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W. J. PEETS ET AL

2,284,474

LUBRICATED HOOK FOR SEWING MACHINES

Filed June 22, 1939

2 Sheets-Sheet 1

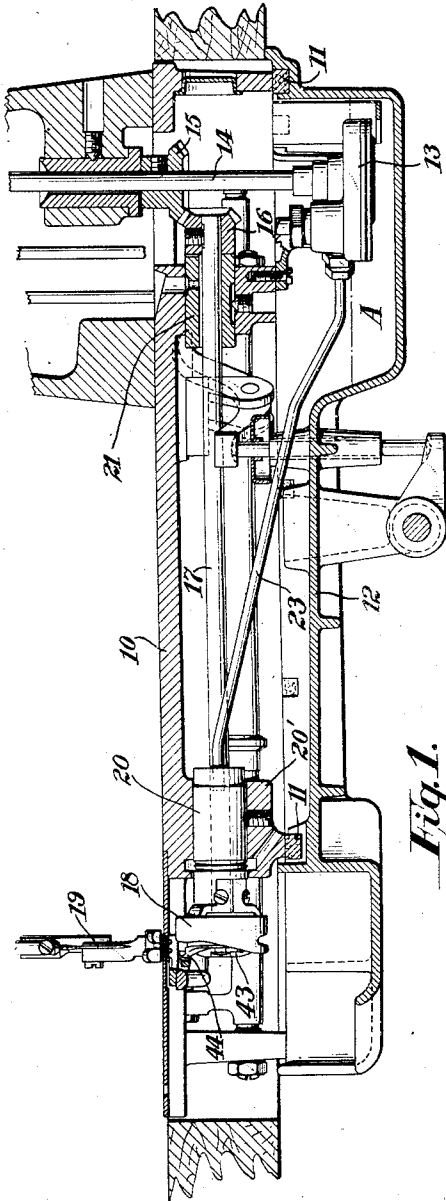


Fig. 1.

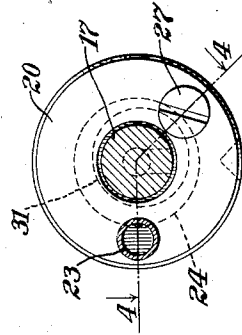


Fig. 2.

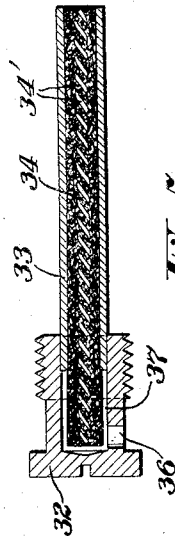


Fig. 3.

