Feb. 5, 1946. C. E. COLEGROVE 2,394,369

ROTARY LOOP TAKER FOR SEWING MACHINE (MAGNETIC)

Filed Sept. 13, 1943 2 Sheets-Sheet 1

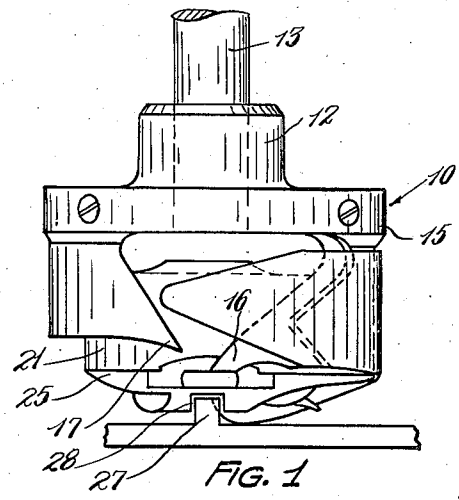


FIG. 1

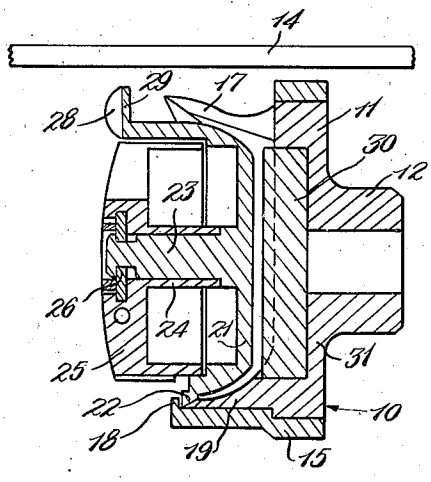


FIG. 3

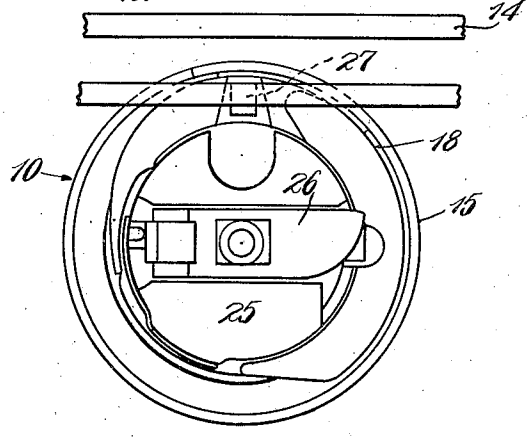


FIG. 2

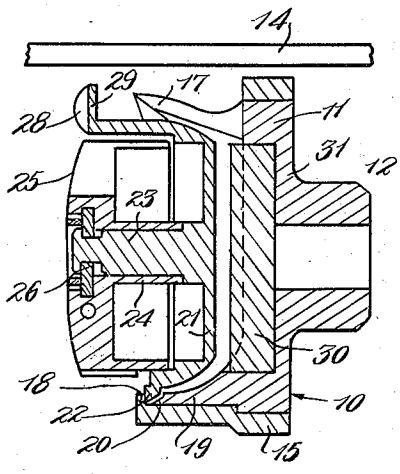


FIG. 4

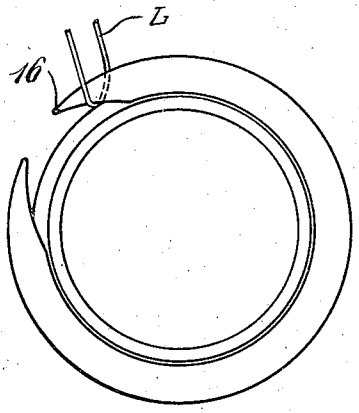


FIG. 5

INVENTOR.
CHARLES E. COLEGROVE
BY
Kuris Hudson Boughton & Williams
ATTORNEYS

Feb. 5, 1946. C. E. COLEGROVE 2,394,369

ROTARY LOOP TAKER FOR SEWING MACHINE (MAGNETIC)

