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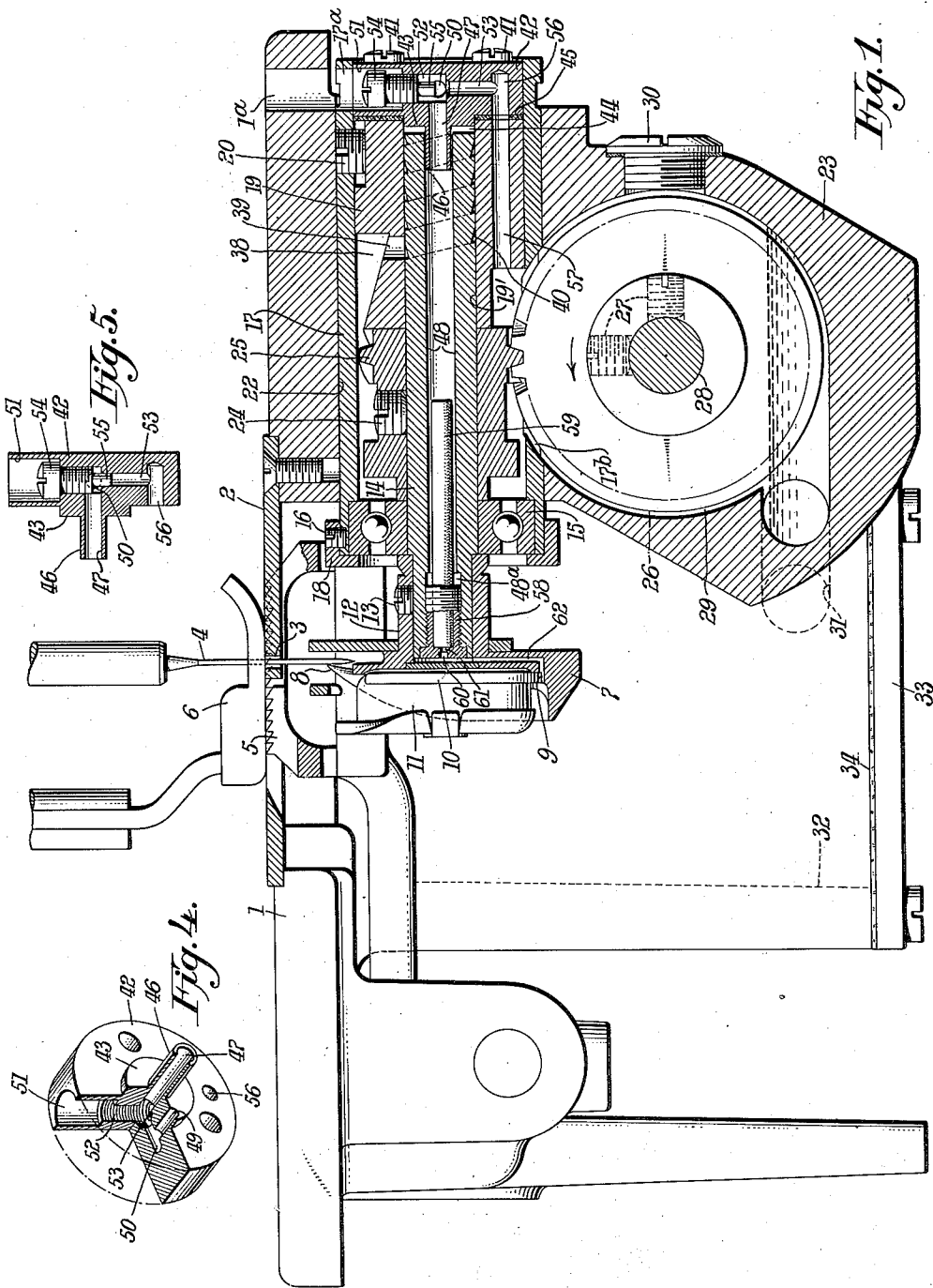
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LUBRICATING DEVICE FOR SEWING MACHINE LOOP-TAKERS

