

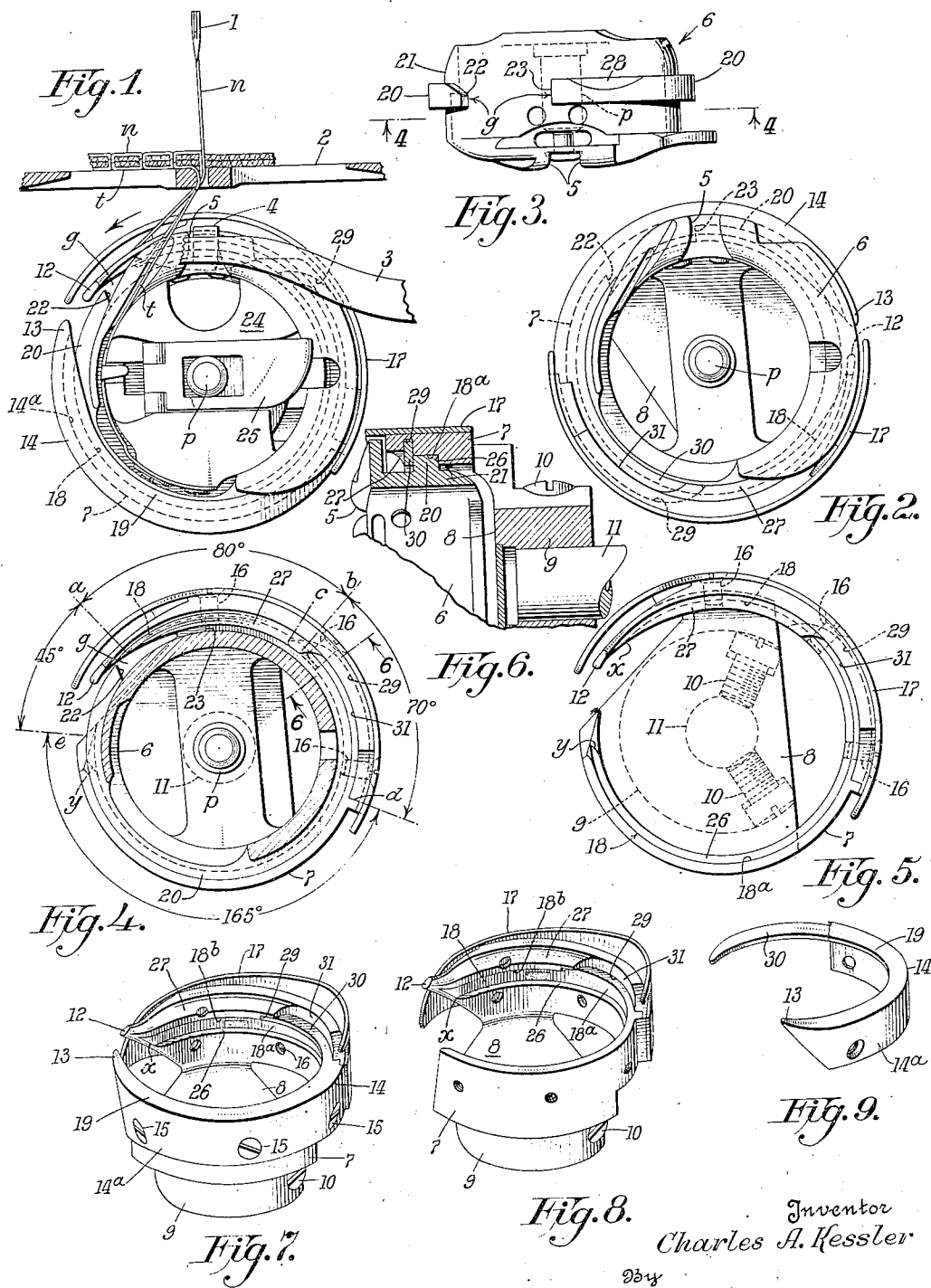
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ROTARY HOOKS FOR SEWING MACHINES

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Witness:
Gaspar Pecina

Fig. 8.

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ROTARY HOOK FOR SEWING MACHINES

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This invention relates to improvements in lock-stitch sewing machines and more particularly to improvements in sewing machine loop-takers of the type known in the art as "rotary hooks" which are designed to cast loops of needle-thread about an interlocking bobbin-thread housed within a stationary thread-case forming a part of the loop-taker, in the formation of lock stitches.

