

R. K. HOHMANN.
 ROTARY SEWING MACHINE.
 APPLICATION FILED OCT. 10, 1908.

983,902.

Patented Feb. 14, 1911.

3 SHEETS-SHEET 1.

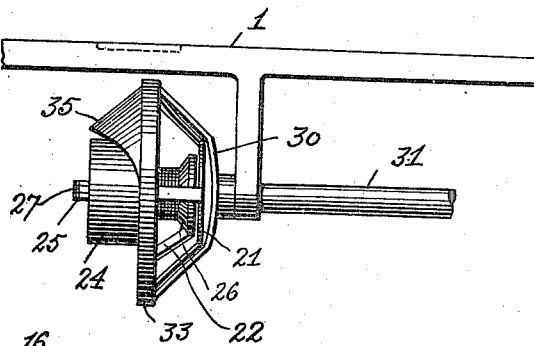
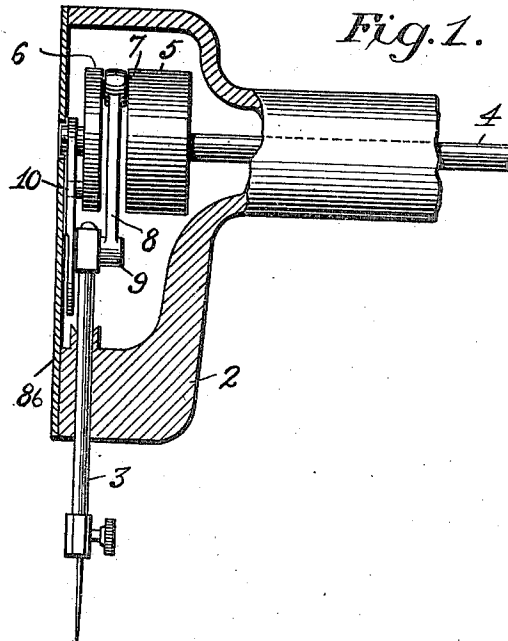
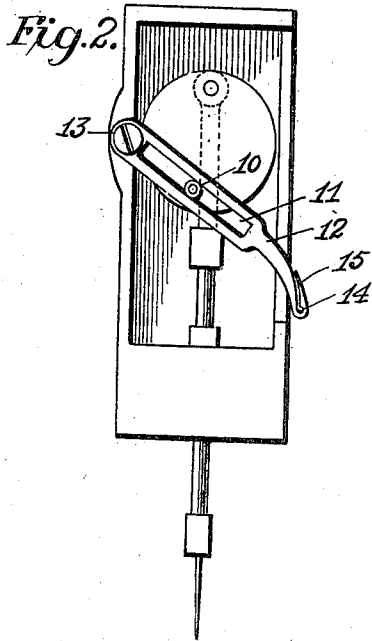
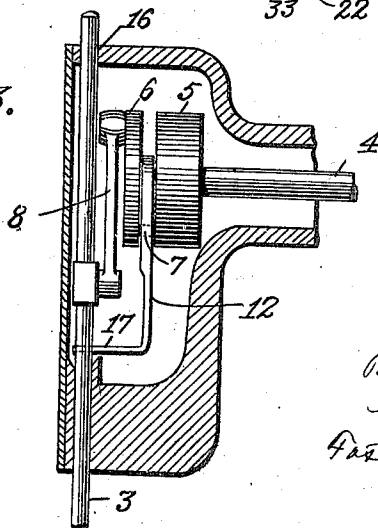


Fig. 3.



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3 SHEETS—SHEET 2.

Fig. 4.

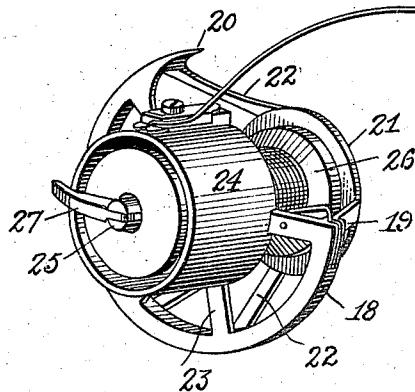


Fig. 6.