Filed April 13, 1948

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

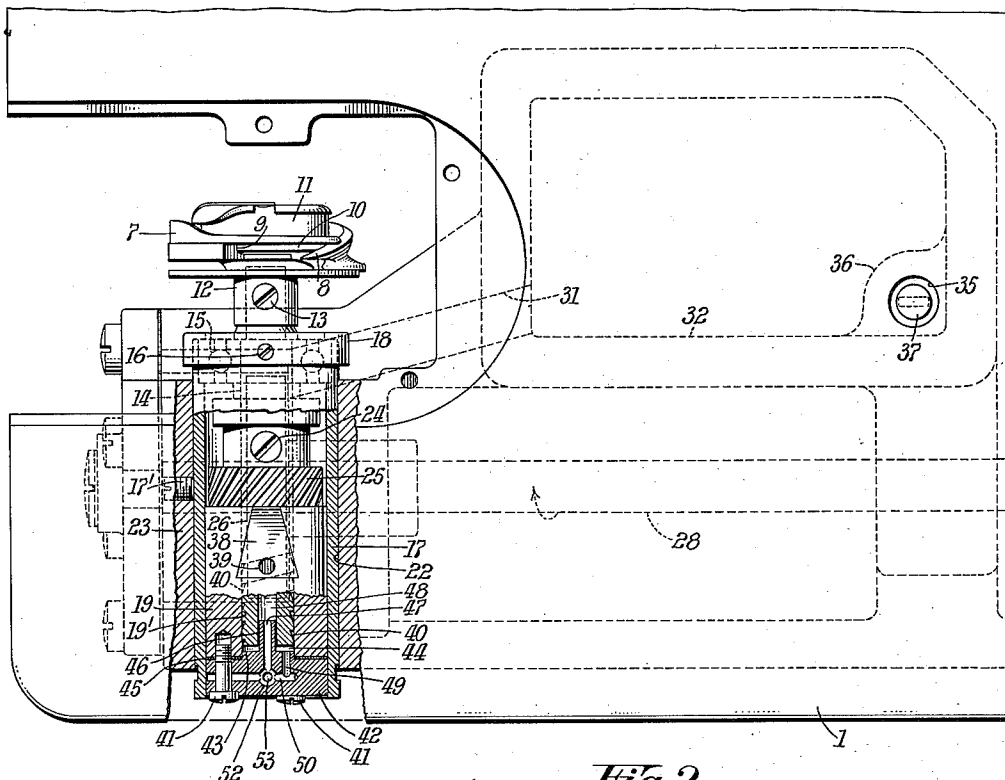


Fig. 2.

