May 8, 1956 F. S. HOWARD 2,744,691

BOBBIN WINDER

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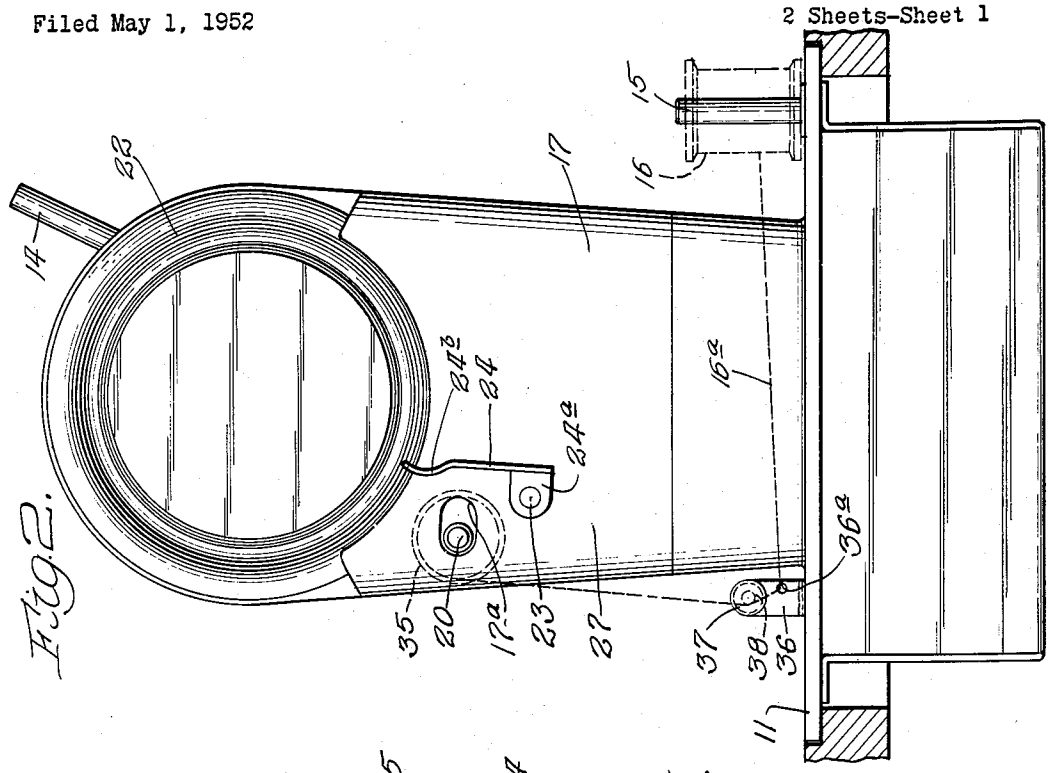


Fig. 2.

