Oct. 8, 1935. P. H. DIXON 2,016,364

ROTARY SEWING HOOK

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Fig. 1.

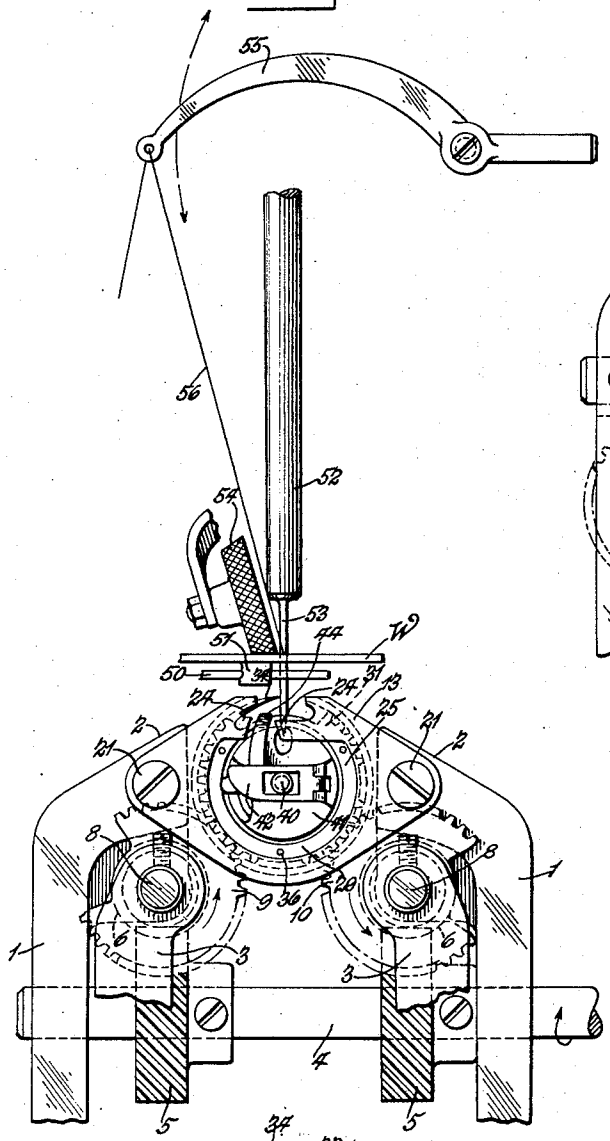


Fig. 2.

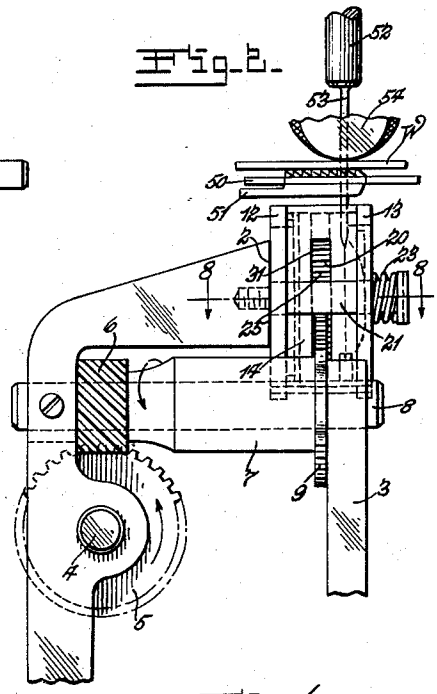


Fig. 4.

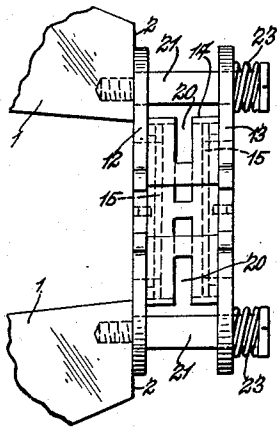
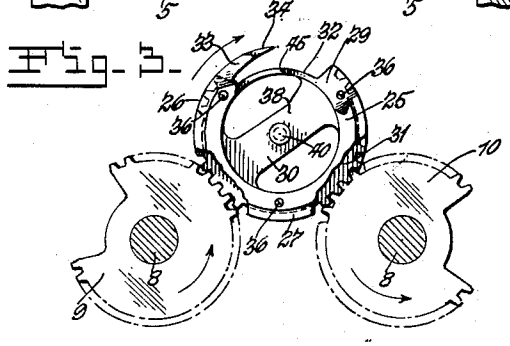


Fig. 3.



