

Feb. 4, 1964

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3,120,204

ROTARY HOOK WITH THREAD AND NEEDLE GUARD

Filed Jan. 29, 1962

Fig. 1

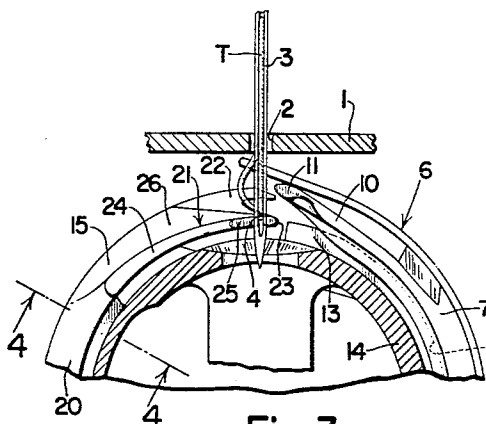
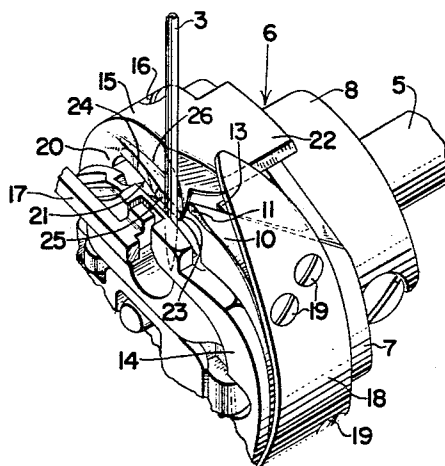


Fig. 3

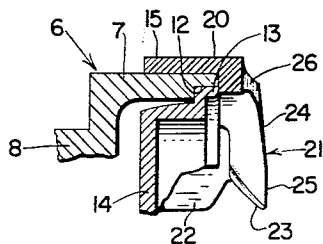


Fig. 4

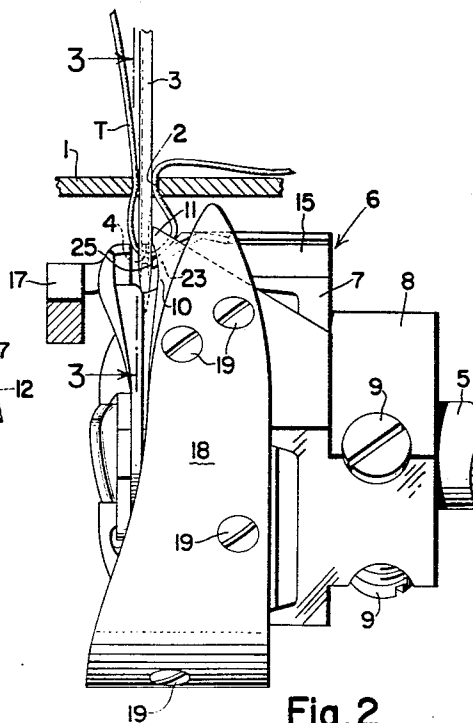


Fig. 2

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3,120,204

ROTARY HOOK WITH THREAD AND NEEDLE GUARD

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Filed Jan. 29, 1962, Ser. No. 169,412
4 Claims. (Cl. 112-228)

The present invention relates to a rotary hook for sewing machines and has for an object to provide a new and improved needle guard, and more particularly, to provide an improved needle guard for a rotary hook.

A rotary hook, such as disclosed in the United States patent of Kessler, No. 2,085,699, has for many years been used extensively in high speed industrial lock stitch sewing machines. Such a hook includes a gib which acts to close the open side of the raceway in the hook body in which the bearing rib of the bobbin carrier is journaled. The gib is formed at the trailing end with a loop controlling tail that receives the thread loop after cast-off and controls the same as the loop is being withdrawn. In accordance with this invention, the trailing end of the gib is modified to provide a needle guard that protects the needle against being struck by the loop seizing beak of the hook. By virtue of this invention, there has been provided a needle guard that is simple and economical and very effective.

Having in mind the above and other objects that will be evident from an understanding of this disclosure, the invention comprises the devices, combinations and arrangements of parts as illustrated in the presently preferred embodiment of the invention which is hereinafter set forth in such detail as to enable those skilled in the art readily to understand the function, operation, construction and advantages of it when read in conjunction with the accompanying drawings in which:

FIG. 1 is a fragmentary perspective view of a sewing machine rotary hook embodying the present invention.

FIG. 2 is a fragmentary elevational view of the rotary hook illustrated in FIG. 1.

FIG. 3 is a fragmentary sectional view taken substantially on the line 3-3 of FIG. 2.

