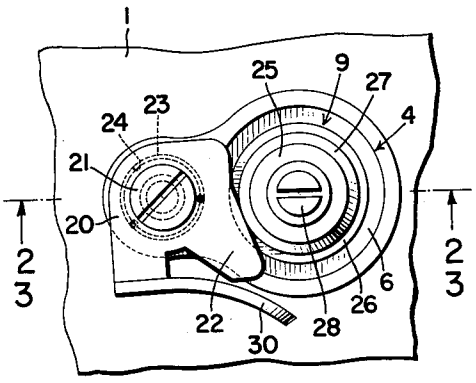

Fig.1

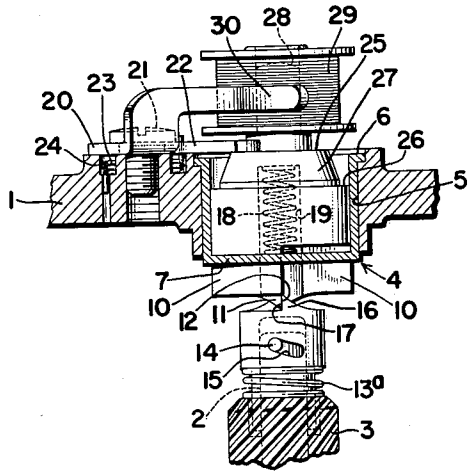

Fig.3

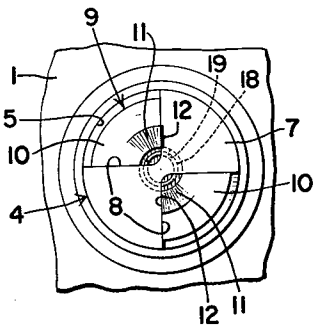

Fig.4

INVENTOR.
Edward J. Herbst

WITNESS
William Martin

BY
Marshall J. Breen
ATTORNEY

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BOBBIN WINDER MECHANISM FOR SEWING MACHINES

Edward J. Herbst, South Plainfield, N.J., assignor to The Singer Manufacturing Company, Elizabeth, N.J., a corporation of New Jersey

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5 Claims. (Cl. 242—22)

The present invention relates to bobbin winder mechanisms for sewing machines and has for an object to provide a simplified bobbin winder mechanism which is economical, dependable, durable, and easy to operate.

Having in mind the above and other objects that will be evident from an understanding of this disclosure, the invention comprises the devices, combinations and arrangements of parts as illustrated in the presently preferred embodiment of the invention which is hereinafter set forth in such detail as to enable those skilled in the art readily to understand the function, operation, construction and advantages of it when read in conjunction with the accompanying drawings in which:

Fig. 1 is a fragmentary top plan view of a sewing machine having a bobbin winder mechanism in accordance with this invention.

Fig. 2 is a sectional view taken substantially on the line 2—2 of Fig. 1.

Fig. 3 is a sectional view taken substantially on the line 3—3 of Fig. 1, but with a bobbin mounted on its supporting post and the device in bobbin winding position.

Fig. 4 is a fragmentary bottom plan view of the bobbin winder mechanism of Fig. 1.

The bobbin winder mechanism in accordance with this invention is particularly designed to be used in a sewing machine having a built-in vertical axis drive motor, as illustrated, for example, in the United States patent of Peets, No. 2,617,375.

There is illustrated in the drawings a fragmentary portion of the frame of the sewing machine, or more particularly, of the top cover plate 1 and portions of the vertical axis drive shaft 2 of the motor of the machine and of the sewing machine driving worm 3 on the upper end thereof.

The bobbin winder mechanism comprises a sleeve 4 mounted in a bore 5 in the cover plate 1 for rotation on an axis aligned with the axis of the drive shaft 2. At its upper edge, the sleeve 4 is provided with a laterally extending flange 6 that limits the vertical position of the sleeve 4 in the bore 5. At its lower end, the sleeve 4 has a bottom wall 7 which, as seen in Fig. 4, has two oppositely disposed segmental shaped apertures 8. A bobbin receiving spindle 9, preferably molded of a plastic material such as nylon, is mounted within the sleeve 4 for endwise movement and has two depending lugs 10 conforming in shape to the apertures 8 and extending through the apertures 8 for keying the spindle 9 to the sleeve 4 for rotation. The leading portions of the lugs 10 are formed with downwardly extending projections 11 which, at their leading edges, are provided with drive faces 12 arranged substantially parallel to the axis of the spindle.

