

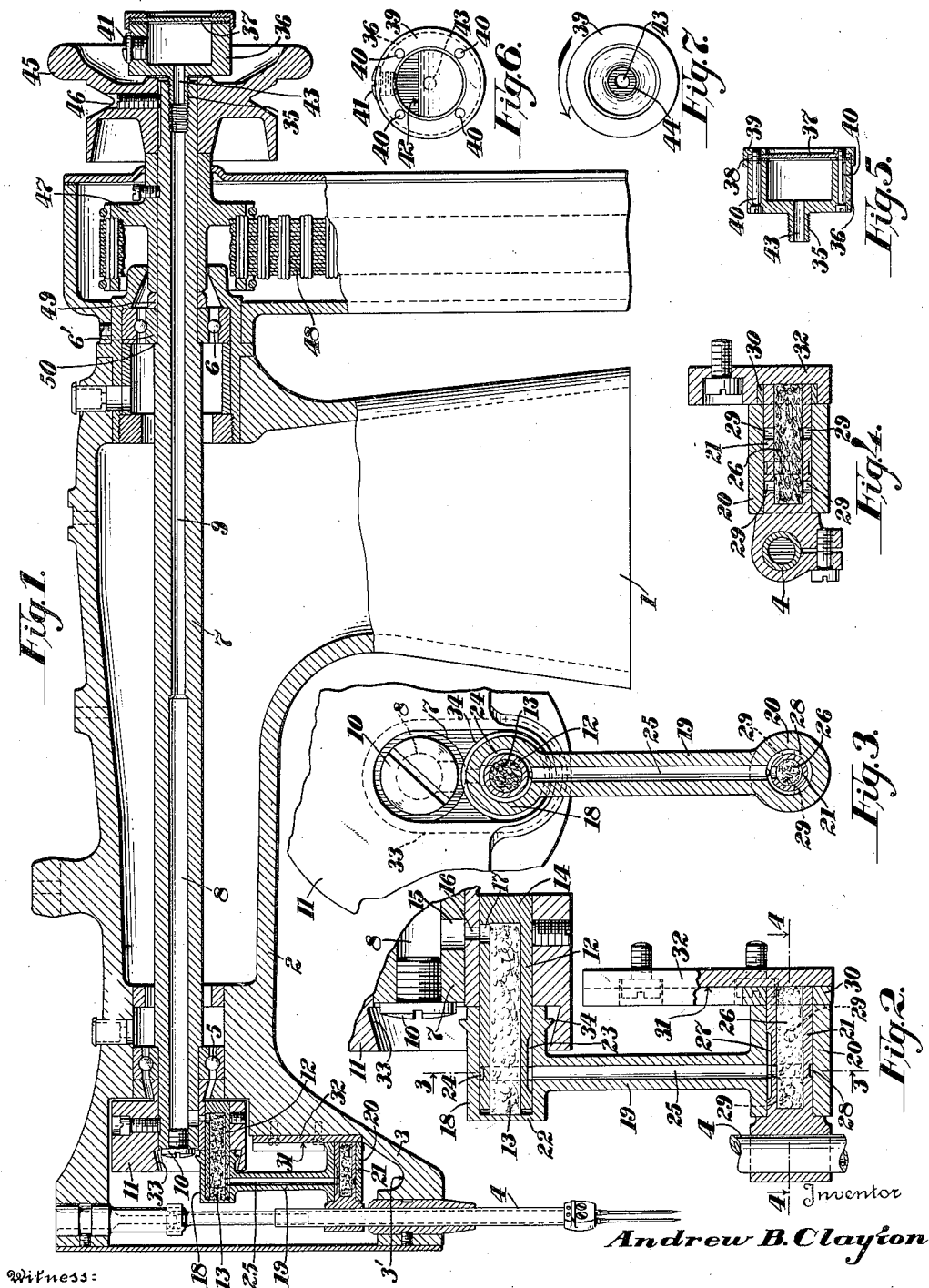
Oct. 6, 1936.

