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F. PARRY

2,334,644

ROTARY LOOP-TAKER MECHANISMS FOR SEWING MACHINES

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2 Sheets-Sheet 1

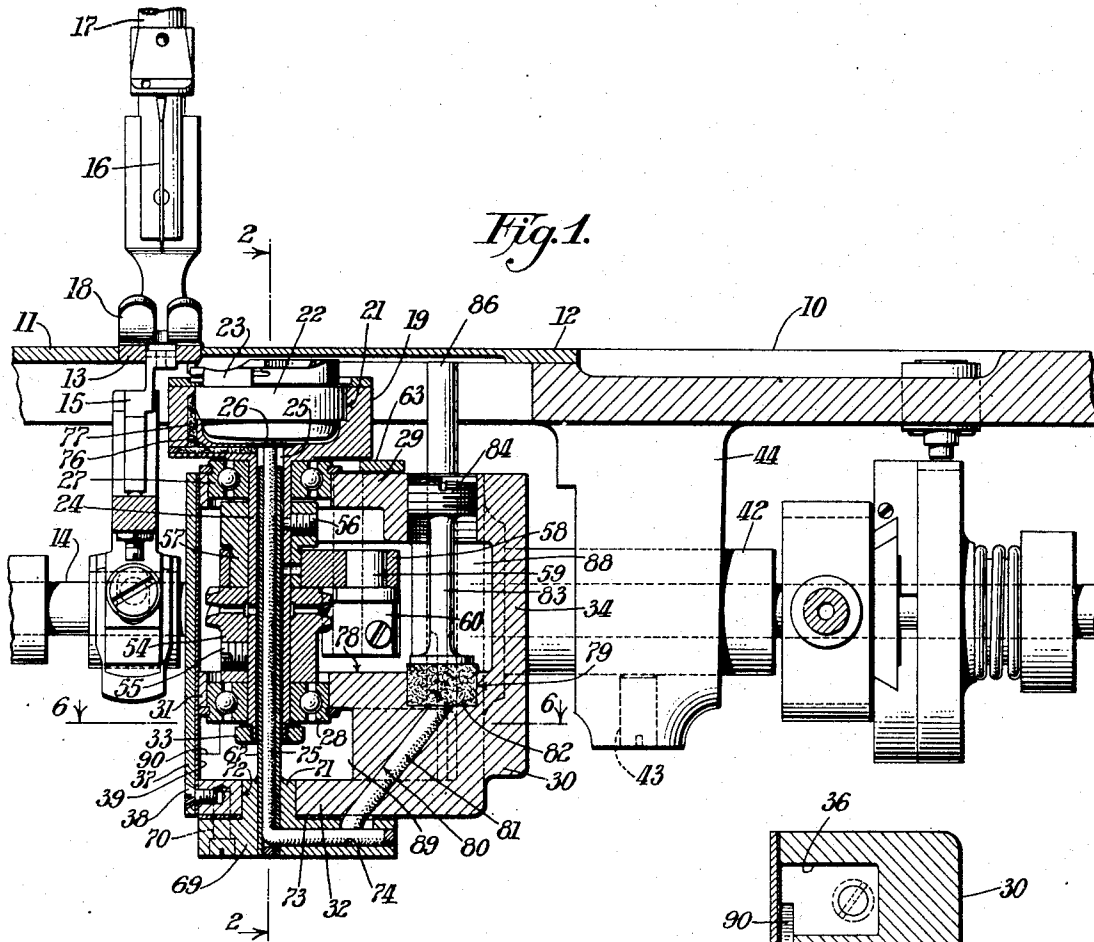


Fig. 1.

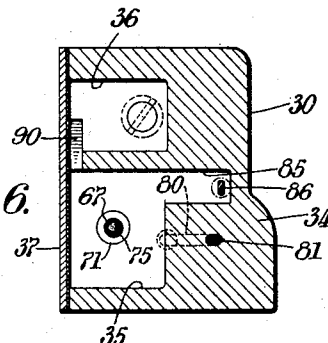


Fig. 6.