More specifically, the invention relates to improvements in a rotary loop-taker of the type disclosed in United States patents of Kessler No. 1,995,278, March 19, 1935, and No. 2,085,699, June 29, 1937.

When stitching fabrics containing a considerable amount of sizing, or other filler material, some of this material, under repeated thrusts of the needle, becomes dislodged and is deposited upon the hook. As the hooks were heretofore constructed, some of this material would find its way into the bearing between the relatively moving components of the hook and mix with the oil in said bearing, thus forming an effective lapping compound. In a comparatively short time, this compound grinds out the bearing, resulting in the failure of the loop-taker mechanism.

Therefore, it is the primary object of the invention so to construct the rotating portion of the hook and the stationary thread-case journaled therein that lint and other foreign matter will be excluded from the thread-case raceway in the hook to a degree not heretofore possible.

Another object of the invention is to provide an improved and enlarged bearing for the thread-case in a rotary hook, whereby the thread-case has a more nearly perfect support in the hook and therefore is less subject to tipping under the pull of the thread and, consequently, produces less friction, wear and noise. As is well understood, friction produces heat, especially in high speed machines such as lock stitch sewing machines in which it is not uncommon for the hook to rotate at speeds between 10,000 and 12,000 R. P. M.

In certain machines as heretofore constructed, and under certain working conditions, friction causes the parts to become heated to such a degree that the operator can change bobbins only with great difficulty and with a likelihood of having her fingers burned. Obviously, such friction and heat also cause wear in the parts and premature failure of the stitch-forming mechanism.

In view of the foregoing, it will be appreciated that any reduction in friction in a loop-taker, and the attendant reduction of heat therein, is highly important and particularly desirable, especially in

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view of the fact that, when sewing at high speed, the operator is required, every few minutes, to remove the empty bobbin and replace it with a filled bobbin.

With the above and other objects in view, as will hereinafter appear, the invention comprises the devices, combinations and arrangements of parts hereinafter set forth and illustrated in the accompanying drawings of a preferred embodiment of the invention, from which the several features of the invention and the advantages attained thereby will be readily understood by those skilled in the art.

In the drawings,

Fig. 1 is an outer or front face elevation of a rotary hook embodying the present invention, showing the beak of the hook as having taken a loop of needle thread from the needle; together with a portion of a work-supporting throat-plate, in section, and a portion of a rotation-restraining bar for the thread-case.

Fig. 2 is a front face elevation of the rotary hook and the thread-case carrier-member journaled therein, with the cap section of the thread-case removed.

Fig. 3 is a top view of the thread-case carrier-member.

Fig. 4 is a front face elevation of the rotary hook with the thread-case carrier-member therein, the latter being sectioned on the line 4-4 of Fig. 3, and with the thread-case retaining gib removed.

Fig. 5 is a front face elevation of the cup-shaped hook-member with the usual segmental needle-loop-deflecting and bobbin-thread pull-off plate secured thereto.

Fig. 6 is a detail sectional view taken on the line 6-6 of Fig. 4.

Fig. 7 is a perspective view of the hook member and segmental plate shown in Fig. 5 and showing the hook-member additionally fitted with an improved form of gib for holding the thread-case carrier-member in the hook-member.

Fig. 8 is a view similar to Fig. 7 with the improved gib removed.

Fig. 9 is a perspective view of the gib removed from the hook-member.

Referring more specifically to the drawings, the improved loop-taker is adapted to be embodied in lock-stitch sewing machines having a reciprocating eye-pointed needle 1, a work support including a throat plate 2, work-feeding mechanism, not shown, and a thread-case rotation-restraining bar 3 having a laterally projecting finger

4 loosely entering a notch 5 in a thread-case carrier member 6, later to be described.

The loop-taker comprises a generally cup-shaped hook-body member including a cylindrical side wall 7 and a bottom wall 8 which has a hub 9 adapted to be secured, by screws 10, upon a horizontally disposed rotary actuating shaft 11, which, as is common in this type of sewing machine, makes two rotations for each reciprocation of the needle. The cylindrical side wall 7 of the loop-taker is partly cut away to provide, at its outer edge, a needle-thread-loop seizing beak 12. The beak 12 is opposed to, and slightly spaced from a loop-discharging tail or spur 13 provided upon a segmental gib 14 detachably secured, as by screws 15, upon the cylindrical side wall 7 of the loop-taker.