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Fig. 5.

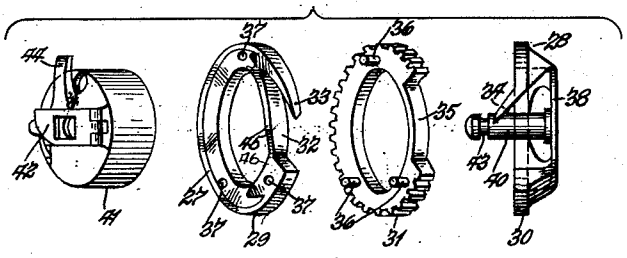


Fig. 6.

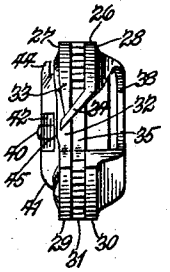


Fig. 7.

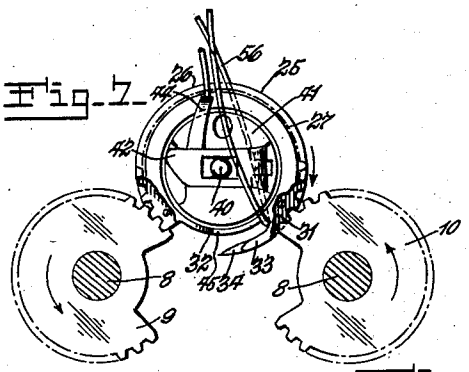


Fig. 8.

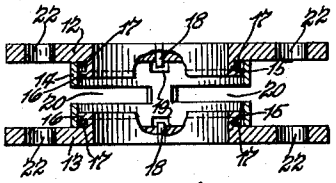


Fig. 9.

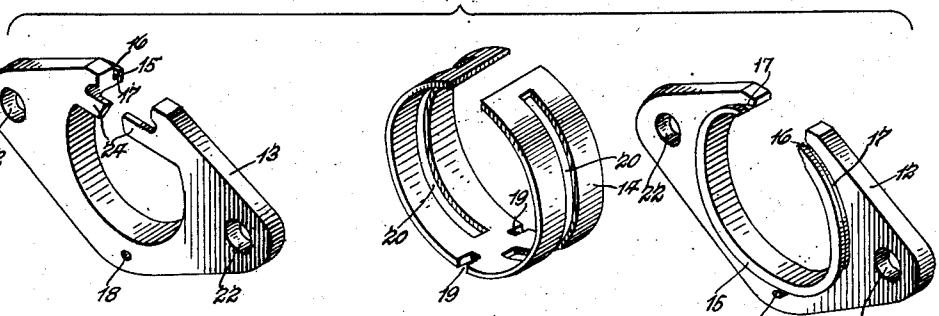
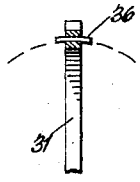
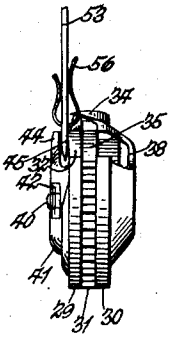


Fig. 10.

Fig. 11.





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Patented Oct. 8, 1935 2,016,364

UNITED STATES PATENT OFFICE

2,016,364

ROTARY SEWING HOOK

Paul H. Dixon, Springfield, Ill.

Application April 24, 1933, Serial No. 667,683

6 Claims. (Cl. 112—189)

This invention relates to sewing machines and more particularly to rotary sewing hooks for use therein.

This application is a continuation in part of my application, Serial No. 605,824, filed April 18, 1932.

An object of this invention is to provide a high speed positively driven rotary sewing hook which is simple of construction, economical to manufacture and efficient in operation.

Another object of the invention is to provide a sewing hook so constructed and arranged that the needle thread may be caught and cast completely around the hook with sufficient clearance and in such a manner as to avoid twisting of the thread through narrow passages.

