May 18, 1948. C. A. KESSLER 2,441,937

SEWING MACHINE LOOP-TAKER MECHANISM

Filed March 16, 1945

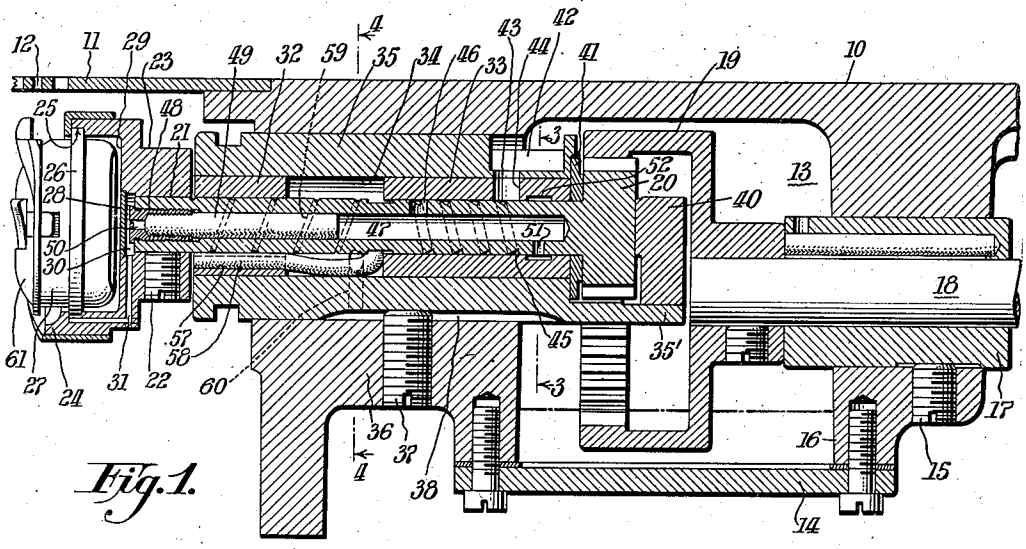


Fig. 1.

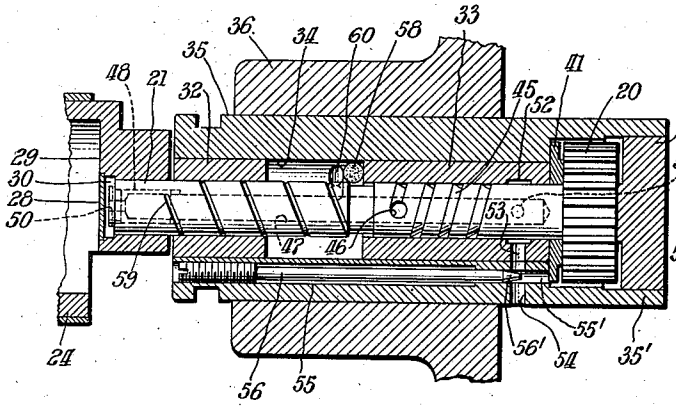


Fig. 2.

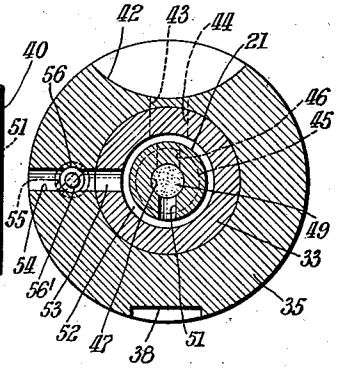


Fig. 3.

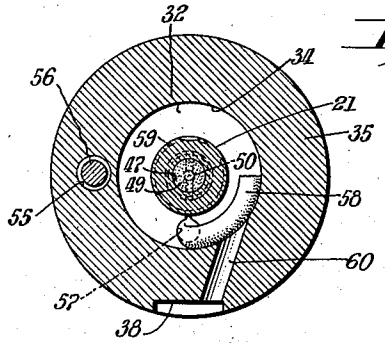


Fig. 4.