Filed Sept. 13, 1943 2 Sheets-Sheet 2

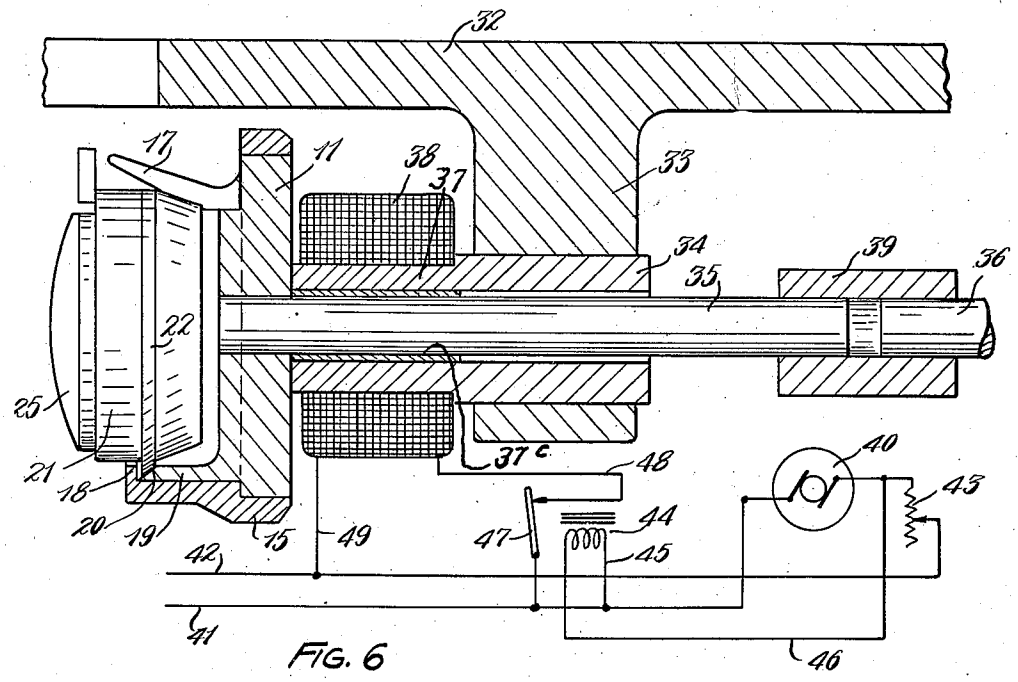


FIG. 6

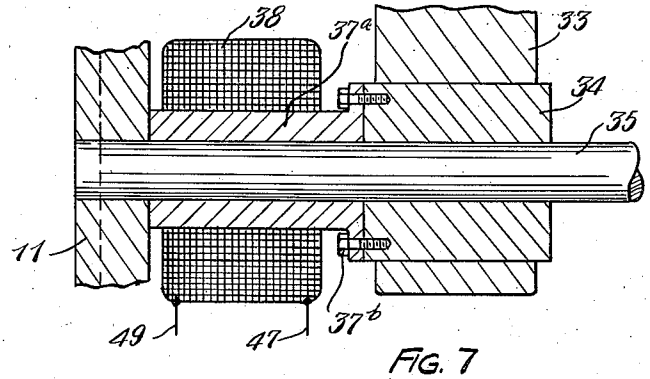


FIG. 7

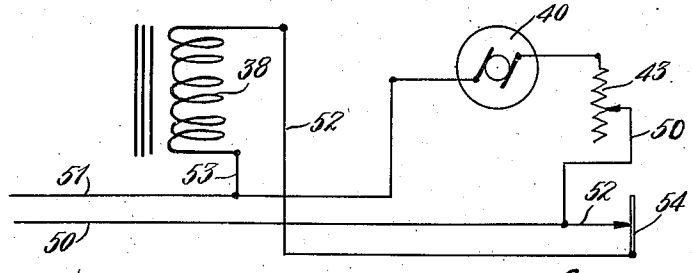


FIG. 8

INVENTOR.
CHARLES E. COLEGROVE
BY
Kuris Hudson Boughton & Williams
ATTORNEYS

Patented Feb. 5, 1946

2,394,369

UNITED STATES PATENT OFFICE

2,394,369

ROTARY LOOP TAKER FOR SEWING MACHINES (MAGNETIC)

Charles E. Colegrove, Lakewood, Ohio, assignor to White Sewing Machine Corporation, Cleveland, Ohio, a corporation of Delaware

Application September 13, 1943, Serial No. 502,086

17 Claims. (Cl. 112—228)

This invention relates to a loop taker for a sewing machine as, for example, a "lock stitch" sewing machine. The invention relates more particularly to a loop taker of the type known as a rotary loop taker or revolving hook loop taker.

As is well known in the art, loop takers of the rotary or revolving hook type include a rotatable cup-shaped body which has a loop seizing beak for manipulating the loop in the upper or needle thread. A bobbin case carrier is mounted within the cup-shaped body but held against rotation therewith or therein and receives the bobbin which carries the thread. In this connection it will be understood that suitable means usually carried by the bed plate of the sewing machine cooperates with a portion of the bobbin case carrier to hold the latter against rotation while the body rotates relative thereto. The bobbin is mounted in a bobbin case supported in the bobbin case carrier against rotation relative thereto. The loop seizing beak of the rotatable body enters the loop in the upper or needle thread and carries one side of said loop in front of the rim of the body while taking the other side of said loop to the rear of the bobbin case carrier.

The rotatable body is provided with a circular raceway for a peripheral bearing rib on the non-rotatable bobbin case carrier. The body usually has a portion cut away to form the loop seizing beak and to provide also an opening for the upper or needle loop thread to permit the passage of that side of the loop which is carried to the rear side of the bobbin case carrier. The bobbin case carrier has a portion of its periphery cut away to provide a similar opening, wherefore the raceway in the body and the bearing rib on the bobbin case carrier are not continuous throughout their circumferences.