A. B. CLAYTON

2,056,644

LUBRICATING MEANS FOR SEWING MACHINE NEEDLE BAR MECHANISMS

Filed June 8, 1935



UNITED STATES PATENT OFFICE

2,056,644

LUBRICATING MEANS FOR SEWING MACHINE NEEDLE-BAR MECHANISMS

Andrew B. Clayton, Union, N. J., assignor to The Singer Manufacturing Company, Elizabeth, N. J., a corporation of New Jersey

Application June 8, 1935, Serial No. 25,533

10 Claims. (Cl. 112—256)

This invention relates to sewing machines, more particularly of the type having a frame including an overhanging bracket-arm and a drive shaft which is journaled in ball-bearings in the overhanging bracket-arm and at one end carries a crank which is connected by a link to the reciprocatory needle-bar of the machine. Difficulty has been experienced in lubricating the needle-bar driving mechanism of a machine of this type, for the reason that a ball-bearing excludes the possibility of pick-up of lubricant by the main-shaft from its bearing for conduction to the moving bearings of the needle-bar driving mechanism in the manner disclosed for example in U. S. patent to Dial et al., No. 772,502, dated Oct. 18, 1904.

It has been proposed, as disclosed in U. S. Patent No. 1,998,583, dated Apr. 23, 1935, to overcome the difficulty in question by providing the main-shaft with an axial bore which is extended from the needle-bar crank-and-link mechanism through the shaft bearing and is connected by a lateral duct leading outwardly of the shaft to a lubricant-containing sleeve or reservoir surrounding the shaft within the sewing machine bracket-arm.

With a lubricator, such as disclosed in said U. S. Patent No. 1,998,583, the oil-reservoir is difficult of access for replenishment of the lubricant supply and there is no means of readily ascertaining when replenishment of the lubricant supply is necessary. Further, there is a tendency for a lateral inlet duct to quickly throw all of the oil out of the shaft when the machine is running.

There is another objection to the placing of an oil-reservoir sleeve about the shaft and that is due to the tendency of the packing glands at the ends of the sleeve to warp or spring the shaft, when screwed up sufficiently to be oil-tight, thus unbalancing the shaft and causing an annoying increase in vibration when the machine is operated at high speed.

The present invention aims to provide lubricating means for a sewing machine needle-bar mechanism which will not unbalance the shaft and which is readily accessible for replenishment of the lubricant supply, the need for which can be seen at a glance. A further object of the invention is to provide means to avoid flooding of the needle-bar mechanism with oil.

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 drawing of a preferred embodi-

ment 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 accompanying drawing Fig. 1 is a longitudinal vertical section through the bracket-arm of a sewing machine embodying the invention. Fig. 2 is a similar view, on an enlarged scale, of the crank-and-link mechanism for driving the needle-bar. Fig. 3 is a section on the line 3—3, Fig. 2. Fig. 4 is a section on the line 4—4, Fig. 2. Fig. 5 is an axial section through the oil reservoir, showing the holding screws for the end-cap. Fig. 6 is a face view of the oil reservoir, showing the oil-level when stationary. Fig. 7 is a similar view showing the annular appearance assumed by the oil supply when the machine is running.

In the preferred embodiment of the invention illustrated, 1 represents the standard of the overhanging bracket-arm 2 of a sewing machine, the arm 2 terminating as usual in the head 3 in which the reciprocatory needle-bar 4 is mounted.

Journaled within and lengthwise of the bracket-arm 2, in the conventional ball-bearings 5, 6 is the main-shaft 7 which is bored out longitudinally from end to end to provide the aligned ducts 8, 9, the latter of which is somewhat smaller in diameter than the former which is closed at the end of the shaft by the oil-tight screw-plug 10.

Fixed to the shaft 7 is the crank-head 11 in which is tightly fixed the hollow crank-pin 12 fitted with the internal wick 13. The crank-pin 12 is closed at its inner end 14 and the wick 13 receives oil from the shaft bore 8 through the aligned lateral ducts 15, 16, 17 in the shaft 7, crank-head 11 and crank-pin 12, respectively.

Journaled on the crank-pin 12 is the bearing boss 18 at the upper end of the link 19 the bearing boss 20 at the lower end of which has journaled in it the lateral pin 21 clamped to the needle-bar 4. The upper end boss 18 on the link 19 is closed at its outer end at 22 and the crank-pin 12 has no lateral ducts leading outwardly from the wick 13 to the bearing surface for the link 19. Hence, all of the oil supplied to such bearing surface must pass endwise through the wick 13 to the extreme end of the crank-pin 12 and work back along the bearing surface of such crank-pin in which is cut the longitudinal oil-groove 23 stopping short of the free end of the crank-pin. The groove 23 communicates with the circumferential oil-groove 24 in the crank-pin from which oil passes through the duct 25 in the link 19 to the bearing surfaces within the boss 20 at the lower

end of the link. No oil can be thrown from the enclosed outer end of the crank-pin 12 and the oil must pass through the entire length of the wick 13 before it reaches the crank-pin bearing surfaces. The wick 13 is long enough to permit of its being packed sufficiently tight to avoid flooding of the parts with oil.

