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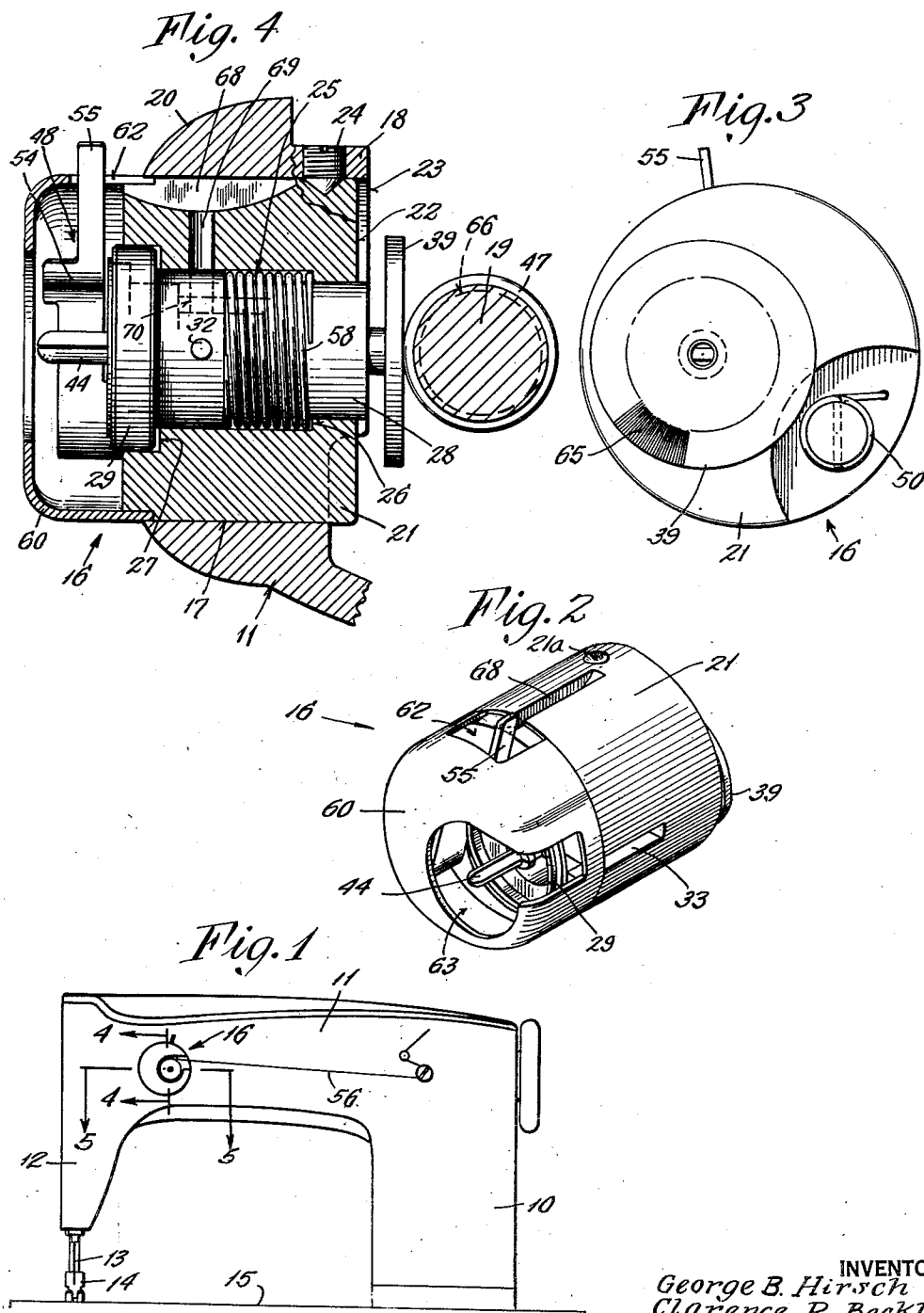
G. B. HIRSCH ET AL