In other words, the construction provides gaps in the cooperating bearing surfaces of the rib and raceway and these gaps can cause what is known in the art as "clogging." This "clogging" may cause serious difficulty in the efficient operation of a sewing machine of this type and can result even in temporarily stopping the operation of the machine.

"Clogging" will not occur if the upper or needle thread loop is properly or normally formed and the loop seizing beak carries such loop in the correct manner around the bobbin case and bobbin case carrier. On the other hand, should the upper or needle thread loop be improperly formed as, for example, if it should be too slack or if loose threads should accumulate in the vicinity of the loop taker, such improperly formed loop or loose threads may be picked up by the loop seizing beak or hook and be drawn between the raceway in the body and the peripheral bearing rib on the bobbin case carrier. Under such circumstances it frequently happens that the thread which is improperly drawn into the raceway becomes so tightly wedged therein as to prevent the free and efficient operation of the loop taker or even to completely stop its operation. When such an occurrence takes place it is necessary usually to take the loop taker apart so that the wedged thread can be removed from the raceway. This is a serious disadvantage as taking the loop taker apart is a fairly complicated manipulation which the usual operator is not competent to perform, particularly as such operator ordinarily is not equipped with the proper tools for this purpose.

An object of the invention is to provide a construction for a sewing machine loop taker of the type specified and which is so designed that the loop taker can be maintained in proper working condition readily and conveniently by any operator.

Another object of the invention is to provide a loop taker such as specified in the last named object and wherein the proper maintenance of the same can be obtained without disassembling the loop taker mechanism.

A still further object is to provide a loop taker mechanism which is so constructed that should any thread become wedged between the raceway in the rotatable body and the bearing rib on the bobbin case carrier such thread can be readily and quickly removed by the operator without disassembling the loop taker mechanism.

A still further and important object of the invention is to provide a loop taker such as specified in the above named objects and which is so constructed as not to require the operation of movable parts or the disassembling of the device by the operator in order to maintain proper working conditions in the loop taker.

Another object is to provide a loop taker mechanism for an electrically driven sewing machine and wherein the proper working relationship between the bearing rib on the non-rotatable bobbin case carrier and the raceway in the rotatable body is automatically established upon energization of the driving motor of the machine while upon deenergization of said motor said relationship is automatically terminated and non-working clearance is provided between said rib and raceway, wherefore any "clogging" material may be removed readily from the mechanism.

Further and additional objects and advantages not hereinbefore specified will subsequently become apparent during the detailed description of several embodiments of the invention which is to follow.

The present invention contemplates attaining the objects above specified and the objects and advantages later to become apparent by providing in the loop taker clearance between the side walls of the circular raceway in the rotatable body and the peripheral bearing rib on the non-rotatable bobbin case carrier, together with means normally acting to maintain one side of the bearing rib in contact with one side of the raceway but which means is of such character that the bobbin case carrier can be moved to separate the contacting side of the bearing rib and the side wall of the raceway.

More specifically, the invention contemplates a loose fit between the bearing rib of the bobbin case carrier and the raceway in the rotatable body while a permanent magnet located in the rotatable body exerts sufficient magnetic attraction on the bobbin case carrier to maintain the inner side of the bearing rib in contact with the inner side wall of the raceway. However, in the event of "clogging" this magnetic attraction is overcome and the inner side of the bearing rib and the inner side wall of the raceway are separated, thus enabling the threads or other matter producing the "clogging" to be removed. It is also proposed to have the inner side wall of the raceway disposed at an angle to a plane perpendicular to the axis of rotation of the loop taker and to have the side of the bearing rib which cooperates with said side of the raceway complementally shaped to said side wall.

In addition, it is proposed to utilize in an electrically driven sewing machine, an electromagnet in place of the permanent magnet and which electromagnet is energized and deenergized synchronously with the energization and deenergization of the driving motor of the machine.

Referring to the accompanying drawings illustrating several embodiments of the invention,

Fig. 1 is a top plan view of a rotary loop taker and a portion of the horizontal operating shaft for the same and illustrates a portion of the keeper which is carried by the bed plate of the sewing machine and engages a cooperating portion of the bobbin case carrier to hold the latter and the bobbin case against rotation;

Fig. 2 is a front elevational view of the loop taker shown in Fig. 1;

Fig. 3 is a longitudinal vertical sectional view through the loop taker shown in Fig. 1 and illustrates the parts in their normal operative relationship;

Fig. 4 is a view similar to Fig. 3 but illustrating the relationship of the parts when the bobbin case carrier has been moved axially against the attracting force of the magnet to bring the front side of the bearing rib on the carrier in contact with the front wall of the raceway to enable the "clogging" material to be removed from the loop taker;

Fig. 5 is a somewhat diagrammatic view illustrating the upper or needle thread loop which has been picked up by the loop seizing beak of the loop taker, which operation, if improperly performed, may result in what is known as "clogging;"

Fig. 6 is a fragmentary view, partly in section and partly in elevation, illustrating the bed plate of an electrically driven sewing machine and showing a modified form of the invention from that previously illustrated, the manner in which the field winding of the electromagnet of this modified form is connected in the circuit of the driving motor being shown diagrammatically;

Fig. 7 is a fragmentary sectional view showing the bushing that is part of the electromagnet formed of non-magnetic material and connected to a separate bushing extension which supports the field winding and is formed of magnetic material, and

Fig. 8 is a wiring diagram illustrating a somewhat different arrangement for placing the field winding of the electromagnet in circuit with the driving motor from the arrangement shown in Fig. 6.