The lateral pin 21 on the needle-bar is also fitted with an internal wick 26 and has cut in its bearing surface the longitudinal oil-groove 27 and the circumferential oil-groove 28. The pin 21 is also formed with the radial apertures 29 through which the wick 26 picks up oil from the bearing surfaces between the pin 21 and link 19. The wick 26 lubricates the slide bearing between the slide-block 30 carried by the pin 21 and the slide-way 31 in the guide-block 32 secured within the bracket-arm head 3. The crank-head 11 is formed with an undercut groove 33 within which is disposed the oil sling 34 on the boss 18 at the upper end of the link 19. The head 3 is provided internally at its lower end with the usual oil sump 3'.

Screwed into the bore 9 at the opposite end of the shaft 7 is the externally threaded and internally apertured axial neck 35 of the cylindrical oil reservoir 36 the outer end of which is closed oil-tight by means of the glass disk or window 37 which is clamped upon the gasket 38 by means of the cap-ring 39 into which are threaded the holding screws 40. The oil-reservoir 36 is thus carried by the shaft 7 and surrounds the center-line or axis of the shaft 7 produced beyond the rearward free end of the latter. Such reservoir may be supplied with fluid lubricant through the side opening normally closed by the oil-tight screw-plug 41.

The oil-level 42 should be maintained high enough to cover the axial aperture 43 when the machine is at rest, as shown in Fig. 6, so that oil may flow into the shaft apertures 9 and 8. When the machine is running, the oil in the reservoir 36 will assume an annular form with a central or axial air bubble 44 exposing the axial aperture 43, as shown in Fig. 7. On account of the small size and axial position of the oil inlet aperture 43, and the absence of a lateral inlet duct rotating with the shaft 7, there is little tendency for the oil to be thrown back from the shaft 7 into the oil-reservoir 36. This tendency is governed by the size of the inlet axial aperture 43, being reduced as the size of such aperture is reduced. Oil which has passed through the reduced aperture 43 into the shaft duct 9 and particularly into the still larger duct 8 adjacent the crank head 11 will be sufficiently trapped against reverse flow to insure an adequate supply of oil to the crank and link needle-bar driving mechanism at all times. So long as the oil-reservoir 36 is at least half full, oil will enter the shaft 7 through the inlet duct 43 when the shaft is stationary and regardless of the exact angular position at which the shaft is stopped. The oil level 42 may be checked at a glance through the glass window 37 when the machine is at rest.

The shaft 7 carries the usual balance wheel 45 having the belt-groove 46 for connection to the usual driver. The shaft 7 may also carry the clip-belt pulley 47 which may be connected by the clip-belt 48 to the sewing machine bed-mechanism (not shown). The oil-reservoir 36 also functions as a cap screw to clamp together the hub of the balance wheel 45, the hub of the belt-pulley 47, the collar 49 and the inner race ring

6' of the ball-bearing 6 seated against the shoulder 50 on the shaft 7.

It will be understood that with properly fitted parts constructed in accordance with the invention, very little oil will escape from the working bearings within the head 3, although such bearings will be adequately lubricated for high speed operation.

The foregoing specification is not to be read in limitation of the invention to the preferred embodiment thereof shown and described, as modifications may obviously be made in the forms and relative arrangements of parts within the spirit of the invention which is not limited except insofar as the appended claims and prior art may require.

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

1. The combination with a sewing machine bracket-arm terminating at its free end in a head, of a shaft journaled in said bracket-arm, a crank at one end of said shaft within said head, a reciprocatory needle-bar in said head connected to be driven by said crank, the opposite end of said shaft projecting exteriorly of the bracket-arm, said shaft having an oil-duct extending longitudinally thereof from said crank to and through the opposite end of said shaft, and a rotary oil-reservoir mounted on said opposite end of said shaft in communication with said oil-duct.

2. The combination with a sewing machine bracket-arm terminating at its free end in a head, of a main-shaft journaled in said bracket-arm, a crank at one end of said shaft within said head, a reciprocatory needle-bar in said head connected to be driven by said crank, the opposite end of said shaft projecting exteriorly of the bracket-arm, said shaft having an oil-duct extending longitudinally thereof from said crank to and through the opposite end of said shaft, and a rotary oil-reservoir mounted on said opposite end of said shaft and communicating with said oil-duct through an oil-inlet aperture coaxial with said shaft.

