March 24, 1953 W. A. AYERS 2,632,604

SEWING MACHINE

Filed Sept. 8, 1951

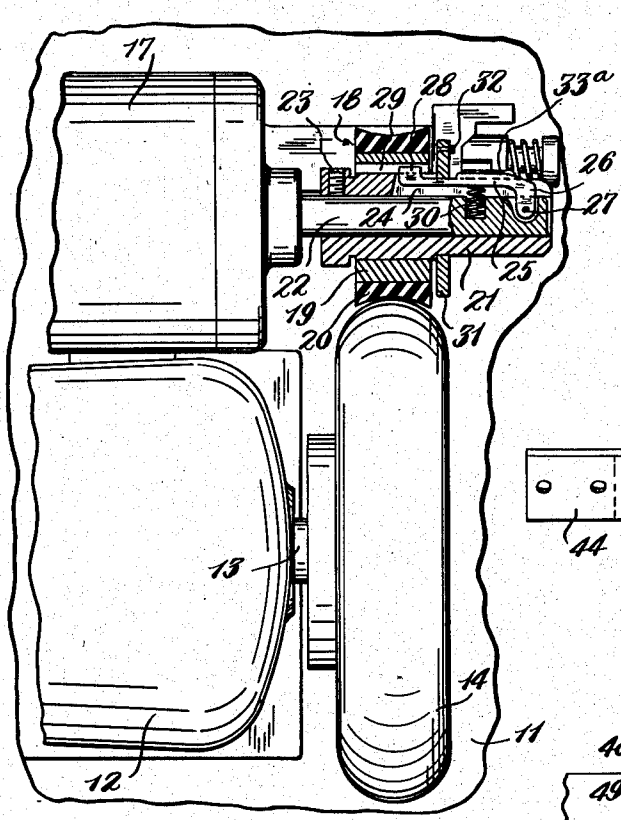


FIG. 1

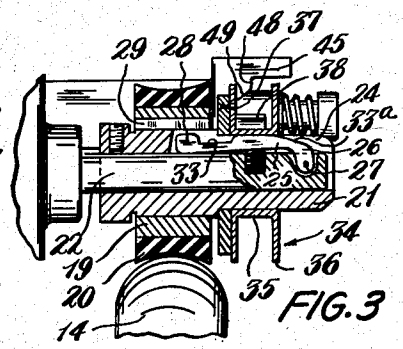


FIG. 3

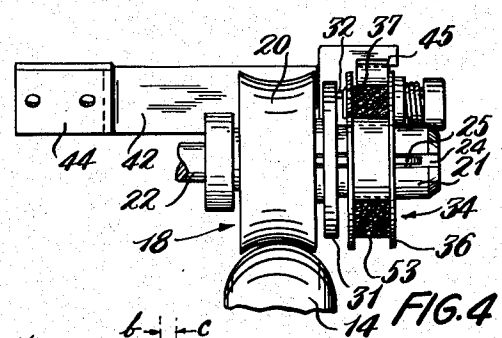


FIG. 4

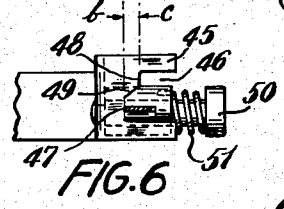


FIG. 6

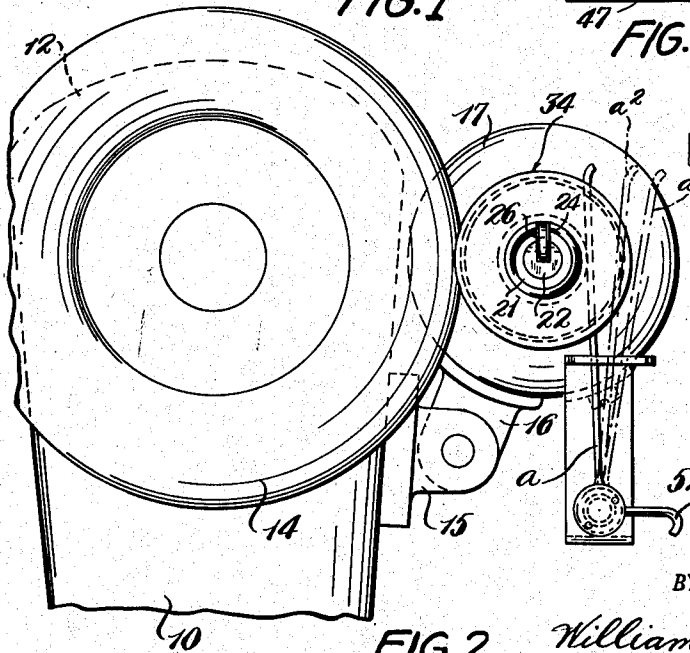


FIG. 2

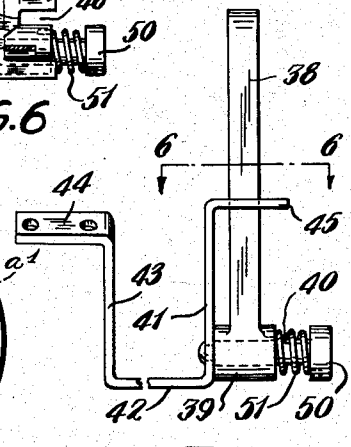


FIG. 5

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SEWING MACHINE

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11 Claims. (Cl. 242—22)

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This invention relates to a sewing machine and more particularly to an improved and novel bobbin winder mechanism for such a machine.

The bobbin winder mechanisms usually included in sewing machines are such that when the mechanisms are used to wind bobbins it is necessary as a rule to disconnect or unclutch the hand wheel of the sewing machine with respect to the main horizontal shaft that is rotatably mounted in the horizontal arm of the sewing machine head. Inasmuch as it has been necessary to provide clutch means between the hand wheel and the main shaft there has resulted the need for clearance between the main shaft and the hand wheel hole in the sewing machine head to provide clearance for the free running of the main shaft when the hand wheel is unclutched therefrom. This condition has resulted in eccentricity of the hand wheel when it is reclutched to the main shaft, wherefore the relatively large mass of the hand wheel rotating eccentrically to the main shaft produces substantial vibration in the sewing machine head.

An object of the invention is to provide a bobbin winder mechanism for a sewing machine of such character that the hand wheel may be permanently mounted with precision and concentricity on the main shaft, thus obviating the use of a clutch mechanism between the hand wheel and the main shaft with a resultant cost saving as to the clutch parts and their assembly and also eliminating vibration in the head of the sewing machine which would be caused by an eccentrically rotating hand wheel.