The loop taker illustrated in Figs. 1 to 4 inclusive comprises a generally cup-shaped body 10 and which body includes an inner or hub member 11 having a centrally disposed hub or sleeve portion 12 mounted upon and secured to the horizontally extending shaft 13. The shaft 13 is rotatably supported in suitable bearings (not shown) and is connected with and suitably driven by the operating mechanism (not shown) of the sewing machine, as will be well understood by those skilled in the art. The sleeve or hub portion 12 is secured to the shaft 13 by any suitable means as, for example, by setscrews not shown.

It will be seen that the member 11 rotates on a horizontal axis which is located below and extends parallel to the needle plate 14 of the sewing machine and is positioned in proper relation to the needle, feed means and other functional parts of the stitch forming mechanism, as will be well understood.

The body 10 of the loop taker also includes the looper or hook ring 15 which in this instance is shown as separate from the member 11 but interfitting the periphery of the latter and fixedly secured thereto by suitable means, such as screws.

It will be understood that the looper or hook ring 15 of the body 10 is cut away as is usual in loop takers to provide the loop seizing beak 16 and the loop controlling tail 17. The looper or hook ring 15 is provided at its outer end and remote from the member 11 with an arcuate inwardly and radially extending flange 18 that forms the outer side of a raceway in the body and in which raceway is journaled the peripheral bearing rib on the bobbin case carrier later to be referred to.

The hub member 11 is provided with a forwardly extending arcuate portion 19 which interfits the ring 15 and the forward end of said portion 19 constitutes the inner side of said raceway in the body. Although the forward end of the portion 19 of the member 11 may be straight and parallel to the outer side of the raceway (the inner side of flange 18), said forward end, as indicated at 20, is angularly disposed relative to the outer side of the raceway for a purpose later to be explained.

The bobbin case carrier is indicated at 21 and is substantially cup-shaped and fits within the body 10, as will be well understood. The bobbin case carrier is provided with the peripheral annular bearing rib 22 extending into the raceway formed by the ring 15 and its flange 18 and the outer end 20 of the portion 19 of the member 11. The inner side of the rib 22 is angularly disposed relative to its front side and is parallel to the rear wall 20 of the raceway. The parts are so dimensioned that the bearing rib 22 has a loose or free fit in the raceway sufficient to accommo-

date stray threads in the raceway and so that on any axial movement of the bobbin case carrier relative to the body, either the front straight side of the bearing rib 22 can be brought into engagement with the straight front wall of the raceway or the inclined rear side of the bearing rib can be brought into engagement with the inclined rear wall of the raceway, as indicated, respectively, in Figs. 4 and 3. It will be noted that the width of the raceway is such that when the front side of the bearing rib engages the front wall of the raceway the rear side of the rib and rear wall of the raceway are out of contact, and vice versa. It will be seen that when relative rotation takes place between the body and the bobbin case carrier during the rotation of the body, said rib 22 and the raceway will have relative rotation.

The bobbin case carrier is provided with an outwardly extending centrally disposed post 23 which slidably receives the centrally disposed sleeve 24 of the bobbin case 25, as is well known in the art. Also, as will be apparent to one skilled in the art, suitable fastening means indicated at 26 is provided on the bobbin case for securing the same in position upon the post 23 of the bobbin case carrier. It will be understood that the bobbin on which the thread is wound is mounted on the sleeve 24 of the bobbin case and is housed within said case and the bobbin case carrier when these two latter parts are in assembled relationship.

The bobbin case carrier 21, the bobbin case 25 and the bobbin are held against rotation with the body by means of a keeper 27 fixedly carried by the bed plate of the sewing machine and engaging in a notch 28 formed in an upstanding portion 29 at the outer end of the bobbin case carrier 21, as is usual in loop takers of this type.

In Fig. 5 there is diagrammatically illustrated the manner in which the loop seizing beak 16 of the loop taker picks up the loop L of the upper or needle thread. If the loop L is correctly formed, the loop taker will carry the loop properly around the bobbin case. On the other hand, if a slack loop is formed through improper manipulation, or if loose threads accumulate in the vicinity of the loop taker, such slack loop or loose threads are liable to be picked up by the loop seizing beak 16 and be drawn between the raceway in the body 10 and the bearing rib 22 on the bobbin case carrier, resulting in "clogging."