Another object of the invention is to provide a rotary sewing hook of minimum dimensions, while employing a standard size bobbin, in order to reduce the length of needle thread required to make the loop and thus to diminish the wear on the thread.

Another object of the invention is to provide a close fitting race for a sewing hook but which will nevertheless be expansible laterally and circumferentially, thereby eliminating the possibility of binding the sewing hook by reason of thread or foreign substances lodging in the race.

A further object of the invention is to provide a race for a sewing hook with dirt grooves into which foreign substances may lodge without interfering with the successful operation of the hook.

A further object of the invention is to provide a race for a sewing hook, skeleton in form, thereby reducing to a minimum the collection of dirt which would otherwise bind the mechanism.

A further object of the invention is to provide a rotary sewing hook having a gauge surface adjacent the needle point positioned and arranged in such a manner as to wipe the needle and thus provide a positive clearance between the needle and the hook point.

A further object is to provide a rotary sewing hook and a race therefor so constructed and arranged that a bobbin contained within a housing provided by the hook is easily accessible to an operator and readily removable therefrom for reloading.

A further object of the invention is to provide in a sewing machine, a rotary sewing hook having a point operating adjacent the line of the needle in a plane normal to the path of the work, with the needle threaded from front to back. Such an arrangement results in convenience in threading the needle, permits a construction of the sewing hook assembly whereby the bobbin case, retained within the sewing hook, may be readily removed from the sewing hook at the front of the machine, prevents wearing or fraying of the thread by the roller presser, and avoids the tendency of the stitches to be laid and remain in staggered relationship but insures that the stitches are laid in a straight line.

Many advantages, due to the details of construction, will be apparent without specific mention thereof and additional advantages in the device as a whole will be apparent from the following detail description taken in connection with the accompanying drawings, in which—

Fig. 1 is a front elevation of the mechanism showing only that part of the sewing machine as a whole which is associated with the invention. The needle bar, the needle thread take-up, and the feed and work plate are of common construction and, therefore, need not be illustrated in full. Parts of the machine not illustrated may be of standard construction and constitute no part of the invention.

Fig. 2 is a side elevation showing the mechanism in the same position as Fig. 1.

Fig. 3 is a front view of the sewing hook, with the bobbin case removed, and illustrating how the sewing hook is meshed with its synchronized driving gears.

Fig. 4 is a plan view of the expansible race assembly with the sewing hook removed and showing how the parts are positioned and resiliently held together.

Fig. 5 is a detail perspective view of the bobbin case and sewing hook elements disassembled.

Fig. 6 is an edge view of the sewing hook and bobbin case and presenting the hook point.

Fig. 7 is a front elevation of the sewing hook in the act of tumbling the needle thread about the bobbin.

Fig. 8 is a sectional view of the assembled race, without the sewing hook, taken on line 8—8, Fig. 2.

Fig. 9 is a detail perspective view of the race elements disassembled.

Fig. 10 is a section of the sewing hook ring gear.

Fig. 11 is an edge view of the sewing hook showing how the needle thread loop is engaged by the hook point and how the needle is guarded from the path of the point.

In the embodiment of the invention illustrated in the drawings the sewing hook and its race are shown as being supported by a framework con-

sisting of two vertical arms 1, their upper ends bending forwardly and having their ends finished to present flat faces 2. Arms 3 of the frame also assist in supporting the mechanism and particularly the driving gears and their shafts.

A driving shaft 4 is journalled in the frame members or vertical arms 1 and it will be understood that this shaft is driven in timed relation with any machine in which the mechanism of the invention is applied. The shaft 4 carries two spiral gears 5 adapted to mesh with spiral gears 6, which are carried respectively by sleeves 7. The sleeves 7 are mounted for rotation on stud shafts 8 supported by the frame members. Segmental gears 9 and 10 are also secured to and rotate with the sleeves 7.

