Oct. 10, 1933. L. G. BOWMAN 1,930,382

LUBRICATING MEANS FOR SEWING MACHINES

Filed June 27, 1931 4 Sheets-Sheet 1

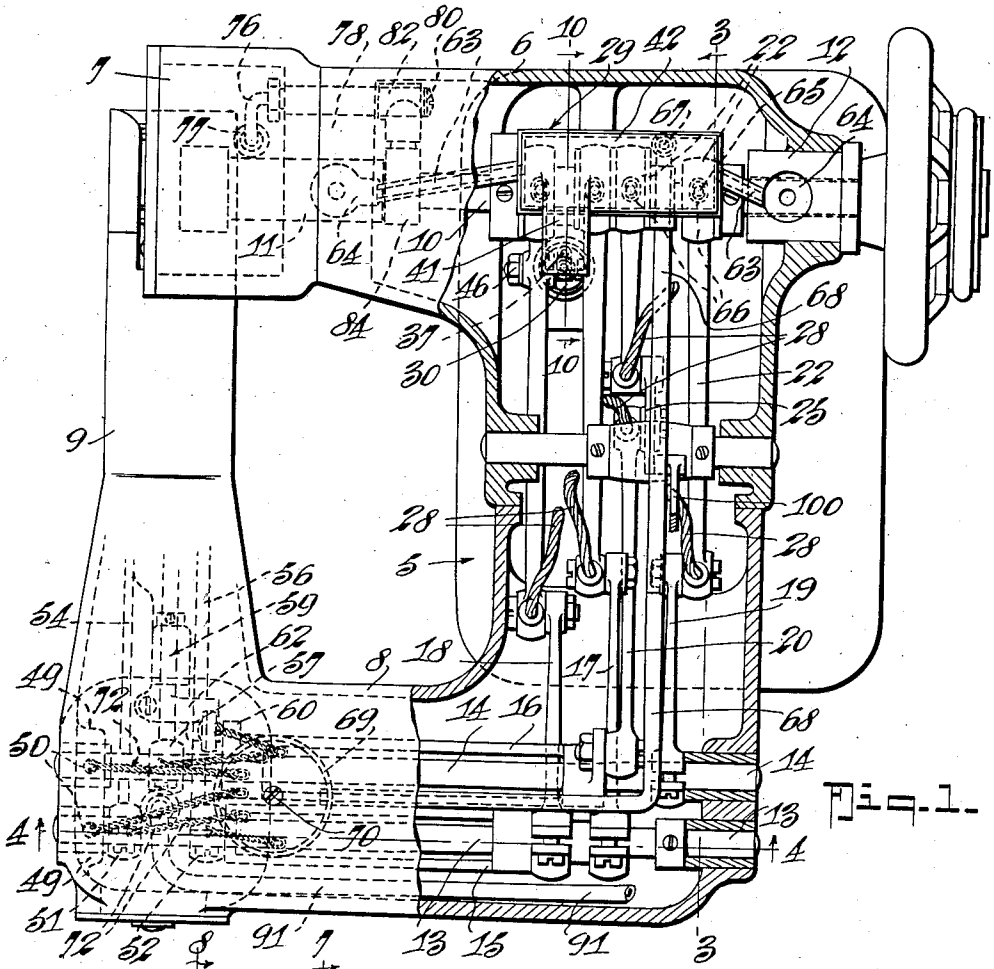


Fig. 1.

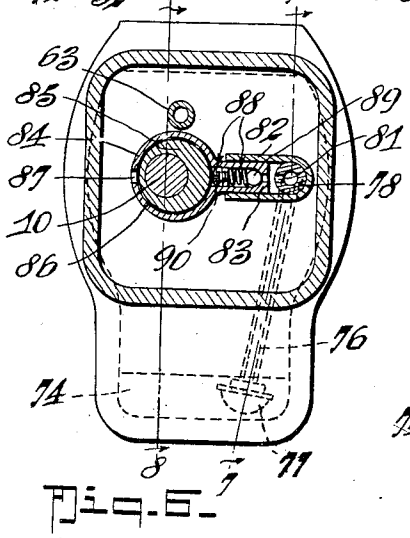


Fig. 5.

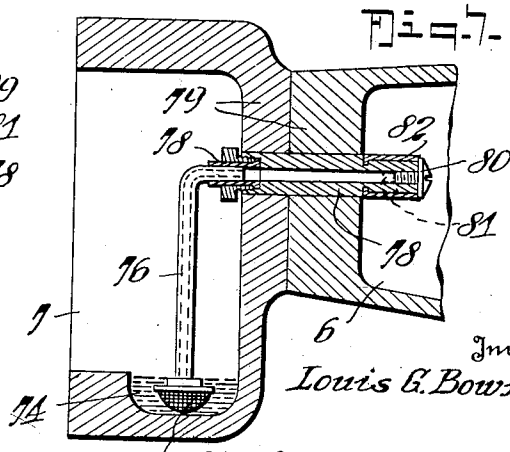


Fig. 7.

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LUBRICATING MEANS FOR SEWING MACHINES

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Fig. 1.