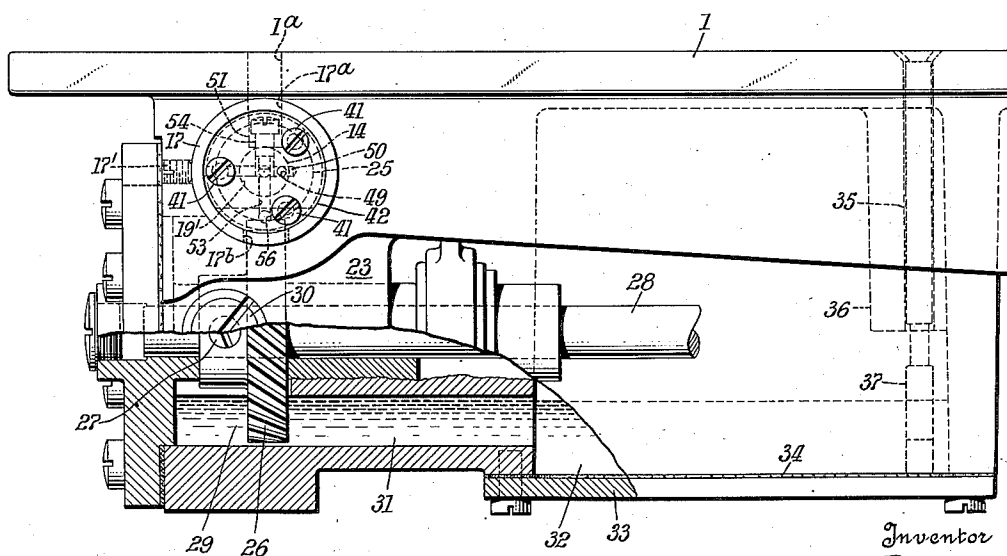


Fig. 3.

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UNITED STATES PATENT OFFICE

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LUBRICATING DEVICE FOR SEWING
MACHINE LOOP TAKERS

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This invention relates to lubricating devices for sewing machines and, more particularly, to devices for supplying lubricant to the thread-carrier raceway of a sewing machine rotary loop-taker.

The present invention has for its primary object to provide improved means for regulating the delivery of lubricant axially into a longitudinal bore of a loop-taker carrying shaft from which bore the lubricant is suitably conducted to the loop-taker raceway.

A more specific object of the invention is to provide means insuring the delivery of a regulatable quantity of lubricant to the raceway of a sewing machine loop-taker having its axis of rotation substantially parallel to the line of feed of the work past the stitch-forming mechanism of the machine, i. e., crosswise of the bed-shaft of the machine, as in zigzag stitching machines.

With these and other objects in view, as will hereinafter appear, the invention comprises the devices, combinations, and arrangements of parts described in connection with the accompanying drawings of a preferred embodiment of the invention, in which—

Fig. 1 is a front end elevation, partly in section, of a portion of a zigzag sewing machine in which the present invention has been embodied; the section being taken substantially in the vertical plane containing the rotation axis of the loop-taker of the machine.

Fig. 2 is a slightly reduced top-plan view, partly in section of a portion of the machine bed with the throat-plate removed therefrom.

Fig. 3 is a front side elevation, partly in section, of a portion of the machine bed.

Fig. 4 is a perspective view, partly in section, of a flow-control member forming a part of this improved lubricating device.

Fig. 5 is a vertical sectional view of the flow-control member shown in Fig. 4, with a discharge regulating screw thereof adjusted to a position in which it causes all of the lubricant to be delivered into the longitudinal bore of the loop-taker shaft.

Referring to the drawings, the sewing machine is illustrated as having a frame including a bed 1 upon which is secured a throat-plate 2 provided with a slot 3 affording clearance for a vertically reciprocating and laterally vibratory needle 4. Operating through suitable slots in the throat-plate 2 is a feed-dog 5 effective to advance work crosswise of the bed 1. Opposed to the feed-dog 5 is the usual spring-depressed presser-foot 6.

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Complemental to the needle 4, in the formation of lock-stitches is a rotary loop-taker 7 which, in the present case, is of the rotary hook type having a needle-thread loop seizing beak 8.

5 The loop-taker 7 is internally provided with a raceway 9 in which is journaled the peripheral bearing rib 10 of a bobbin-carrier 11 suitably restrained against rotation with the loop-taker. The loop-taker 7 has a hub 12 secured by set screws, as 13, upon one end of a horizontally disposed loop-taker shaft 14 extending substantially parallel to the line of feed or, in other words, crosswise of the bed 1.

At its end portion adjacent the loop-taker 7, the loop-taker shaft 14, is journaled in a ball-bearing 15 located in a recessed portion of a sleeve 17; the ball-bearing being held against outward movement lengthwise of the sleeve 17 by a flanged cap 18 which is secured to one end of the sleeve by the screw 16. The opposite end portion of the shaft 14 is journaled in and terminates within a bearing-bushing 19 secured in the sleeve 17 by a set-screw 20. The sleeve 17 is secured, as by set-screw 17', for horizontal endwise adjustment, in an aperture 22 provided in a housing-bracket 23 depending from and, in the present case, integral with the front side portion of the bed 1.