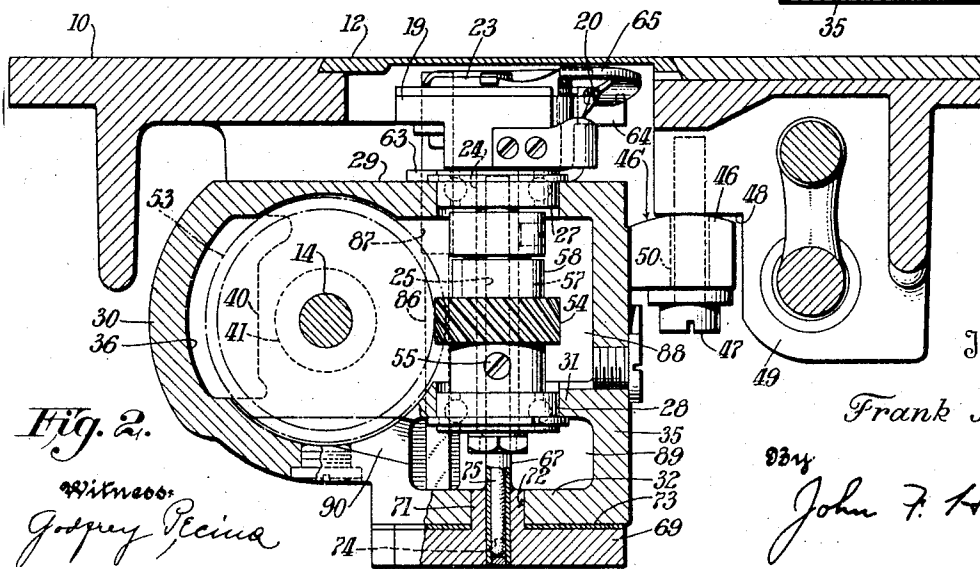


Fig. 2.