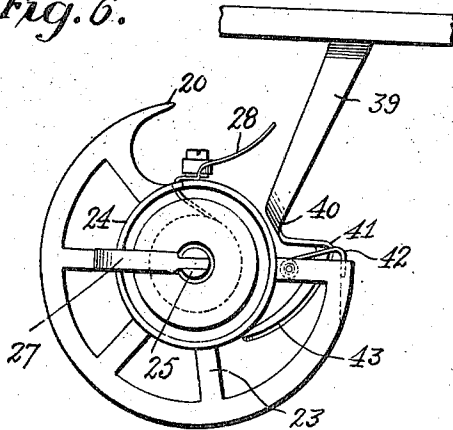


Fig. 7.

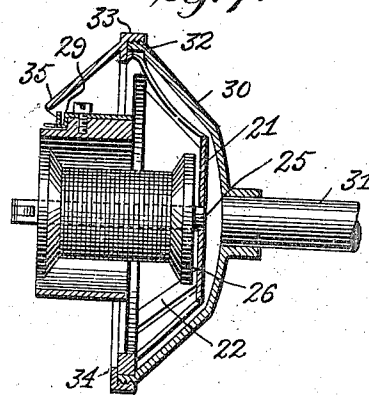


Fig. 5.

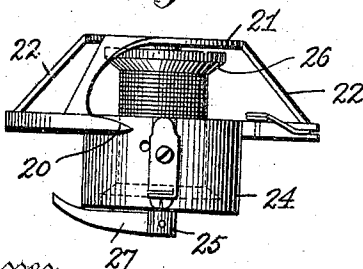
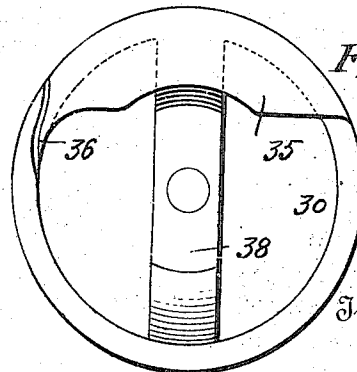


Fig. 8.



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3 SHEETS-SHEET 3.

Fig. 9.

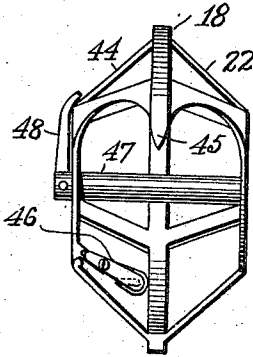


Fig. 10.

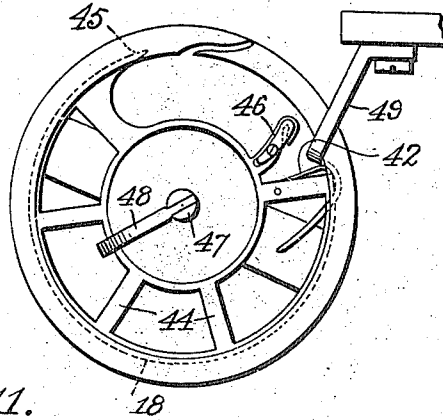


Fig. 11.

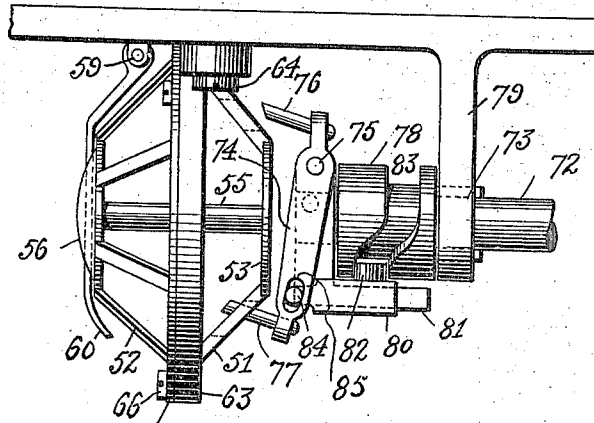
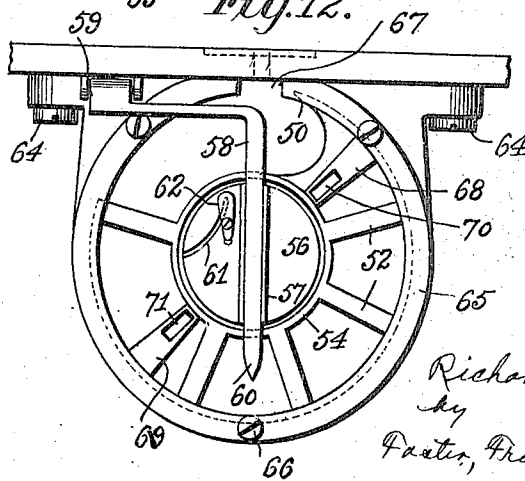


Fig. 12.



