Nov. 6, 1956 E. W. JOHNSON ET AL 2,769,418

LUBRICATING DEVICES FOR SEWING MACHINES

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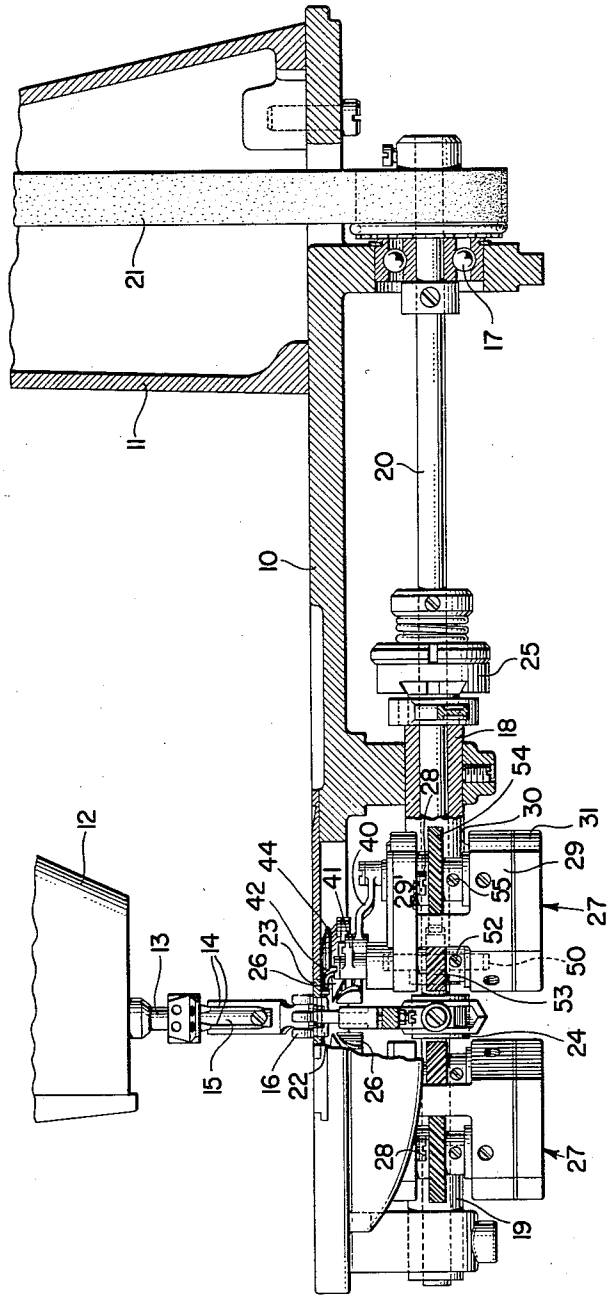


Fig. 1.

WITNESS

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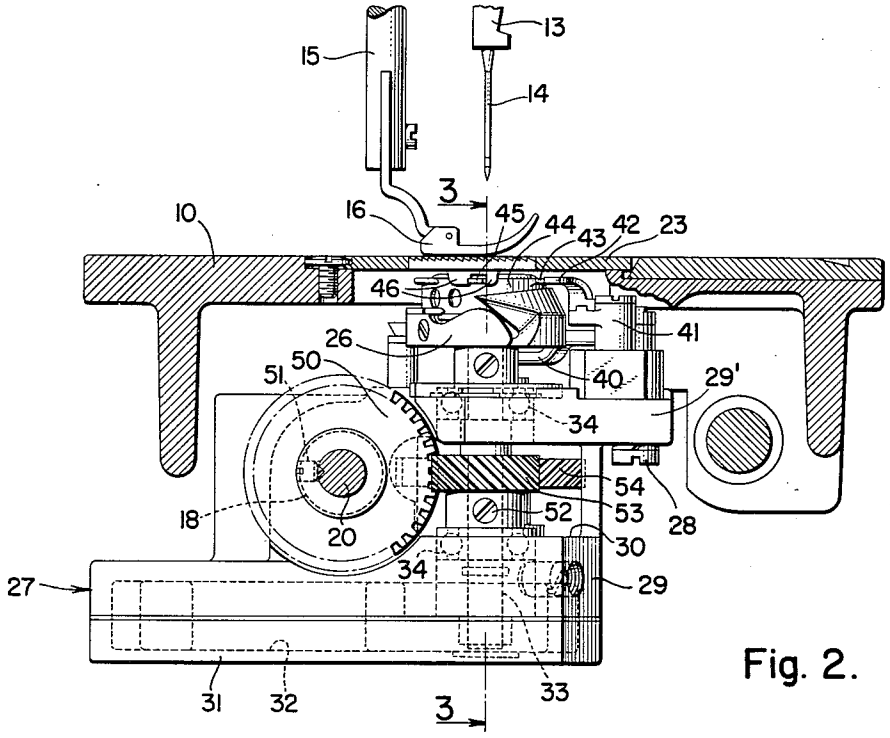