Detachably secured by screws 16 upon and overlying a portion of the cylindrical side wall 7 of the loop-taker body is a segmental sheet metal plate 17 which serves as a needle-thread-loop deflecting member and bobbin-thread pull-off device, as is well understood in the art.

The side wall of the loop-taker body 7 is cut away circumferentially to provide an internal raceway 18, comprising a cylindrical wall 18^a, an outer wall 18^b and an inner wall 26; the outer side wall 18^b of said raceway being, in part, completed by a side flange 19 of the segmental and detachable gib 14. Journalled in the raceway 18, and thereby having a bearing support in the loop-taker body, is a bearing rib 20 formed upon and extending circumferentially of a generally cylindrical side wall 21 of the thread-case carrier-member 6, hereinbefore mentioned. The bearing rib 20 is interrupted to provide the usual needle-thread clearance gap *g*, a loop-detaining shoulder 22 and a loop-confining shoulder 23. The length of the gap between the shoulders 22 and 23 is made as short as is permissible and yet afford ample clearance for entrance and exit of the loop of needle thread *n* thereby to give a maximum circumferential length to the bearing rib 20. Disposed within the thread-case carrier-member 6 is a thread-case cap section 24 containing a bobbin (not shown) of interlocking thread *t* about which the needle-thread loops are cast by the loop-taker in the formation of lock-stitches. The cap-section 24 is releasably secured, by a latch 25, to a central post *p* of the carrier-member 6.

As hereinbefore stated, important features of this invention reside in the specific construction of the rotary hook member and the thread-case journaled therein, by means of which the thread-case is better supported in the hook and more accurately held against tipping therein as, for example, by the pull of the thread, and by means of which lint and other foreign matter is more effectively excluded from the thread-case raceway 18. This has been accomplished by affording an improved bearing for the thread-case and closing, to a greater extent than heretofore, the openings through which foreign matter may enter the raceway.

Obviously, the ideal construction, would comprise a completely annular and unbroken raceway formed in the hook body and a completely annular bearing rib formed on the thread-case carrier-member and closely fitted within the raceway. Such a construction would afford a perfect bearing for the thread-case and would exclude all lint and dirt from the raceway. Unfortunately, that construction is not possible, inasmuch as the needle-loop must pass completely around the carrier-member and the carrier-member

must be readily removable from, and replaceable in, the hook-body. The more nearly this ideal construction may be approached the more nearly will friction, wear and noise be eliminated and foreign matter excluded from the raceway. In order to permit insertion of the thread-case carrier-member into the hook-body, it is common practice to form one portion of the outer wall of the raceway as an integral part of the hook body and another portion as a detachable gib. When inserting the carrier-member into the hook-body a portion of the bearing-rib, at the top edge of the carrier-member, is first placed in the raceway behind that portion of the outer wall which is integral with the hook-body. Next, the lower edge of the carrier member is swung inwardly to place the inner surface of the bearing rib into contact with the inner side wall 26 of the raceway; and finally the removable gib is secured to the hook-body to hold the carrier-member in the raceway.

With a view to obtaining a maximum portion of the raceway wholly within the hook-body and yet to permit removal and replacement of the carrier-member 6, I have machined a portion of the raceway wholly within the hook-body from *a* to *b* (Fig. 4) i. e. extending backwardly from the hook beak for approximately 80 degrees. This affords an inwardly extending segmental flange 27 which merges into the inner side wall of the hook-body and constitutes a portion of the outer wall of the raceway 18. The remainder of the raceway is open faced and adapted to be closed by the side flange 19 of the removable gib 14.

When the member 6 is in the position shown in Fig. 4 relative to the hook body 7 i. e. with the shoulder 22 just short of contact with the leading end of the flange 27, the portion of the flange 27 which overlies the rib 20 extending backwardly from the shoulder 23 is of maximum permissible length. In this position the clearance afforded by the gap *g* plus the slight amount of clearance between the rib 20 and the flange 27 is just sufficient to permit the thread-case carrier-member to be placed into and removed from the hook-body. To afford clearance and thereby facilitate the tipping movement of the thread-case carrier-member relative to the hook-body, when inserting the rib 20 into and removing it from, that portion of the raceway behind the flange 27, the rear edge of the upper portion of the rib 20 is chamfered, as at 28.