2,592,516

BOBBIN WINDER FOR SEWING MACHINES

Filed Oct. 17, 1946

2 SHEETS—SHEET 1



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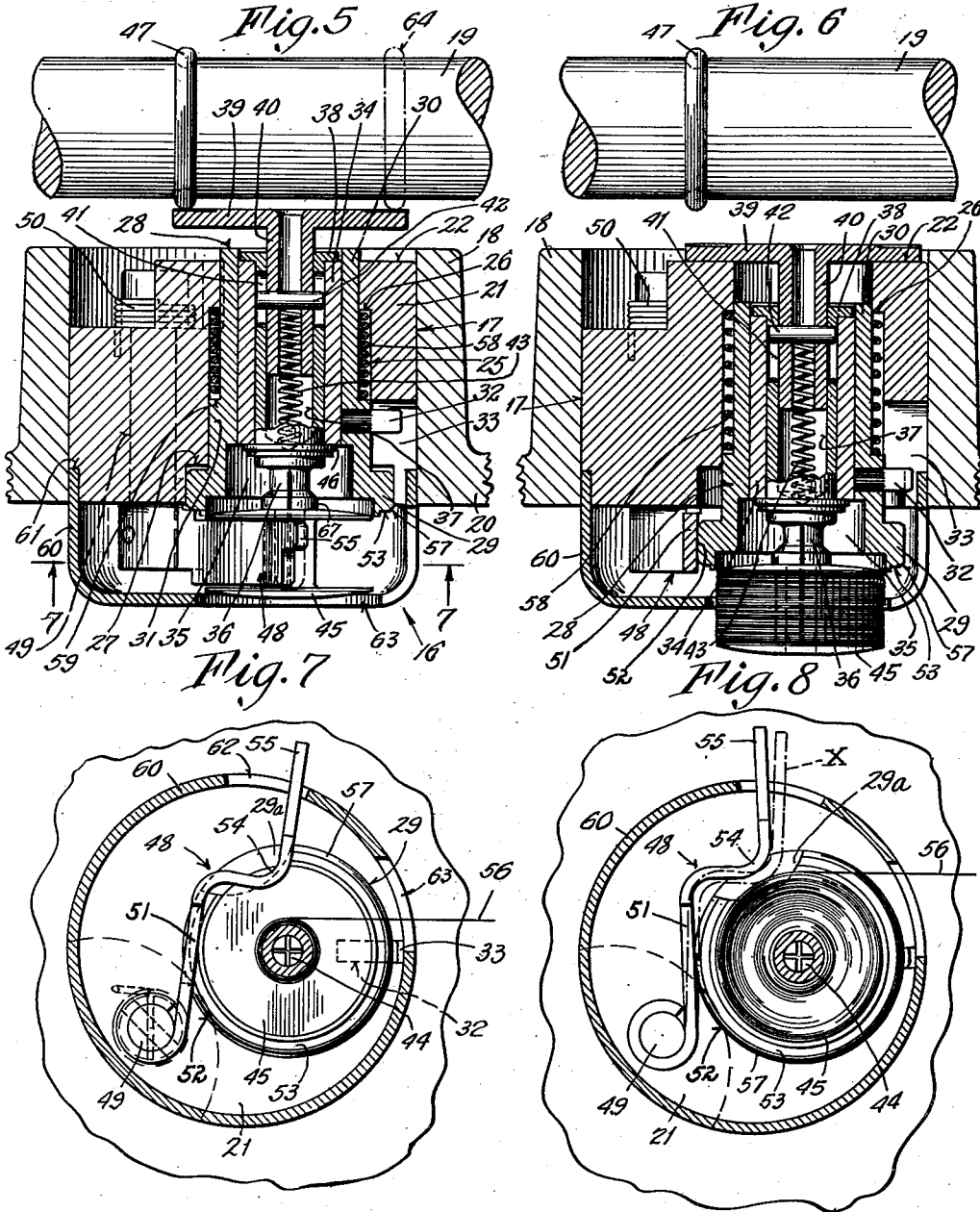
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UNITED STATES PATENT OFFICE

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BOBBIN WINDER FOR SEWING MACHINES

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This invention relates to sewing machines, and more particularly to bobbin-winding mechanisms of sewing machines.