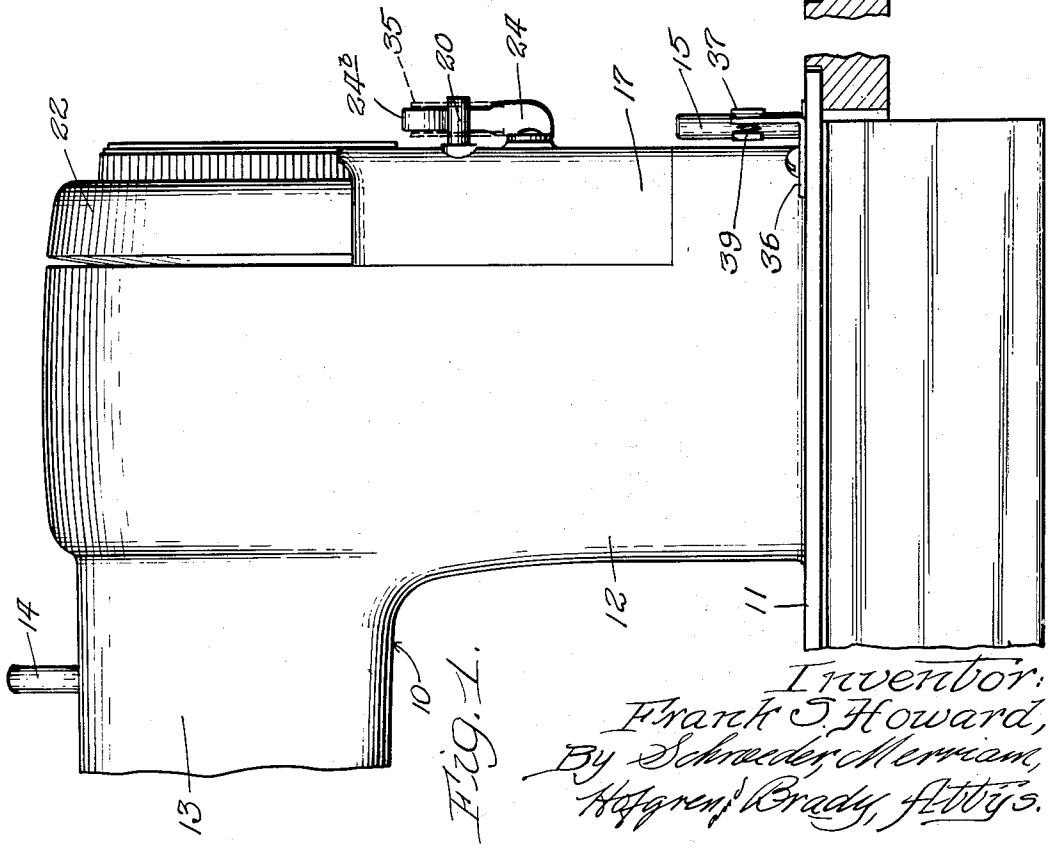


Fig. 1.

Inventor:
Frank S. Howard,
By Schroeder, Merriam,
Hofgren & Brady, Attys.

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Fig. 5.

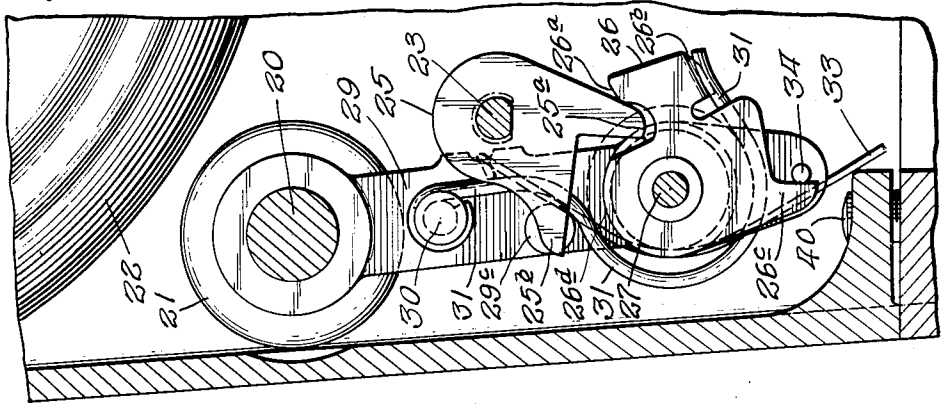


Fig. 4.