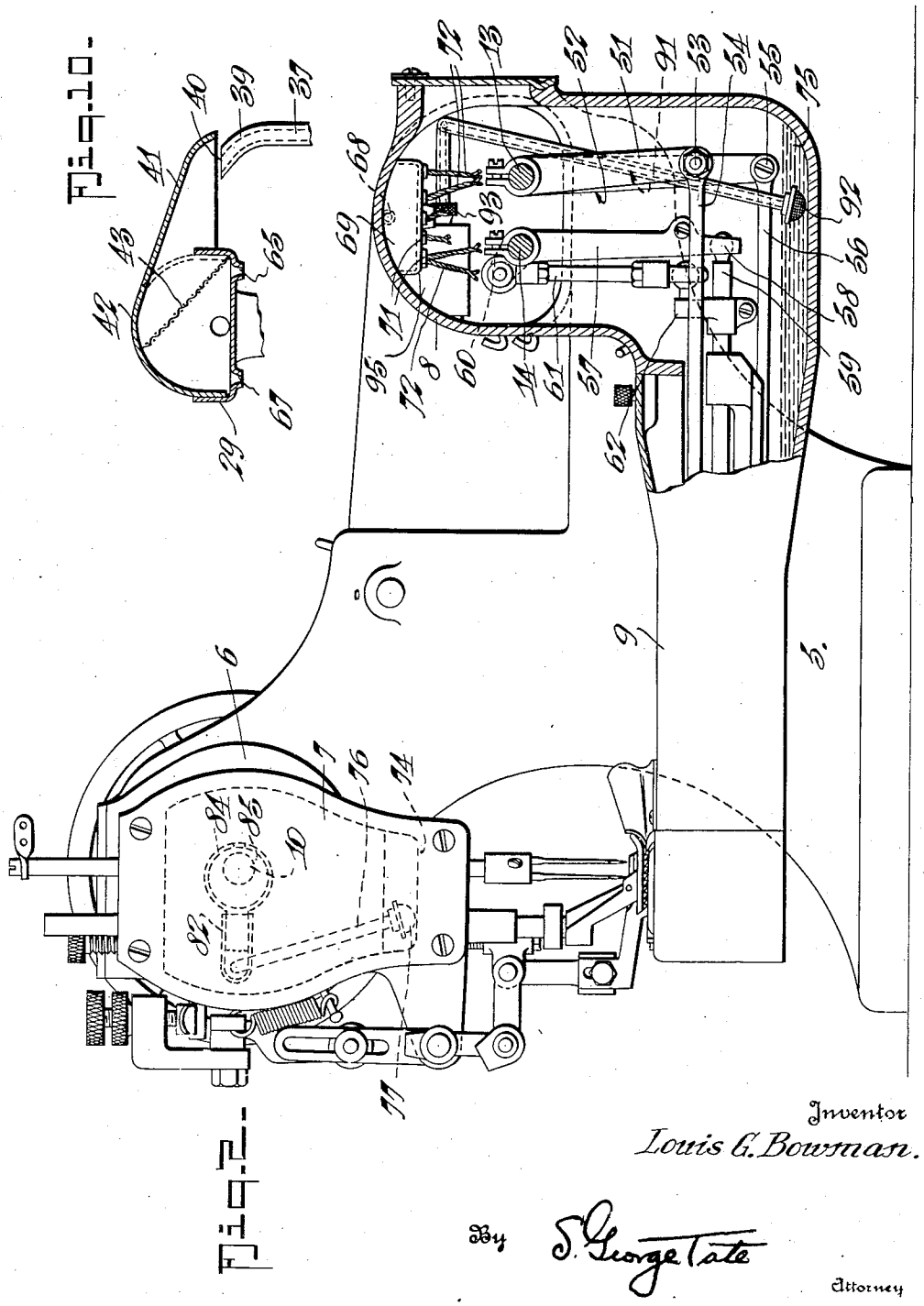


Fig. 2.

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LUBRICATING MEANS FOR SEWING MACHINES