A further object of the invention is to provide a bobbin winder mechanism for a sewing machine which is simple in construction, efficient in operation and wherein the bobbin can be quickly and easily mounted in bobbin winding position and operatively connected to the power source of the sewing machine.

Another object of the invention is to provide a bobbin winder mechanism for a sewing machine which includes novel and efficient means for operatively positioning the bobbin on the mechanism for winding operations and for automatically disconnecting the bobbin from the power source of the mechanism when the predetermined amount of thread has been wound on the bobbin.

A still further object of the invention is to provide, in a sewing machine of the type wherein the power source is operatively connected to the hand wheel through a friction driving member in contact with the hand wheel, improved and

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novel mechanism for winding a bobbin and wherein provision is included for automatically disconnecting the drive to the friction member when the bobbin is positioned for winding operation and for automatically reconnecting the friction member with its drive when the wound bobbin is removed from the mechanism.

Another object of the invention is to provide a bobbin winder mechanism having an improved and novel means for automatically operatively disconnecting the bobbin from the power source when the predetermined and desired amount of thread has been wound upon the bobbin.

Further and additional objects and advantages not hereinbefore referred to will become apparent during the description of an embodiment of the invention which is to follow.

Referring to the accompanying drawing illustrating said embodiment of the invention—

Fig. 1 is a fragmentary top plan view of a sewing machine head of the type employing an outside electric motor as a power source and which motor is operatively connected to the hand wheel of the sewing machine by means of a friction member driven from the motor shaft; the form of mechanism embodying the present invention being shown mounted on the motor shaft and illustrated partly in section and partly in top plan, the bobbin being omitted in this view.