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UNITED STATES PATENT OFFICE.

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ROTARY SEWING-MACHINE.

983,902.

Specification of Letters Patent.

Patented Feb. 14, 1911.

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To all whom it may concern:

Be it known that I, RICHARD K. HOHMANN, a citizen of the United States, and resident of San Diego, in the county of San Diego and State of California, have invented certain new and useful Improvements in Rotary Sewing-Machines, of which the following is a specification.

This invention relates to sewing machines, and particularly to the type known as rotary machines, producing a lock stitch. Its objects are to provide a simple and efficient means for carrying the thread which constitutes the lower thread of the stitch and for looping the upper thread around the lower thread.

The main object had in view is the production of a practical and commercially successful machine which shall include a lower thread holder adapted to receive any ordinary spool of thread as well as any ordinary bobbin now used in rotary machines.

I am aware that others have patented mechanisms intended to carry an ordinary spool as the bobbin for the lower thread in a rotary machine, but none of those machines is now manufactured commercially, and I believe this to be due to defects in principle and in design which have been overcome by my invention. It will be understood that in a rotary machine it is necessary in the formation of each stitch to loop the part of the upper thread carried down by the needle entirely around the lower thread carrier, and that where the lower thread carrier is made large enough to receive an ordinary spool of thread the difficulty in obtaining a smooth, easy and accurate operation is much greater than with the small holders for the ordinary bobbins. Furthermore, with the large specially constructed lower spool carrier it is necessary to have a cooperating specially constructed take up, and my present invention includes such a take up. This take up is not specifically claimed herein, since it is made the subject of a separate application.

The novel features of my invention and the operation thereof will be understood from the following description taken in connection with the accompanying drawings.

In the drawings: Figure 1 is a side view partly in section, showing a portion of a

work plate and head of a machine, together with my thread holders and looper below the work plate; Fig. 2 is an end view of the head with the end plate removed; Fig. 3 is a longitudinal section of the head showing a modified construction for operating the needle bar and take up; Fig. 4 is a perspective view of my holder for containing the lower thread; Fig. 5 is a plan view of the holder shown in Fig. 4; Fig. 6 is an end view of the holder together with a portion of the work plate and an arm for preventing rotation of the holder; Fig. 7 is a longitudinal section of the holder in place in the rotary casing which loops the thread around it; Fig. 8 is an end view of the rotary casing; Fig. 9 is a plan view of a modified form of thread holder; Fig. 10 is an end view of the holder shown in Fig. 9 mounted in a rotary casing and provided with an arm connected to the plate of the machine for preventing rotation of the holder; Fig. 11 is a side view of a rotary thread holder beneath the work plate of the machine together with means for rotating it; and Fig. 12 is an end view of the construction shown in Fig. 11.

In the drawings, 1 represents the work plate of the machine and 2 represents the head in which the needle bar 3 reciprocates vertically. This needle bar is operated from a rotary shaft 4 which carries upon its end a head made up of the two circular disks 5 and 6 rigidly connected together by wrist pin 7. The wrist pin 7 passes through an eye in the end of the link arm 8 which is pivotally connected at 9 to the upper end of the needle bar 3. On the outer face of the disk 6 there is a roller 10 working in the slot 11 in the take up arm 12, which take up arm is pivotally supported at 13 immediately adjacent the edge of the disk 6. This take up arm is provided at its outer end with the usual eye 14 to receive the thread and the slot 15 to permit the easy insertion of the thread.

It will be observed that the rotation of the shaft 4 will reciprocate the needle bar 3 vertically and that the roller 10 working in the slot 11 will turn the take up arm 12 upon its pivot 13. It will be observed further that by reason of the position of the pivot 13 and the relation of the arm 12 to the roller 10

the elevation of the arm will be effected during about one fourth of the revolution of the disk 6 and that thus the motion of the arm in ascending is much quicker than when descending. This is because the roller 10 is working in the slot near the pivot when the arm is ascending and is farther removed from the pivot when the arm is descending, and it will be understood that the timing of the upward motion of the take up may be adjusted and controlled by the position of the roller 10 on the face of the disk 6. This quick take up with a long throw is specially designed for use with my thread carrying and looping means for the lower thread, since as hereafter explained my thread holder is made large enough to carry an ordinary spool of thread, and is consequently so large as to result in the formation of a long loop which passes around it.