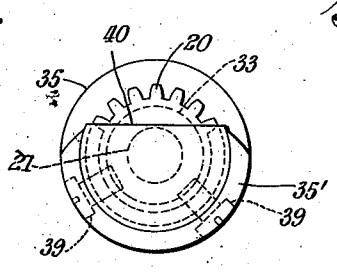


Fig. 5.

Witness:
Godfrey Decina

Inventor
Charles A. Kessler

By William P. Stewart
Attorney

Patented May 18, 1948

2,441,937

UNITED STATES PATENT OFFICE

2,441,937

SEWING MACHINE LOOP-TAKER MECHANISM

Charles A. Kessler, Plainfield, N. J., assignor to The Singer Manufacturing Company, Elizabeth, N. J., a corporation of New Jersey

Application March 16, 1945, Serial No. 583,092

6 Claims. (Cl. 112—256)

1

This invention relates to devices for lubricating the thread-carrier raceways of sewing machine loop-takers and, more particularly, the thread-carrier raceways of loop-takers of the horizontal-axis rotary hook type.

The present invention has for its primary object to provide means for obtaining proper lubrication of the thread-carrier raceway of a sewing machine loop-taker at any speed of operation of the machine.

More specifically, it is an object of this invention to provide improved means insuring delivery to a rotary hook raceway of a quantity of lubricant which may be regulated to meet requirements at different speeds of operation of the machine.

With these and other objects in view, as will hereinafter appear, the invention consists in 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 represents a vertical longitudinal section of a portion of the bed-plate of a sewing machine containing the present improvement. Fig. 2 represents a horizontal longitudinal section of the loop-taker shaft mechanism; the loop-taker being shown as partly broken away. Fig. 3 represents a vertical section of the loop-taker shaft and its bushing; the section being taken substantially on the line 3—3 of Fig. 1. Fig. 4 represents a section similar to Fig. 3, but taken substantially on the line 4—4 of Fig. 1. Fig. 5 is an end elevation of the inner end of the loop-taker shaft bushing and pinion.

The present rotary hook mechanism comprises a modification of that disclosed in the U. S. patent of S. Zonis, No. 2,267,581, December 23, 1941, to which reference may be had for a more complete disclosure of the sewing machine.

The sewing machine in part illustrated in the drawings has a work-supporting bed-plate 10 provided with a throat-plate 11 having a needle-aperture 12. The bed-plate 10 has depending walls formed to provide a gear-casing and oil-reservoir chamber 13 having a bottom closure-plate 14 suitably secured to said walls.

Secured by a screw 15 in a wall 16 of the gear-casing, is a bushing 17 in which is journaled a horizontally disposed rotary actuating shaft 18. The shaft 18 may be rotated by any suitable driving connections therewith; for example, as shown in the prior Patent No. 2,267,581 hereinbefore mentioned. Secured to the end of the shaft

2

18 within the oil-reservoir chamber 13 is the hub of an internal driving gear 19.

In mesh with the teeth of the internal gear 19 is a pinion 20 having its horizontal axis of rotation preferably lying in a vertical plane containing the axis of rotation of the driving shaft 18. The ratio of the internal gear 19 and pinion 20 is such that said pinion rotates twice for each rotation of the gear 19. The pinion 20, which is also disposed in the oil-reservoir chamber 13, is carried by one end of a horizontally disposed loop-taker shaft 21 and is preferably integral with said shaft. Secured by screws, as 22, upon the opposite end of the shaft 21 is the hub 23 of a rotary-hook form of loop-taker 24. The loop-taker 24 has the usual cup-shaped body which is provided in its cylindrical side wall with a raceway 25 for the peripheral bearing-rib 26 of a thread-carrier 27 journaled in the loop-taker; said thread-carrier 27 being restrained, in any usual or suitable manner, against rotation with the loop-taker. The loop-taker shaft aperture in the hub 23 of the loop-taker is closed by a disk 28 set into the bottom wall 29 of the loop-taker; the loop-taker being, as usual, mounted upon the shaft 21 so that the end of said shaft is spaced from the disk, whereby an oil-collecting recess 30 is provided in the loop-taker. Connecting the oil-collecting recess 30 and the raceway 25 is an angular lubricant-duct 31 provided in the body of the loop-taker.