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2 Sheets-Sheet 2

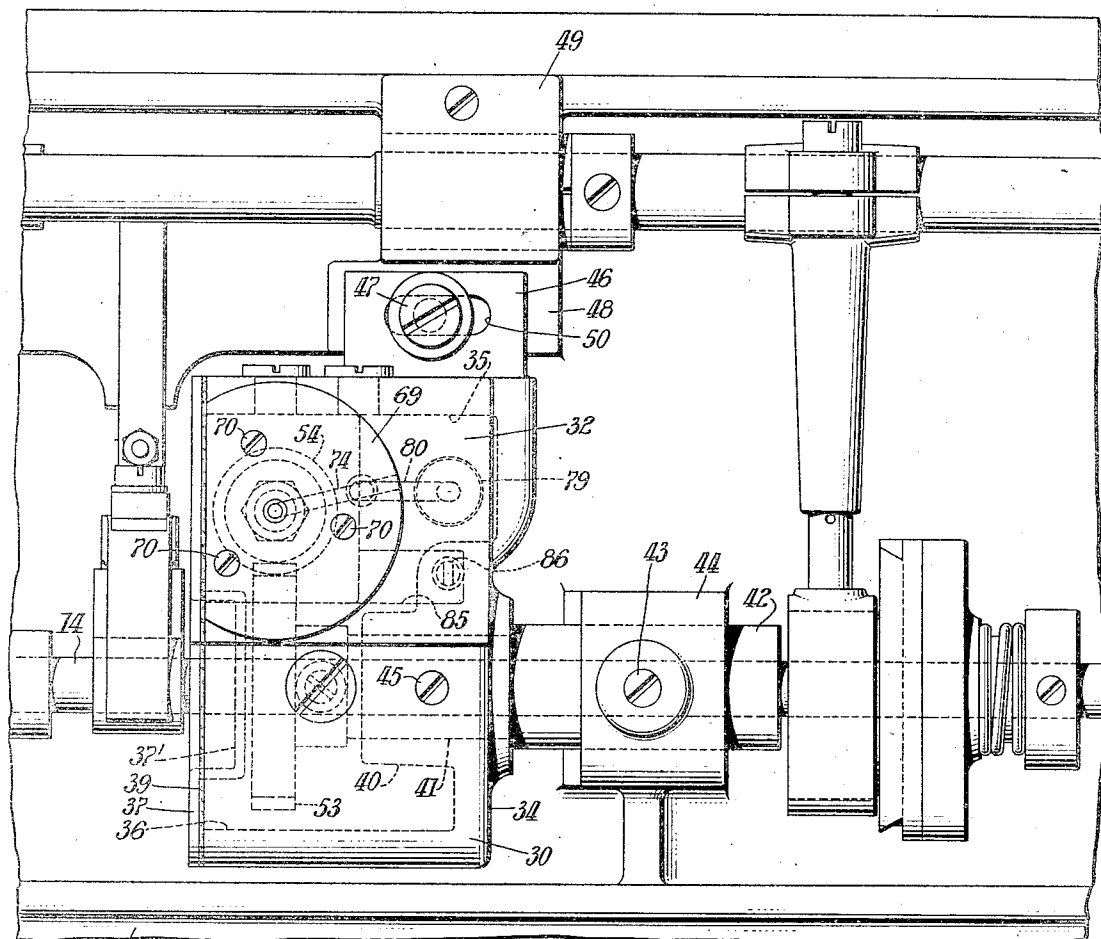


Fig. 3.

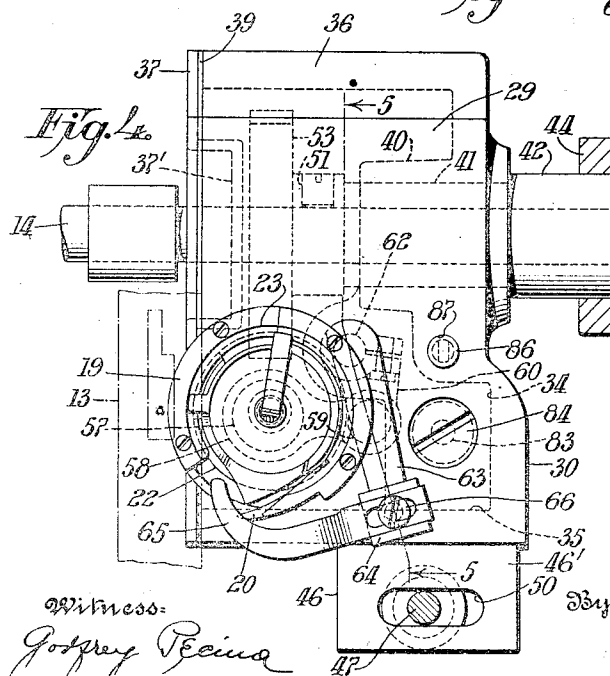


Fig. 4.

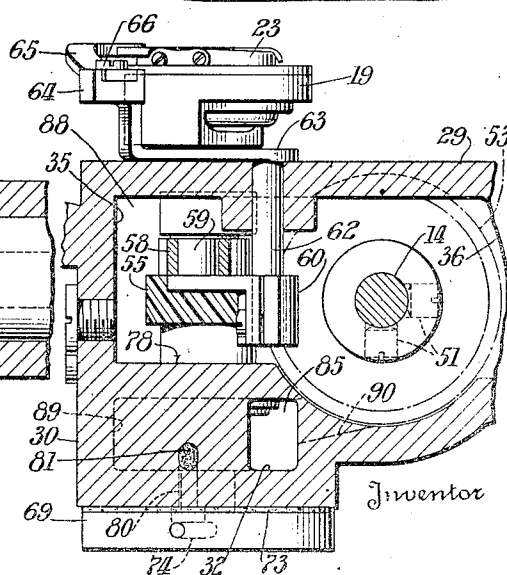


Fig. 5.

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ROTARY LOOP-TAKER MECHANISM FOR SEWING MACHINES

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11 Claims. (Cl. 112—256)

This invention relates to loop-taker mechanisms of sewing machines and, more particularly, to loop-takers of the vertical-axis rotary hook type, and has for an object to provide improved means for supplying lubricant to the actuating mechanism of vertical-axis rotary hooks and to the thread-carrier oscillating mechanism associated therewith.

The invention also has for its object to provide means for automatically delivering lubricant in controlled quantity to the thread-carrier raceway of a vertical-axis rotary hook from a substantial supply of lubricant. Other and more specific objects of the invention will be apparent from the following description and claims.