It will be observed that in the form shown in Fig. 1 the needle bar does not pass through the top of the head 2 but terminates therein below the disk 6.

In Fig. 3 I have shown a modified construction in which the needle bar passes through the head at 16 and it is connected to the front of the disk 6 by means of the link arm 8. In this instance the take up arm 12 passes between the disks 5 and 6 and the wrist pin 7 works in the slot 11, thus effecting the same motion as in the construction shown in Fig. 1. In this form however I prefer to bend the end 17 of the arm 12 so as to bring the eye 14 thereof to the front edge of the head. The plate 86 is secured in place by any suitable means and is removable so as to permit access to the parts.

The principal feature of my invention consists in the means for holding the lower thread and for looping the upper thread around it and forming a lock stitch. In the several figures of the drawings I have shown several different forms of thread holders, but they all have certain features of construction in common and the same fundamental principles of construction and operation underlie all of them.

In Fig. 4 I have shown a thread holder including a circular marginal rim 18 which is cut away from the point 19 to the point where the hook 20 is formed. It will be observed that this cut-away portion extends over about one fourth of the circumference and that the loop engaging hook 20 faces this cut-away portion. A disk 21 is supported by the downwardly inclined spider arms 22 connected to the rim 18, and the radial arms 23 connected to the rim 18 support at their ends the cylindrical casing 24 which is adapted to hold the thread. A shaft 25 extends outwardly from the disk 21 and is adapted to receive a spool 26 of ordinary thread of various sizes. On the end of this shaft there is a pivoted spring arm

27 which is adapted to be turned into the position shown in Fig. 4 so as to hold the spool 26 in place. It will be observed that while the shaft 25 is adapted to receive an ordinary spool it is also adapted to receive the bobbins which are ordinarily used in rotary sewing machines, and that therefore the operator may use either a spool or a bobbin in accordance with which happens to be the most convenient at the time. The thread 28 from the spool 26 is passed through a slot in the cylinder 24 beneath the tension plate 29 and upward through a slot cut in the end of that tension plate.

The form of thread holder shown in Fig. 4 is intended to be stationary when the machine is in operation, and in Fig. 7 I have shown means for carrying the loop of the upper thread around this thread holder. This means consists of a case 30 secured to the end of the rotary shaft 31 and being of such a shape as to substantially conform to the shape of the rear side of the thread holder. This case 30 has an interior groove 32 furnishing a bearing for the rim 18 of the thread holder, and there is a screw threaded ring 33 secured upon the outer edge of this case and having the inwardly turned flange 34 bearing upon the side of the rim 18 and securely holding it in place. By the use of this screw threaded ring the thread holder is securely held in place by parts which may be made very thin and light and at the same time very effective. In order to secure lightness, the case 30 is also made in skeleton form, embodying merely the outer rim connected by the curved cross piece 38. It will be understood that means may be used for locking the ring 33 to the case 32 so as to prevent it from becoming unscrewed during the rapid rotation of the parts. At one side the ring 33 has an overhanging segmental flange 35 inclined downwardly toward the axis and extending substantially to the end of the cylinder 24 so as to guide the thread over the end of that cylinder. It will be observed by reference to Fig. 8 that this overhanging flange extends only a comparatively short distance around the circumference, and that its edges are made curved so as to permit the thread to slide easily over it. At the forward edge of this flange there is provided a loop engaging hook 36. It will be understood that the case 30 revolves around the spool holder and would naturally tend to make that holder rotate. In order to prevent this rotation I provide an arm 39 secured to the under surface of the table extending downwardly to a point adjacent the outer end of the cylinder 24 at 40, and thence curving inwardly along that cylinder to the point 41, where it rests upon the curved spring pressed member or arm 42 carried by the end 19 of the cut-away portion of the rim 18. This arm is curved as

described in order to permit the flange 35 to pass freely by it, and by resting upon the spring arm 42 it prevents the rotation of the thread holder. From the point 41 the arm is continued in a curve around the back of the holder to a point near the margin of the disk 21 and this extension is for the purpose of guiding the thread up around the holder so that it will easily and freely pass between the arms 41 and 42. As shown the arms 22 extend inward from the rim at an angle of about 45°, making it easy for the loop to pass around the holder.