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2 Sheets-Sheet 2

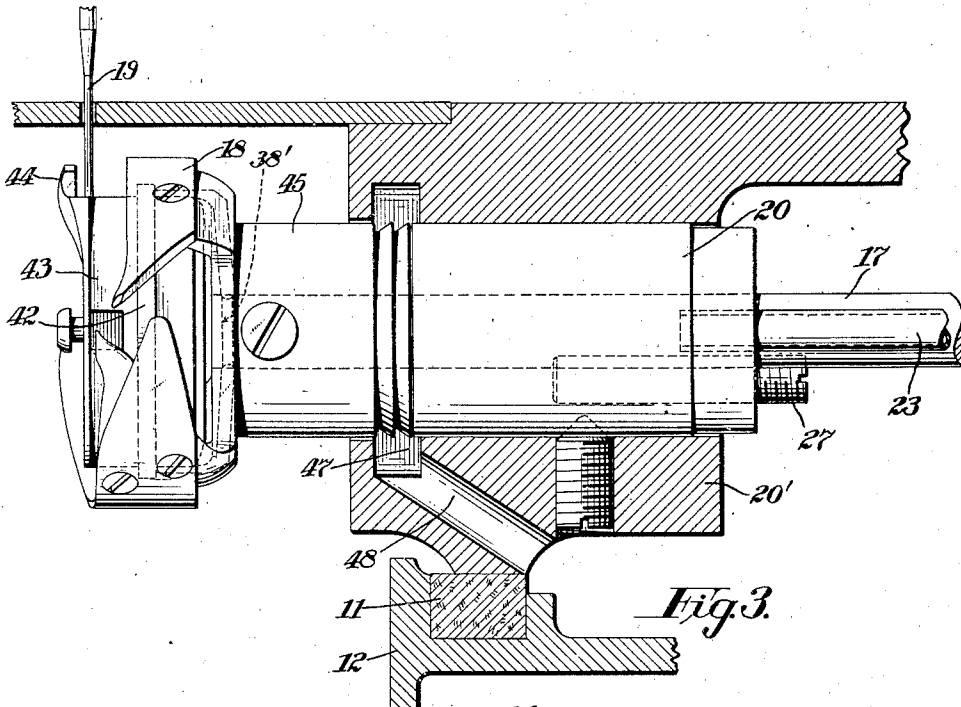


Fig. 3.

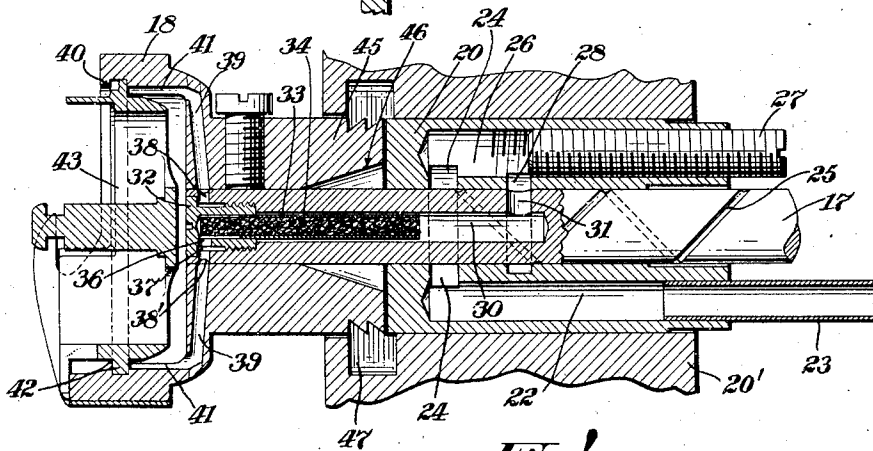


Fig. 4.

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UNITED STATES PATENT OFFICE

2,284,474

LUBRICATED HOOK FOR SEWING
MACHINES

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Application June 22, 1939, Serial No. 280,468

10 Claims. (Cl. 112—256)

This invention relates to sewing machines and more particularly to improved means for lubricating the raceway of a rotatable hook in which the stationary bobbin-case is journaled.

One of the objects of this invention is to provide improved means for supplying oil to the raceway of a rotatable hook during the operation of the machine and to discontinue supplying the oil when the machine is idle.

Another object of this invention is to supply a larger quantity of oil to the hook raceway when the machine is operating at high speeds than is supplied when the machine is operating at low speeds.

Still further objects of this invention are to provide improved means for shutting off the supply of oil to the hook raceway and to provide means for returning oil, which may escape from the front bearing bushing of the hook-shaft, to the oil-reservoir.

A still further object of this invention is to provide a readily removable filter for filtering the oil before it is delivered to the raceway of the hook.

With the above and other objects in view, as will hereinafter appear, the invention comprises the devices, combinations and arrangements of parts hereinafter set forth and illustrated in the accompanying drawings of a preferred embodiment of the invention, from which the several features of the invention and the advantages attained thereby will be readily understood by those skilled in the art.

In the drawings:

Fig. 1 is a vertical sectional view taken through the bed of a sewing machine embodying my invention, some of the mechanism below the bed being shown in elevation.

Fig. 2 is an end elevation of the bearing bushing for the hook-shaft, on an enlarged scale.