Fig. 2.

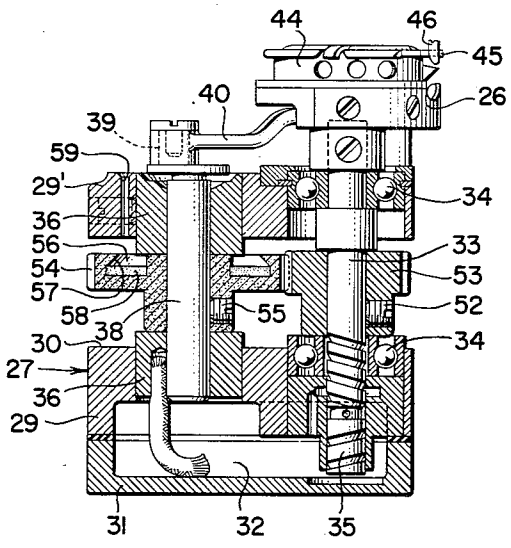


Fig. 3.

WITNESS

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LUBRICATING DEVICES FOR SEWING MACHINES

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4 Claims. (Cl. 112—256)

This invention relates to lubrication of sewing machines and, more particularly, to a means for properly lubricating the drive gearing of a sewing machine loop taker.

The lubricating means of the present invention has an advantageous application to the drive gearing associated with a vertical axis rotary hook of a lock stitch sewing machine of the type employing a hook-supporting bracket or saddle which is also adapted to carry a bobbin case opener mechanism that is driven in timed relation with the rotary hook.

Sewing speeds in excess of 4,000 stitches per minute are demanded of modern sewing machines of this type. As is well known in the art of lock-stitch sewing, the loop-taker or rotary hook must be driven two revolutions for each reciprocation of the needle, so that hook speed demands approaching 10,000 R. P. M. are not uncommon in vertical axis rotary hook machines.

The problem of wear in the drive gearing for such high-speed hooks is more pronounced in view of the frequent starting and stopping incident to normal sewing machine operation. Moreover, a relatively severe loading is imposed upon the gears by the bobbin case opening mechanism which must be driven by the rotary hook gear drive.

It is an object of this invention to provide a simple and efficient lubricating system for the drive gearing of a sewing machine loop taker.

It is a further object of this invention to provide a lubricating means of the above character, whereby a continuous flow of lubricant is insured directly to the wearing surfaces of the gear teeth.

It is also an object of this invention to provide a lubricating system for the drive gearing of a sewing machine loop taker in which the dissipation of lubricant is carefully controlled to prevent lubricant from being thrown by the gearing onto the work or the sewing machine operator.

With the above and other objects and advantages in view as will hereinafter appear, this invention comprises the devices, combinations and arrangements of parts hereinafter described and illustrated in the accompanying drawings of a preferred embodiment in which:

Fig. 1 is a side elevational view of a portion of a sewing machine, partly in vertical section, and having my invention applied thereto;

Fig. 2 is an enlarged end elevational view of the sewing machine of Fig. 1 with the machine frame being illustrated in vertical section to expose the rotary hook support or saddle; and

Fig. 3 represents a vertical section through the hook saddle taken substantially along line 3—3 of Fig. 2.

Referring to Fig. 1, the gear drive for a rotary hook in which the lubricating means of the present invention is embodied is shown as applied to a two-needle lock-stitch sewing machine. The machine comprises a conventional frame including a work-supporting bed 10, a vertical standard 11 rising from the bed and a sewing head 12 supported by said standard and overhanging said bed. Journaled for vertical reciprocation in the sewing head is a needle-bar 13 which carries two needles 14—14 spaced apart lengthwise of the bed. The needle-bar is reciprocated in the usual fashion by suitable mechanism (not shown) carried in the upper portion of the machine frame. Also journaled vertically in the sewing head is a presser-bar 15 which is spring biased downwardly and to which is affixed a work-engaging presser-foot 16.