An object of the invention is to improve the bobbin-winding mechanism of a sewing machine. This is accomplished in part by the provision of a winding mechanism in the form of an attachment which without alteration is capable of being factory installed conveniently in any of a number of different locations on the over-arm or on other conveniently located parts of the sewing machine. Thus the individual requirements of different customers regarding the use and/or location of the bobbin-winding device may be easily and economically met. Where a customer does not desire to have a bobbin winder, the attachment may be omitted, and if an opening has been provided for it on the overarm or elsewhere, this may be covered with a plate, such as an ornamental name plate. If at any later time the customer desires to install a bobbin winder, this may be very easily done by merely removing the ornamental plate and securing in place the bobbin winder, which is supplied as a separate unit. The attaching of the device can be accomplished by simple means provided for the purpose, without special driving and other connections being made.

A feature of the invention is the provision of a bobbin-winding attachment which is simple and economical in construction, and reliable in operation at all times.

Another feature of the invention is the provision of a bobbin-winding attachment in the form of a cartridge which can be conveniently mounted in a simple aperture, such as a circular bore, in a wall of the machine.

A still further feature of the invention is the provision of a cartridge-type bobbin winder which is semi-automatic in operation, and which is easily and quickly loaded with an empty bobbin, and unloaded after the bobbin has been fully wound with thread.

Other features and advantages will hereinafter appear.

In the accompanying drawings:

Figure 1 is a front elevation of a sewing machine having the improved bobbin-winding attachment, made in accordance with the invention.

Fig. 2 is a perspective view of the bobbin-winding attachment per se.

Fig. 3 is a rear elevation of the bobbin-winding attachment.

Fig. 4 is a vertical diametric section of the attachment on the overarm of the machine, the section being taken on the line 4-4 of Fig. 1, and the parts of the attachment being shown

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in operating position but with a bobbin omitted for the sake of clarity of illustration.

Fig. 5 is a fragmentary horizontal section taken on the line 5-5 of Fig. 1, the parts being in the operative position, and a bobbin being mounted in the attachment in readiness to receive thread.

Fig. 6 is a view like Fig. 5, but with the parts in inoperative position, the bobbin having been completely wound with thread.

Fig. 7 is a vertical section taken on the line 7-7 of Fig. 5, and

Fig. 8 is a view like Fig. 7, but showing the automatic latch mechanism of the device being operated by building up of the thread on the bobbin, thereby to automatically disconnect the device and render it inoperative.

The sewing machine illustrated in Fig. 1 comprises a post 10 having an overarm 11 and sewing head 12, the latter mounting the usual needle 13 and presser foot 14, and the post being carried on a base or bed 15.

In accordance with the invention a novel and improved bobbin-winding attachment 16 is provided for securement to the overarm 11 of the machine, the said attachment being in the form of a unitary device shaped like a cartridge, as shown in Fig. 2, and being so organized that without alteration it can be factory installed in any of a number of different locations, or omitted entirely from the machine and quickly and conveniently installed at a later time, all to suit the individual requirements of different customers.

Accordingly, as shown in Figs. 4, 5 and 6, the overarm 11 is provided with a cylindrical bore 17, and with a tubular boss 18 encircling the bore and extending inwardly toward the needle-operating shaft 19 of the machine, the said boss enabling the bore 17 also to be extended inwardly from the front wall 20 of the arm so as to have a fairly substantial length.

The bobbin-winding cartridge 16 comprises a cylindrical body 21 having an outside diameter which enables it to closely fit in the bore 17 of the overarm. The inner end 22 of the body 21 terminates just short of the inner edge 23 of the boss 18 when the cartridge is mounted in the overarm 11, as shown in Figs. 4, 5 and 6, and a set screw 24 is provided in the boss 18 for engagement with a conical recess or "spot" 21a in the cartridge body, to properly locate the latter in the arm and secure it against inadvertent dislodgment.

The body 21 of the bobbin-winding cartridge has a stepped bore 25 provided with internal

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shoulders 26, and 27. Within the bore 25 a sleeve 28 is mounted for axial movement, the sleeve having at one end a peripheral flange 29 engaging the part of the bore 25 of largest diameter, having a reduced portion 30 engaging the smallest part of the bore 25, and having a portion 31 engaging the part of the bore 25 which extends between the shoulders 26 and 27.