Fig. 3 is an enlarged side elevation of the hook, the hook-actuating shaft, and a bearing bushing for the hook-shaft, the depending lug of the bed in which the bushing is fixed being shown in section.

Fig. 4 is a horizontal sectional view taken substantially along the line 4—4 of Fig. 2.

Fig. 5 is an enlarged sectional view of the filtering cartridge and its holding means.

In the embodiment of this invention selected for illustration 10 represents the bed-plate of a machine formed with depending side and end walls which rest upon the gasket of resilient material 11 carried by the oil-pan 12. The bed of the sewing machine together with the oil-pan 55

form an oil tight compartment which houses the actuating mechanism of the machine.

Carried by the bed 16 of the machine is a centrifugal pump 13, actuated by the usual vertical shaft 14 which has its upper end operatively connected to the needle-bar actuating shaft (not shown). The shaft 14 through the gears 15 and 16 actuates the hook-shaft 17 which is journaled in the bearing bushings 20, 21 carried by the bed. Fixed to the end of the shaft 17 is a rotary hook 18 which cooperates with the usual reciprocating needle 19 in the formation of lock stitches. For a more detailed description of the sewing machine oil-pan and oil-pump reference may be had to the copending application of R. Kaier for a Sewing machine, Serial No. 152,707, filed July 9, 1937.

As more clearly shown in Fig. 4 the bearing bushing 20 is formed with a conduit 22 which is connected with the centrifugal pump 13 by the tube 23 so that when the machine is operating oil is supplied from the reservoir A by the centrifugal pump 13 through the tube 23 and to the conduit 22 under pressure. Conduit 22 communicates with an internal circular groove 24 which is formed in the bushing and supplies oil to the bearing surface between the bearing bushing 20 and the shaft 17, the shaft 17 being provided with a spiral groove 25 which returns the oil to the reservoir. The bearing bushing is also formed with a conduit 26 which is tapped to receive a screw 27. The conduit 26 is arranged below the level of the hook-shaft 17 (Fig. 2) and connects the circular groove 24 with a second circular groove 28 which is formed slightly eccentric relative to the shaft 17 so that its outer periphery will intersect the conduit 26 but will not intersect the conduit 22.

The shaft 17 is formed with a longitudinal arranged bore 30 and a radial duct 31 which communicates with the circular groove 28 in the bearing bushing 20. The end of the hook-shaft 17, to which the hook 18 is fixed, is provided with a screw 32 which closes the open end of the longitudinal bore 30 in the shaft 17. Carried by the screw and extending into the bore 30 is a tube 33 filled with fibrous material 34 held together by a metal supporting rib 34' (Fig. 5). This tube and fibrous material are in effect a filter cartridge for filtering oil passing through it and may be readily removed, cleaned, and replaced or if desired a new filter may be substituted for the old one. The rib 34' comprises two wires twisted about each other and holding therebetween the strands of fibrous material. It is similar to an

ordinary pipe cleaner and functions to hold the fibers separate and prevents them from being packed too tightly in the tube. This rib also maintains the filtering material in its predetermined form and permits the fibrous material to be readily and accurately inserted in the tube.

The screw 32 is formed with a radial duct 36 which leads the oil, that passes through the filter 34, to a circular chamber 37 formed between the screw 32 and the hook-shaft. The oil is led from the chamber 37 through a radial duct 38 and circumferential groove 38' in the shaft 17 to the conduits 39 formed in the body of the hook 18. These conduits 39 are disposed substantially 180° apart and the outer ends are connected with the raceway 40 formed in the hook-body by the grooves 41. Journaled in the raceway 40 in the hook-body is the bearing rib 42 of the usual stationary thread-case 43. It will be understood that the thread-case is formed with an ear 44 which cooperates with a thread-case restraining finger fixed to a stationary part of the machine, for the purpose of preventing the thread-case from turning with the rotary hook.