Journaled beneath the bed 10 in a ball bearing 17 and sleeve bushings 18 and 19 is a bed shaft 20 which is driven, as by a belt 21, in one-to-one relation with the needle-bar actuating mechanism in the upper portion of the frame i. e. belt 21 imparts one revolution to bed shaft 20 for each cycle of needle reciprocation. A conventional four-motion work-feeding mechanism is provided including a feed-dog 22 which is disposed to work in opposition to the presser-foot through slots formed in a throat plate 23 carried on the bed. Motion is imparted to the feed-dog in a manner well known in the art by means of a feed-lift eccentric 24 and an adjustable feed-advance eccentric 25, both carried by the bed shaft 20.

Cooperating with the spaced needles 14—14 in the formation of two spaced lines of lock stitches are two vertical axis rotary hooks 26—26 each carried in a support bracket or saddle 27 disposed one at each side of the feed-dog 22. Each of the saddles 27 is clamped to a respective one of the bed shaft bushings 18, 19 and each is also secured by means of a fastening screw 28 which is threaded into the underside of the bed. Since both of the hook saddles and the driving connections therein are similar save that they are of the opposite hand, a description of one will apply to both and will be sufficient for an understanding of the present invention.

Referring more particularly to Figs. 2 and 3, the hook saddle 27 is formed at one side of the bed shaft 20 with a horizontally extending opening 30 which divides the saddle into vertically spaced portions 29 and 29'. The bottom of the sadddle 27 is recessed and closed by a bottom cover plate 31 to provide a reservoir 32 from which the rotary hook 26 is lubricated. The hook 26 is secured for rotation with a hook shaft 33 which is journaled vertically in the saddle 27 in anti-friction bearings 34—34, one in each of the spaced portions 29, 29' so that the hook shaft spans the horizontal opening 30 of the saddle and depends into the reservoir 32.

At its lower extremity the hook shaft is formed with a screw pump indicated as 35 which is adapted to force lubricant from the reservoir 32 through a bore in the hook shaft to the hook.

Journaled vertically in the hook saddle in bushings 36—36 is a bobbin case opener shaft 38 which spans the horizontal opening 30 in the saddle and is parallel to the hook shaft 33. At its upper extremity, the bobbin case opener shaft is provided with a crank pin 39 which is embraced by a pitman 40 which in turn is pivotally connected to a bell-crank lever 41 supported atop the hook saddle. The bell-crank lever 41 carries a bobbin case opening finger 42 which is adapted upon rotation of the bobbin case opener shaft 38 periodically to engage a lug 43 extending from a bobbin case 44 about which the hook 26 rotates. Rotation of the bobbin case with the hook is prevented by a rotation-restraining finger 45 projecting from the bobbin case, which finger is confined between spaced stop lugs 46—46 which depend from the throat plate 23. The action of the bobbin case opening finger, as is well known in the art, is to open a gap between the rotation-restraining finger 45 and the stop lugs 46—46 for the free passage of the needle thread therebetween during each cycle of stitch formation.

Both the hook shaft and the bobbin case opener shaft are driven from the bed shaft 20 by means of a helical gear 50 which is made fast to the bed shaft by means of a set screw 51. Secured to the hook shaft 33 by set screws

52 and disposed within the horizontal opening 30 of the hook saddle is a helical pinion 53 which meshes with the gear 50. The pinion 53 is made half the size of the gear 50 so that the hook will partake of two revolutions for each cycle of needle reciprocation. The bobbin case opener shaft is driven at half the speed of the hook shaft by means of a gear 54 which is secured to the opener shaft 38 by means of a set screw 55 and is disposed in mesh with the hook driving pinion 53.