The sleeve 28 is prevented from turning in the body 21 by a pin 32 anchored in the sleeve and projecting into a slot 33 of the body, as shown in Figs. 5 and 6. Within the sleeve 28 a bearing bushing 34 is press-fitted, the front end of the bushing being flush with the bottom of a central recess 35 in the sleeve, and the back end of the bushing terminating just short of the back end of the sleeve. Inside the bushing 34 a spindle 36 is rotatably carried, the said spindle having a bore 37 extending for most of its length and having a peripheral flange 38 at its back end, adapted to engage the back end of the bearing bushing 34.

The spindle 36 carries a flat friction wheel 39, the latter being adapted to float with respect to the spindle between a retracted inoperative position as shown in Fig. 6, and a partially extended operative position shown in Fig. 5. To accomplish this floating mounting, the friction wheel 39 has a shank 40 axially slidable in the bore 37 of the spindle, and the latter has slots 41 diametrically opposite each other for slidably receiving a drive pin 42 which is anchored in the shank 40 of the friction wheel. The said shank 40 is also bored to accommodate a helical compression spring 43 one end of which engages the drive pin 42, the other end engaging the inner end wall of the bore 37 in the spindle. The spring 43 tends to hold the shank 40 and friction wheel 39 in the position of Fig. 5, which is termed a rearwardly extended position, relative to the spindle 36, since it projects the maximum allowable distance from the spindle.

The front end 44 of the spindle 36 is of reduced diameter and is adapted to mount a bobbin 45, the said end having cross cuts to enable it to yield and become slightly smaller in overall diameter so as to frictionally seize the bobbin 45 and hold it against relative turning. Any suitable means for holding the spindle 36 against axial movement in the bushing 34 may be provided, such as the split retainer ring 46 shown in Figs. 5 and 6.

The friction wheel 39 is adapted to receive power from the needle-operating shaft 19 of the machine, preferably through the intermediary of a resilient annulus 47 carried by the shaft, for the purpose of driving the spindle 36 and the bobbin 45 mounted thereon. The said annulus is engageable with the face of the wheel 39 when the latter is shifted axially inward from the position of Fig. 6 to the operative position of Fig. 5 and during the time that the wheel is maintained in this shifted position. To hold the wheel 39 in the said operative or shifted position a latch 48 is provided, carried by and keyed to a shaft 49 which passes longitudinally through the body 21 and at its other end mounts a coil spring 50, the said spring being anchored in the body 21 and also in the shaft 49, and being arranged to bias the latch 48 in a clockwise direction as viewed in Figs. 7 and 8. The latch 48 has a straight portion 51 engageable with both the outer periphery 52 and the front face 53 of the flange 29 on the sleeve 28. When the latch 48 is in engagement with the front face 53 of the

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flange, which is the locking position as shown in Figs. 5 and 7, the sleeve 28 is held in a predetermined axial position in the body 21 wherein the friction wheel 39 is maintained against the driving washer 47. The wheel 39 is yieldably held under pressure against the washer 47 by the action of the compression spring 43, which is compressed to a degree as determined by the extent of movement of the sleeve 28 and the engagement of the wheel and washer.

For the locking position of the latch 48 an offset portion 54 thereof extends between the flanges of the bobbin 45, the said portion also projecting at its end 55 beyond the periphery of the body 21 so that the latch may be manually operated when necessary. To provide clearance for the offset portion 54 of the latch 48 the flange 29 of the sleeve 28 is provided with an arcuate cut 29a, as shown in Fig. 8. By this organization, as thread 56 is wound on the bobbin 45 the thread will build up to a large diameter as shown in Figs. 6 and 8 and in so doing will engage the offset portion 54 of the latch 48 and shift the latch counterclockwise against the action of the latch spring 50. As a result of this movement, the latch will occupy the position shown by the broken lines X in Fig. 8, and the portion 51 of the latch will become engaged with a camming chamfer 57 on the flange 29, whereupon any pressure on the sleeve 28 tending to shift it axially forward will cause the latch to be automatically cast aside. To provide such pressure, a compression spring 58 is located to encircle the sleeve 28 and engage a shoulder 59 thereof, Figs. 5 and 6, the other end of the spring engaging the shoulder 26 in the body 21.