30 Secured by a set-screw 24 upon the loop-taker shaft 14, between the bearings 15 and 19, is a spiral gear 25 engaged by a driving spiral gear 26 secured by set-screws 27 upon a horizontal bed-shaft 28 disposed transversely of the loop-taker shaft 14 and extending lengthwise of the bed 1. The upper portion of the gear 26 projects through an opening in the bracket 23 and through a slot 17^b in the sleeve 17, for engagement with the gear 25. The bed-shaft 28 is driven by any usual or suitable means to rotate once for each complete reciprocation of the needle 4, and the ratio of the gears 25 and 26 is such that the loop-taker shaft 14 performs two rotations for each rotation of the bed-shaft 28.

45 The driving spiral gear 26 is disposed within a cylindrical chamber 29 constituting an auxiliary reservoir formed in the housing-bracket 23; the reservoir 29 containing a supply of lubricant into which the gear 26 dips. Access to the gear-securing screws 27 is provided by a removable screw 30 threaded into the front wall of the housing-bracket 23. The auxiliary reservoir 29 is supplied with lubricant through a duct 31 formed in the housing-bracket and connecting
55 said auxiliary reservoir with a primary lubricant-

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reservoir 32 forming a portion of the housing-bracket 23. The bottom-wall of the reservoir 32 comprises a removable closure-plate 33 which is suitably secured to the bracket 23 and sealed by a gasket 34. The supply of lubricant in the reservoir 32 may be replenished through an aperture 35 formed in a boss 36 at one corner of the reservoir 32 and terminating at its upper end in the upper or work-supporting face of the bed 1. A dip-stick 37 is removably disposed in the aperture 35.

In the operation of the machine, lubricant, picked up from the auxiliary reservoir, is thrown off by the gears 26 and 25 within the sleeve 17. Some of this lubricant is caught in a catch-basin 38 in the form of a recess provided at the end portion of the bearing-bushing 19 proximate to the driven-gear 25 and disposed above the loop-taker shaft 14. The downwardly inclined bottom wall of the catch-basin 38 has an aperture 39 open to the shaft-aperture 19' of the bushing 19, whereby lubricant, deposited in the catch-basin 38, is gravitationally conducted into said shaft-aperture of the bushing or, in other words, is deposited upon the shaft 14. The shaft 14 is peripherally provided with a spiral thread 40 extending from below the bushing-aperture 39 to the end of the shaft 14 remote from the loop-taker 7, the lead of the thread 40 being in a direction to conduct the lubricant toward said end of the shaft. The spiral thread 40 and the surrounding wall of the bore 19' in the bushing 19 constitutes a screw pump which forces the oil into a compression chamber later referred to.

Secured to the outer end of the bushing 19, by screws 41, is a circular flow-control member or block 42 which is located in the outer end of the sleeve 17. The inner face of the block 42 is reduced to form centrally thereof a circular boss 43 extending into the shaft-aperture 19' of the bushing 19; the block-boss 43 being spaced from the end of the shaft 14 to provide a compression chamber 44 therebetween within the bushing 19. Interposed between the block 42 and the bushing 19 is a gasket 45 to provide an oil-tight seal. The block 42 is further provided centrally thereof with a horizontal tubular extension 46 having a longitudinal bore 47, which extension is closely fitted into a bore 48 formed axially in the shaft 14 to extend throughout the length thereof; it being understood that the tubular extension 46 enters the bore 48 at the end of the shaft 14 remote from the loop-taker 7. At its forward end the loop-taker shaft 14 has threaded into it a cartridge 58 in which is secured one end of an oil filtering and conducting wick 59, the main portion of which is located in the bore 48 of the loop-taker shaft. The head end of the cartridge 58 is formed with a transverse screw-driver slot 60, for screwing the cartridge into the shaft 14, and with a central aperture 61 which permits oil, transmitted through the wick 59, to escape from the cartridge and enter a radial duct 62, formed in the body of the loop-taker, for transmission to the raceway 9.