Fig. 2 is an end elevational view taken looking from the right hand side of Fig. 1 with the bobbin being shown applied to the motor shaft and the feeler finger of the bobbin drive release device shown in three different positions.

Fig. 3 is a fragmentary view similar to the sectional portion of Fig. 1 but showing the relationship of the parts after the bobbin has been positioned for the winding operation and the friction member which drives the hand wheel has been operatively disconnected from the motor shaft.

Fig. 4 is a fragmentary plan view of the parts shown in Fig. 3 with the bracket of the bobbin drive release device detached from the motor and a portion of one flange of the bobbin shown in section and illustrates the relationship of the parts after the control feeler has been moved by the thread to its outermost position to operatively disconnect the bobbin with respect to the motor shaft.

Fig. 5 is a detached elevational view of the control feeler finger, the bracket, and associated parts of the bobbin drive release device, and

Fig. 6 is a fragmentary view of the bobbin drive release device partly in section and partly in plan, with the section taken substantially on line

6—6 of Fig. 5 looking in the direction of the arrows.

The sewing machine head or gooseneck illustrated comprises the usual vertically extending standard 10 supported by the sewing machine bed 11 and having at its upper end the integral horizontally extending arm 12. The sewing machine head rotatably mounts in suitable bearings a horizontal main shaft 13 extending lengthwise of the arm 12 of the head and having permanently fixed thereto in precise concentricity therewith a hand wheel 14. The rear side of the standard 10 has secured thereto a bracket 15 to which is pivotally connected the supporting arm 16 that is secured to and mounts the electric drive motor 17 for the sewing machine. It will be understood that the drive motor due to its pivotal mounting can be moved toward and away from the sewing machine head and is normally urged toward the sewing machine head by spring means, not illustrated, but well known so that the friction driving member or pulley 18 is firmly pressed against the periphery of the hand wheel 14 to drive the same and the sewing mechanism of the machine.

The sewing machine thus far described is common and well understood in the art, except that the hand wheel 14 is permanently attached to the main shaft 13 in precise concentricity therewith and there is no necessity for clutching and unclutching these parts, and hence it is not believed necessary to describe in greater detail the portions of the sewing machine already referred to except the friction driving member or pulley 18.

This member or pulley 18 comprises a metal inner cylinder 19 on the periphery of which is secured a friction outer and driving cylinder 20 which preferably is formed of soft rubber adhered or secured to the inner cylinder 19. The inner cylinder 19 fits upon but is rotatable relative to an elongated sleeve 21 that is fixed to the shaft 22 of the motor 17 by suitable means as, for instance, by the setscrew 23. The sleeve 21 is provided with a slot 24 preferably milled in the sleeve and extending axially thereof inwardly from its outer end.

A lever 25 is located in the slot 24 and has an angularly disposed portion 26 extending into a recess in the motor shaft 22 and wherein it is pivotally connected to the motor shaft by a pivot pin 27. The lever 25 is provided at its free end with a driving detent or lug portion 28 projecting radially with respect to the sleeve 21 and shaft 22 and adapted to engage in an axial slot 29 milled in the inner metal sleeve 19 of the friction driving member or pulley 18. A spring 30 is housed in a recess in the motor shaft 22 and acts on the lever 25 so as normally to urge said lever outwardly to engage the driving lug 28 of the lever in the slot 29 of the friction member or pulley 18 to operatively connect said member with the motor shaft 22, wherefore the motor will rotate the member 18 and the latter will drive the hand wheel 14 and the sewing machine mechanism.

The sleeve 21 outwardly of the friction driving member 18 has a portion of reduced diameter providing an external annular shoulder and on such portion is a driving disk 31 engaging said external shoulder and having a pressed driving fit on the said reduced portion of the sleeve 21.

The driving disk 31 mounts on one side thereof and near its circumference a driving pin 32 the purpose of which will later be pointed out. It will be apparent that the driving disk 31 will

at all times rotate with the sleeve 21 when the latter is being rotaed by the motor shaft 22.

It will be noted that when the lever 25 is in its normal outward position under the action of the spring 30 with the lug 28 engaged in the slot 29 of the friction driving member 18 that then said disk extends into a notch 33 formed in the lever 25 intermediate the driving lug 28 and that portion of the lever having the curved upper edge indicated in the drawings at 33*a*.