It will be seen by reference to Fig. 6 that the holder is retained in such position that the loop engaging hook 20 is adjacent, but to one side of the point, where the needle passes down through the work plate. In operation the rotation of the case 30 carries the point 36 through the loop of the upper thread formed by the needle, and since that hook faces in the opposite direction from the hook 20 it will carry the loop up to that hook which will then enter and engage the portion of the loop which is below the hook 36. The continued motion of the case 30 will carry the ends of the loop around with it and by reason of the fact that this hook 36 is upon the forward inclined side of the case opposite to the side to which is attached the shaft 31 the thread will be made to pass around the end of the case and will not be permitted to fall upon that side which is attached to the shaft 31. The flange or guard 35 will carry this thread outward so that it will properly pass over the end of the cylinder 24 and will not wrap around that cylinder or be caught thereby. The inner end of the loop which is engaged by the hook 20 is directed back down and behind the spool holder by the arms 22, thus passing behind the disk 21 and between it and the case 30. As seen in Fig. 7, sufficient space is allowed for the free passage of the thread between the holder and the case. When the loop of thread has been carried to a point near the bottom of the thread holder the take up mechanism commences to operate so as to draw up that loop and as the loop is drawn up to a point near the end 19 it is being pulled by the take up so that there is practically no slack in it. It passes beneath the guiding arm 43 and is drawn between the spring arm 42 and the bearing point 41 of the arm 39, these parts being so shaped that there is very little resistance to the passage of the thread. After the thread has passed through this point the take up quickly draws it up around the lower thread, it being so adjusted that its quick upward stroke will occur at this time. By reason of the fact that my thread holder is of sufficient size to include an ordinary spool, and by reason of the fact that in the form shown in Fig. 7 it is necessary for the thread to ride up over

the flange 35, there will be a rather long loop of the upper thread formed, and therefore it is necessary to have some such take up as that shown in Fig. 1 for quickly and properly drawing the loop around the lower thread.

In Figs. 9 and 10 the thread holder has the narrow bearing rim 18 as in Fig. 4, and this rim is cut-away for about one fourth of its circumference for the same purpose as is indicated in connection with the form shown in Fig. 4. In this instance however I do not use the cylindrical part 24, but place arms 44 on the forward side of the rim inclined downwardly toward the axis, thus making the holder substantially symmetrical on both sides. It has the loop engaging hook 45 facing the cut-away portion, and is provided with an arm 46 carrying a thread guide and adjustable tension. In this instance the spool is placed upon the shaft 47 and is held in place by the hinged arm 48. It will be understood that in this form it is not necessary to use the flange 35 on the casing 30, and that this casing 30 terminates with the grooved portion indicated in Fig. 7 by the numeral 32, and that it is provided with a screw threaded ring corresponding to the ring 33, but without the depending flange 35. In this form of the device the arm 49 extends from the table top and bears upon the spring 42 so as to prevent rotation of the spool holder, and it is not necessary to give this arm 49 as much curvature as in Fig. 6, since there is no flange 35 to interfere with it. The end of the arm 49 is continued around behind the spool holder so as to serve as a guide for the thread in the same way as in the previously described form. In operation it will be understood that the arms 22 and 44 direct the threads constituting the sides of the loop around opposite sides of the holder, and that the thread is drawn up by the take up in the same manner as previously described. While the form of holder shown in Figs. 4 to 7 has many advantages over those previously in use, I prefer the form shown in Figs. 9 and 10.

In Figs. 11 and 12 I have shown a spool holder which rotates instead of remaining stationary, and in this form I do not use a surrounding case for carrying the thread around the holder. The thread holder in this instance is made up of a narrow marginal bearing rim as in the previous forms, and this rim is cut away for a portion of its circumference leaving a loop engaging hook 50 at one side. Arms 51, 52 extend downwardly and outwardly from this ring toward the axis and on the inner side these arms are secured to a disk 53 against which the end of the spool fits. On the outer sides the arms are connected to a ring 54 providing a circular opening sufficiently large to permit the passage of an ordinary spool of