A race is supported on the faces 2 of the arms 1 and comprises a race back 12, a race front 13 and a race ring 14, as best illustrated in Figs. 4, 8 and 9. The race front 13 and the race back 12 are yoke-shaped and include circular openings. The race back and race front are equipped on the inner face of each with a laterally extending flange 15 positioned about the circular opening. The inner face of the flange is finished to provide a bearing surface for the sewing hook, as will be better understood from later description. A vertical flange 16 extends circumferentially from the flange 15 forming a dirt groove 17 back of the flange 16. The race ring 14 is constructed of spring steel and is placed in position about the ledges 16. Pins 18 extend inwardly from the faces of the race back 12 and the race front 13 and engage in slots 19 in the edges of the race ring 14 to align the ring in proper position. The race ring 14 has slots 20 to accommodate the gears 9 and 10. The race is assembled and supported in position by a pair of screws 21 which pass through appropriate holes 22 in the ends of the race back and race front and extend into the arms 1 at the faces 2. It will be understood that the outer edge of the race back abuts the faces 2 of the arms 1. Spring members 23 are positioned between the heads of the screws 21 and the outer face of the race front 13. Thus, the three members of the race are held in resilient assembly permitting expansion if thread or dirt gets in the race and thereby prevents binding of the sewing hook which is adapted to rotate in the race.

Lugs 24 are positioned, as shown in Figs. 1 and 9, in such a manner as to engage a finger on the bobbin case to prevent the rotation of the case. A sewing hook 25, which has been heretofore referred to without a number, is supported for rotation in the race. It includes a cylindrical periphery 26 adapted to fit the inner surface of the race ring 14, and plane circular surfaces 27 and 28, perpendicular to the axis of rotation, are adapted to fit the inner faces of the flanges 15 on the race back 12 and the race front 13.

The construction of the sewing hook is illustrated in detail in disassembled relationship in Fig. 5. It includes a front ring member 29, a rear ring member 30, and an intermediate or gear member 31. The circumferential periphery of the ring members 29 and 30 forms the bearing surface 26 heretofore described. The front ring member 29 has a cutaway portion at its outer edge leaving a web 32 and a forwardly extending projection 33 which forms a brace for a hook point 34, which extends forwardly from the periphery of the rear ring member 30.

The gear member 31 has a cutaway portion 35 matching, when assembled, the cutaway portion adjacent the web 32 of the front ring member 29. The hook point 34 extends from the periphery of the rear ring member 30 forwardly to a position in which the point, when the sewing hook is assembled, is in the plane of the face 27, and abuts and is braced by the projection 33 on the ring member 29.

As a convenient means of assembly for the sewing hook, arcuate pins 36 are secured to the ring gear 31 and are adapted to engage in holes 37 in the front and rear ring members. The position and curvature of the pins 36 are best illustrated in Fig. 10. The resiliency of the pins 36 is sufficient to hold the members in tight assembly.

A web 38 extends across the rear face of the ring member 30 in a plane perpendicular to the axis of rotation and forms a support for a stud 40 about which a bobbin case 41 is positioned. The bobbin case 41 is cylindrical and may be of ordinary construction, including a latch 42 adapted to engage a groove 43 at the outer end of the stud 40. The bobbin case includes, however, a finger 44 which is positioned between the lugs 24 on the front face of the race front 13 and the bobbin case is thereby held against rotation while its housing, comprising the sewing hook, as heretofore described, rotates freely in its race. Sufficient space is allowed between the lugs 24 to permit the needle thread being pulled through the opening between them and around the bobbin thread without binding. The front edge 45 of the web 32 on the front ring member extends outwardly beyond the plane of the surface 27, forming a gauge for the needle point and adapted to wipe the needle as the hook point passes the needle.

The outer surface of the front ring member 29 including the surface 27 is relieved, as shown at 46, in advance of the hook point, thereby permitting adequate clearance for the needle in its downward movement. As the hook point advances, the gauge surface 45 may engage the needle, thus avoiding any chance of the point striking the needle and at the same time provides a positive clearance which should be less than the width of a thread for which the machine is adapted.

It will be understood that the gears 9 and 10 extend through the slots 20 in the race ring 14 and mesh with the ring gear 31 of the sewing hook. All of these gears, 9, 10 and 31, are segmented, leaving a portion broken away to accommodate the needle thread loop and the hook point. The arrangement is such that at least one gear 9 or 10 engages with the ring gear 31 at all times. Since the gears 9 and 10 are driven in synchronism, the ring gear will be properly driven even though one of the gears 9 and 10 is not in engagement. The gears 9 and 10 are driven in such relationship to the other mechanism that the sewing hook is rotated twice during each cycle of operation of the sewing machine.