The spring 58 is aided by the spring 43 in tending to move the sleeve 28 axially forward, and the combined action of the said springs is such that when the increased thread diameter on the spool 45 shifts the latch 48 into engagement with the chamfer 57, the latch will be immediately quickly cast aside to the position of Figs. 6 and 8, and the sleeve 28 will be snapped forward until stopped by engagement of the friction wheel 39 with the back surface 22 of the body 21, such engagement acting as a brake.

This movement will of course disengage the friction wheel 39 from the driving annulus 47, and therefore the bobbin will promptly cease to turn, after having been fully wound with thread.

Where only a partially wound bobbin is desired, or where the thread supply runs out before the bobbin is fully wound, the finger piece 55 is operated to release the bobbin winder manually from the driving shaft, whereupon the bobbin may be readily removed.

The front end of the body 21 is provided with a formed sheet metal cover 60 having the shape of a shallow cup, the said cover being press-fitted against a shoulder 61 of the body as shown. The cover 60 has an opening 62 to provide clearance for the latch 48, and has a second opening 63 to admit the bobbin 45, and to admit thread to the latter.

As shown in Fig. 1, the thread 56 may be fed to the bobbin-winding cartridge 16 from the right thereof, being supplied from any suitable location on the post 10 or arm 11.

Where the bobbin-winding attachment is to be used on a machine wherein the direction of turning of the spindle 36 would be opposite to that desired, a reversal of the spindle can be effected by shifting the driving annulus 47 to a position

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such as shown by the broken lines 64 in Fig. 5. This position is on the opposite side of the shaft 36, and therefore for a given rotation of the needle-operating shaft 19, a reverse rotation of the friction wheel 39 and spindle 36 is had.

Referring to Fig. 3, the face of the friction wheel 39 along an annular peripheral zone is provided with straight-line knurling 65 to provide better traction and eliminate slippage between the friction wheel and the driving annulus, and preferably the latter is recessed in the shaft 19, as shown by the broken line 66 in Fig. 4, to correctly position it and prevent dislodgment.

It will be understood that when the fully wound bobbin 45 is projecting from the cover 60 of the cartridge, as shown in Fig. 6, it may be readily grasped and removed from the spindle 36 by merely pulling it therefrom.

The procedure for mounting a bobbin 45 on the slotted end of the spindle 36 is as follows: The bobbin is applied to the slotted end and forced over the latter by pushing with the thumb, in the same manner that a push button is depressed. During this operation the spindle 36 and the sleeve 30 will shift axially inward thereby engaging the friction wheel 39 with the driving annulus 47. The yielding movement of the spindle will halt when the rear surface of the flange 29 on the sleeve 30 engages the shoulder 27 of the body 21, thereby enabling the bobbin to be finally forced fully on the end of the spindle against a positioning shoulder 67 thereon. Before letting go of the bobbin the latch 48 will snap into its latching or locking position under the action of the coil spring 50, this position being shown in Figure 5. The attachment is now in the operative position, ready for winding the thread 56 on the bobbin 45.

Means are provided for enabling the spindle 36 and sleeve 28 to be supplied with oil when desired, so as to prevent excessive wear, the said means comprising a cut 68 in the body 21, communicating with an oil hole 69 passing through the body into the bore 25 thereof. The sleeve 28 and bearing bushing 34 have aligned holes indicated by the dotted lines 70 in Fig. 4, the said holes communicating with the oil hole 69 when the parts of the device are in the operative position shown. Thus, oil which is deposited in the cut 68 will be conducted through to the sleeve 28 and shaft 36 to lubricate the same.

By the provision of the bobbin-winding cartridge 16 it is possible to economically and conveniently meet the various requirements of different customers with respect to bobbin winders. For example, the cartridge 16 may be mounted at any of a number of different places on the machine, such as on the machine overarm 11 or other location adjacent a driven shaft, by merely drilling the machine to receive the body 21, and locating the latter so as to enable the friction wheel 39 to engage the driving annulus 47. This drilling and locating of the attachment may be easily done while the machine is at the factory. Or, if the customer does not desire a bobbin winder at the time of purchase of the machine, but might wish to add a winder at a later date, the machine may be supplied without the winder, and the opening or bore in the machine covered with a suitable cover plate. Then at any subsequent time the bobbin-winding unit may be purchased by the customer and installed in the opening provided by first removing the cover plate, this being accomplished all without the use of special tools or machining operations.