The bobbin to be wound by the mechanism is indicated generally at 34 in Figs. 2, 3 and 4 and is of usual construction in that it comprises a hub 35 and spaced parallel disk-like flanges 36, one of which is provided near its circumference with an opening 37. When it is desired to wind the bobbin 34 all that need be done is to position the same upon the reduced portion of the sleeve 21 until the driving pin 32 of the disk 31 engages in the opening 37 in the one flange of the bobbin. In thus positioning the bobbin upon the sleeve 21 the hub 35 of the bobbin engages the curved upper edge 33*a* of the lever 25 and presses the latter downwardly about its pivot and against the action of the spring 30 and radially inwardly from the position shown in Fig. 1 to the position shown in Fig. 2, at which latter time the driving lug 28 of the lever has moved out of the slot 29 of the friction member or pulley 18 and the latter is operatively disconnected from the sleeve 21 and the motor shaft 22 and hence when the motor 17 is energized rotation will not be imparted to the member or pulley 18 and therethrough to the hand wheel 14. However, at this time rotation is imparted to the driving disk 31 and since the driving pin 32 is in engagement with the opening 37 of the bobbin flange the bobbin will be operatively connected to the sleeve 21 and motor 17 to be rotated thereby.

From the description of an embodiment of the invention as thus far set forth it will have been noted that when the bobbin is operatively positioned on the sleeve 21 to be driven thereby from the motor shaft that automatically the friction driving member or pulley 18 is operatively disconnected from the motor shaft and hence imparts no rotation to the hand wheel 14. This operative disconnection of the friction driving member or pulley 18 occurs automatically whenever the operator positions the bobbin upon the sleeve 21 with the driving pin 32 of the disk 31 extending into the opening 37 in the one flange of the bobbin. Consequently it is not necessary to unclutch the hand wheel 14 with respect to the main shaft 13 of the sewing machine when the bobbin winding operation is performed and therefore said hand wheel can be permanently secured to the main shaft 13 in precise concentricity therewith and the parts forming the usual clutch arrangement between the hand wheel 14 and the main shaft 13 eliminated together with the cost of the same and the cost of assembling such parts.

It is desirable in a bobbin winder mechanism to provide means for terminating the winding operation automatically when the predetermined and proper amount of thread has been wound on the bobbin. The present invention contemplates a novel and efficient bobbin drive release device for this purpose and which device will now be described.

The bobbin drive release device comprises a feeler or thread sensing arm or finger 38 shown as a flat metal strip or strap and having at one

end a hub portion 39 rockably and slidably mounted upon a stub shaft 40 which has one end fixedly secured to the leg 41 of a bracket 42 which, for purposes of illustration, is shown here as substantially a U-shaped bracket. This bracket 42 has its other leg 43 provided at its outer or free end with a laterally disposed attaching portion 44 which is shown as fixedly secured to the housing of the motor 17 or which could be secured to any other suitable securing surface as, for instance, the rear side of the standard 10 or to the bed of the machine.

The arm 41 of the bracket 42 is provided at its free end with a laterally disposed portion 45 having therein a recess 46 through which extends the feeler arm or finger 38. The recess 46 has its inner end or wall provided with straight parallel portions 47 and 48 interconnected by an inclined or camming portion 49, it being noted that the straight portion 47 is longer than the straight portion 48. The stub shaft 40 is provided at its outer end with a head 50 and a torsion-compression spring 51 is mounted on the shaft 40 and connected to the head 50 and the hub 39 of the feeler finger or arm 38 and said spring functions to slide and rock the hub 39 on the shaft 40 normally to a position where the feeler arm 38 is in contact with the straight surface 47 of the recess 46 in the portion 45 of the bracket 42 as is clearly indicated in Fig. 1. The position just referred to is the normal position which the feeler arm 38 occupies and which is indicated at a and in full lines in Fig. 2.