The loop-taker shaft 21 is rotatably journaled in two horizontally spaced bearing-sleeves 32 and 33, which sleeves are suitably secured in the longitudinal opening 34 of a bushing 35. The sleeve 32 forms a bearing for the shaft 21 adjacent the loop-taker 24 and the sleeve 33 forms a bearing for said shaft adjacent the pinion 20; the spacing of said sleeves providing a lubricant-collecting cavity in the bushing-opening 34 between the sleeves. The bushing 35 is secured in a horizontal opening, provided in the wall 36 of the gear-casing, by a screw 37 which enters a groove 38 formed in the outer face of the bushing to extend lengthwise thereof. The described construction provides for assembly of the loop-taker shaft 21 and its bearing-sleeves 32, 33 in the bushing 35 as a unit construction, as well as for axial adjustment of the loop-taker 24 by endwise adjustment of the bushing 35 in the frame-wall 36.

One end portion of the bushing 35, extending into the oil-reservoir 13, is partly cut away to form a segmental extension 35' which partly surrounds the pinion 20 and affords the necessary clearance for engagement of the driving-gear 19

with the pinion 20. Secured by screws 39 in the bushing-extension 35' is a segmental block 40 which serves to hold the loop-taker shaft 21 against endwise movement in its bearings; a washer 41 being preferably interposed between the pinion 20 and the bearing-sleeve 33.

The bushing 35 is provided in its upper face with an oil-collecting cavity 42 which, in part, is disposed in the oil-reservoir chamber 13. The cavity 42 is supplied with oil, during the operation of the machine, by the oil-throwing action of the driving-gear 19 which dips into a supply of oil in the chamber 13. Leading downwardly from the bottom wall of the oil-collecting cavity 42 is an inlet oil-duct 43 provided in the bushing 35 and disposed in vertical alinement with an inlet oil-duct 44 provided radially in the bearing-sleeve 33.

The loop-taker shaft 21 is exteriorly provided, in the portion of the shaft within the sleeve 33, with a spiral groove 45 which terminates at one end in a radial aperture 46 of the shaft 21. The lead of the spiral groove 45 is such as to feed oil from the sleeve-duct 44 to the inlet shaft-aperture 46 upon operation of the machine. Furthermore, the pitch of the spiral groove 45 is preferably sufficiently steep to insure that oil is forced into the shaft-aperture 46 under a pressure which is greater than the centrifugal force action which would oppose entrance of oil into the shaft-aperture 46. The shaft 21 has a longitudinal bore 47 extending from the loop-taker end of the shaft to a point adjacent the pinion 20, and the shaft-aperture 46 communicates with the shaft-bore 47 intermediate the ends of said bore. It will therefore be understood that during the operation of the machine, oil is not only fed or pumped under pressure into the shaft bore 47, but oil pressure is also built up in said shaft bore.

Threaded into the loop-taker end of the shaft 21 is a hollow cartridge 48 having its head end provided with a screw-driver slot. The cartridge 48 is internally threaded to retain therein one end of an oil-filtering wick 49 which extends a substantial distance into the shaft-bore 47. At the head end of the cartridge, the internally threaded portion thereof terminates in an axial cartridge-aperture 50 of reduced size and which is open to the oil-collecting recess 30 of the loop-taker.

Adjacent the inner end of the shaft-bore 47 and at the side of the sleeve oil-duct 44 opposite the radial shaft-aperture 46, the shaft 21 is radially provided with an outlet shaft-aperture 51 which connects the shaft-bore 47 with an annular groove 52 provided internally of the bearing-sleeve 33. As illustrated in Figs. 2 and 3 of the drawings, the bearing-sleeve 33 is radially provided with a discharge or outlet duct 53 extending horizontally from the sleeve-groove 52 and preferably disposed substantially at the level of the shaft-bore 47. The bushing 35 is also radially provided with a discharge or outlet duct 54 communicating with the duct 53 of the bearing sleeve; said duct 54 being formed in the inner end portion of the bushing 35 which extends into the oil-reservoir chamber 13. The shaft-aperture 51, sleeve-groove 52 and alined outlet ducts 53 and 54 together comprise a pressure-relief port for the oil pumped into the shaft-bore 47 by the spiral groove 45 of the shaft.