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The position of the friction wheel 39 shown in Fig. 5 is termed an extended operative position, since it projects from the body 21 and engages the driving annulus 47 for operation thereby. Likewise, the position of the wheel 39 shown in Fig. 6 is termed a retracted inoperative position, since it does not project from the body 21 and, being disengaged from the annulus 47, is not being operated.

Variations and modifications may be made within the scope of this invention and portions of the improvements may be used without others.

We claim:

1. In a sewing machine, a frame part having a power-operated member, and having an opening located adjacent the member; a unitary bobbin winding attachment comprising a body positioned and secured within the opening of the frame part; mounting means slidably carried within the body and having means thereon rotatably mounting a bobbin; a drive mechanism connected with the bobbin-mounting means and rendered operative upon sliding of the mounting means in response to axial pressure on the bobbin, the said mechanism including a member having a surface and driven from the power-operated member; and yieldable traction means between the said surface and the power-operated member.
2. In a sewing machine, a horizontal overarm having a needle-operating shaft, and having an opening located laterally of the shaft; a unitary bobbin-winding attachment comprising a body positioned and secured within the opening of the horizontal overarm; mounting means slidably carried within the body and having means thereon rotatably mounting a bobbin; a drive mechanism connected with the bobbin-mounting means and rendered operative upon sliding of the mounting means in response to axial pressure on the bobbin, the said mechanism including a member having an annular surface and driven from the needle-operating shaft; and yieldable traction means between the said annular surface and the needle-operating shaft.
3. A unitary bobbin-winding attachment for a sewing machine, comprising a housing for securement to a frame part of the machine; a spindle slidably mounted in the housing for mounting a bobbin, the said housing being cut away adjacent one end of the spindle to admit the bobbin, and to admit thread to the latter; friction-drive means for engagement with a power-operated shaft of the machine, the said means being connected with the spindle and being movable between a retracted, inoperative position, and an extended operative position projecting from the housing; and manually operable, releasable means for holding the drive means in extended position.
4. A unitary bobbin-winding attachment for a sewing machine, comprising a housing for securement in an opening of a frame part of the machine; a spindle slidably mounted in the housing for mounting a bobbin, the said housing being cut away adjacent the spindle to admit the bobbin, and to admit thread to the latter; friction-drive means for engagement with a power-operated shaft of the machine, the said means being connected with the spindle and being movable between a retracted, inoperative position, and an extended operative position projecting from the housing; resilient means for moving the drive means to, and for yieldably holding it in re-

tracted position; and manually operable, releasable means for holding the drive means in operative position.

5. A unitary bobbin-winding attachment for a sewing machine, comprising a housing for securement to a frame part of the machine; a spindle in the housing for mounting a bobbin, the said spindle being axially movable between an operating position wherein the bobbin is substantially wholly within the housing and a non-operating position wherein the bobbin is partially projecting from the housing, the latter being cut away adjacent one end of the spindle to admit the bobbin and to admit thread thereto; a drive mechanism for engagement with a power-operated shaft of the machine, the said mechanism being connected with the spindle and being axially movable therewith so as to project from the housing in shaft-engaging, operating position when the bobbin is wholly within the housing; resilient means for moving the spindle and drive mechanism to, and for yieldably holding the same in the non-operating positions; and a latch for holding the spindle and drive mechanism in the operating positions.

6. A unitary bobbin-winding attachment for a sewing machine, comprising a housing for securement to a frame part of the machine; a spindle in the housing for mounting a bobbin, the said spindle being axially movable to an operating position wherein the bobbin is substantially wholly within the housing by pressure on the bobbin from a non-operating position wherein the bobbin is partially projecting from the housing, the latter being cut away adjacent one end of the spindle to admit the bobbin and to admit thread thereto; a drive mechanism for engagement with a power-operated shaft of the machine, the said mechanism having a floating driving connection with the spindle and also being axially movable therewith so as to project from the housing in shaft-engaging, operating position when the bobbin is wholly within the housing; resilient means for moving the spindle and drive mechanism to, and for yieldably holding the same in the non-operating positions; and a latch for holding the spindle and drive mechanism in the operating positions, the said latch being operable to automatically release the spindle and drive mechanism to non-operating position in response to thread building up to a predetermined diameter on the bobbin.