A coupler 13 which, like the spindle 9, is preferably formed of a molded plastic material such as nylon, is loosely mounted on the upper end of the drive shaft 2 for rotation with and for endwise movement relatively thereto. For securing the coupler 13 to the drive shaft 2, there is provided a pin 14 extending diametrically

through the shaft 2 and having the free ends thereof seated in inclined grooves 15 in the side wall of the coupler 13. A coil compression spring 13a is disposed between the coupler 13 and the top of the worm 3 for biasing the coupler upwardly. On the top of the coupler 13 are a pair of lugs 16 having drive faces 17 on the leading edges thereof for cooperating with the drive faces 12 of the lugs 10 whereby, when the drive faces 12 and 17 are in engagement, rotation will be imparted to the spindle 9 upon rotation of the drive shaft 2.

The spindle 9 is biased upwardly to withdraw the lugs 10 out of driving relation with the lugs by a compression spring 18 seated in a central bore 19 extending inwardly from the bottom of the spindle and acting between the end of the bore 19 and the bottom wall 7 of the sleeve 4. For holding the spindle 9 down against the action of the spring 18, there is provided a latching lever 20 mounted on the cover plate 1 for pivotal movement about an axis parallel to the axis of the spindle 9 by a pivot screw 21. The lever 20 includes a latching finger 22 and it is biased about the pivot axis thereof to hold the latching finger 22 in engagement with the periphery of the spindle 9 by a torsion spring 23 seated in an annular groove 24 in the cover plate 1 and anchored at its opposite ends in the lever 20 and the cover plate 1.

The spindle 9 is formed with a pair of shoulders comprising an upper shoulder 25 and a lower shoulder 26. The shoulder 26 is spaced outwardly radially of the spindle 9 from the shoulder 25 and there is provided a smooth inclined surface 27 between the shoulders. The shoulders 25 and 26 are adapted to cooperate with the latching finger 22 to hold the spindle 9 down against the action of the spring 18. The shoulder 25 is arranged so that when it is in engagement with the latching finger 22, as illustrated in Fig. 3, the drive faces 12 and 17 are in drive relation and the spindle 9 rotates with the drive shaft 2. The shoulder 26 is arranged so that when it is in engagement with the latching finger 22, as illustrated in Fig. 2, the drive faces 12 and 17 are out of engagement and the bobbin winder is inoperative.

The upper end of the spindle 9 is formed with a post 28 upon which a bobbin 29 is mounted. To maintain the bobbin 29 on the post, the post is slotted endwise, as seen in Fig. 1, and is formed somewhat larger than the opening in the bobbin so that when the bobbin is placed thereon, the two parts of the post are forced together and thereby frictionally engage the bobbin. For automatically stopping the bobbin winding operation when the desired amount of thread has been wound on the bobbin, the lever 20 includes a tripping arm 30 that engages the thread on the bobbin.

The bobbin winder is normally in the inoperative position, as illustrated in Fig. 2. When a bobbin 29 is placed on the post 28 and the spindle 9 is forced downwardly against the action of the spring 18, the lever 20 under the action of the spring 23 is pivoted to move the latching finger 22 over the upper shoulder 25 of the spindle 9 and thus hold the spindle down. As the spindle 9 is forced downwardly, the drive faces 12 on the lugs 10 move into the plane of rotation of the drive faces 17 of the coupler 13. Thus, when the drive shaft 2 is rotated, the spindle 9 will be rotated with it to wind thread on the bobbin 29.

The resilient mounting of the coupler 13 on the drive shaft 2 is designed to preclude the possibility that the spindle 9 could not be moved downwardly into operative relation with the coupler 13 as would occur in the event that the projections 11 were directly over the lugs 16 of the coupler 13 when the spindle 9 is moved downwardly. In this event, with the present construction, the coupler 13 is forced downwardly against the action of the spring 13a and as it is moved downwardly, the cam ac-

tion between the pin 14 and slot 15 turns the coupler 13 to move it relatively to the spindle 9. The spring 13a also acts as a shock absorber upon initiation of rotation of the bobbin winder.

As the lever 20 is pivoted by the spring 23 to move the latching finger 22 into latching engagement with the shoulder 25, the tripping arm 30 is simultaneously moved into the space between the flanges of the bobbin 29. As the thread accumulates on the bobbin 29, the tripping arm 30 is forced outwardly thereby pivoting the lever 20 against the action of the spring 23 and, after a predetermined amount of thread has been wound on the bobbin, moving the latching finger 22 off the shoulder 25. The spindle 9 is then moved upwardly by the spring 18, which movement disengages the drive faces 12 and 17 to stop the bobbin winder drive and at the same time, through the cam action of the inclined surface 27 on the tripping finger 18, further pivots the lever 20 to withdraw the tripping arm 30 completely from between the flanges of the bobbin winder. The spindle 9 continues to rise until the latching finger 22 engages the lower shoulder 26 of the spindle.