The sewing machine also includes a work plate 50, feed 51, needle bar 52 supporting the needle 53, a roller presser 54 and a needle thread take-up 55. The construction of these machine parts is of common and known design and need not, therefore, be described in detail.

A needle thread 56 is threaded through the needle take-up 55 and through the eye in the needle 53, from front to back. It will, therefore, be understood that the hook point 34 engages the needle thread loop to the rear of the needle while the gauge extension 45 wipes the rear of the needle.

It will also be understood that the sewing hook is positioned to rotate in a plane normal to the path of the work. This arrangement permits threading the needle from the front to back, since the hook engages the needle thread loop at the rear of the needle. Obviously this makes for convenience, and the arrangement is also convenient in permitting the ready removal of the bobbin case from the front of the machine. The arrangement also eliminates the tendency of the stitches to assume and remain in staggered relationship and assures that the stitches will be laid in a straight line.

The machine is so constructed and synchronized that the hook engages in the loop above the eye of the needle. For instance, in actual practice the needle will be withdrawn $\frac{3}{32}$ of an inch from its extreme down position, when the hook point passes the needle, and in this position the point is $\frac{1}{16}$ of an inch above the eye of the needle. This arrangement makes engagement of the hook point within the loop a certainty, when taken in connection with the positive gauging means between the hook point and the needle.

The sewing hook revolves twice, as explained, for each stitch, once to tumble the needle thread around the sewing hook and the bobbin, which is housed in the sewing hook, and once to idle while the stitch is being drawn up by the needle thread take-up **55**.

After the feed **51** advances the work to the proper position, the needle bar **52**, with the needle **53** and the needle thread **56**, descends. After the needle has descended to its lowest point of movement, and withdrawn approximately $\frac{3}{32}$ of an inch, it presents a loop of thread to the sewing hook (Fig. 11). Then while the needle is being wiped by the gauge surface **45** the hook point **34** engages in the loop. The mechanism is aligned so that there is less than the thickness of a thread between the hook point **34** and the needle **53**. The take-up **55** descends, letting out sufficient needle thread, which the sewing hook has caught and is tumbling around the bobbin (Fig. 7). The needle bar then ascends and the take-up **55** pulls the needle thread around the bobbin thread completing a stitch in the work.

It will be understood that various changes may be made in the details of construction, within the scope of the appended claims, without departing from the spirit of this invention. While one application of this sewing hook is illustrated and described in my co-pending application, Serial No. 605,824, filed April 18, 1932, this invention is not at all limited to such an environment.

I claim:

1. In a sewing machine, the combination comprising a circular sewing hook and a race therefor, including a pair of side members adapted to bear against the sides of the sewing hook, an annular member adapted to bear against the circumferential periphery of the sewing hook and to space the side members, and resilient means for holding the side members and annular member in assembled relationship.

2. In a sewing machine, the combination comprising a circular sewing hook, a support and a race for the sewing hook, including a pair of side members, a spacing member between the side members, securing means passing through the side members and into the support, and resilient members interposed between the securing means and a side member whereby the race members are resiliently held in assembly.

3. In a sewing machine, the combination comprising a circular sewing hook and a race therefor, including a pair of side members adapted to bear against the sides of the sewing hook, a resilient annular member adapted to bear against the circumferential periphery of the sewing hook and to space the side members, and resilient means for holding the side members and annular member in assembled relationship.

4. In a sewing machine, the combination comprising a circular sewing hook and a race therefor, including a pair of side members each having an annular flange on its inner face adapted to bear against the sides of the sewing hook, a resilient annular member fitting about said annular flange and providing a bearing for the circumferential periphery of the sewing hook, and means for holding the side members and annular member in assembled relationship.

5. A rotary sewing hook comprising a front ring member having a relieved section on its periphery, a rear ring member, and an intermediate segmental gear member, said rear ring member including a hook point displaced from its periphery and matching the front edge of the front ring member at a relieved section of the periphery of said front ring member.

6. A rotary sewing hook comprising a front ring member, a rear ring member, an intermediate gear member, and arcuate pins adapted to hold said members in assembled relation.

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