The invention comprises the devices, combinations and arrangements of parts hereinafter described in connection with the accompanying drawings, which illustrate a preferred embodiment of the invention and in which:

Fig. 1 is a front side elevation, partly in vertical section, of a fragmentary portion of a sewing machine containing the present improvement. Fig. 2 is a vertical transverse section of the bed-plate of the machine on substantially the line 2—2 of Fig. 1. Fig. 3 is a bottom plan view of a fragmentary portion of the bed-plate of the machine. Fig. 4 is a top plan view of the loop-taker and its supporting bracket. Fig. 5 is a vertical section of the loop-taker supporting bracket on substantially the line 5—5 of Fig. 4. Fig. 6 is a horizontal section of the hook-saddle on substantially the line 6—6 of Fig. 1.

Referring to the drawings, the sewing machine has a frame including a work-supporting bed-plate 10 provided with left and right slide-plates 11 and 12 disposed at opposite sides of a throat-plate 13 suitably secured upon the bed-plate 10.

Rotatably journaled in suitable bearings provided at the under side of the bed-plate 10 is a horizontally disposed actuating shaft 14 extending lengthwise of and located at the rearward portion of said bed-plate. Operatively connected to derive work-advancing movements from the actuating shaft 14 is a feed-dog 15 of the drop-feed type and operating through a suitable feed-slot in the throat-plate 13. The feed-dog 15 is apertured to receive a work penetrating and feeding eye-pointed needle 16 carried by the lower end of an endwise reciprocatory and laterally vibratory needle-bar 17, the feed-dog 15 being opposed by the usual spring-depressed presser-foot 18. The feeding mechanism above referred to is

more fully disclosed in the U. S. patent of W. Myers, No. 2,129,031, Aug. 23, 1938.

Complemental to the needle 16 in the formation of lock-stitches is a rotary loop-taker 19 of the vertical-axis rotary hook type and having a cup-shaped body provided in the cylindrical side wall thereof with a thread-loop seizing beak 20. The cylindrical side wall of the rotary hook is internally provided with an annular raceway 21, and journaled in said raceway is the peripheral bearing-rib 22 of a thread-carrier 23 about which the needle-thread loops are cast by the rotary hook. The thread-carrier is restrained against rotation with the rotary hook in any usual or suitable manner.

Extending downward centrally from the bottom wall of the rotary hook 19, and preferably integral therewith, is a vertically disposed and tubular hook-shaft 24 having its longitudinal bore 25 extending throughout the length of the shaft. In providing the hook-shaft 24 with its longitudinal bore 25, it is preferred to perforate the bottom wall of the hook 19 and thereafter to close the perforation by a disk 26 set into a recess in the inner face of the bottom wall of the hook.

The hook-shaft 24 is journaled in vertically spaced ball-bearings 27 and 28, the upper ball-bearing 27 being disposed in proximity to the rotary hook 19 and in a vertical aperture provided in the substantially horizontal top wall 29 of a supporting bracket or hook-saddle 30. The lower ball-bearing 28 is disposed in a vertical aperture provided in an intermediate horizontal wall 31 spaced vertically from the lower wall 32 of the hook-saddle. The bottom wall of the rotary hook rests upon the inner or rotating race-ring of the upper ball-bearing 27, and the hook-shaft 24 is restrained against endwise movement by a nut 33 threaded upon the reduced lower end of the hook-shaft below and adjacent the lower ball-bearing 28.

The hook-saddle 30 comprises a chambered casing which houses the actuating mechanism for the rotary hook and for the thread-carrier oscillating device, said casing providing a reservoir containing a supply of lubricant distributed to said actuating mechanism and to the thread-carrier raceway of the rotary hook. The upper or top wall 29 of the hook-saddle casing and the bottom wall 32 thereof are integral with a vertical end wall 34, a substantially flat and vertical front side wall 35, and with a vertically curved rear side wall 36. The end portion of the hook-saddle casing opposed to the end wall 34 is closed

by a closure-plate 37 detachably secured to the casing by screws, as 38; a sealing gasket 39 being preferably interposed between the closure-plate 37 and the hook-saddle casing.