The rear wall 26 of the raceway 18 extends, unbroken, from the point *x* to the point *y*, see Figs. 5, 7 and 8, and forms a support for the rear face of the rib 20. Machined in the body portion of the hook, forwardly of the wall 26 and extending from the point *c* to the point *d*, Fig. 4, is an arcuate recess 29 into which is fitted the outer edge portion of the projecting finger 30 of the side flange 19 forming a part of the gib 14. Inasmuch as the finger 30 is fitted into the channel 29 the wall 31 thereof overlies and strengthens the finger 30 and holds it against deflection. From substantially the point *d* to the point *e*, the flange 19 is strengthened and made rigid by an integrally formed skirt portion 14^a extending perpendicular to the face of the flange. Thus, in the present construction, the raceway 18 is completely closed and has rigid front and rear walls from the point *a* to the point *e* or in other words for an angle of 315 degrees. This leaves an angle of only 45 degrees in which there is no rigid bearing for the rib 20 of the thread-case carrier-member and in

which lint and other foreign matter may enter the raceway.

From the foregoing it will be apparent that the present construction affords in the hook-body a closed raceway for the rib on the thread-case carrier-member which is of maximum length and the walls of which are sufficiently accurate and rigid to prevent any lateral tipping of said carrier-member by the pull of the thread, or otherwise. Likewise it will be apparent that the thread-case raceway is completely closed against the entrance of lint and other foreign matter except adjacent the needle-thread gap *g* between the shoulders 22 and 23 on the thread-case carrier-member.

Having thus set forth the nature of the invention, what I claim herein is:

1. A rotary hook for a sewing machine comprising a cup-shaped body member having a cylindrical side wall affording a loop-seizing beak and an internal thread-case raceway extending circumferentially approximately 315 degrees, said raceway having inner and outer side walls of which the entire inner side wall and that portion of the outer side wall extending rearwardly from the beak for approximately 80 degrees are provided wholly by the side wall of the body member; and a gib removably secured to said body portion and comprising the balance of the outer wall of said raceway, a portion of said gib being recessed into a portion of said body member, whereby said body member supports said gib against outward deflection, said body member and gib affording a continuous outer wall for said raceway throughout its entire length.

2. A rotary hook for a sewing machine comprising a cup-shaped body member having a cylindrical side wall affording a loop-seizing beak and an internal thread-case raceway extending circumferentially approximately 315 degrees, said raceway having inner and outer side walls of which the entire inner side wall and that portion of the outer side wall extending rearwardly from the beak for approximately 80 degrees are provided wholly by the side wall of the body member, said body member having formed therein, adjacent said raceway, an arcuate recess extending rearwardly approximately 70 degrees from that portion of the raceway formed wholly in said body member; and a gib removably secured to said body portion and comprising the balance of the outer wall of said raceway, said gib having an extended finger portion fitted into the recess in said body member, whereby said body member overlies said finger portion and

supports it against outward deflection, said body member and gib affording a continuous outer wall for said raceway throughout its entire length.

3. A rotary hook for a sewing machine comprising a cup-shaped body member having a cylindrical side wall affording a loop-seizing beak and an internal circumferential thread-case raceway, said raceway having inner and outer side walls of which the entire inner side wall and that portion of the outer side wall extending rearwardly from the beak for approximately 80 degrees are provided wholly by the side wall of the body member, said body member having formed therein, adjacent said raceway, an arcuate recess extending rearwardly from that portion of the raceway formed wholly in said body member; and a gib having a skirt portion removably secured to said body portion and an integral finger portion fitted into said recess and projecting radially therefrom, whereby said body member supports said gib against outward deflection, said body member and gib affording a continuous outer wall for said raceway throughout its entire length.

4. A rotary hook for sewing machines having a cup-shaped body formed with a loop-seizing beak and a raceway, a thread-case having a circular bearing rib journaled in said raceway and having a gap in said bearing rib to provide a loop-detaining shoulder and a loop-confining shoulder, said hook-body, in the region of said beak, having integral therewith an inwardly extending flange defining the outer side wall of said raceway, said flange extending circularly approximately 80 degrees in a direction back from the beak and merging into the inner side wall of said hook-body, said flange being of maximum allowable length in relation to the length of said gap as will permit assembly of the bobbin-case in the hook-raceway, and a gib detachably secured to said hook-body and having a portion merging into the trailing end of said flange thereby to provide a continuous outer wall for said raceway throughout its entire length.

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The following references are of record in the file of this patent:

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