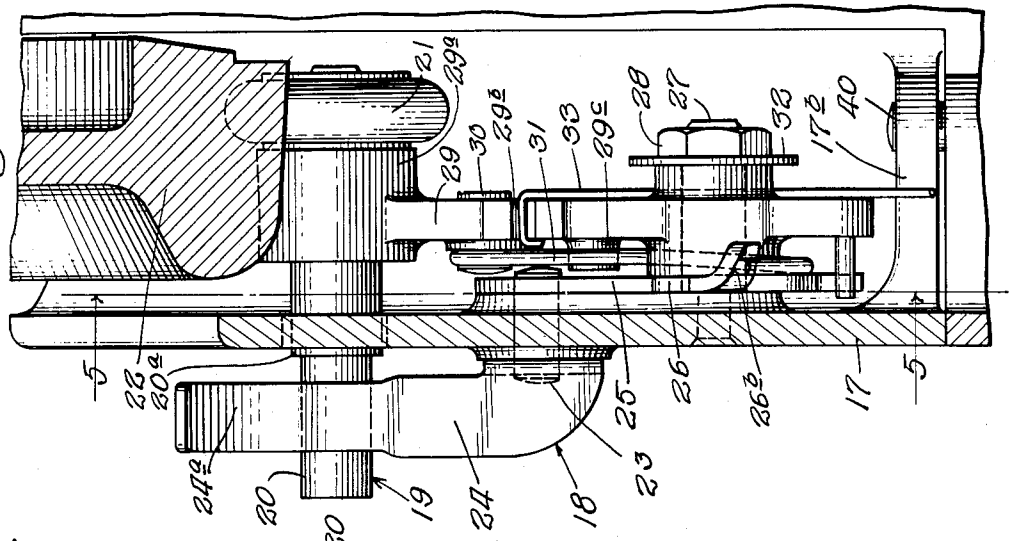
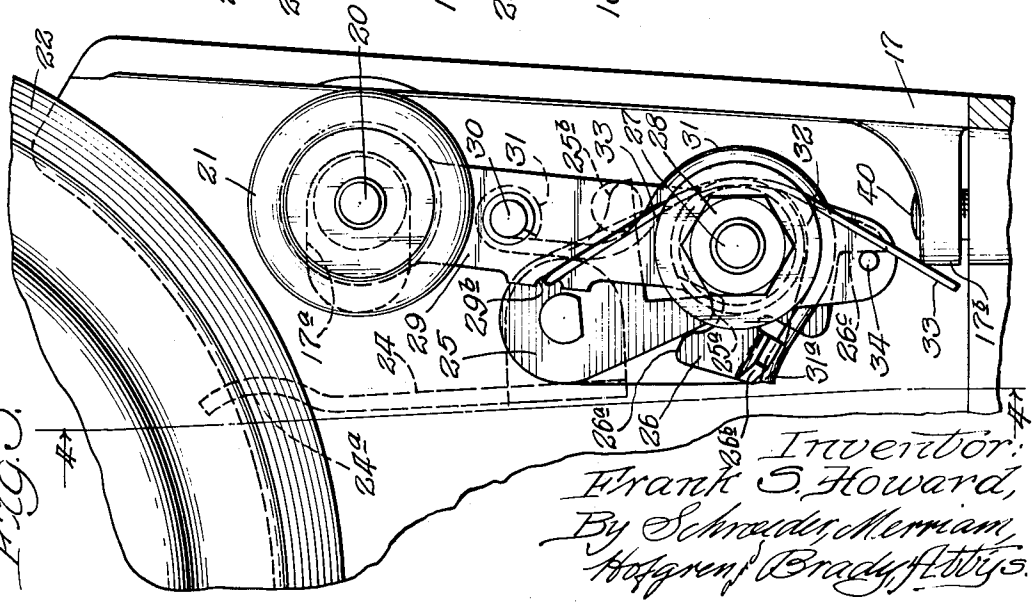


Fig. 3.



Inventor:
Frank S. Howard,
By Schroeder, Merriam,
Hofgren & Brady, Attys.

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BOBBIN WINDER

Frank S. Howard, Chicago, Ill., assignor to Birtman Electric Company, a corporation of Illinois

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9 Claims. (Cl. 242—22)

This invention relates to a sewing machine and particularly to a bobbin winder therefor.

In sewing machines the thread forming the underside of the seam is supplied from a bobbin spool located beneath the bed plate of the machine and adjacent to the loop taker which forms the loop. This loop is formed from the needle thread on each downward movement of the needle during the sewing operation. It is, of course, necessary that this bobbin be kept supplied with thread and, therefore, it must periodically be removed from the machine and wound with a fresh supply of thread.

In most domestic sewing machines the bobbin is adapted to be supported during the winding operation by a rotatable shaft adapted to make driving contact with the flywheel of the sewing machine in order that the bobbin will be rotated and thread drawn from a suply spool onto the bobbin. The bobbin winder of this invention operates on this principle but has many advantages over prior bobbin winders. Thus it provides a structure for automatically locking the rotatable bobbin supporting member in driven contact with the flywheel during the winding of the bobbin and also provides means for moving this member out of driven contact with the flywheel at the end of the bobbin winding operation. Thus, there is no danger of accidental engagement of the bobbin winder unit with the flywheel when the bobbin has been wound or prior to the time the bobbin has been placed thereon and there is no danger of the unit being accidentally prematurely moved out of contact with the flywheel or of being kept in contact with the flywheel beyond the time when the bobbin is completely wound. Other advantages of this invention will be pointed out hereinafter and will be apparent from the following description of one embodiment of the invention as shown in the accompanying drawings.