thread. The spool of thread is placed upon a shaft 55 which has an outwardly curved head 56 loosely fitting within the ring 54, the inner end of the shaft 55 being mounted
 5 to turn in the disk 53. The curved head 56 has a groove 57 across it in which fits the arm 58 pivotally secured at 59 to the table top. This arm holds the shaft 55 containing the spool in place and prevents the spool
 10 from rotating with the spool holder, the lower end 60 of this arm being inwardly curved as shown in Fig. 11. The head 56 is provided with a slot 61 through which the thread from the spool passes, and an adjustable tension device 62 is secured to the head
 15 at the end of this slot. The grooved ring 63 is secured to the table top by screws 64 and surrounds the spool holder and furnishes a bearing in which that holder rotates. A side plate 65 is secured to the end 63 by screws
 20 66 and it serves to retain the holder in place within that ring. The ring 63 is cut away at 67 at the point where the needle passes through the work plate, and thus leaves
 25 room for the formation of the loop of the upper thread, which is to be engaged by the hook 50. The holder is provided with arms 68, 69 having therein the openings 70, 71 to be engaged by the devices hereafter described
 30 by turning the holder. The holder is turned by mechanism upon the end of the rotary shaft 72 mounted in bearings 73. This shaft has on its end a rocking arm 74 pivoted at 75 and carrying at its ends the
 35 pins 76, 77, adapted to enter the openings 70 and 71. This pivoted arm 74 is rotated with the shaft 72 and is rocked upon its pivot so as to make the pins 76 and 77 alternately engage by means of a connection
 40 to the cam 78 which is secured to the arm 79 of the machine and which does not rotate. A sliding sleeve 80 is mounted upon an arm 81 carried by and parallel with the shaft 72, and this sleeve is given longitudinal motion
 45 on the arm 81 by a roller 82 working in the slot 83 in the cam 78. This sleeve has a pin 84 working in the slot 85 in rock arm 74, and thus that rock arm is turned upon its pivot as the shaft 72 rotates. The pins 76 and 77
 50 are alternately withdrawn so as to permit the thread to pass around that side of the thread holder, it being understood that the thread passes one pin while the other is in engagement with the holder, and the parts
 55 are so timed that the thread will be properly drawn around the holder and will not be interfered with by these pins.

In the form shown in Fig. 11 it will be understood that the loop of the thread
 60 formed by the needle is engaged by the hook 50 and that the two sides of that loop pass down the inclined arms 51, 52 upon opposite sides of the holder, and therefore pass entirely around the holder, going under the
 65 retaining arm 58.

While in one form of the invention, as shown, the thread holder rotates, and in the other forms it is stationary, it will be observed that in all forms the holder is supported by a ring-like support either partially or completely surrounding it, and that
 70 there is relative rotation between the holder and support. The width of the bearing surfaces may of course vary, but I prefer to make them narrow so as not only to make
 75 the parts light but to make it easy to direct the thread upon opposite sides of the holder. It will be further observed that the outer bearing ring or rim of the holder is cut away throughout a portion of its circumference
 80 in front of the loop engaging hook so as to permit a free passage of the thread between the holder and support during the last part of each complete revolution. This free passage of the thread is found to be
 85 very advantageous in permitting the long loop surrounding the holder to be properly and successfully drawn by the take up tight around the lower thread forming the lock stitch. The length of the cut-away portion
 90 may vary in accordance with the kind of take up used, but I have found that when this portion extends about one-fourth the distance around the holder, the best results
 95 are produced.

While I have referred to the bearing rim of the holder and to the bearing surface of the support as circular, I wish it to be understood that in using this term I do not
 100 wish it to be understood as necessarily limited to a complete circle, but as referring to the general shape rather than to the extent. It is intended to apply to forms in which a part or parts of the circumference are cut
 105 away.

While my invention is primarily designed for use in carrying an ordinary commercial spool of thread, and my thread holder is shown large enough for that purpose, it will be obvious that some of its features of construction are applicable to thread holders
 110 made only large enough to contain a small bobbin and not a spool.

I have found that my form of take up embodying the slotted arm and roller is best
 115 adapted for taking up properly the long loop of thread formed in my device and that a cam of ordinary size for operating the take up arm cannot be made to successfully
 120 give the quick long upward stroke which is necessary. I have further found by experiment that the arm for preventing the rotation of the thread holder secures the best results when placed at the outer edge of the
 125 holder about level with its center. When so placed the thread will not bind when passing between the arm and holder and consequently be broken, but will pass through freely. If the arm is at the upper edge of the holder the thread will not only not be
 130

entirely released until it has passed that arm, but I find that there will be a certain amount of binding as the thread passes the arm and frequent snapping of the thread will result.

