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H. RITTER ET AL

2,715,553

SEWING MACHINE LUBRICATION

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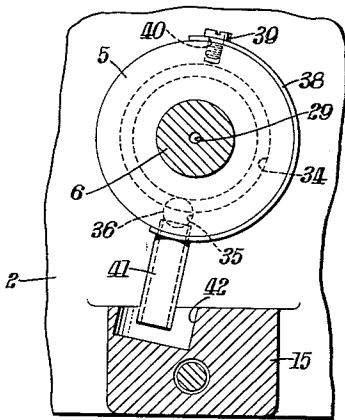


Fig. 2.

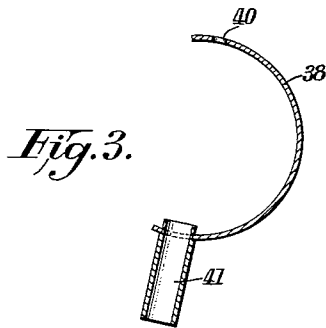


Fig. 3.

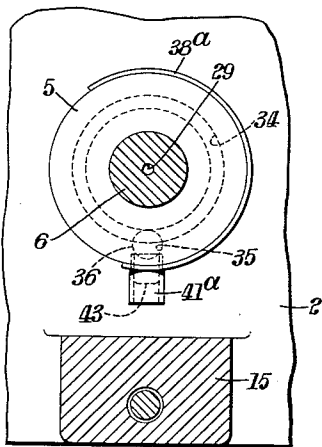


Fig. 4.

WITNESS -

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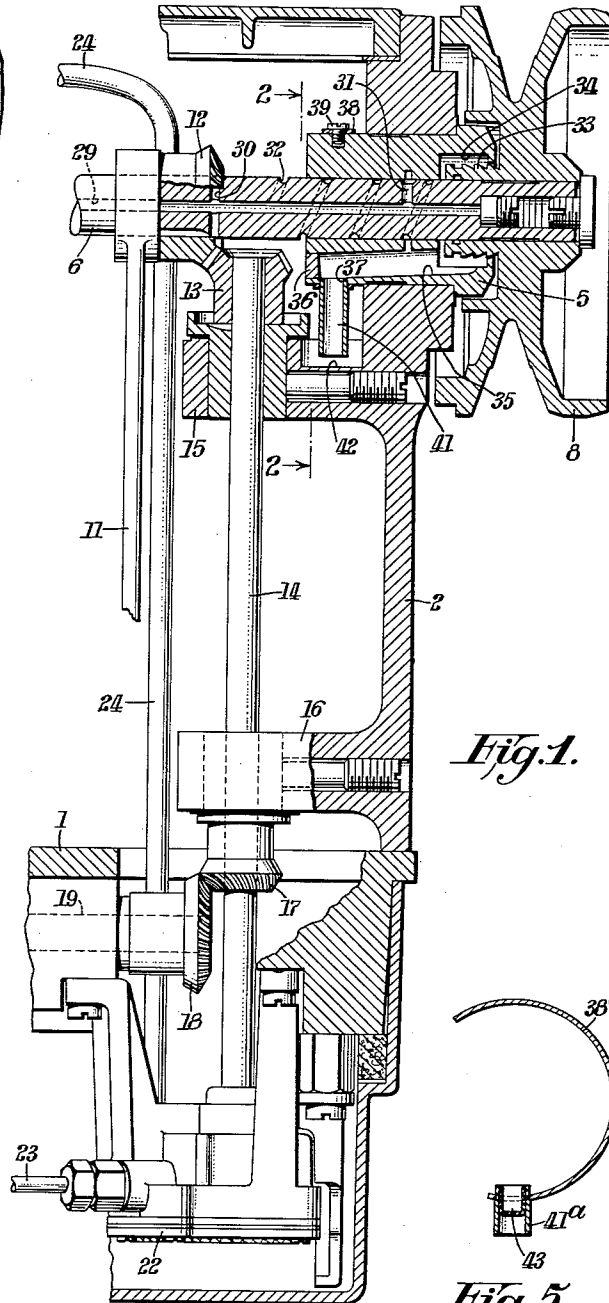


Fig. 1.

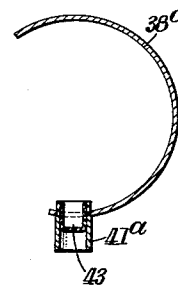


Fig. 5.

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SEWING MACHINE LUBRICATION

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6 Claims. (Cl. 308—36.1)

The present invention relates to lubrication of a sewing machine, and has for a primary object to provide a means for preventing the escape of oil or oil vapors from the interior of the frame of the machine.

It has been found that during operation of those high speed sewing machines which are of the type provided with an oil return duct through the arm-shaft bearing-bushing adjacent the hand wheel, a vacuum is developed, presumably because the hand wheel functions as an air pump, that tends to draw the oil-laden air from the internal portions of the machine through the oil-return duct. It is a specific object of the present invention to provide a vapor-lock in such a machine that will overcome the above-noted defect.