The vertical end wall 34 of the hook-saddle casing has a horizontally apertured lug 40 projecting into the chamber of the casing 30. The lug 40 of the casing is mounted upon the reduced end portion 41 of a bearing-bushing 42 in which the actuating shaft 14 is rotatably journaled. The bearing-bushing is secured by a screw 43 for endwise adjustment in a lug 44 depending from the bed-plate 10, and the hook-saddle 30 is secured upon the end portion 41 of the bearing-bushing by a screw 45. Extending from the front side wall 35 of the hook-saddle is a foot 46 of which the rounded upper portion 46' is secured, by a screw 47, against a flattened lower face 48 of a shouldered bearing-lug 49 depending from the bed-plate 10. The screw 47 passes through a slot 50 in the foot 46, said slot 50 being elongated lengthwise of the actuating shaft 14. Thus, by freeing the screws 43 and 47, the hook-saddle 30 and the bearing-bushing 42 may be together adjusted lengthwise of the actuating shaft 14.

Secured by a screw 51 upon the actuating shaft 14, within the hook-saddle casing, is the hub of a spiral driving gear 53. The spiral gear 53 is in driving engagement with a spiral pinion 54 secured by a set-screw 55 upon the tubular hook-shaft 24 above the lower ball-bearing 28 therefor. The ratio of the gear 53 and pinion 54 is such that the rotary hook 19 performs two rotations for each rotation of the actuating shaft 14, i. e., for each complete reciprocation of the needle 16. The side face of the driving gear 53 is disposed closely adjacent to an inwardly depressed portion 37' of the casing closure-plate 37, and the actuating shaft 14 extends through a closely fitting opening in said depressed portion 37' of the closure-plate. The lower portion of the driving gear 53 dips into a supply of lubricant in the bottom portion of the casing, so that said gear throws off lubricant centrifugally. By locating the depressed portion 37' of the closure-plate in proximity to a side face of the driving gear, said depressed portion 37' of the closure-plate serves as a shield which reduces to a minimum the escape of lubricant through the opening in the closure-plate through which the shaft 14 extends.

Secured by a screw 56 upon the hook-shaft 24, interiorly of the casing 30 and between the spiral pinion 54 and the upper hook-shaft bearing 27, is the hub of an eccentric 57; and embracing the eccentric 57 is the strap of a short horizontally disposed pitman 58. The pitman 58 is apertured to receive a pivot-stud 59 extending vertically from a crank-arm 60 having a split boss clamped upon the lower end of a vertically disposed rock-shaft 62. The rock-shaft 62 is journaled for oscillation in the top wall 29 of the hook-saddle casing 30, and the upper end of the rock-shaft 62 is provided with a carrier-arm 63 disposed exteriorly of the casing 30 and having a horizontal portion thereof located between the top wall 29 of the casing and the rotary hook 19. The carrier-arm 63 is bent upwardly between its ends and terminates in an enlargement 64 which is horizontally recessed in its upper face, adjacent the rim of the rotary hook 19, to receive the shank of a horizontally disposed opener-finger 65 secured for endwise adjustment by a screw 66. The free end of the opener-finger 65 is positioned to engage the thread-carrier 23 in the usual man-

ner and for the purpose of slightly oscillating the thread-carrier in a direction opposite to the direction of rotation of the rotary hook.

Disposed in the bore 25 of the tubular hook-shaft 42 in spaced relation to said shaft is a stationary tube 67 which preferably extends upwardly into proximity to the bottom wall of the rotary hook 19. The lower end of the tube 67 is fixed in a vertical aperture of a supporting plate 69 detachably secured by screws 70 to the bottom wall 32 of the hook-saddle casing 30. The supporting plate 69 has a boss 71 through which the tube 67 extends, said boss 71 being disposed in an aperture 72 in the bottom wall 32 of the casing. A sealing gasket 73 is preferably disposed between the plate 69 and the bottom wall 32 of the casing.