When it is desired to mount a bobbin on the sleeve 21 for a winding operation the operator depresses the finger 52 extending from the hub 39 of the feeder arm to rock said arm from position a to dash line position a', at which latter position it is located at the other extremity of the recess 46 and in engagement with the straight portion 48 thereof and is clear of the path of the bobbin as the latter is telescoped upon the sleeve 21 to position it so the driving pin 32 will engage in the opening 37 of the bobbin flange. As soon as the bobbin has been thus positioned the operator releases the downward pressure upon the finger 52 and the spring 51 acts to rock the feeler arm from position a' back to normal position a at which time the feeler arm is located between the flanges of the bobbin and adjacent to the hub 35 of the bobbin and in contact with the inner bobbin flange containing the opening 37 and with the straight portion 47 of the inner wall of the recess 46.

When the motor 17 is energized and winding rotation is imparted to the bobbin 34 the feeler arm 38 contacts the thread 53 as it is wound on the bobbin and as the thread builds up it moves the feeler arm again the action of the spring 51. During the first part of this movement of the feeler arm it is in contact with the straight portion 47 of the recess in the part 45 of the bracket and has merely rocking movement. Then as the wound thread increases in diameter the feeler arm 38 comes in contact with the inclined portion or surface 49 of the recess 46 and this causes the feeler arm as it is further rocked by the increasing diameter of the wound thread to also have outward movement axially of the stub shaft 40 and against the action of the spring 51 until the feeler arm is brought into contact with the other or outer flange of the bobbin. The outward movement of the feeler arm imparted by the inclined portion 49 has an amplitude indicated by dash lines b and c of Fig. 6. The length of the inclined or camming portion 49 of the recess 46 is such that coincident with the feeler arm reaching the outer end of the portion 49 it is exerting axial pressure on the outer flange of the bobbin and hence moves the bobbin axially sufficiently far to disengage the driving pin 32 from the opening 37 in the inner flange of the bobbin, whereupon the operative driving connection between the bobbin and sleeve 21 is interrupted and further rotation of the bobbin is terminated.

The function just referred to occurs when the feeler arm is in position a^2 indicated in Fig. 2 and clearly shown in Fig. 4 and it will be understood that the lengths of the straight portion 47 and the inclined portion 49 of the recess 46 in the bracket 42 are such that this position is reached when the desired amount of thread has been wound upon the bobbin. Consequently it will be seen that when the desired amount of thread is wound upon the bobbin the driving connection to the bobbin is automatically interrupted by the feeler arm exerting axial pressure outwardly on the outer flange of the bobbin to disengage the driving pin 32 from the opening 37 in the inner flange of the bobbin. The operator now in order to remove the bobbin depresses the finger 52 to move the feeler arm from position a^2 to position a' whereupon the wound bobbin can be slipped off of the end of the sleeve 21. When this has been done the finger 52 is released and the feeler arm is moved by the spring 51 automatically from position a' through position a^2 to position a. Also the removal of the bobbin has automatically operatively reconnected the friction driving member or pulley 18 to the sleeve 21 and the motor shaft 22 as the driving lug 28 of the lever 25 engages in the slot 29 and now energization of the motor 17 drives the sewing mechanism of the machine through the pulley 18 and hand wheel 14.

Although a preferred embodiment of the invention has been illustrated and described, it will be understood the invention is not to be limited thereto and may take various modified forms coming within the scope of the appended claims.

Having thus described my invention, I claim:

1. A bobbin winder mechanism comprising a source of power including a driving shaft, bobbin driving means carried by said shaft, a bobbin mounted on said shaft, said driving means and said bobbin having cooperating interengaging portions operatively connecting said means and bobbin, rockable and laterally movable means cooperating with the bobbin and rockable in response to the thread wound upon the bobbin, and camming means acting on said last named means during its rocking movement to move the latter laterally when a predetermined amount of thread has been wound upon the bobbin to positively move the bobbin to disengage the cooperating portions of said bobbin and said driving means.

2. A bobbin winder mechanism comprising a source of power including a driving shaft, bobbin driving means carried by said shaft, a bobbin mounted on said shaft, said driving means being provided with a pin and said bobbin being provided with an opening receiving said pin to operatively connect said driving means and bobbin, rockable and laterally movable means cooperating with the bobbin and rockable in response to the thread wound upon the bobbin, and camming means acting on said last named means during its rocking movement to move the latter laterally when a predetermined amount of thread has been wound upon the bobbin to positively move the bobbin to disengage said pin and opening to inter-

rupt the driving connection between the driving means and the bobbin.