Having in mind these and other objects that will be evident from an understanding of this disclosure, a presently preferred embodiment of the invention is herein-after set forth in such detail as to enable those skilled in the art to readily understand the function, operation, construction, and advantages of it, when read in conjunction with the accompanying drawings, in which:

Fig. 1 is a fragmentary vertical section of a machine having a vapor lock, made in accordance with the present invention, incorporated therein.

Fig. 2 is a fragmentary vertical section taken substantially along the line 2—2 of Fig. 1.

Fig. 3 is a section view of a vapor lock device per se that is made in accordance with the present invention.

Fig. 4 is a view similar to Fig. 2 but having a modified vapor lock device mounted thereon.

Fig. 5 is a view similar to Fig. 3 of the modification included in Fig. 4.

The present invention is illustrated as embodied in a chain-stitch sewing machine similar to that disclosed in the U. S. patent of Clayton, No. 2,345,327, as modified in accordance with the disclosure of the U. S. patent of Clayton, No. 2,394,510, to which patents reference is made for a more complete understanding of the details of the machine illustrated. Since these details do not form any part of the present invention it is not deemed necessary to expand this disclosure in relation thereto.

That portion of the sewing machine illustrated in the drawings includes a bed 1 having a standard 2 rising therefrom, which standard supports a bracket-arm (not shown) overhanging the bed 1 in the usual manner. Journalled in the bracket-arm and upper portion of the standard in suitable bearings, including the bushing 5, is a main or arm-shaft 6. The bushing 5 is inserted into a circular aperture in the end of the bracket-arm. Mounted upon that end of the shaft 6 that projects through the end of the bracket-arm is a hand-wheel 8, and mounted upon the shaft 6 inwardly of the bushing 5 is a gear 12 adapted to mesh with a gear 13 secured upon the upper end of a vertically disposed shaft 14 journalled in suitable bearing bosses 15 and 16 in the standard 2. A gear 17 is carried intermediate the ends of the shaft 14, which gear meshes with a gear 18 on a bed-shaft 19. At its lower end, the shaft 14 is opera-

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tively connected to an oil pump 22. As will be understood by reference to the above-mentioned U. S. patent of Clayton, No. 2,345,327, the oil-pump 22 is normally immersed in oil and is adapted to force the lubricant to the bed mechanism of the machine through the duct 23, and to the arm mechanisms through the duct 24.

The lubrication system for the arm mechanisms of the machine includes suitable connections which lead the oil from the duct 24 to a longitudinal bore 29 formed centrally in the shaft 6. Lubricating oil delivered by the pump 22 to the bore 29 through the above described connections, travels lengthwise of the shaft 6.

That portion of the shaft 6 illustrated in Fig. 1 is provided with radial bores 30 and 31 that communicate with the bore 29 and serve to conduct lubricant to the periphery of the shaft 6. The bore 30 opens at the periphery of the shaft at the gear 12 and is partially covered thereby. In operation the oil that issues from the bore 30 lubricates the gear 12 and its mating gear 13, and by the action of these gears, the oil is churned into a mist which serves to bathe all the adjacent machine elements in an oil mist, and thus, effectively lubricates them.

The bore 31 delivers oil to that end of the bushing 5 nearest the hand-wheel 8, and the shaft 6 is formed with a spiral groove 32 that conducts the oil along the shaft and back into the bracket-arm, thus lubricating the bearing surface between the shaft 6 and bushing 5. An oil-sling 33 is formed upon the hand-wheel 8 that projects into a recess 34 formed in the bearing 5, which prevents any of the oil from escaping along the shaft 6. The oil that is thrown against the walls of the recess 34 runs down and out an inclined conduit or bore 35, formed in the bushing 5, and back into the interior of the bracket-arm.

In prior machines of the type above set forth, the oil-return bore 35 has been formed to open directly into the internal portion of the bracket-arm. As set forth above, the actuating mechanism within the bracket-arm, including the gears 12 and 13 creates a mist of oil. In practice, it has been found that this air which is laden with the oil mist or vapor has been drawn or carried out of the interior of the machine through the bore 35, presumably by a suction caused by the very high speeds of rotation of the hand-wheel 8 which sets the adjacent air into rotation causing centrifugal force to throw it outwardly, or by the chimney effect through the standard 2 caused by heating of the air by the motion of the machine-elements and the consequent rising thereof, which air escapes through the oil-return bore 35. The oil removed from the machine is usually deposited upon the hand-wheel 8 forming droplets which are thrown outwardly by centrifugal force. This results, of course, in a loss of oil, and also in a very undesirable condition of having oil thrown off by the hand-wheel 8.

To eliminate the above-noted defect, in accordance with the present invention, the machine is provided with a vapor-lock that prevents the oil-laden air from being drawn out of the interior of the bracket-arm, but does not prevent the return through the duct 35 of the oil thrown off by the oil-sling 33. In the embodiment of the present invention illustrated in Figs. 1, 2 and 3, the vapor-lock consists of a liquid seal. The inner end of the bore 35 is closed by a plug 36, and a bore 37 is formed radially in the bushing 5. A thin sheet-metal segmental strap 38 is secured to the outer periphery of the bushing 5 by means of a screw 39 adapted to pass through an aperture 40 in the strap and to be screwed into the bushing 5. At its end opposite the aperture 40, the strap 38 carries a depending tube 41, fitted into an aperture in the strap. The lower portion of the tube extends into a well 42 formed in the bearing boss 15 and the upper portion is fitted directly into the radial bore 37.