The tube-supporting plate 69 is provided with a horizontal aperture 74 having one end thereof terminating in the vertical tube aperture of said plate in alinement with a radial aperture provided in the tube 67. Disposed in the supporting-plate aperture 74 and extending upwardly through the tube 67 into engagement with the closure disk 26 in the bottom wall of the rotary hook 19 is a lubricant-conducting wick 75. The bottom wall of the rotary hook 19 has a radial and preferably wick-filled duct 76 extending outwardly from the axial opening in the bottom wall of the rotary hook, i. e., from the bore 25 of the hook-shaft 24, said radial duct 76 being connected with the lower end of a vertical duct 77 which is also preferably wick-filled and extends to the hook raceway 21 in a direction substantially parallel to the axis of rotation of the rotary hook.

The inner wall of the hook-saddle casing 30 is recessed to provide a horizontally flat shelf 78 comprising a continuation of the upper face of the intermediate bearing-wall 31. The wall of the shelf 78 is formed with an upwardly open pocket 79, and opening into the bottom wall of said pocket is the upper end of a vertically inclined duct 80 provided in the wall of the casing 30. The lower end of the duct 80 is connected by aligned apertures provided in the sealing gasket 73 and supporting-plate 69 with the supporting-plate aperture 74. A lubricant feeding wick 81 is preferably disposed in the duct 80, the lower end of said wick 81 contacting the wick 75.

The shelf-pocket 79 is filled with a lubricant-absorbent packing 82, such as felt or the like, and it is preferred to have the felt-packing 82 extend above the upper face of the shelf 78. Bearing downwardly upon the felt-packing 82 to compress and thereby control the porosity thereof is the flanged lower end of a regulator 83 having at its upper end an enlarged head 84 threaded into the top wall 29 of the hook-saddle casing 30. The slotted upper end of the regulator-head 84 is accessible exteriorly of the casing 30 for varying the density and therefore the porosity of the felt-packing 82.

As illustrated more particularly in Fig. 6 of the drawings, the casing wall from which the intermediate bearing-wall 31 extends is formed with a recess 85 of which the bottom wall is substantially level with the inner face of the bottom wall 32 of the hook-saddle-casing. Disposed in said recess 85 is a lubricant-measuring rod 86 having its lower end resting upon the bottom wall of the recess. The measuring rod 86 extends through an aperture in the shelf-wall 78 and the upper end of the measuring rod extends through and is rounded to closely fit a filling aperture 87 in

the top wall 29 of the hook-saddle casing. By removing the rod 86, the casing may be supplied with lubricant through the casing-aperture 87.

It will be understood from the foregoing description that the front portion of the hook-saddle casing is interiorly divided by the intermediate wall 31 into an upper compartment 88 and a lower compartment 89. The rearward end of the intermediate wall 31 merges into the rearward portion of the bottom wall 32 of the casing, whereby the upper compartment 88 is open from the front portion of the casing to the rearward portion thereof which houses the driving gear 53. However, the lower front compartment 89 of the casing is also connected with the rearward portion of the upper compartment 88 by a passageway 90 adjacent the closure-plate 37.

As indicated by the dot-dash line in Fig. 2 of the drawings, sufficient lubricant is preferably supplied to the hook-saddle casing, through the filling aperture 87, to bring the level of the lubricant substantially up to the lower face of the intermediate wall 31. With this quantity of lubricant, the driving gear 53 dips into the lubricant and, upon operation of the machine, throws off lubricant centrifugally and thereby distributes a flood of lubricant to the actuating mechanism within the casing.

By this means a flood of lubricant is also constantly supplied to the felt-packing 82 in the shelf-pocket 79 during the operation of the machine, the excess lubricant flowing rearwardly off from the shelf-wall 31 and passing downwardly through the lower ball-bearing 28 and through the passageway 90, whereby the level of the lubricant in the compartment 89 may be measured. The felt-packing 82 functions as an oil-metering device to supply lubricant to the wick 80. In this manner, lubricant is supplied to the wick 15 and is fed by capillarity to the end of the wick 15 adjacent the bottom wall of the rotary hook. The lubricant is thrown off from the upper end of the wick 15 by the rotary hook and is thus supplied to the radial duct 76 of the rotary hook and delivered to the rotary hook raceway 21. Excess lubricant delivered by the upper end of the wick 15 may drain downwardly through the bore 25 of the hook-shaft 24, externally of the stationary tube 67.