A rotary loop taker embodying the present invention enables the slack loop, loose threads, or other obstruction causing the "clogging" to be readily cleared from the raceway. The clearing of the raceway does not require the disassembling of the loop taker, any particular skill or knowledge on the part of the operator, or the manipulation of any parts or the use of tools for such purpose.

The member 11, as shown in Figs. 3 and 4, is provided within the body 10 with a centrally disposed recess, in this instance, a rectangular recess, in which there is secured a magnet 30 which may be a permanent bar magnet. The magnet may be secured in the recess by any suitable means, such as screws or other securing elements. In the form of the invention illustrated in Figs. 1 to 4 inclusive it is contemplated that the member 11 be constructed of suitable non-magnetic material as, for example, stainless steel or bronze. Thus the member 11 acts as a shield to the magnet and causes the lines of magnetic force between the opposite poles of the magnet to be so disposed that the magnet attracts the bobbin case carrier toward it and holds the inclined rear side of the bearing rib 22 in engagement with the inclined rear wall 20 of the raceway, as clearly indicated in Fig. 3. This is the normal work relationship between the parts and the latter, when thus disposed, are capable of quiet relative rotation therebetween.

It will be understood that the size and strength of the magnet 30 and the maximum gap which can occur between the front side of the magnet and rear side of the bobbin case carrier are so proportioned that the magnet will exert the proper attracting force upon the bobbin case carrier to maintain the rear side of the bearing rib in engagement with the rear wall of the raceway, as shown in Fig. 3. However, if "clogging" occurs, the slack loop, loose threads or other obstruction causing the "clogging" will tend to move the bobbin case carrier axially from the position shown in Fig. 3 toward the position shown in Fig. 4, and thus separate the rear side of the bearing rib and the rear wall of the raceway, allowing the obstruction to be withdrawn by the operator, whereupon the parts will resume automatically the normal operative relationship under the action of the magnet. In case the obstructing material does not so move the bobbin case carrier sufficiently far axially, the operator, by merely pulling forwardly on the bobbin case carrier, can produce this movement and then free the raceway of the obstruction. Therefore in the event of "clogging" the operator can eliminate the "clogging" without disassembling the loop carrier, without requiring any tools, and without manipulating any of the parts of the loop taker except possibly the drawing forward of the bobbin case carrier as just referred to. As soon as the "clogging" has been removed, the parts are restored automatically to their proper relationship without any effort being required by the operator since the magnet 30 will draw the bobbin case carrier from the position shown in Fig. 4 into the position shown in Fig. 3.

In some instances it may be more advantageous to construct the member 11 of magnetic material, as, for example, if it is desired to harden the inclined front end 20 of the portion 19 of the member 11. In this event the loop taker will be constructed in the identical manner as the loop taker previously described, except that the magnet receiving recess in the member 11 will be provided with a non-magnetic shield and into which shield the magnet 30 can be fitted.

In assembling the loop taker the bobbin case carrier 21 may first be positioned in the ring 15, and then the ring with the bobbin case carrier therein is telescoped upon the member 11 and secured thereto.

In Fig. 6 there is illustrated a modified form of the invention and which form, at least as to electrically driven sewing machines, may be the preferred form. In this modified form of the invention the principal parts of the loop taker are the same as in the previously described form and are designated by the same reference numerals and therefore need not be described in detail. It should be noted that the member 11 in this modified form is not provided with a hub portion 12 since the member 11 has sufficient thickness without the recess 30 to provide adequate contacting bearing engagement between the member 11 and the operating shaft to which said member is fixed.

In the form of the invention shown in Fig. 6 a portion of the bed plate of an electrically driven

sewing machine is indicated at 32 and said bed plate is formed of non-magnetic material and has on its under side a depending integral lug 33 which supports a bushing 34 formed in this instance of magnetic material such as soft steel or iron and which bushing constitutes a journal for the operating shaft 35. The shaft 35 extends into the central opening in the member 11 and is secured to said member by suitable means such as setscrews, keys or the like, as will be well understood in the art. It will be noted that the shaft 35 extends to the inner side of the member 11 and is flush therewith. The shaft 35 is formed of suitable magnetic material and since the member 11 is formed of non-magnetic material said member acts as a shield for the shaft 35. In the event that it is desirable to form the member 11 of magnetic material, as previously referred to, a shield of non-magnetic material could be interposed between the shaft 35 and the member 11 as will be readily understood. It will also be understood that should it be desirable to form the bed plate 32 and lug 33 of magnetic material a suitable shield of non-magnetic material could be interposed between the lug 33 and the bushing 34.