3. The combination with a sewing machine bracket-arm terminating at its free end in a head, of a main-shaft journaled in said bracket-arm, a crank at one end of said shaft within said head, a reciprocatory needle-bar in said head connected to be driven by said crank, the opposite end of said shaft projecting exteriorly of the bracket-arm, said shaft having an oil-duct extending longitudinally thereof from said crank to and through the opposite end of said shaft, and a rotary oil-reservoir mounted on said opposite end of said shaft and communicating with said oil-duct through an oil-inlet aperture coaxial with said shaft, said oil-reservoir having a transparent oil-tight window in its exposed face.

4. In a sewing machine, a reciprocatory needle-bar, a needle-bar actuating shaft, a crank on one end of said shaft connected to drive said needle-bar, a ball-bearing surrounding said shaft adjacent said crank, a rotary oil-reservoir carried by said shaft at the extreme opposite end of the latter and surrounding the axis of said shaft, said shaft being formed with a longitudinal oil-duct leading from said oil-reservoir through said ball-bearing to said crank.

5. In a sewing machine, a bracket-arm terminating at its free end in a head, a reciprocatory needle-bar journaled in said head, a drive-shaft journaled in said bracket-arm, a crank-pin carried by said drive-shaft, said drive-shaft and crank-pin having communicating longitudinal

oil-ducts for passage of oil from said drive-shaft into said crank-pin, the oil-duct in said crank-pin being open at the free end only of the crank-pin for egress of oil, a link connected at its lower end to said needle-bar and at its upper end journaled on said crank-pin, said link enclosing the open free end of said crank-pin.

6. In a sewing machine, a drive-shaft having a crank head formed with an undercut recess, a crank-pin projecting from said recess and having an oil-duct extending longitudinally thereof, said drive-shaft having a supply oil-duct in communication with the crank-pin oil-duct, a link having a boss at its upper end journaled on said crank-pin, said boss having a closed outer end and at its inner end extending into said undercut recess, and a reciprocatory needle-bar connected to be driven by said link.

7. In a sewing machine, a drive-shaft having a crank head formed with an undercut recess, a crank-pin projecting from said recess and having an oil-duct extending longitudinally thereof, said drive-shaft having a supply oil-duct in communication with the crank-pin oil-duct, a link having a boss at its upper end journaled on said crank-pin, said boss having a closed outer end and at its inner end extending into said undercut recess, and a reciprocatory needle-bar connected to be driven by said link, said boss having an oil sling within said undercut recess.

8. A sewing machine having a bracket-arm terminating at its free end in a head, a main-shaft journaled in said head, a crank-pin at one end of said main-shaft and a balance-wheel at the opposite end of said main-shaft, a reciprocatory needle-bar connected to be driven by said crank-pin, said crank-pin having an oil-duct therein and said shaft having a longitudinal oil-duct in communication with the crank-pin

oil-duct at one end of the shaft and extending longitudinally of said shaft to and through the opposite end of the latter, and a rotary oil-reservoir screwed into the shaft oil-duct and tightened against the hub of said balance-wheel.

9. The combination with a sewing machine bracket-arm terminating at its free end in a head, of a shaft journaled in said bracket-arm, a hollow crank at one end of said shaft within said head, a reciprocatory needle-bar in said head connected to be driven by said crank, said shaft having an oil-duct extending longitudinally thereof and communicating at one end with said hollow crank, said duct having an oil-intake orifice remote from said crank, and means to supply oil to said duct through said oil-intake orifice, a portion of said duct within the shaft being of larger diameter than an adjacent portion of said duct nearer said oil-intake orifice.

10. The combination with a sewing machine bracket-arm terminating at its free end in a head, of a main-shaft journaled in said bracket-arm, a crank at one end of said shaft within said head, a reciprocatory needle-bar in said head connected to be driven by said crank, the opposite end of said shaft projecting exteriorly of the bracket-arm, said shaft having an oil-duct extending longitudinally thereof from said crank to and through the opposite end of said shaft, and a rotary oil-reservoir mounted on said opposite end of said shaft and communicating with said oil-duct through an oil-inlet aperture coaxial with said shaft, at least a portion of the oil-duct in said shaft being enlarged relative to said coaxial oil-inlet aperture to trap oil against reverse flow into the oil-reservoir when the machine is running.

ANDREW B. CLAYTON.