Due to the pressure created by the pump 13 some oil may leak from the end of the bearing bushing 20 adjacent the hub 45 of the hook 18. To lead any oil which may escape from this end of the bushing back to the oil-reservoir, the bore in the hub 45 of the hook 18 is flared outwardly to form a conically shaped bore 46, and when the machine is operating the oil is thrown by centrifugal force against the wall of the conical bore 46 and due to its inclined surface climbs along the wall towards the larger diameter of the bore, and is finally thrown off into the circular groove 47 formed in the depending lug 20'. Any oil which may be thrown off into the groove 47 is returned to the reservoir by the inclined conduit 48 (Fig. 3).

The operating of the lubricating device is as follows: When the machine is operated the vertical shaft 14 through its operative connection with the driven needle-bar shaft (not shown) actuates the impeller in the centrifugal pump 13 thereby forcing oil from the reservoir A through the tube 23 and conduit 22 in the bushing 20 to the circular groove 24. Some of the oil supplied to the groove 24 is used to lubricate the bearing surface between the hook-shaft 17 and the bearing bushing 20 and the remainder of the oil is conducted through the conduit 26, circular groove 28, and radial duct 31 to the longitudinal bore 30 in the shaft 17. The oil which is under pressure in the longitudinal bore 30 passes through the fibrous material 34 in the removable filtering cartridge 33, through the radial duct 36 to the circular chamber 37, from whence it is conducted through the radial ducts 38 and circular groove 38' to the conduits 39 formed in the hook-body, the oil being conducted from the outer ends of the conduits 39 to the raceway 40 in the hook-body by the grooves 41. It will be understood that centrifugal force holds the oil in these grooves 41 and the grooves are slightly inclined outwardly towards the raceway 40.

From the foregoing it will be observed that the oil-reservoir is located below the shaft 17 and that oil is supplied to the raceway in the rotary hook under pressure and only when the machine is operating. It will be apparent that the pressure of oil supplied to the longitudinal bore in the shaft 17 varies with the speed of the machine due to the fact that the centrifugal pump 13 is directly connected with the actuat-

ing mechanism of the machine. It is, therefore, apparent that a greater amount of lubricant is forced through the filter material 34 and conducted to the raceway 40 when the machine is operating at high speeds than is supplied to the raceway when the machine is operating at lower speeds.

Because of the nature of the material to be stitched, it is sometimes desirable to operate the machine without supplying lubricant to the raceway of the hook. The flow of oil may be stopped by turning the screw 27 until it covers the duct or the screw 27 may be removed to stop the flow of oil to the hook-raceway, the oil is allowed to escape through the conduit 26 back to the reservoir. When the screw is removed the oil pressure in the conduit 26 is reduced and, due to the centrifugal force created by the radial duct 31 in the shaft 17, which is greater than the reduced pressure in the conduit 26, oil will not be forced into the longitudinal bore 30 of the shaft 17.

From the foregoing description it will be obvious that the elements employed and details of construction are susceptible of material variations. The privilege is therefore reserved of resorting to all such legitimate changes therein as may be fairly embodied within the spirit and scope of the appended claims.

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

1. In a sewing machine, a hook-actuating shaft formed with a longitudinal bore, a bearing bushing in which said shaft is journaled, a conduit formed in said bushing and arranged parallel to and at one side of said shaft for conducting oil to the bearing surface of said shaft and a second conduit formed in said bushing and connected with said first conduit for conducting oil to the bore in said shaft, a rotary hook formed with a raceway and fixed to one end of said shaft, said hook being provided with an oil conducting passage for leading oil from the bore in said shaft to the raceway in said hook, an oil-reservoir located below said bushing, and means for supplying oil under pressure from said oil-reservoir to the first mentioned conduit in said bushing.

2. In a sewing machine, a hook-actuating shaft formed with a longitudinal bore, a bearing bushing in which said shaft is journaled, a conduit formed in said bushing for conducting oil to the bearing surface of said shaft and a second conduit formed in said bushing for conducting oil to the bore in said shaft, a rotary hook formed with a raceway and fixed to one end of said shaft, said hook being provided with an oil conducting passage for leading oil from the bore in said shaft to the raceway in said hook, an oil-reservoir, means for supplying oil from said oil-reservoir to the first mentioned conduit in said bushing, and means for closing said second conduit to prevent oil from being supplied to the bore in said shaft.