In order to obviate feeding of lubricant from the casing compartment 89 upwardly to the loop-taker through the bore of the hook-shaft 24, by the rotation of the shaft about the stationary tube 67, said tube is preferably provided with a radial aperture open to a diametral duct in the driven pinion 54 secured upon the hook-shaft. The rotary hook-shaft 24 and the hub of the eccentric 57 are also preferably provided with additional ducts leading to the outer face of the eccentric. The outer walls of the casing 30 are preferably provided with threaded apertures located to afford access to the securing screws of the actuating mechanism within the casing, said apertures being normally closed by suitable screws whereby the chamber of the casing is substantially oil-tight.

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

1. In a sewing machine, a vertically reciprocating needle, a vertical-axis rotary loop-taker complementary to said needle in the formation of lock-stitches and provided with a thread-carrier raceway, a vertically disposed loop-taker carrying shaft having a longitudinal bore, a wick-filled stationary tube extending lengthwise of and dis-

posed in the bore of said shaft, lubricant-conducting connections between the bore of said shaft and said raceway, and means including a lubricant-delivery regulating device for supplying lubricant to the wick of said tube.

2. In a sewing machine, a vertically reciprocating needle, a vertical-axis rotary loop-taker complementary to said needle in the formation of lock-stitches and provided with a thread-carrier raceway, a vertically disposed loop-taker carrying shaft having a longitudinal bore, a wick-filled tube extending lengthwise of and disposed in the bore of said shaft, lubricant-conducting connections between the bore of said shaft and said raceway, and means including a manually regulatable metering device disposed above the lower end of said shaft for supplying lubricant to the wick of said tube.

3. In a sewing machine, a vertically reciprocating needle, a vertical-axis rotary loop-taker complementary to said needle in the formation of lock-stitches and provided with a thread-carrier raceway, a loop-taker bracket having a chambered casing providing a lubricant-supply reservoir, a vertically disposed loop-taker shaft rotatably journaled in said bracket and provided with a longitudinal bore having lubricant-conducting connections with said raceway, a tube extending from a wall of said bracket into the bore of said shaft, a lubricant-conducting wick extending lengthwise in the bore of said shaft and disposed in said tube, and means including a lubricant-collecting device disposed above the level of the supply of lubricant in said reservoir for feeding lubricant to said wick.

4. In a sewing machine, a vertically reciprocating needle, a vertical-axis rotary loop-taker complementary to said needle in the formation of lock-stitches and provided with a thread-carrier raceway, a chambered casing providing a lubricant-supply reservoir, a vertically disposed loop-taker shaft rotatably journaled in said casing and provided with a longitudinal bore having lubricant-conducting connections with said raceway, a shelf-wall disposed in the chamber of said casing and provided with a lubricant-pocket disposed above the level of the supply of lubricant in said reservoir, a lubricant-metering device disposed in said pocket, means disposed in said casing for supplying a flood of lubricant from said reservoir to said pocket, and means for conducting lubricant delivered by said metering device through the bore of said shaft.

5. In a sewing machine, a vertically reciprocating needle, a vertical-axis rotary loop-taker complementary to said needle in the formation of lock-stitches and having a thread-carrier raceway, a chambered casing having an internal bearing-wall disposed above the bottom wall of said casing in vertically spaced relation thereto and providing a lubricant-reservoir between said walls, said internal wall being provided in its upper face with a lubricant-pocket, a vertically disposed loop-taker carrying shaft journaled in said bearing wall with the lower end of said shaft spaced from the bottom wall of said casing, said shaft being provided with a longitudinal bore having lubricant-conducting connections with said raceway, a lubricant-metering device disposed in said lubricant-pocket, means disposed within said casing for supplying a flood of lubricant to said metering device, and lubricant-conducting connections with said metering device for feeding lubricant through the bore of said shaft.

6. In a sewing machine, a vertically reciprocatory needle, a vertical-axis rotary loop-taker complementary to said needle in the formation of lock-stitches and having a thread-carrier raceway, a chambered casing having an internal bearing-wall disposed above the bottom wall of said casing in spaced relation thereto and providing a lubricant-reservoir between said walls, said internal wall being provided in its upper face with a lubricant-pocket, a vertically disposed loop-taker carrying shaft journaled in said bearing wall with the lower end of said shaft spaced vertically from the bottom wall of said casing, said shaft being provided with a longitudinal bore having lubricant-conducting connections with said raceway, a lubricant-metering device disposed in said lubricant-pocket, means disposed within said casing for supplying a flood of lubricant to said metering device, and a wick extending lengthwise through the bore of said shaft and having lubricant-conducting connections with said lubricant-pocket.