The end of the shaft 35 remote from the loop taker is operatively connected to the drive shaft 36 in a manner later to be explained and which drive shaft, in turn, is operatively connected to the driving mechanism of the sewing machine in any desirable and preferred manner as will be well understood in the art and hence it is not illustrated herein. The bushing 34 is shown in Fig. 6 as provided with a reduced integral extension 37 which extends from the left hand end of the bushing 34 as viewed in the drawing toward the rear side of the member 11. It will be noted that a clearance is provided between the shaft 35 and the bushing 34 while a bearing sleeve 37c is interposed between the shaft 35 and the extension 37. A field winding 38 is mounted on the extension 37 and when said field winding is energized by an eelctric current, the bushing 34, extension 37, shaft 35 and field winding 38 become an electromagnet of which the shaft 35 and the bushing 34 and extension 37 are the core.

As previously stated, the shaft 35 is operatively connected to the drive shaft 36 and this operative connection may take the form of a coupling sleeve 39 receiving and secured to the adjacent ends of the shafts 35 and 36 with said ends spaced apart to provide a gap as indicated in Fig. 6. The coupling sleeve 39 preferably will be constructed of a non-magnetic material and the space between the adjacent ends of the shafts would constitute an air gap. This results in a more efficient electromagnet. If desirable, the coupling sleeve 39 might be dispensed with and the drive shaft 36 formed of a non-magnetic material and directly connected to the shaft 35 by means well known in the art.

In Fig. 7 the bushing 34 is illustrated as not having the integral extension 37 but as being provided with a separate member 37a taking the place of the extension 37 and secured to the bushing 34 by suitable securing means as, for example, the screws 37b. In this arrangement the bushing 34 may be formed of non-magnetic material if it is desirable to do so, it being understood of course that the extension member 37a is formed of magnetic material.

It will be understood that when the field winding 38 is energized magnetic attraction will occur between the left hand end of the shaft 35 as viewed in the drawings and the bobbin case carrier 21 and draw the latter inwardly of the cup-shaped body 10 of the loop taken and cause the beveled side of the bearing rib 22 to engage with the beveled side 20 of the raceway. This relationship between the parts of the loop taker is the normal working relationship at which time the relative rotation between said parts can occur quietly and properly. Upon deenergization of the field winding 38 the magnetic attraction is terminated and there is no influence existing which draws the bobbin case carrier inwardly of the body of the looper taker. Consequently if threads or other material which might cause "clogging" have worked into the loop taker, such threads or material can be readily removed by the operator due to the clearance existing between the bearing rib and the sides of the raceway.

In an electrically operated sewing machine it would be preferable to employ an arrangement wherein the field winding 38 is energized and deenergized synchronously with the energization and deenergization of the electric driving motor for the machine. In this way the normal working relationship between the parts of the loop taker and particularly between the bearing rib and raceway would be automatically established upon starting the operation of the machine and would be automatically terminated upon stopping the operation of the machine at which time any "clogging" material could be cleared from the loop taker by the operator as previously explained.

In Fig. 6 there is illustrated an arrangement wherein the field winding 38 is energized and deenergized synchronously with the energization and deenergization of the electric driving motor 40 for the electrically driven sewing machine. In this view the electric circuit to the motor 40 is through the leads 41 and 42. In the lead 42 there is shown a rheostat 43 by means of which the energization, deenergization and speed of the motor 40 are controlled as will be well understood in the art. A relay 44 is connected to the leads 41 and 42 by wires 45 and 46 respectively. Consequently whenever the circuit to the motor 40 is closed and said motor is energized the relay 44 functions to close a normally open switch 47. The switch 47 when closed bridges the gap contacts in an electrical lead 48 which is connected to the lead 41 and to the field winding 38. The field winding 38 is also connected by a lead 49 with the lead 42. It will thus be seen that whenever the motor 40 is energized by the proper manipulation of the rheostat 43 the field winding 38 is also energized and conversely when the motor 40 is deenergized through the control of the rheostat 43 said field winding is deenergized. Therefore whenever the sewing machine is operating the electromagnet functions automatically to maintain the parts of the rotary loop taker in their normal operative positions and when said machine is not operating and the motor 40 is deenergized the electromagnet is automatically inoperative and the parts of the rotary loop taker can be cleared of any "clogging" material. In addition it will be noted that the circuit to the field winding 38 is connected to the circuit to the motor 40 in advance of the rheostat 43 and consequently the field winding 38 when energized receives a constant current value even though the current value to the motor 40 may be varied through the rheostat 43.

In Fig. 8 a slightly different wiring arrangement for the motor 40 and field winding 38 of the electromagnet is shown. In the wiring diagram depicted by Fig. 8 the circuit to the motor 40 is by means of the leads 50 and 51 with the main controlling rheostat 43 located in the lead 50. The field winding 38 of the electromagnet is connected to the leads 50 and 51 by the leads 52 and 53 respectively. In this wiring arrangement, however, the relay 44 is omitted and the switch 54 in the lead 52 may be operatively and mechanically interlocked with the rheostat 43 by means well known in the art and such that when the rheostat 43 is manipulated to close the circuit to the motor 40 the switch 54 is simultaneously closed to close the circuit to the field winding 38, it being understood that the manipulation of the rheostat 43 after the circuit to the motor 40 is closed and for the purpose of varying the current value to the motor to change the speed of the latter does not affect the closed position of the switch 54. It will further be understood that as soon as the rheostat 43 is manipulated to interrupt the circuit to the motor 40 the switch 54 is simultaneously and automatically opened and the field winding 38 deenergized.