Of the drawings: Figure 1 is a fragmentary side elevation of a sewing machine head showing the flywheel end of this head and the supporting arm together with the external structure of one embodiment of the bobbin winder of this invention; Figure 2 is an end elevation of the sewing machine of Figure 1 taken from the right-hand end thereof; Figure 3 is a fragmentary elevation of the bobbin winder and adjacent portion of the flywheel taken from the inside of the supporting arm of the sewing machine; Figure 4 is a section taken substantially along line 4—4 of Figure 3; and Figure 5 is a section taken substantially along line 5—5 of Figure 4.

The sewing machine shown in the accompanying drawings includes a head **10** supported on a base **11** and including a vertical arm **12** and an overhanging arm **13**. Mounted on the overhanging arm **13** and rearwardly thereof is a thread spool support **14** adapted to support a spool of thread during the sewing operation. Mounted at the right-hand end of the base **11** adjacent the vertical

arm **12** is a pin **15** adapted to support a spool **16** of thread for winding the bobbin.

Forming a part of the rear surface of the vertical arm **12** and removable therefrom is a plate **17** shaped to form a smooth continuation of the surface of this arm **12**. Mounted on this plate **17** for removal therewith is the bobbin winder unit **18**.

The bobbin winder unit **18** includes a rotatable bobbin supporting member **19** comprising a shaft **20** having an enlarged portion **20***a* on the inner end thereof and a rubber covered wheel **21** attached to the extreme inner end of shaft **20** for rotating this shaft when the wheel **21** is moved into contact with the flywheel **22** of the sewing machine.

Rotatably mounted about the pin **23** on the outer surface of the plate **17** is an arm **24** of strip metal having a bracket end **24***a* attached to the pin **23** for rotation therewith and a curved upper end **24***b* adapted to be moved to a position adjacent to the shaft **20**. Mounted on the inner end of this pin **23** for rotation therewith is a first lever **25** having a cam wedging surface **25***a* adapted to engage a similar cam wedging surface **26***a* on a second lever **26**. This second lever is mounted for rotation about a second pin **27** located beneath and slightly forwardly of the first pin **23** as viewed in Figure 2. This second pin which has its inner end threaded and carries a nut **28** also rotatably supports a second arm **29** which extends upwardly from the second pin **27** and is provided on its upper end with an enlarged bearing portion **29***a* that rotatably supports the enlarged part **20***a* of the shaft **20** with the wheel **21** against the inner end of this bearing portion **29***a*.

By rotating the arm **29** in a counterclockwise direction as viewed in Figure 3 the rubber covered wheel **21** is moved into frictional driven contact with the flywheel **22**. In order to permit this movement toward the flywheel and to permit movement away from the flywheel the portion of the plate **17** through which the shaft **20** projects is provided with an elongated slot **17***a*. When the shaft **20** is at one end of the slot as shown in Figures 2 and 3, the wheel **21** is out of contact with the flywheel. When the wheel **21** is moved into contact with the flywheel **22**, the shaft **20** is at the inner end of this slot.

The inner surface of the second arm **29** is provided with an inwardly projecting stud **30** to which is attached one end of a relatively strong spring **31**. This spring **31** extends downwardly behind stud **29***c* on arm **29** and then curved around the front part of the lever **26** and then rearwardly and upwardly so that the lower end **31***a* of the spring is beneath and bearing upwardly against the turned out flange **26***b* on this second lever **26**. When the parts are in the positions shown in Figures 2–5 inclusive, the spring **31** is relatively unflexed.

The arm **29** is also provided with a second spring **33** that is relatively weaker than the first spring **31**. This second spring **33** engages a notch **29***b* at the rear edge of the arm **29** and extends forwardly around the front of the support for the arm **29** and beneath a washer **32** and then passes behind a stop **17***b* formed as a part of the plate **17**. When in this position the lower end of the spring **33** bears against the stop **17***b* while the upper end of this spring bears against the rear of the arm **29** at the notch **29***b*. Thus the spring **33** constantly urges the arm **29** away from the flywheel **22** and toward the position shown in the drawings where the wheel **21** is out of contact with the flywheel **22**. The stop **17***b* and a similar member on the other side of the plate **17** are adapted to be engaged by threaded parts **40** to hold the plate on the machine.