3. In a sewing machine having a rotary hook formed with a raceway and a shaft formed with a longitudinal bore, means for supplying oil through the bore in said shaft to the raceway in said hook, and a removable metal tube filled with fibrous material extending into the bore of said shaft for the purpose of filtering the oil supplied to the raceway in the hook.

4. In a sewing machine having a rotary hook and a bobbin-carrier having interengaging means with said rotary hook, a shaft carrying said hook and formed with a longitudinal bore, an oil-reservoir, means for supplying oil from

said reservoir through said longitudinal bore to the interengaging means and a screw carried by the end of said shaft, said screw carrying a self-contained filtering cartridge.

5. In a sewing machine, a rotating shaft, a bearing in which said shaft is journaled, a hook having a hub which surrounds said shaft and terminates adjacent said bearing, said hub being formed with a conically shaped bore in the end adjacent said bearing, said conically shaped bore flaring outwardly toward the end of said hub adjacent said bearing and providing a clearance space between said bore and shaft.

6. In a sewing machine, a rotating shaft, a bearing in which said shaft is journaled, an oil-reservoir, means for supplying oil from said reservoir to said bearing, a hook carried by said shaft and having a hub which surrounds said shaft and terminates adjacent said bearing, said hub being formed with a conical bore for causing any oil which may escape from said bearing to be thrown off the end of the hub adjacent said bearing, and means for collecting any oil which may be thrown off and returning it to said reservoir.

7. In a sewing machine, a hook-actuating shaft formed with a longitudinal bore, a bearing bushing in which said shaft is journaled, a conduit formed in said bushing and arranged parallel to said shaft, a duct communicating with said conduit and leading to the bearing surface between said shaft and said bushing, a second conduit connecting said duct with the longitudinal bore in said shaft, a rotary hook formed with a raceway and fixed to one end of the hook-actuating shaft, said hook being provided with an oil conducting passage which communicates with the bore in said shaft and the raceway in said hook, an oil-reservoir, means for supplying oil from said reservoir to the first mentioned conduit in said bushing and means for regulating the flow of oil through said second conduit.

8. In a sewing machine, a hook-actuating shaft formed with a longitudinal bore, a rotary

hook carried by said shaft and formed with a raceway, said shaft and said hook being formed with oil conducting passageways for leading oil from a point intermediate the ends of the shaft to the raceway of the hook, a bearing bushing in which said shaft is journaled, said bushing being formed with a pair of conduits which are arranged parallel to the shaft one of said conduits communicating with the bearing surface between the shaft and the bearing bushing and the other of said conduits being connected with the first conduit to receive oil therefrom and conduct it to the bore in said shaft, an oil-reservoir, and means for supplying oil from the reservoir to the first mentioned conduit in said bushing.

9. In a sewing machine, a hook-actuating shaft formed with a longitudinal bore, a bearing in which said shaft is journaled, a conduit for supplying lubricant to said bearing, a pump for supplying lubricant under pressure to said conduit when the machine is operated, means in said bearing for conducting lubricant from said conduit to the bore in the shaft, and a manually controlled valve located in said bearing for regulating the flow of lubricant through said means whereby the bearing for the shaft will be lubricated under pressure at all times and the flow of lubricant to the longitudinal bore in the hook-shaft is under the control of the operator.

10. In a sewing machine having a rotary hook and a bobbin-case journaled in a raceway in said hook a shaft for supporting and actuating said hook, said shaft being formed with a longitudinal bore, an oil reservoir, means for supplying oil under pressure from said reservoir to said bore, and a readily insertable and removable self-contained filtering cartridge comprising a rigid tube having a fibrous material compressed therein and located in said bore.

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