The block 42 is provided with a horizontal duct 49 leading from the compression chamber 44 and disposed substantially parallel to and at the level of the axis of the shaft 14. The duct 49 opens into a horizontally transverse duct 50 provided in the block 42 and sealed at its outer end by one of the block-fastening screws 41 which is larger than and intersects the duct 50 (see Fig. 2).

The block 42 is also provided with a vertically

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stepped opening comprising an upper clearance bore 51, a reduced and threaded bore 52 which serves as a distributing chamber, and a further reduced lower outlet-bore 53. Threaded into the bore 52 is a discharge regulating screw 54 having at its lower end a teat 55 which is substantially smaller in diameter than the bore 52 and which is adapted, when the screw 54 is adjusted inwardly, to fit into and close the upper end of the outlet-bore 53. The bore 52 intersects the bore 47 of the block-extension 46 and also intersects the transverse duct 50 of the block 42, said bore 52 being substantially larger in diameter than the duct 50. The lower end of the outlet-bore 53 is open to a horizontally disposed duct 56 in the block 42, which duct 56 is connected by an aperture in the gasket 45 with a horizontal drain-duct 57 provided in the bushing 19 below the shaft 14 and adapted to discharge lubricant upon the driving spiral gear 26 which is disposed in the lubricant-reservoir 29. The screw 54, which serves as a control valve for determining the amount of lubricant forced into the bore of the loop-taker shaft, may be adjusted by a screw-driver through a hole 1^a in the bed 1 and an aligned hole 17^a in the sleeve 17. The bore 53, duct 56 and duct 57 constitute a by-pass for the oil discharged by the screw pump. With the screw 54 adjusted to its uppermost position, as shown in Fig. 1, the outlet-bore 53 is unobstructed and oil is free to flow from the distributing chamber 52 downwardly through the bore 53 and thence horizontally through the drain-duct 57, over the gear 26 and back to the reservoir 29. Under this condition, little, if any, oil is transmitted to the bore 48 of the loop-taker shaft. As the screw 54 is adjusted inwardly the teat 55 approaches the upper end of the bore 53 and gradually reduces the flow of oil there-through, thus causing more of the oil delivered into the distributing chamber 52 to enter the bore 48 in the loop-taker shaft thereby building up pressure in that bore and consequently increasing the amount of oil transmitted to the loop-taker raceway 9. When the screw 54 is adjusted to the position shown in Fig. 5, the teat 55 completely closes the bore 53 and prevents oil from flowing therethrough. Therefore, in this position of adjustment of the screw 54, the entire output of the screw pump is forced into the bore of the loop-taker, thereby effecting maximum lubrication of the raceway 9.

From the foregoing, it will be apparent that this invention has provided an improved and simplified lubricating means for the bobbin-carrier raceway in a rotary loop-taker, in which the lubricant enters the bore in the loop-taker shaft at the rotation axis thereof and therefore such entry is not opposed by centrifugal force as it is in many lubricating systems in which the oil enters the shaft bore through a radial duct. Likewise it will be apparent that this construction affords conveniently actuated means for varying the amount of lubricant transmitted to the raceway from little, or none, to the entire output of the screw pump comprising the spiral thread 40 and the wall of the shaft aperture 19'.

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

1. In a sewing machine, a rotary shaft having a longitudinal bore; a loop-taker carried by one end of said shaft and having a thread-carrier raceway; lubricant conducting connections between said bore of the shaft and said raceway, said bore being open at the end of said shaft op-

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posite said loop-taker; lubricant-conduit means for delivering oil into the open bore end of said shaft; pump-means connected to supply lubricant into said lubricant-conduit; a lubricant by-pass duct connected with said lubricant-conduit and leading away from the bore of said shaft; and means for regulating the flow of lubricant through said by-pass duct.