Having thus described the invention, what is claimed is:

1. In a sewing machine, the combination with a thread holder having a narrow circular bearing rim, of a thin ring-like support having on its inner side a groove extending inwardly from its edge in which said rim fits, and having upon its outer side a thin screw threaded ring engaging the threads of said support and having an inwardly turned flange for holding said rim in said groove.

2. In a sewing machine, the combination with a thread holder having a narrow circular bearing rim between its ends, a portion of the circumference of said rim being cut away, a loop engaging hook at the edge of and facing said cut-away portion, a ring-like support fitting said rim, means for securing relative rotation of the holder and support, a flange on said support for directing the thread around one side of said holder, and arms directing the thread around the opposite side of the holder.

3. In a sewing machine, the combination with a spool holder, means moving in a single direction for passing a loop of thread freely around said holder, an arm secured to a fixed part of the machine and extending in the path of a portion of the holder to prevent rotation thereof, and a curved spring-pressed surface on said portion of the holder making contact with said arm and permitting the easy passage of the thread between said surface and arm.

4. In a sewing machine, the combination with a thread holder having a circular bearing rim, a portion of which is cut away, a loop engaging hook at one edge facing said cut-away portion, a spring-pressed rounded bearing surface at the opposite edge of said cut-away portion, rotary means for passing a loop of thread engaged by said hook around opposite sides of said holder, an arm secured to the machine and making contact with said spring-pressed bearing surface to prevent rotation of the holder.

5. In a sewing machine, the combination with a thread holder, comprising a circular rim, a portion of which is cut away, of means for passing the sides of a loop of thread around opposite sides of said holder, an arm secured to a fixed part of the machine and extending within said cut-away portion below the top of the holder to prevent rotation of the holder, and a curved extension of said arm around the back of the holder to direct the thread between said arm and holder at the point of contact.

6. In a rotary sewing machine, the combi-

nation with a thread holder having a circular rim extending more than one-half the distance around it, a circular rotary support for said rim moving in a single direction and so constructed as to pass a loop of thread freely around said holder between it and the support without making contact at any one point with both the holder and support, a fixed arm secured to the machine and bearing upon a portion of the holder to prevent rotation thereof, and means for permitting the thread to pass between said arm and holder.

7. In a rotary sewing machine, the combination with a thread holder having a circular rim extending more than one-half the distance around it, a circular rotary support for said rim moving in a single direction and so constructed as to pass a loop of thread freely around said holder, between it and the support without making contact at any one point with both the holder and support, a fixed arm secured to the machine and bearing upon a portion of the holder to prevent rotation thereof, and a rounded spring-pressed bearing point between said arm and holder to permit the passage of the thread without binding.

8. In a rotary sewing machine, the combination with a thread holder having a circular rim extending more than one-half the distance around it, a circular rotary support for said rim moving in a single direction and so constructed as to pass a loop of thread freely around said holder between it and the support without making contact at any one point with both the holder and support, a fixed arm secured to the machine and bearing upon a portion of the holder to prevent rotation thereof, and a guide directing the thread between said arm and holder at the point of contact.

9. In a sewing machine, the combination with a thread holder having a narrow circular bearing rim, of a ring-like support having on its inner side a groove extending inwardly from its edge in which said rim fits, and having upon its outer side a screw threaded ring engaging the threads of said support and having an inwardly turned flange for holding said rim in said groove, and a segmental downwardly inclined flange to guide the thread around the holder.

10. A thread holder for rotary sewing machines, comprising a frame, a transverse marginal bearing rim a portion of the circumference being cut away, inclined arms on said frame extending inwardly from said rim on one side, a central cylindrical spool case on the opposite side connected to said rim, a central longitudinal spool carrying shaft within said frame and spool case, means for holding a spool on said shaft, in combination with a rotary thread carrying support having a bearing groove engaging

said rim, and a segmental flange on said support adapted to direct the thread over the end of said spool case.

11. In a sewing machine the combination with a spool holding frame having a circular bearing rim partly cut away to receive a loop of thread, of a central longitudinal spool carrying shaft within said frame, a central cylindrical spool case connected to said rim, a thread carrying rotary support having a circular bearing surface

engaging said rim, and a segmental flange on said holder extending inwardly at an angle to direct the thread over the end of said spool case.

In testimony whereof I affix my signature in presence of two witnesses.

RICHARD K. HOHMANN.

Witnesses:

W. W. LAYMAN,
ARTHUR L. BRYANT.