7. A unitary bobbin-winding attachment for a sewing machine, comprising a housing having means for securing it to a frame part of the machine; a non-rotatable sleeve axially movable in the housing; a spindle rotatable in the sleeve for mounting a bobbin, the said housing being cut away adjacent one end of the spindle to admit the bobbin and to admit thread to the latter; a drive shaft connected with the spindle and axially movable to and from an extended position with respect thereto; charged elastic means tending to hold the drive shaft in and return it to extended position; a friction wheel on the drive shaft, engageable with a power-operated shaft of the machine under pressure supplied by the elastic means when the said sleeve is in a predetermined axial position in the housing; a latch engageable with the sleeve for holding the latter in the said predetermined axial position, the said latch being automatically released in response to thread building up on the bobbin; and charged elastic means moving the sleeve out of the said predetermined position upon release of the latch,

the said friction wheel being thereby moved so as to separate it from the power-operated shaft.

8. A unitary bobbin-winding attachment for a sewing machine, comprising a housing having means for securing it to a frame part of the machine; a non-rotatable sleeve axially movable in the housing; a spindle rotatable in the sleeve for mounting a bobbin, the said housing being cut away adjacent one end of the spindle to admit the bobbin and to admit thread to the latter; a drive shaft connected with the spindle and axially movable to and from an extended position with respect thereto; charged elastic means tending to hold the drive shaft in and return it to extended position; a friction wheel on the drive shaft, engageable with a power-operated shaft of the machine under pressure supplied by the elastic means when the said sleeve is in a predetermined axial position in the housing; a latch engageable with the sleeve for holding the latter in the said predetermined axial position, the bobbin being contained substantially wholly within the housing when the sleeve is latched, and the said latch being automatically released in response to thread building up on the bobbin; and charged elastic means moving the sleeve out of the said predetermined position upon release of the latch, the said friction wheel being thereby moved so as to separate it from the power-operated shaft, and the bobbin being projected from the housing as a consequence of the said movement.

9. A unitary bobbin-winding attachment for a sewing machine, comprising a cylindrical housing having means for securing it in a bore in a frame part of the machine; a non-rotatable sleeve axially movable in the housing in parallelism with the axis of the latter; a spindle extending through and rotatable in the sleeve for mounting a bobbin, the said housing being cut away adjacent one end of the spindle to admit the bobbin and to admit thread to the latter; a drive shaft connected to operate the spindle and axially movable to and from an extended position with respect thereto; a spring tending to hold the drive shaft in and return it to extended position; a friction wheel on the drive shaft, engageable with a power-operated shaft of the machine under pressure supplied by the spring when the said sleeve is in a predetermined axial position in the housing; a spring-charged latch engageable with the sleeve for holding the latter in the said predetermined axial position, the said latch being automatically released in response to thread building up on the bobbin; and a spring moving the sleeve out of the said predetermined position upon release of the latch, the said friction wheel being thereby moved so as to separate it from the power-operated shaft, and the latch by engagement with the said sleeve being held in releasing position.

10. A unitary bobbin-winding attachment for a sewing machine, comprising a cylindrical housing having means for securing it in a bore in a frame part of the machine; a non-rotatable sleeve axially movable in the housing in parallelism with the axis of the latter; a spindle extending through and rotatable in the sleeve for mounting a bobbin, the said housing being cut away adjacent one end of the spindle to admit the bobbin and to admit thread to the latter; a drive shaft passing axially through the spindle and having a pin-and-slot driving connection therewith, the shaft being axially movable in the spindle to and from an extended position with respect thereto; charged elastic means tending to hold the drive shaft in and return it to extended position; a

friction wheel on the drive shaft, engageable with a power-operated shaft of the machine under pressure supplied by the elastic means when the said sleeve is in a predetermined axial position in the housing; a latch engageable with the sleeve 5 for holding the latter in the said predetermined axial position, the said latch being automatically released in response to thread building up on the bobbin; and charged elastic means moving the sleeve out of the said predetermined position upon 10 release of the latch, the said friction wheel being thereby moved so as to separate it from the power-operated shaft.

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