The bottom end of the second arm 29 beyond the second pin 27 is provided with an inwardly projecting stud 34 normally engaging a depending lip 26c on the second lever 26. When the parts are at rest as shown most clearly in Figures 3 and 5, the strong spring 31 bearing upwardly against the second lever flange 26b holds the lip 26c against the stud 34.

With the parts in the position shown in the drawings the bobbin winder is out of operation as the rubber covered wheel 21 is out of contact with the flywheel 22. When it is desired to wind a bobbin with thread, however, an ordinary bobbin 35 is placed on the projecting end of the shaft 20 where it is held in place for rotation with this shaft by a small spring (not shown). The thread 16a is led from the spool 16 and through an opening 36a in a bracket 36 mounted on the base 11. This thread is then led up behind a button 37 and onto the bobbin 35. This button 37 is mounted on a shaft 38 that is movably supported on the bracket 36 and the button is held in frictional contact with the thread 16a by a small spring 39 at the rear thereof. This arrangement which is conventional provides a predetermined tension on the thread 16a so that it will be pulled smoothly from the spool 16.

As soon as the bobbin 35 has been placed on the shaft 20 and the thread 16a attached thereto the first arm 24 is rotated in a counterclockwise direction as viewed in Figure 2 (clockwise as viewed in Figure 3) to rotate the first lever 25 in this same direction. Rotation of the first lever 25 causes the cam wedging surface 25a to move into wedging contact with the similar cam surface 26a on the second lever 26. This wedging action moves the extending end of the second lever 26 downwardly so that the two surfaces 25a and 26a are in contact and the rear substantially vertical edges of the levers 25 and 26 are substantially aligned. This movement of the wedging surfaces into contact with each other causes a counterclockwise rotational movement as viewed in Figure 3 of the second lever 26 around its pin 27. As the strong spring 31 bears against the bottom of the flange 26b on the second lever, this movement also causes rotation of the second arm 29 to bring the rubber covered wheel into contact with the peripheral surface of the flywheel 22. As soon as this contact occurs, spring 31 is placed under additional stress so that the tension in this spring holds the wheel 21 against the flywheel 22 with a predetermined force depending upon the strength of the spring.

When the parts have been moved to the positions described above with the small wheel 21 in contact with the flywheel 22, rotation of the flywheel causes rotation of this rubber covered wheel 21 and thus of the shaft 20 and the bobbin 35 thereon. This rotation of the bobbin draws thread 16a from the spool 16 and winds it on the bobbin.

As the thread wound on the bobbin gradually builds up it begins to bear against the first arm 24 in the area adjacent the bottom of the curved portion 24b. This build-up of thread soon begins to push the first arm 24 away from the shaft 20. This outward movement of the arm 24 causes a corresponding movement of the first lever 25 so that the cam surface 25a moves inwardly relative to the cam surface 26a on the lever 26. As soon as a predetermined extent of movement has occurred dependent upon the amount of thread desired to be wound on the bobbin, the cam wedging surfaces 25a and 26a are moved out of contact with each other. As soon as this occurs the second lever 26 is no longer held in its depressed position by the lever 25 and the lever is free to rotate to the position shown in Figures 3 to 5. This, in effect, disengages the lower end of spring 31. In other words, the release of second lever 26 releases the anchorage of the lower end of spring 31 so that this spring is no longer effective in holding the bobbin winder wheel 21 against the flywheel 22. As soon as this relatively strong spring 31 has been thusly released the relatively weak spring 33 which has been ineffective up to this time because it is weaker than spring 31 immediately becomes effective to force the arm 29 and the bobbin winder wheel 21 away from the flywheel 22 and stop the rotation of the bobbin. The wound bobbin may then be removed and is ready for use in the sewing machine in the customary manner.