2. In a sewing machine, a rotary shaft having a longitudinal bore; a loop-taker carried by one end of said shaft and having a thread-carrier raceway; lubricant conducting connections between the bore of said shaft and said raceway, said bore being open at the end of said shaft remote from said loop-taker; a lubricant compression chamber at said remote end of the loop-taker shaft; pump-means connected to supply lubricant under pressure into said compression chamber; lubricant conducting means connecting said compression chamber with said shaft bore; a lubricant by-pass duct connected with said lubricant conducting means and leading away from the bore of said shaft, and means for regulating the flow of lubricant through said by-pass duct.

3. In a sewing machine, a rotary shaft having a longitudinal bore; bearings in which said shaft is rotatably journaled; a loop-taker carried by one end of said shaft and having a thread-carrier raceway; lubricant conducting connections between said bore of the shaft and said raceway, said bore being open at the end of said shaft remote from said loop-taker; a lubricant compression chamber in one of said bearings; pump-means connected to supply lubricant under pressure into said compression chamber; lubricant conduit means for delivering lubricant from said compression chamber axially into the bore of said loop-taker shaft for transmission to said raceway; a lubricant by-pass duct connected with said lubricant-conduit means and leading away from the bore of said shaft; and a valve for regulating the flow of lubricant through said by-pass duct.

4. In a sewing machine, a frame affording a lubricant reservoir; a sleeve mounted in said frame; a rotary shaft journaled within said sleeve and having a longitudinal bore; a loop-taker carried by one end of said shaft and having a thread-carrier raceway; lubricant conducting connections between said bore of the shaft and said raceway, said bore being open at the end of said shaft remote from said loop-taker; a flow-control member supported within said sleeve at the open end of said shaft; a lubricant compression chamber between said shaft and said member; pump-means connected to force lubricant received from said reservoir into said compression chamber; and valve means provided by said flow-control member for selectively directing all of said lubricant into the bore in said shaft or for returning a portion of it back to said reservoir.

5. In a sewing machine, a frame affording a lubricant reservoir; a sleeve mounted in said frame; bearings supported within said sleeve; a lubricant catch-basin provided by one of said bearings; means to supply lubricant to said catch-basin from said reservoir; a rotary shaft journaled in said bearing and having a longitudinal bore; a loop-taker carried by one end of said shaft and having a thread-carrier raceway; lubricant conducting connections between said bore of the shaft and said raceway, said bore being open at the end of said shaft remote from

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said loop-taker; lubricant conduit means for delivering lubricant from said catch-basin into the open bore end of said shaft; pump-means embodied in said lubricant conduit means for placing said lubricant under pressure; a lubricant by-pass duct connected with said lubricant conduit and leading away from the bore of said shaft; and means for regulating the flow of lubricant through said by-pass duct.

6. In a sewing machine, a frame affording a lubricant reservoir; a rotary drive-shaft journaled in said frame; a loop-taker shaft journaled in said frame above and transversely of said drive-shaft and provided with an axial bore; a gear connection between said drive-shaft and said loop-taker shaft for rotating the latter from the former; a loop-taker carried by one end of said loop-taker shaft and having a thread-carrier raceway; lubricant conducting connections between the bore of said loop-taker shaft and said raceway; means including said gear connection and a pump to take lubricant from said reservoir and deliver it under pressure axially into that end of said loop-taker shaft remote from the loop-taker; a lubricant by-pass duct connected with the intake end of said shaft bore; and means for regulating the flow of lubricant through said by-pass.

7. In a sewing machine, a frame affording a lubricant reservoir; a rotary drive-shaft journaled in said frame; a loop-taker shaft journaled in bearings supported by said frame above and transversely of said drive-shaft, said loop-taker shaft being provided with an axial bore; a catch-basin formed in one of said bearings; a gear connection between said drive shaft and said loop-taker shaft for rotating the latter from the former and for conveying lubricant from said reservoir into said catch-basin; a loop-taker carried by one end of said loop-taker shaft and having a thread-carrier raceway; lubricant conducting connections between the bore of said loop-taker shaft and said raceway; means including a screw pump to receive lubricant from said catch-basin and to transmit it under pressure into that end of said loop-taker shaft remote from the loop-taker; a lubricant by-pass duct connected with the intake end of said shaft bore; and means for regulating the flow of lubricant through said by-pass.