Although it is not thought necessary, certain parts of the loop taker as for instance the bobbin case 25 or the bobbin itself which is enclosed in the bobbin case carrier might be made of non-magnetic material such as stainless steel, aluminum or possibly plastic.

Although several embodiments of the invention have been illustrated and described herein it will be understood that the invention is susceptible of various modifications and adaptations within the scope of the appended claims.

Having thus described my invention, I claim:

1. A rotary loop taker for a sewing machine comprising a relatively rotatable body and a bobbin case carrier mounted therein, said body and carrier being capable of limited relative axial movement and having a cooperating raceway and a bearing rib loosely interfitting the same, and magnetic means having a magnetized portion located within said body and acting by direct magnetic attraction on said carrier to produce relative axial movement between the body and carrier to maintain one side wall of said raceway in contact with the corresponding side of said rib.

2. A rotary loop taker for a sewing machine comprising a relatively rotatable body and a bobbin case carrier mounted therein, said body being provided with a raceway and said carrier having a bearing rib loosely interfitting said raceway, said body and carrier being capable of limited relative axial movement, and magnetic means having a magnetized portion located within said body and acting by direct magnetic attraction on said carrier to produce relative axial movement between the body and carrier to maintain one side wall and said raceway in contact with the corresponding side of said rib.

3. A rotary loop taker for a sewing machine comprising a relatively rotatable body and a bobbin case carrier mounted therein, said body and carrier having a cooperating raceway and a bearing rib loosely interfitting the same, said body and carrier being capable of limited relative axial movement, said raceway and said rib having their inner sides inclined relative to a plane perpendicular to the axis of the loop taker, magnetic means having a magnetized portion located within said body and acting by direct magnetic attraction on said carrier to produce relative axial movement between said body and carrier to maintain said inner sides of the raceway and rib in contact with each other.

4. A rotary loop taker for a sewing machine comprising a cup-shaped body and a bobbin case carrier relatively rotatable therein, said body and carrier having a loosely interfitting raceway and bearing rib, said body and carrier being capable of limited relative axial movement, and a magnet having a portion located in the bottom wall of said body and acting magnetically on said carrier to draw the same axially to maintain the inner sides of said raceway and rib in contact with each other.

5. A rotary loop taker for a sewing machine comprising a cup-shaped body having a raceway of fixed width, a bobbin case carrier relatively rotatable in said body and having a bearing rib loosely interfitting said raceway, said body and carrier being capable of limited relative axial movement, said body being provided with a recess communicating with the interior of the body, and a magnet located in said recess and exerting magnetic attraction on the inner end of said carrier to normally maintain the inner sides of said raceway and rib in contact.

6. A rotary loop taker for a sewing machine comprising a cup-shaped body and a bobbin case carrier relatively rotatable therein, said body and carrier having a loosely interfitting raceway and bearing rib, said body and carrier being capable of limited relative axial movement, said body being provided with a recess communicating with the interior of the body, and a permanent magnet secured in said recess and attracting said carrier and normally maintaining the inner side wall of the raceway in contact with the inner side of the bearing rib.

7. A rotary loop taker for a sewing machine comprising a body having a raceway of fixed width, a bobbin case carrier relatively rotatable in said body and having a bearing rib loosely interfitting said raceway, said body and carrier being capable of limited relative axial movement and magnetic means having a portion located within said body and magnetized during the normal operation of the machine and exerting direct magnetic attraction on said carrier to produce relative axial movement between the carrier and body and to maintain the inner sides of said raceway and rib in contact with each other and the outer sides thereof separated.

8. A rotary loop taker for a sewing machine comprising a relatively rotatable body and a bobbin case carrier mounted therein, said body and carrier having a cooperating raceway of fixed width and a bearing rib loosely interfitting the same, said body and carrier being capable of limited relative axial movement and power means forming a permanent operative part of said loop taker and acting during operation of said loop taker to produce relative axial movement between said body and carrier to maintain one side wall of said raceway in contact with the corresponding side of said rib.

9. In combination in a sewing machine, power means for operating the machine, a rotary loop taker driven by said power means and including a relatively rotatable body element and a bobbin case carrier element mounted therein, said elements having a cooperating raceway of fixed width and a bearing rib loosely interfitting the

same, said elements being capable of limited relative axial movement, power means forming a permanent operative part of said loop taker and acting to produce relative axial movement between said body and carrier to maintain one side wall of said raceway in contact with the corresponding side of said rib, and means operatively associating both of said power means to render the same active or inactive in synchronism.