3. A bobbin winder mechanism comprising a source of power including a driving shaft, a driving disk fixedly carried by said shaft and provided with a pin extending axially of the shaft, a bobbin mounted on said shaft and having spaced flanges with the flange adjacent to said driving disk provided with an opening receiving said pin to drivingly connect said bobbin, disk and shaft, rockable means extending between the flanges of the bobbin and rockable in response to the thread wound upon the bobbin, said rockable means being movable in a direction axially of said shaft, and camming means acting on said rockable means during its rocking movement to impart said axial movement thereto when a predetermined amount of thread has been wound upon the bobbin to positively act on the other flange of the bobbin to move the bobbin axially of the shaft to disengage said pin from said opening and to interrupt the driving connection to the bobbin.

4. A bobbin winder mechanism as defined in claim 3 and wherein said rockable and axially movable means comprises a lever arm extending between the flanges of the bobbin and having at one end a hub portion, a stub shaft extending through said hub portion and supporting said lever arm for rocking movement and axial movement thereon, a spring acting on said hub portion to resist rocking and axial movements in one direction and acting to maintain said lever arm normally in a predetermined position, said camming means including a bracket mounting said stub shaft and having a portion provided with a recess through which said lever arm extends and the inner end of which recess has straight parallel wall portions interconnected by an inclined camming wall portion, said lever arm being rocked in response to the thread wound upon the bobbin and against the action of said spring and being moved axially by said camming wall portion from engagement with the bobbin flange having said opening into engagement with the other bobbin flange to exert axial pressure thereon and positively move said bobbin to disengage said pin from said opening.

5. In a sewing machine of the type wherein the head includes a main shaft for operating the sewing mechanism, a hand wheel fixed on said main shaft, a source of power including a driving shaft, and a friction driving member on said driving shaft and engaging said hand wheel to drive the latter and said main shaft; the improvement which comprises means operatively associated with said driving shaft for mounting a bobbin thereon in driven relationship thereto, movable means carried by said driving shaft, said movable means and said friction member having cooperating portions normally interengaged and operatively connecting said driving shaft and friction member, said movable means having a portion engageable by the bobbin when the latter is mounted on the driving shaft to move said movable means and operatively disengage said cooperating portions of said movable means and said friction member to operatively disconnect the latter from said driving shaft.

6. In a sewing machine of the type wherein the head includes a main shaft for operating the sewing mechanism, a hand wheel fixed on said main shaft, a source of power including a driving shaft, and a friction driving member on said driving shaft and engaging said hand wheel to drive the latter and said main shaft; the improvement which comprises means operatively associated with said driving shaft for mounting a bobbin thereon in driven relationship thereto, a lever pivotally carried by said driving shaft and extending axially thereof, said lever and said friction member having cooperating portions engageable to operatively connect said driving shaft and friction member, spring means carried by said driving shaft and acting on said lever to normally engage said cooperating portions, said lever having a portion engageable by the bobbin when the latter is mounted on the driving shaft to rock said lever against the action of said spring and operatively disengage said cooperating portions of said lever and said friction member to operatively disconnect the latter from the driving shaft.

7. In a sewing machine of the type wherein the head includes a main shaft for operating the sewing mechanism, a hand wheel fixed on said main shaft, a source of power including a driving shaft, and a friction driving member on said driving shaft and engaging said hand wheel to drive the latter and said main shaft; the improvement which comprises an elongated sleeve mounted on and secured to said driving shaft, a friction driving member freely rotatable on said sleeve, said sleeve outwardly of said friction driving member having a portion upon which a bobbin can be mounted in driven relationship thereto, said sleeve being provided with a slot extending axially thereof from the outer end of the sleeve to within said friction driving member, the inner circumference of said friction driving member being provided with an axially extending slot communicating with the inner end of the slot in said sleeve, a lever arm extending axially of the sleeve and driving shaft and having its outer end pivotally connected to the driving shaft and its inner end provided with a lug adapted to engage in the slot in said friction driving member, spring means acting on said lever arm to normally maintain said lug in engagement in said slot in said friction driving member to operatively interconnect said driving shaft, sleeve and friction driving member, said lever arm having a portion normally projecting outwardly of the slot in said sleeve at the portion thereof upon which the bobbin is mounted, wherefore when the bobbin is mounted upon the sleeve it acts to depress said lever arm against said spring means to disengage said lug from the slot in the friction driving member to operatively disconnect said friction driving member from said sleeve and driving shaft.