8. In a sewing machine, a frame affording an oil reservoir; a rotary drive shaft journaled lengthwise of said frame; a sleeve mounted in said frame above and transversely of said drive shaft, said sleeve having an opening in its under side; a loop-taker shaft journaled lengthwise within said sleeve and having an axial bore; a loop-taker carried by one end of said loop-taker shaft and having a thread-carrier raceway; lubricant conducting connections between the bore in said loop-taker shaft and said raceway; a drive gear carried by said drive shaft and projecting through the opening in said sleeve, the lower portion of said drive gear contacting oil in said reservoir; a driven gear on said loop-taker shaft in mesh with said driving gear and receiving oil therefrom; ducts to conduct oil thrown off by said driven gear axially into the bore of said loop-taker shaft for transmission to said raceway; and means for by-passing a portion of the oil passing through said ducts.

9. In a sewing machine, a frame affording an oil reservoir; a rotary drive shaft journaled lengthwise of said frame; a sleeve mounted in said frame above and transversely of said drive

shaft, said sleeve having an opening in its under side; a pair of shaft bearings within said sleeve; a loop-taker shaft journaled in said bearings lengthwise of said sleeve and having an axial bore; a catch-basin provided by one of said bearings; a loop-taker carried by one end of said loop-taker shaft and having a thread-carrier raceway; lubricant conducting connections between the bore in said loop-taker shaft and said raceway; a drive gear carried by said drive shaft and projecting through the opening in said sleeve, the lower portion of said drive gear contacting oil in said reservoir; a driven gear on said loop-taker shaft in mesh with said driving gear and receiving oil therefrom and transmitting it to said catch-basin; ducts to conduct oil from said catch-basin axially into the bore of said loop-taker shaft for transmission to said raceway; and means for by-passing a portion of the oil passing through said ducts.

10. In a sewing machine, a frame affording an oil reservoir; a rotary drive shaft journaled lengthwise of said frame; a sleeve mounted in said frame above and transversely of said drive shaft, said sleeve having an opening in its under side; a loop-taker shaft journaled lengthwise within said sleeve and having an axial bore open at one end; a loop-taker carried by one end of said loop-taker shaft and having a thread-carrier raceway; lubricant conducting connections between the bore in said loop-taker shaft and said raceway; a drive gear carried by said drive shaft and projecting through the opening in said sleeve, the lower portion of said drive gear contacting oil in said reservoir; a driven gear on said loop-taker shaft in mesh with said driving gear and receiving oil therefrom; a catch-basin for receiving oil from said driven gear; ducts to conduct oil from said catch-basin to the open end of the

bore of said loop-taker shaft for transmission to said raceway; and adjustable means for by-passing a variable portion of the oil passing through said ducts.

11. In a sewing machine, a frame; a pair of aligned bearings supported by the frame; a rotary shaft journaled in said bearings and having a longitudinal bore open at one end; a loop-taker carried by the other end of said shaft and having a thread-carrier raceway; lubricant conducting connections between said bore and said raceway; a compression chamber formed in one of said bearings at the open end of said shaft; means to supply lubricant under pressure into said chamber; and a flow-control member supported adjacent said one of said bearings and comprising one wall of said compression chamber, said flow-control member also providing a distributing chamber receiving lubricant from said compression chamber, a hollow tube connecting said distributing chamber with the bore in said shaft, a by-pass duct, and a discharge regulating screw threaded into said flow-control member and adjustable to two extreme positions to cause lubricant in said distributing chamber to flow mainly through said by-pass duct or wholly into said shaft bore.

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