FIG. 4 is a fragmentary sectional view taken substantially on the line 4-4 of FIG. 3.

With reference to the drawings, there is illustrated a sewing machine throat plate which is on the sewing machine bed and the upper surface of which constitutes the work supporting surface. The throat plate 1 has a needle aperture 2 through which a reciprocating needle 3 moves endwise and defines the point of stitch formation. A needle thread T is threaded through an eye 4 of the needle 3. Beneath the throat plate 1 is a hook shaft 5 on the end of which is mounted a rotary hook 6 that cooperates with the needle 3 in the formation of lock stitches. The hook 6, which is generally of conventional configuration, includes a cup-shaped hook body 7 and a hub 8 that receives and is secured by set screws 9 to the hook shaft 5. The hook body 7 is formed with a loop seizing beak 10 that terminates in a loop seizing point 11. Upon rotation of the hook shaft 5, the hook 6 is rotated about the axis of the shaft 5 and the loop seizing point 11 moves in a counterclockwise circular path of travel defining a plane normal to the axis of the hook shaft 5. The needle 3 defines a needle path relatively to the hook 6 and the hook 6 is arranged on one side of and closely adjacent to the plane defined by the path of travel of the loop seizing point with the loop seizing point passing in loop seizing relation relatively to the needle.

The hook body 7 has an internal circular raceway 12 in which is journaled a peripheral bearing rib 13 of a bobbin carrier 14. For assembly, a portion of the raceway 12 in front of the loop seizing point 11 in the direc-

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tion of rotation is open-sided and is closed by a gib 15 secured by screws 16 to the periphery of the hook body 7. The bobbin carrier 14 is held against rotation with the hook body 7 by a rotation restraining finger 17. A thread guard 18 is secured to the periphery of the hook body 7 by screws 19.

The gib 15 has an edge 20 which, axially of the hook 6, is spaced from the plane defined by the path of travel of the loop seizing point 11 and disposed on the side of the plane opposite from the needle 3. This spacing is to provide clearance for the needle 3 as it descends into cooperation with the hook. In operation, the needle reciprocates in a path closely adjacent to the plane defined by the path of travel of the loop seizing point 11. After reaching its point of maximum penetration, the needle begins to rise, and as it does, it throws a loop which is then entered by the loop seizing point 11. To insure loop seizure, the point 11 must pass immediately adjacent to the needle 3. However, the needle may be bent or may be deflected so that, during operation, it may be positioned in the path of travel of the point 11 and thus struck by it, in which case it would of course become bent or broken and also may damage the point 11. To avoid this, a needle guard is provided which is adapted to engage the needle 3 and to position it closely adjacent to but out of the path of travel of the point 11.

In accordance with this invention, a needle guard 21 is formed on the front edge 20 at the trailing end 22 of the gib 15, that is, the end of the gib 15 immediately in front of the point 11 and which is also the end upon which the loop controlling tail 23 is formed. The needle guard 21 begins at an intermediate point on the gib 15 and extends in the direction toward the tail 23, the surface 21 including a needle deflecting surface 24 rising smoothly from the front edge 20 toward the plane defined by the path of travel of the loop seizing point 11 and a needle positioning surface 25 at the free end of the gib adjacent to the tail 23.

The needle positioning surface 25 is substantially straight and disposed in the plane defined by the path of travel of the loop seizing point 11. Angularly of the hook, the surface 25 is disposed adjacent to the loop seizing point 11 so that the needle 3 is engaged by this surface at loop seizure. Radially of the hook, the surface 25 is disposed inwardly of the loop seizing point 11 and to accommodate the same, the beak 10 diverges radially from the peripheral surface of the bobbin carrier 14.

It will, of course, be apparent that the needle positioning surface 25 must be disposed at all times below the uppermost portion of the eye 4 of the needle 3 so that the thread is not pinched between the needle 3 and the surface 25. This is obtained, not only by locating the needle guard as low as possible in the needle path, but also by the timing of the hook relatively to the needle and by the location and formation of the needle guard and beak 10. In operation, the needle reaches the bottom of its downstroke, or the point of maximum penetration, opposite an intermediate point of the gib 15, and begins to rise to form a loop. It is thus during the upstroke of the needle that the needle guard becomes effective. Raising the loop seizing point 11 provides for loop seizure at a point closer to the throat plate 1 and thus reduces the required needle penetration, thereby also raising the eye of the needle relatively to the needle positioning surface 25 at loop seizure. A further advantage of this feature is that, for the same rise of needle above the throat plate, the reduced penetration permits reducing the stroke of the needle, thereby reducing inertia.