The gear train 50, 53 and 54 is exposed, the gears 53 and 54 being disposed in the horizontal opening 30 in the hook saddle so that convenient access may be had to them to facilitate timing adjustment of the hook and of the bobbin case opener mechanism. These timing adjustments may be made by loosening the set screws 52 and 55 and angularly adjusting the hook shaft 33 or bobbin case opener shaft 38 with respect to their respective driving gears 53 and 54. The main driving gear 50 is also exposed so that access may be had to the set screw 51 by which the position of the gear 50 may be shifted along the bed shaft 20. Such adjustment is necessary whenever it is desired to shift the hook saddle bodily as to accommodate a different lateral spacing of the needles 14—14.

Since the gears are exposed and prone to collect lint and dust incident to the operation of the sewing machine, communication of the gears with the lubricant reservoir 32 for the hook is disadvantageous. Accordingly, the construction of the present invention provides for an independent supply of lubricant to the gear train 50, 53 and 54 in which the bobbin case opener gear 54 is formed and adapted to provide a lubricant reservoir for the gear train.

To this end, gear 54 is constructed of a porous material, preferably of a sintered metal product through which it is possible to maintain a flow of lubricant. An annular recess 56 is formed in the upper face of gear 54 with the outer peripheral sidewall of the recess being preferably undercut as shown at 57 in Fig. 3. Lubricant of the proper type for the gear train may be introduced periodically to a pad or wick 58 disposed in the recess 56 via an oil hole 59 which is formed vertically in the hook saddle portion 29' and terminates above the recess 56.

Under centrifugal action during operation of the sewing machine, lubricant from the recess 56 is dispelled radially through the porous gear 54 directly to the teeth thereof. This lubricant is picked up by the teeth of the hook driving pinion 53 which is in mesh with gear 54 and is in turn transferred to the teeth of the main driving gear 50 in mesh with the pinion 53. The pinion 53 and the main driving gear 50 are preferably constructed of conventional nonporous material.

The porosity of the bobbin case opener gear provides for a nice metering action so that upon supplying lubricant to the recess 56, the flow of the lubricant to the gear teeth continues over a relatively long period of time thus supplying a prolonged flow of lubricant directly to the wearing surfaces of the gear teeth. This metering action of the porous gear 54 is also important since it minimizes objectionable spilling or throwing off of lubricant onto the work being stitched or onto the machine operator.

The present invention, therefore, provides a simple and economical system for providing lubrication in an ideal manner to the drive gearing of a sewing machine loop taker.

Having thus described the nature of the invention, what we claim herein is:

1. In a sewing machine, a loop-taker supporting saddle, an actuating shaft journaled for rotation in said machine, a driven shaft journaled for rotation in said saddle, a train of gears connecting said actuating shaft to said driven shaft, at least one of said gears being rotatable about a substantially vertical axis and being formed of a porous material capable of conducting lubricant therethrough, an upwardly open lubricant containing recess formed in said porous gear, and means in said saddle for delivering lubricant into said recess.

2. In a sewing machine of the type having an actuating shaft and a loop taker supporting saddle, a pair of shafts journaled in said hook saddle, a continuous train of gears operatively interconnecting said shafts, one of said gears being constructed of a porous material and being formed in one face with an annular recess defining a lubricant reservoir, and means formed in said hook saddle for directing a supply of lubricant into the recess of said porous gear.

3. In a sewing machine of the type having an actuating shaft and a loop taker supporting saddle, a pair of shafts carried by said hook saddle, at least one of said last mentioned pair of shafts being journaled in said hook saddle on a substantially vertical axis, a continuous train of meshing gears operatively interconnecting said pair of shafts with said actuating shaft including a gear of porous material capable of conducting lubricant therethrough being secured for rotation with said vertical axis shaft, an annular recess formed in the top side of said porous gear, and means for directing a supply of lubricant into the recess of said porous gear.

4. In a sewing machine of the type having an actuating shaft, a loop taker supporting saddle extending across said actuating shaft, said saddle having vertically spaced projections disposed at one side of said actuating shaft, a hook shaft and a bobbin case carrier opener shaft being journaled vertically in said projections, a continuous train of meshing gears operatively interconnecting said shafts including a gear of porous material capable of conducting lubricant therethrough, said porous gear being disposed between the projections of said hook saddle and secured for rotation with one of said shafts journaled vertically therein, an annular recess formed in the top side of said porous gear, the outer peripheral sidewall of said annular recess being undercut, and means formed in the hook saddle projection above said porous gear for directing lubricant into said annular recess.

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