With the structure of this invention the bobbin winding unit is held firmly and positively against the flywheel during the bobbin winding by the action of the spring 31 having its lower end bearing upwardly against the flange 26b and its upper end urging the arm 29 toward the flywheel 22. However, as soon as a predetermined amount of thread has been wound on the bobbin, the winding unit is not only released from this spring force but is also sharply and rapidly moved away from the flywheel by the action of the spring 33. This action is achieved by, in effect, releasing the bottom of the strong spring 31 when the cam surfaces 25a and 26a are disengaged so that the spring 31 no longer exerts a strong force and so that the heretofore relatively weak spring 33 can go into action. With this arrangement there is no chance of accidental overwinding of thread as the thread winding action is automatically stopped. Similarly, there is no chance of the winding unit accidentally contacting the flywheel of the machine such as might occur when the operator grasps the bobbin to remove it from the shaft 20. In prior structures where this accidental contact occurred, it often caused the operator to drop the bobbin with a resulting partial unwinding of the thread thereon or caused friction burns to the fingers. Furthermore, the bobbin winder of this invention does not require the alert supervision formerly required because as soon as the bobbin is wound, the winding unit is forcefully and abruptly moved out of contact with the flywheel.

The cam surfaces 25a and 26a which cause the wedging action and move the lever 26 downwardly so that the spring 31 becomes effective are not only useful in providing and releasing this wedging action, they are also useful in predetermining the amount of thread wound on the bobbin. This is true because the shape and extent of these wedging surfaces determines how far the arm 24 must be moved outwardly before these cam surfaces are released. This outward movement of the arm 24 determines the amount of thread wound on the bobbin. Cam surfaces 25a and 26a are held in the same relative position at the beginning of each winding operation because of the provision of the forwardly-projecting spur 25b on lever 25. When the lever 25 has been rotated so that the surfaces 25a and 26a are in contact, this spur bears against the upper curved surface 26d of lever 26 to limit the extent of the rotational movement of the lever 25 and thus of lever 26.

Having described my invention as related to the embodiment shown in the drawings, it is my intention that the invention be not limited by any of the details of description, unless otherwise specified, but rather be construed broadly within its spirit and scope as set out in the accompanying claims.

I claim:

1. In a sewing machine including a driven flywheel, a bobbin winder adjacent to the flywheel comprising a rotatable bobbin supporting member, a first arm rotatable toward the member at the beginning of the winding and then away from the member by wound thread on the bobbin, a second arm carrying the bobbin supporting member and rotatable toward and away from the flywheel to move the bobbin supporting member into and out of contact with the flywheel, a first lever rotatable with the first arm, a second lever rotatable with the second arm, both levers having cooperating wedging surfaces for moving the second arm toward the flywheel to make driving contact of the bobbin supporting member therewith on moving the first arm toward the supporting member, a relatively strong spring between the second lever

and second arm urging the second arm toward the flywheel only when both levers are in the wedging engagement with each other, and a relatively weak spring urging the second arm away from the flywheel, said strong spring serving to overcome the weak spring when said levers are in said wedging contact.

2. In a sewing machine including a driven flywheel, a bobbin winder comprising a rotatable bobbin supporting member movable into and out of driven contact with the flywheel, an arm movable toward the member at the beginning of the winding and then away from the member by wound thread on the bobbin, a relatively strong spring urging the supporting member into contact with the flywheel, a relatively weak spring urging the member out of said contact, said strong spring overcoming said weak spring during the said bobbin winding operation to hold the bobbin supporting member in said contact with the flywheel, and apparatus operatively releasing said strong spring when said arm has been moved a predetermined distance away from said bobbin supporting member by said wound thread on the bobbin, said release of the strong spring thereby permitting the weak spring to move said bobbin supporting member out of said contact with the flywheel.

3. In a sewing machine including a driven flywheel, a bobbin winder comprising a rotatable bobbin supporting member movable into and out of driven contact with the flywheel, an arm movable toward the member at the beginning of the winding and then away from the member by wound thread on the bobbin, and apparatus automatically locking the member against the flywheel when the arm is moved toward the member and automatically moving the member away from the flywheel when the arm is moved away from the member, said locking apparatus including a spring normally urging the bobbin supporting member into contact with the flywheel when said arm is adjacent to the member together with means effectively releasing the spring to inactivate the same when the arm has been moved away from the member.