8. In a sewing machine of the type wherein the head includes a main shaft for operating the sewing mechanism, a hand wheel fixed on said main shaft, a source of power including a driving shaft, and a friction driving member on said driving shaft and engaging said hand wheel to drive the latter and said main shaft; the improvement which comprises, in combination, means on said driving shaft for mounting a bobbin thereon, a driving element rotatable with said driving shaft, said element and said bobbin having cooperating interengaging portions forming a driving connection between the element and bobbin, movable means carried by said driving shaft, said movable means and said friction member having cooperating portions normally interengaged and operatively connecting said driving shaft and friction member, said movable

means having a portion engageable by the bobbin when the latter is mounted on the driving shaft to move said movable means and operatively disengage said cooperating portions of said movable means and said friction member to operatively disconnect the latter from said driving shaft, a rockable and laterally movable arm extending between the flanges of the bobbin and rockable in response to the thread wound upon the bobbin, and means cooperating with said arm and acting to positively move the latter laterally when a predetermined amount of thread has been wound upon the bobbin with such movement of said arm imparting axial movement to the bobbin to disengage the cooperating portions of the driving element and bobbin.

9. In a bobbin winder for a sewing machine, in combination, a power source, a sewing machine including driving mechanism, connectable and disconnectable means operatively associating said power source and said mechanism, a spindle rotated by said power source, means for automatically disconnecting said first named means to terminate the operative association between said power source and said mechanism when a bobbin is placed on said spindle, disengageable means carried by said spindle and positively operatively connecting the bobbin to the spindle to be driven thereby, thread sensing means adapted to engage the thread wound on the bobbin, and means cooperating with said thread sensing means and automatically disengaging said disengageable means to operatively disconnect said spindle and bobbin when the desired amount of thread has been wound on the bobbin.

10. A bobbin winder mechanism comprising a source of power including a driving shaft, bobbin driving means carried by said shaft and provided with a portion adapted to interengage with a portion of a bobbin mounted on said shaft to operatively connect said driving means and bobbin, rockable and laterally movable means adapted to cooperate with the bobbin and rockable in response to the thread wound upon the bobbin and comprising a lever arm adapted to extend between the flanges of the bobbin and having at one end a hub portion, a stub shaft extending through said hub portion and supporting said lever arm for rocking movement and axial movement thereon, a spring acting on said hub portion to resist rocking and axial movements in one direction and acting to maintain said lever arm normally in a predetermined position; and camming means acting on said lever arm during its rocking movement to move the latter laterally when a predetermined amount of thread has been wound upon the bobbin and including a bracket mounting said stub shaft and having a portion provided with a recess through which said lever arm extends, with the inner end of said recess having straight parallel wall portions interconnected by an inclined camming wall portion, said lever arm being moved laterally by said camming wall portion from engagement with one bobbin flange into engagement with the other bobbin flange to exert pressure thereon and positively move said bobbin axially to disengage therefrom the interengaging portion of the bobbin driving means.

11. In a sewing machine bobbin winder, a rotatable shaft, bobbin driving means carried by said shaft and having a portion adapted to interengage with a portion of a bobbin when the latter is positioned on and is moved a predetermined distance in one direction axially of said shaft, and a rockable and laterally movable thread sensing means adapted to engage the thread being wound on said bobbin to be rocked thereby, and means cooperating with said thread sensing means for moving the latter laterally during its rocking movement to cause it to directly and positively engage a portion of the bobbin and move the latter axially of the shaft in the opposite direction when a predetermined amount of thread has been wound on the bobbin to disengage said portion of the bobbin driving means from the bobbin.

WALDEMAR A. AYRES.

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