10. In combination in a sewing machine, a rotary loop taker comprising a body and a bobbin case carrier relatively rotatable in said body, a rotatable shaft on which said body is secured and having its end exposed within said body, said body and said carrier having a cooperating raceway and a bearing rib loosely interfitting the same, said body and carrier being capable of limited relative axial movement, and electromagnetic means including a core and operatively associated with said loop taker and exerting magnetic attraction between said body and carrier to produce relative axial movement therebetween to maintain one side wall of said raceway in contact with the corresponding side of said rib, said shaft being part of the core of said magnetic means.

11. In combination in a sewing machine, a rotary loop taker comprising a body and a bobbin case carrier relatively rotatable in said body, a rotatable shaft on which said body is secured and having its end exposed within said body, said body and said carrier having a cooperating raceway and a bearing rib loosely interfitting the same, said body and carrier being capable of limited relative axial movement, and electromagnetic means operatively associated with said loop taker and exerting magnetic attraction between said body and carrier to produce relative axial movement between said body and carrier to maintain one side wall of said raceway in contact with the corresponding side of said rib, said electromagnetic means including as a core said shaft and a member mounted on the latter, and a field winding mounted on said member.

12. In combination in a sewing machine, a rotary loop taker comprising a body element and a bobbin case carrier element relatively rotatable in said body element, a rotatable shaft on which said body element is secured and having its end exposed within said body element, means for actuating said shaft and including an electric motor, said elements having a cooperating raceway and a bearing rib loosely interfitting the same, said elements being capable of limited relative axial movement, electromagnetic means operatively associated with said loop taker and exerting magnetic attraction between said elements to produce relative axial movement therebetween to maintain one side wall of said raceway in contact with the corresponding side of said rib, said shaft and a member mounted on the latter constituting the core of said electromagnetic means, a field winding mounted on said member, interconnected electrical circuits to said motor and said field winding, and means operatively associated with said electrical circuits for effecting simultaneous energization and deenergization of said motor and field winding.

13. In combination in a sewing machine, a rotary loop taker comprising a body element and a bobbin case carrier element relatively rotatable in said body element, a rotatable shaft on which said body element is secured and having its end exposed within said body element, an electric motor for actuating said shaft, said elements having a cooperating raceway and a bearing rib loosely interfitting the same, said elements being capable of limited relative axial movement, electromagnetic means operatively associated with said loop taker and exerting magnetic attraction between said elements to produce relative axial movement therebetween to maintain one side wall of said raceway in contact with the corresponding side of said rib, said shaft and a member mounted on the latter constituting the core of said electromagnetic means, a field winding mounted on said member, a circuit to said motor, control means in said circuit for controlling the starting and stopping and the speed of said motor, a circuit for said field winding connected to said motor circuit in advance of said control means, and a normally open switch means operatively associated with said field winding circuit.

14. The combination in a sewing machine as defined in claim 13 and wherein switch closing means is operatively associated with said switch means and said control means and is actuated when the motor is started and is automatically rendered inoperative when the motor is stopped.

15. In combination in a sewing machine, a rotary loop taker comprising a body element and a bobbin case carrier element relatively rotatable in said body element, a rotatable shaft on which said body element is secured and having its end exposed within said body element, an electric motor for actuating said shaft, said elements having a cooperating raceway and a bearing rib loosely interfitting the same, said elements being capable of limited relative axial movement, electromagnetic means operatively associated with said loop taker and exerting magnetic attraction between said elements to produce relative axial movement therebetween to maintain one side wall of said raceway in contact with the corresponding side of said rib, said shaft and a member mounted on the latter constituting the core of said electromagnetic means, a field winding mounted on said member, a circuit to said motor, control means in said circuit for controlling the starting and stopping and the speed of said motor, a circuit for said field winding connected to said motor circuit in advance of said control means, a normally open switch means operatively associated with said field winding circuit, and means for closing said switch means and including a relay and a circuit connecting said relay to said motor circuit intermediate said motor and said control means.

16. A rotary loop taker for a sewing machine comprising a relatively rotatable body element and a bobbin case carrier element mounted therein, said body and carrier elements having a cooperating raceway and a bearing rib loosely fitting the same, said elements being capable of limited relative axial movement, and electromagnetic means having a magnetized portion located within said body element and acting by direct magnetic attraction on said carrier element to produce relative axial movement between the carrier and body elements to maintain one side wall of said raceway in contact with the corresponding side of said rib.

17. In combination in a sewing machine, an electric motor for operating the machine, a rotary loop taker driven by said motor and including a relatively rotatable body element and a bobbin case carrier element mounted therein, said elements having a cooperating raceway and a

bearing rib loosely interfitting the same, said elements being capable of limited relative axial movement, electromagnetic means operatively associated with said loop taker and having a portion of its core located within said body element and exerting a direct magnetic attraction on said carrier element to produce relative axial movement between said elements to maintain one side wall of said raceway in contact with the corresponding side of said rib, and means operatively associating said motor and said electromagnetic means to effect synchronous energization and de-energization thereof.

CHARLES E. COLEGROVE.