In order to provide means for regulating the effectiveness of the described pressure-relief port, the bushing 35 is longitudinally provided with a

stepped bore 55 having a reduced portion 55' thereof intersecting the bushing-duct 54. Threaded into the bushing-bore 55, for endwise adjustment, is a shouldered valve-rod 56 disposed substantially parallel to the loop-taker shaft 21 and having its inner end conically shaped to provide a needle-valve 56'. By endwise adjustment of the valve-rod 56, the position of the needle valve 56' may be regulated to vary the size of the pressure-relief duct, or completely to close said duct.

The shaft-bearing face of the sleeve 33 is, of course, directly lubricated by the oil supplied through the sleeve oil-duct 44 and also, in part, by the oil discharge through the radial shaft-aperture 51. In order to insure adequate lubrication of the shaft-bearing face of the sleeve 32, said sleeve is provided in its inner face with a groove 57 extending lengthwise of the sleeve. Lying in the groove 57 is one end portion of a wick 58, of which the other end extends into contact with the inner bottom face of the bushing 35 in the bushing-opening 34 between the sleeves 32 and 33. Some excess oil fed by the spiral groove 45 will be discharged into the bushing-opening 34 between the bearing-sleeve 32, 33. In this manner, oil is supplied to the wick 58 and is fed thereby to the bearing-face of the sleeve 32. The portion of the shaft 21 within the sleeve 32 is exteriorly formed with a spiral groove 59 having a lead such as to feed excess oil back into the bushing-opening 34 between the bearing-sleeves.

The quantity of oil which may collect in the bushing-opening 34 is limited by the provision in the bushing 35 of a drain-aperture 60 having its inlet end disposed slightly above the level of the lowest portion of the opening 34. The aperture 60 is connected with the external bushing-groove 38, of which one end extends into the oil-reservoir chamber 13.

From the foregoing description, it will be understood that, during the operation of the machine, oil is continuously pumped under pressure into the loop-taker shaft bore 47 and that the oil is pressure-fed through the oil-filtering wick 49 and through the restricted cartridge-aperture 50 into the loop-taker recess 30, from which recess the oil is delivered through the lubricant-duct 31 to the raceway 25 of the loop-taker. By endwise adjustment of the valve-rod 56, the pressure of the oil within the loop-taker shaft bore 47 may be regulated to a nicety to meet the requirements of different operating speeds and different kinds of work. To provide for access to the head end of the valve-rod 56, it is simply necessary to withdraw the thread-case 61 from its carrier 27 which is journaled in the loop-taker; the usual construction of the bottom walls of the thread-case carrier 27 and of the loop-taker 24 being such as to permit of use of a screw-driver for adjusting the valve-rod. The present construction, therefore, provides for adjustment of the oil-pressure in the shaft-bore without removal of the loop-taker from the shaft 21.

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

1. In a sewing machine, a rotary loop-taker having a thread-carrier raceway, a loop-taker carrying shaft provided with a longitudinal bore and with radial inlet and outlet apertures in the wall thereof and open to said bore, means rendered effective upon rotation of said shaft for supplying lubricant under pressure through said inlet aperture into the bore of said shaft, lubri-

cant-conducting means connecting the bore of said shaft and said raceway, a pressure-relief duct connected with said outlet aperture of the shaft, and manually adjustable means for varying the size of said pressure-relief duct.

2. In a sewing machine, a rotary shaft having a longitudinal bore and having inlet and outlet apertures in the wall thereof and open to said bore, a loop-taker carried by said shaft and having a thread-carrier raceway, lubricant-conducting means connecting the bore of said shaft and said raceway, a lubricant-supply reservoir, pump means effective upon rotation of said shaft for supplying lubricant under pressure through said inlet aperture into said bore of the shaft, and adjustable means connected with said reservoir for bleeding lubricant from said bore of the shaft through said outlet aperture.