7. In a sewing machine, a vertically reciprocatory needle, a rotary loop-taker complementary to said needle in the formation of lock-stitches and provided with a thread-carrier raceway, a chambered casing providing a lubricant-supply reservoir, a vertically disposed loop-taker carrying shaft rotatably journaled in said casing and provided with a longitudinal bore having lubricant-conducting connections with said raceway, a wick-filled tube extending upwardly from the bottom wall of said casing and lengthwise into the bore of said shaft, and means rendered effective by a moving part of the machine within said casing for delivering lubricant from a supply in said reservoir to the wick within said tube.

8. In a sewing machine, a vertically reciprocatory needle, a rotary loop-taker complementary to said needle in the formation of lock-stitches and having a thread-carrier raceway, a chambered casing providing a lubricant-supply reservoir, a vertically disposed loop-taker carrying shaft rotatably journaled in said casing and provided with a longitudinal bore having lubricant-conducting connections with said raceway, means for rotating said shaft including driving and driven gears housed by said casing within the lubricant-supply reservoir thereof, a plate detachably secured to the bottom wall of said casing, a wick-filled tube extending upwardly from said plate and lengthwise into the bore of said shaft, and means for delivering lubricant from a supply in said reservoir to the wick within said tube.

9. In a sewing machine, a supporting bracket having a housing chamber providing a lubricant-supply reservoir, a rotary loop-taker shaft journaled in said bracket for rotation about a vertical axis, a loop-taker carried by the upper end of said shaft and including a body having a side

wall provided with a thread-carrier raceway, said loop-taker being disposed above the level of the supply of lubricant in said reservoir and having a bottom wall provided with a lubricant duct connected with said raceway, a loop-taker actuating shaft journaled for rotation about an axis transverse to the axis of rotation of said loop-taker shaft, driving connections in said chamber between said shafts including a toothed gear adapted to dip into the supply of lubricant in said reservoir, a lubricant-collecting device disposed in said chamber above the level of the supply of lubricant therein and below said loop-taker, and means for feeding lubricant from said lubricant-collecting device to said bottom wall of the loop-taker.

10. In a sewing machine, a supporting bracket having a housing chamber providing a lubricant-supply reservoir, a rotary loop-taker shaft journaled in said bracket for rotation about a vertical axis, a loop-taker carried by the upper end of said shaft and having a thread-carrier raceway, said shaft having a longitudinal bore and said loop-taker having a lubricant duct connecting said shaft bore with said raceway, a loop-taker actuating shaft journaled for rotation about an axis transverse to the axis of rotation of said loop-taker shaft, driving connections in said chamber between said shafts including a toothed gear adapted to dip into the supply of lubricant in said reservoir, a lubricant-collecting device disposed in said chamber above the level of the supply of lubricant therein and below said loop-taker, and means for feeding lubricant from said collecting device into said shaft bore endwise of the shaft and upwardly through said bore.

11. A loop-taker mechanism for sewing machines, comprising, a chambered casing providing a lubricant-supply reservoir, a vertically disposed loop-taker shaft, vertically spaced bearings in said casing for said shaft, a loop-taker carried by the upper end of said shaft externally of said casing, said loop-taker having a body provided with a thread-carrier raceway, a thread-carrier journaled in said raceway and restrained against rotation with said loop-taker, means for rotating said shaft including driving and driven gears disposed in the chamber of said casing, one of said gears being disposed to dip into a supply of lubricant in said reservoir, an eccentric carried by said shaft in the chamber of said casing and between said bearings, a vibratory finger disposed externally of said casing for oscillating said thread-carrier in a direction opposite to the direction of rotation of said loop-taker, a rock-shaft journaled in said casing and carrying said finger, and operative connections with said eccentric within said chamber of the casing for actuating said rock-shaft.

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