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During normal operation of the sewing machine, the oil that is thrown off by the gears 12 and 13 maintains the well 42 full. Thus, the lower free end of the tube 41 is always immersed in oil and will function in the normal manner as a liquid-seal vapor-lock, i. e., the oil-laden air cannot escape through the bore 35, but the oil thrown off by the sling 33 can be returned through the bore 35.

In Figs. 4 and 5 there is illustrated a modification of the vapor-lock. In this device there is a strap 38a that is spring-like in character and which is formed substantially greater than semi-circular so that it can be clamped to the bushing 5. The tube 41a carried by the strap 38a is shorter than the tube 41 and does not seat in a well such as the well 42 in the boss 15. Instead, there is provided a wire mesh screen 43 that is carried internally of the tube 41a. The modification as illustrated in Figs. 4 and 5 functions to prevent the oil vapors and mist from passing into the duct 35 by reason of the fact that they cannot pass through the screen 43 because the screen holes will normally be closed by droplets of oil which form a liquid seal over the screen enhanced by the constant return of oil through the bore 35.

It will be understood by those skilled in the art that the present invention is equally applicable to a lock-stitch type sewing machine as to a chain-stitch type machine.

Numerous other 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 my invention. All such modifications which do not depart from the spirit of my invention are intended to be included within the scope of the appended claims.

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

1. In a sewing machine having a frame, a bushing extending through a wall of the frame, a rotary shaft journaled in the bushing and having a free end extending through the bushing to the exterior of the frame, means for supplying lubricant to the bearing surface between said shaft and bushing, means for collecting the lubricant that escapes from the bearing surface adjacent the free end of the shaft, a lubricant-return conduit formed as a bore in the bushing leading from the collecting means to the interior of the frame, said bore terminating in a portion radially disposed with respect to the bushing, a strap secured to the bushing and carrying a tube communicating with the radially disposed portion of said bore, and a liquid-seal associated with said tube for preventing lubricant-laden air within the frame from entering the conduit.

2. In a sewing machine having a frame, a bushing extending through a wall of the frame, a rotary shaft journaled in the bushing and having a free end extending through the bushing to the exterior of the frame, means for supplying lubricant to the bearing surface between said shaft and bushing, means for collecting the lubricant that escapes from the bearing surface adjacent the free end of the shaft, a lubricant-return conduit formed as a bore in the bushing leading from the collecting means to the interior of the frame, said bore terminating in a portion radially disposed with respect to the bushing, a strap secured to the bushing and carrying a tube communicating with the radially disposed portion of said bore, said frame having a well formed therein adjacent the tube and into which the lower portion of said tube extends.

3. In a sewing machine having a frame, a bushing extending through a wall of the frame, a rotary shaft

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journaled in the bushing and having a free end extending through the bushing to the exterior of the frame, means for supplying lubricant to the bearing surface between said shaft and bushing, means for collecting the lubricant that escapes from the bearing surface adjacent the free end of the shaft, a lubricant-return conduit formed as a bore in the bushing leading from the collecting means to the interior of the frame, said bore terminating in a portion radially disposed with respect to the bushing, a strap secured to the bushing and carrying a tube communicating with the radially disposed portion of said bore, said tube having a screen carried internally thereof to form a liquid seal for preventing lubricant-laden air within the frame from entering the conduit.

4. A vapor-lock for preventing lubricant-laden air or vapor from entering a lubricant return conduit in a bearing bushing of a sewing machine, comprising a C-shaped strap formed of sheet metal that is spring-like in character and formed arcuately to define more than one-half a circle for resiliently clamping itself to a bushing, said strap having an aperture therein, a tube secured to the strap and registering with said aperture, and a small mesh screen carried by the tube and positioned substantially transversely of the axis of the tube for forming a liquid-seal that will permit a free flow of liquid therethrough but prevent the free flow of gases and vapors therethrough.

5. A vapor-lock for preventing lubricant-laden air or vapor from entering a lubricant return conduit in a bearing bushing for a sewing machine comprising a C-shaped strap formed of sheet metal that is spring-like in character and formed arcuately to define more than one-half a circle for resiliently clamping itself to a bushing, said strap having an aperture therein, a tube secured to the strap and registering with said aperture, and porous material within said tube having a porosity that will permit drainage of a lubricant therethrough but small enough to permit the lubricant to form a film over said porous material closing the pores thereof to seal the tube against the free flow of gases and vapors therethrough.

6. A vapor-lock means for use in a sewing machine, comprising, a bearing bushing for a rotary shaft, an oil-return conduit formed substantially longitudinally of the bushing and terminating in a radially disposed portion opening at the periphery of the bushing, an arcuately shaped strap formed substantially to conform to the transverse periphery of the bushing adjacent the peripheral opening of the conduit, said strap being secured to the bushing, and means for producing a vapor-lock including a tube carried by the strap and communicating with the conduit at the peripheral opening thereof.

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