Numerous alterations of the structure herein disclosed will suggest themselves to those skilled in the art. However, it is to be understood that the present disclosure relates to a preferred embodiment of my invention which is for purposes of illustration only and not to be construed as a limitation of the invention. All such modifications which do not depart from the spirit of the invention are intended to be included within the scope of the appended claims.

Having thus described the nature of the invention, what I claim herein is:

1. In a sewing machine having a frame, a drive shaft journaled in said frame, and a bobbin winder mechanism comprising a sleeve mounted in said frame for rotation on an axis aligned with the axis of said drive shaft, said sleeve including a bottom wall having an aperture, a bobbin receiving spindle mounted in said sleeve for rotation and for endwise movement and having a lug extending through said aperture for keying said spindle to said sleeve for rotation, a lug upon the end of said drive shaft adjacent to said spindle, cooperating drive faces on said lugs for coupling said spindle to said drive shaft for unitary rotation upon endwise movement of said spindle toward said drive shaft, spring means arranged between said spindle and the bottom wall of said sleeve for biasing said spindle endwise away from said drive shaft to disengage said faces, and releasable latch means for holding said spindle against endwise movement under the action of said spring with said faces in driving engagement and thereby holding said spindle in driven relation with said shaft.

2. In a sewing machine having a frame, a drive shaft journaled in said frame, and a bobbin winder mechanism comprising a bobbin receiving spindle mounted on said frame for rotation and for endwise movement on an axis aligned with the axis of said drive shaft, a collar loosely mounted on the end of said drive shaft adjacent to said spindle, means for securing said collar to said drive shaft for limited movement endwise and angularly of said drive shaft comprising an angled slot in the side wall of said collar and a pin extending laterally from said drive shaft and received within said slot, spring means for biasing said collar endwise of said drive shaft toward said spindle, opposed lugs on the end of said collar and the adjacent end of said spindle and having cooperating drive faces for coupling said spindle to said drive shaft for unitary rotation upon endwise movement of said spindle toward said drive shaft, spring means for biasing said spindle endwise away from said drive shaft to disengage said coupling means, and releasable latch means for holding said spindle against endwise movement under the action of said spring means with said faces in driving engagement and thereby holding said spindle in driven relation with said shaft.

3. A bobbin winder mechanism for use with a sewing machine having a frame and a drive shaft journaled in the frame, said bobbin winder mechanism comprising a sleeve adapted to be mounted in the frame for rotation on an axis aligned with the axis of the drive shaft, said sleeve including a bottom wall having an aperture, a bobbin receiving spindle mounted in said sleeve for rotation and for endwise movement and having a lug extending through said aperture for keying said spindle to said sleeve for rotation, a coupler adapted to be mounted upon the end of the drive shaft adjacent to said spindle and having a lug, cooperating drive faces on said lugs for connecting said spindle to said coupler for unitary rotation upon endwise movement of said spindle toward said coupler, spring means arranged between said spindle and the bottom wall of said sleeve for biasing said spindle endwise away from said coupler to disengage said drive faces, and releasable latch means adapted to be mounted on the sewing machine frame for holding said spindle against endwise movement under the action of said spring with said drive faces in driving engagement and thereby holding said spindle in driven relation with said coupler.

4. In a sewing machine having a frame, a drive shaft journaled in said frame, and a bobbin winder mechanism comprising a bobbin receiving spindle mounted on said frame for rotation and for endwise movement on an axis aligned with the axis of said drive shaft, coupling means comprising opposed lugs on the end of said drive shaft and the adjacent end of said spindle and having cooperating drive faces for coupling said spindle to said drive shaft for unitary rotation upon endwise movement of said spindle toward said drive shaft, spring means for biasing said spindle endwise away from said drive shaft to disengage said coupling means, and releasable latch means for holding said spindle against endwise movement under the action of said spring means with said coupling means in engagement and thereby holding said spindle in driven relation with said shaft, said releasable latch means comprising a lever pivotally mounted on said frame on an axis parallel to the axis of said spindle, means for biasing said lever against said spindle, a first shoulder on said spindle adapted to cooperate with said lever for holding said spindle against endwise movement under the action of said spring means with said coupling means in engagement and thereby holding said spindle in driven relation with said drive shaft, and a second shoulder on said spindle adapted to cooperate with said lever for holding said spindle against endwise movement under the action of said spring means with said coupling means disengaged and thereby defining the inoperative position of said spindle.

5. In a sewing machine in accordance with claim 4 in which said lever includes a bobbin thread engaging arm for pivoting said lever off said first shoulder when the accumulation of thread on the bobbin reaches a predetermined amount, and a smooth outwardly extending surface on said spindle between said first shoulder and said second shoulder for camming said lever away from the axis of said spindle upon endwise movement of said spindle out of driven relation with said drive shaft for moving said arm away from the bobbin.

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