3. In a sewing machine, a rotary loop-taker having a thread-carrier raceway, a rotary loop-taker carrying shaft provided with a longitudinal bore and with inlet and outlet apertures in the wall thereof and connected with said bore in spaced relation to said loop-taker, lubricant-conducting connections with said bore of the shaft for directing lubricant to said raceway, a sleeve embracing the portion of said shaft containing said inlet aperture, one of the proximate faces of said shaft and said sleeve being provided with a spiral groove leading to said inlet-aperture of the shaft, means effective upon rotation of said shaft for supplying lubricant to said spiral groove, and adjustable means for regulating the flow of lubricant through said outlet aperture.

4. A loop-taker assembly unit for sewing machines, comprising, a bushing provided with lubricant-inlet and lubricant-outlet apertures, a sleeve secured in said bushing and provided with lubricant-inlet and lubricant-outlet apertures communicating with the corresponding apertures of said bushing, a shaft rotatably journaled in said sleeve and provided with a longitudinal bore and with radial lubricant-inlet and lubricant-outlet apertures communicating with the corresponding apertures of said sleeve, a loop-taker carried by one end of said shaft and provided with a thread-carrier raceway having lubricant-conducting connections with said bore of the shaft, one of the proximate faces of said shaft and sleeve being provided with a spiral groove rendered effective upon rotation of said shaft to pump lubricant from the lubricant-inlet aperture of said sleeve and into the lubricant-aperture of said shaft, and valve means for regulating the flow of lubricant through the communicating lubricant-outlet apertures of said shaft, sleeve and bushing.

5. A loop-taker assembly unit for sewing machines, comprising, a bushing provided with lubricant-inlet and lubricant-outlet apertures, a sleeve secured in said bushing and provided with lubricant-inlet and lubricant-outlet apertures communicating with the corresponding apertures of said bushing, a shaft rotatably journaled in said sleeve and provided with a longitudinal bore closed at one end and having radial lubricant-inlet and lubricant-outlet apertures communicating with the corresponding apertures of said sleeve, said lubricant outlet being located nearer to the closed end of said bore than is said lubricant-inlet, a loop-taker carried by the end of said shaft remote from the closed end of said bore and said loop-taker being provided with a thread-carrier raceway having lubricant-conducting connections with said bore of the shaft, one of the proximate faces of said shaft and sleeve being provided with a spiral groove having a direction of lead to pump lubricant from the lubricant-inlet aperture of said sleeve and into the lubricant-aperture of said shaft, and a valve-rod adjustably carried by said bushing in parallel relation with said shaft, said valve-rod being accessible for adjustment at the loop-taker end of said bushing and being adapted to extend into said outlet aperture of the bushing.

6. In a sewing machine having a bed-plate provided with a lubricant-reservoir, in combination, a horizontally disposed bushing secured in said bed-plate and provided within said reservoir with lubricant-inlet and lubricant-outlet ducts, a pair of bearing-sleeves disposed in and spaced from each other lengthwise of said bushing, thereby providing a lubricant-collecting cavity in said bushing between said sleeves, a lubricant-drainage duct leading from said cavity and terminating in said reservoir, a shaft rotatably journaled in said bearing-sleeves and provided with a longitudinal bore and with radial lubricant-inlet and lubricant-outlet apertures, a first one of said sleeves having radial inlet and outlet apertures connecting with the corresponding ducts of said bushing, and said outlet aperture of the sleeve connecting with the outlet aperture of said shaft, a loop-taker carried by said shaft and having a thread-carrier raceway, lubricant-conducting connections between the bore of said shaft and said raceway, said shaft being provided within said first one of said sleeves with a spiral groove leading from said inlet aperture of the sleeve to said inlet aperture of the shaft, means rendered effective upon rotation of said shaft for supplying lubricant from said reservoir into said inlet duct of the bushing, means for supplying lubricant from said cavity of the bushing to the shaft bearing face of the second one of said bearing-sleeves, and valve means carried by said bushing for regulating the flow of lubricant through the bushing outlet duct to said reservoir.

CHARLES A. KESSLER.

REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
1,230,461	Brush	June 19, 1917
2,098,904	Waterman	Nov. 9, 1937
2,267,581	Zonis	Dec. 23, 1941
2,283,869	Graesser	May 19, 1942
2,300,388	Parry	Oct. 27, 1942
2,329,487	Sauer	Sept. 14, 1943