It is also an advantage of this construction that the needle guard assists in controlling the loop cast by the needle. Immediately above the needle positioning sur-

face 25, the needle guard has a beveled surface 26 that extends to a continuation of the edge 20. This surface 26 provides clearance for formation of the loop and also engages the loop to throw it upwardly into the path of the loop seizing point 11 and tends to keep it in the path of the point 11.

Numerous alterations of the structure herein disclosed will suggest themselves to those skilled in the art. However, it is to be understood that the present disclosure relates to a preferred embodiment of my invention which is for purposes of illustration only and not to be construed as a limitation of the invention. All such modifications which do not depart from the spirit of the invention are intended to be included within the scope of the appended claims.

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

1. In a rotary hook for sewing machines, a hook body formed with a loop seizing beak terminating in a loop seizing point having a circular path of travel in a plane normal to the axis of rotation of said hook, said hook body being adapted to be arranged on one side of and with said loop seizing point in loop seizing relation to a needle, an element secured to the periphery of said hook body, and a needle guard on said element and extending therefrom in a direction axially of said hook toward said path of travel and disposed in front of said loop seizing point in the direction of rotation of said hook, said needle guard comprising a needle positioning surface disposed substantially in the plane defined by the path of travel of said loop seizing point and being located inwardly of said point radially of said hook and adjacent said point angularly of said hook, said needle guard being adapted to engage a needle and to position the same relatively to said loop seizing point to avoid collision of said point and needle at loop seizure.

2. In a rotary hook for a sewing machine, a hook body formed with a loop seizing beak terminating in a loop seizing point having a circular path of travel in a plane normal to the axis of rotation of said hook, said hook body being adapted to be arranged one side of and with said loop seizing point in loop seizing relation to a needle, an element secured to the periphery of said hook body and having an edge disposed in front of said loop seizing point in the direction of rotation of said hook and spaced from the plane defined by the path of travel of said loop seizing point on the side of said plane opposite from the needle, and a needle guard on said element in front of said loop seizing point, said needle guard comprising a needle positioning surface and a needle deflecting surface rising smoothly from said edge to said needle positioning surface, said needle positioning surface being disposed substantially in the plane defined by the path of travel of said loop seizing point, and being located inwardly of said point radially of said hook and adjacent to said point angularly of said hook, said needle positioning surface being adapted to engage a needle and to position the same relatively to said loop seizing point to avoid collision of said point and needle at loop seizure.

3. In a rotary hook for a sewing machine, a hook body formed with a loop seizing beak terminating in a loop seizing point having a circular path of travel in a plane normal to the axis of rotation of said hook, said hook body being adapted to be arranged on one side of and with said loop seizing point in loop seizing relation to a needle, an element secured to the periphery of said hook body and having an edge disposed in front of said loop seizing point in the direction of rotation of said hook and spaced from the plane defined by the path of travel of said loop seizing point on the side of said plane opposite from the needle, said element having a trailing end disposed adjacent to said loop seizing point angularly of said hook, and a needle guard on the trailing end of said element in front of said loop seizing point, said needle guard comprising a needle positioning surface and a needle deflecting surface rising smoothly from said edge to said needle positioning surface, said needle positioning surface being disposed substantially in the plane defined by the path of travel of said loop seizing point and being located inwardly of said point radially of said hook and adjacent to said point angularly of said hook, said needle positioning surface being adapted to engage a needle and to position the same relatively to said loop seizing point to avoid collision of said point and needle at loop seizure.

4. In a rotary hook for sewing machines, a hook body formed with a loop seizing beak terminating in a loop seizing point having a circular path of travel in a plane normal to the axis of rotation of said hook, said hook body being adapted to be arranged on one side of and with said loop seizing point in loop seizing relation to a needle, said hook body having an internal circular raceway including an open-sided portion, a bobbin carrier having a peripheral bearing rib journaled in said raceway, a gib secured to the periphery of said hook body and closing the open-sided portion of said raceway, said gib having an edge disposed in front of said loop seizing point in the direction of rotation of said hook and spaced from the plane defined by the path of travel of said loop seizing point on the side of said plane opposite from the needle, said gib having a trailing end disposed adjacent to said loop seizing point angularly of said hook, and a needle guard on the trailing end of said gib, said needle guard comprising a needle positioning surface and a needle deflecting surface rising smoothly from said edge to said needle positioning surface, said needle positioning surface being disposed substantially in the plane defined by the path of travel of said loop seizing point, and being located inwardly of said point radially of said hook, said needle positioning surface being adapted to engage a needle and to position the same relatively to said loop seizing point to avoid collision of said point and needle at loop seizure.

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