4. In a sewing machine including a driven flywheel, a bobbin winder adjacent to the flywheel comprising a rotatable bobbin supporting member, a first arm movable toward the member at the beginning of the winding and then away from the member by wound thread on the bobbin, a second arm carrying the bobbin supporting member and movable toward and away from the flywheel to move the bobbin supporting member into and out of contact with the flywheel, and apparatus for moving the second arm toward the flywheel to make driving contact of the supporting member therewith on moving the first arm toward the supporting member and then releasing said driving contact when the first arm has been moved away from the supporting member, said moving and releasing apparatus including a first spring normally holding the bobbin supporting member in contact with the flywheel when the first arm is adjacent to the member, a weaker spring urging the member out of said contact, and means effectively releasing said first spring to inactivate the same when the first arm has been moved away from the supporting member.

5. In a sewing machine including a casing and a rotatable flywheel, a bobbin winder adjacent to the flywheel comprising a rotatable bobbin supporting member extending through the casing, a first arm on the exterior of the casing rotatable toward the member at the beginning of this winding and then away from the member by wound thread on the bobbin, a second arm within the casing carrying the bobbin supporting member and rotatable toward and away from the flywheel to move the bobbin supporting member into and out of contact with the flywheel, a first lever rotatable with the first arm, a second lever rotatable with the second arm, both levers being within the casing and having cooperating wedging surfaces for moving the second arm toward

the flywheel to make driving contact of the supporting member therewith on moving the first arm from the exterior of the casing toward the supporting member, a relatively strong spring between the second lever and second arm urging the second arm toward the flywheel only when both levers are in the wedging engagement with each other, and a relatively weak spring urging the second arm away from the flywheel, both said springs being within the casing and the strong spring overcoming the weak spring when said levers are in said wedging contact.

6. In a sewing machine including a casing and a rotatable flywheel, a bobbin winder comprising a rotatable bobbin supporting member extending through the casing and having its inner end movable into and out of driven contact with the flywheel, an arm on the exterior of the casing movable toward the member at the beginning of the winding and then away from the member by wound thread on the bobbin, a relatively strong spring within the casing urging the supporting member into contact with the flywheel, a relatively weak spring within the casing urging the member out of said contact, said strong spring overcoming said weak spring during the said bobbin winding operation to hold the bobbin supporting member in said contact with the flywheel, and apparatus operatively releasing said strong spring when said arm has been moved a predetermined distance away from said bobbin supporting member by said wound thread on the bobbin, said release of the strong spring thereby permitting the weak spring to move said bobbin supporting member out of said contact with the flywheel.

7. In a sewing machine including a driven wheel, a bobbin winder comprising a rotatable bobbin supporting member movable into and out of driven contact with the wheel, an arm movable toward the member at the beginning of the winding and then away from the member by wound thread on the bobbin, a relatively strong spring urging the supporting member into contact with the wheel, a relatively weak spring urging the member out of said contact, and apparatus actuating the strong spring only when the arm has been moved toward said bobbin supporting member to overcome the action of the weak spring.

8. In a sewing machine including a casing and a rotatable wheel, a bobbin winder adjacent to the wheel comprising a rotatable bobbin supporting member extending through the casing, a first arm on the exterior of the casing rotatable toward the member at the beginning of this winding and then away from the member by wound thread on the bobbin, a second arm within the casing carrying the bobbin supporting member and rotatable toward and away from the wheel to move the bobbin supporting member into and out of contact with the wheel, a first lever rotatable with the first arm, a second lever rotatable with the second arm, both levers being within the casing and having cooperating wedging surfaces for moving the second arm toward the wheel to make driving contact of the supporting member therewith on moving the first arm from the exterior of the casing toward the supporting member, a relatively strong spring between the second lever and second arm urging the second arm toward the wheel only when both levers are in the wedging engagement with each other, and a relatively weak spring urging the second arm away from the wheel, both said springs being within the casing and the strong spring overcoming the weak spring when said levers are in said wedging contact.

9. In a sewing machine including a driven wheel, a bobbin winder comprising a rotatable bobbin supporting member movable into and out of driven contact with the wheel, an arm movable toward the member at the beginning of the winding and then away from the member by wound thread on the bobbin, a relatively strong spring urging the supporting member into contact with the wheel, a relatively weak spring urging the member out of said

contact, said strong spring overcoming said weak spring during the said bobbin winding operation to hold the bobbin supporting member in said contact with the wheel, and apparatus operatively releasing said strong spring when said arm has been moved a predetermined distance away from said bobbin supporting member by said wound thread on the bobbin, said release of the strong spring thereby permitting the weak spring to move said bobbin supporting member out of said contact with the wheel.

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