Filed June 27, 1931 4 Sheets-Sheet 3

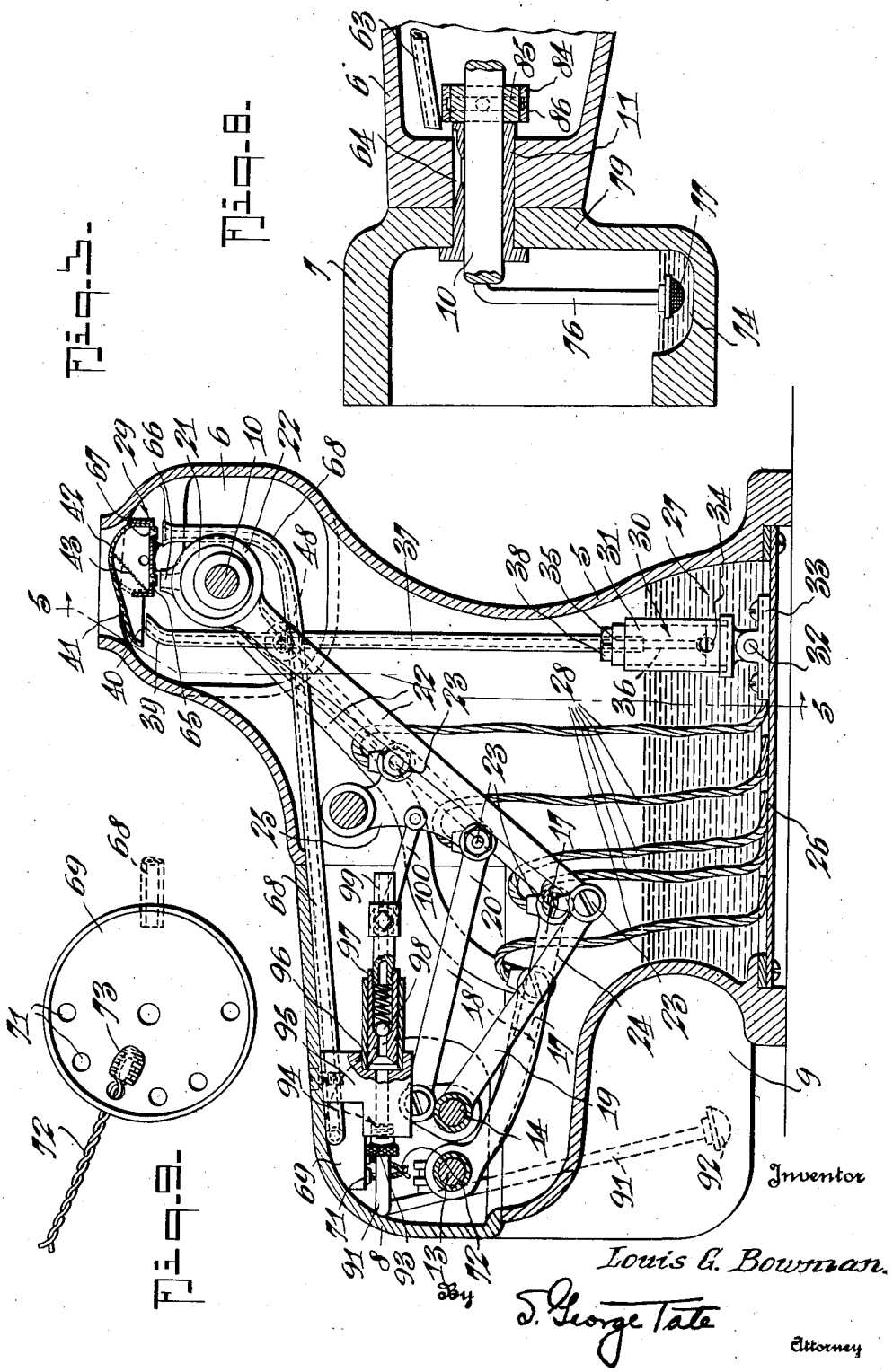


Fig. 7.

Fig. 8.

Fig. 9.

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Oct. 10, 1933. L. G. BOWMAN 1,930,382

LUBRICATING MEANS FOR SEWING MACHINES

Filed June 27, 1931 4 Sheets-Sheet 4

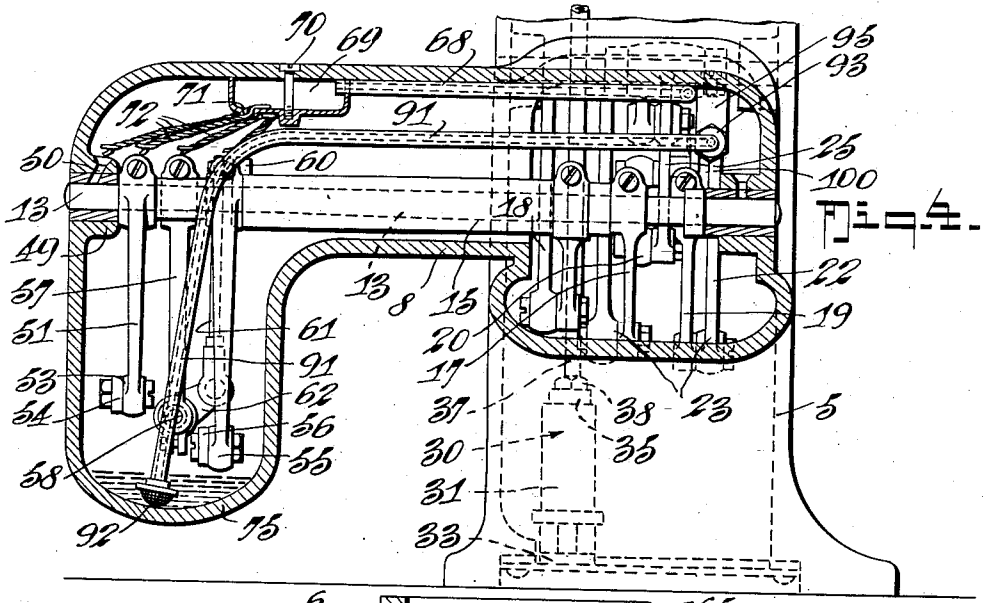


Fig. 4.

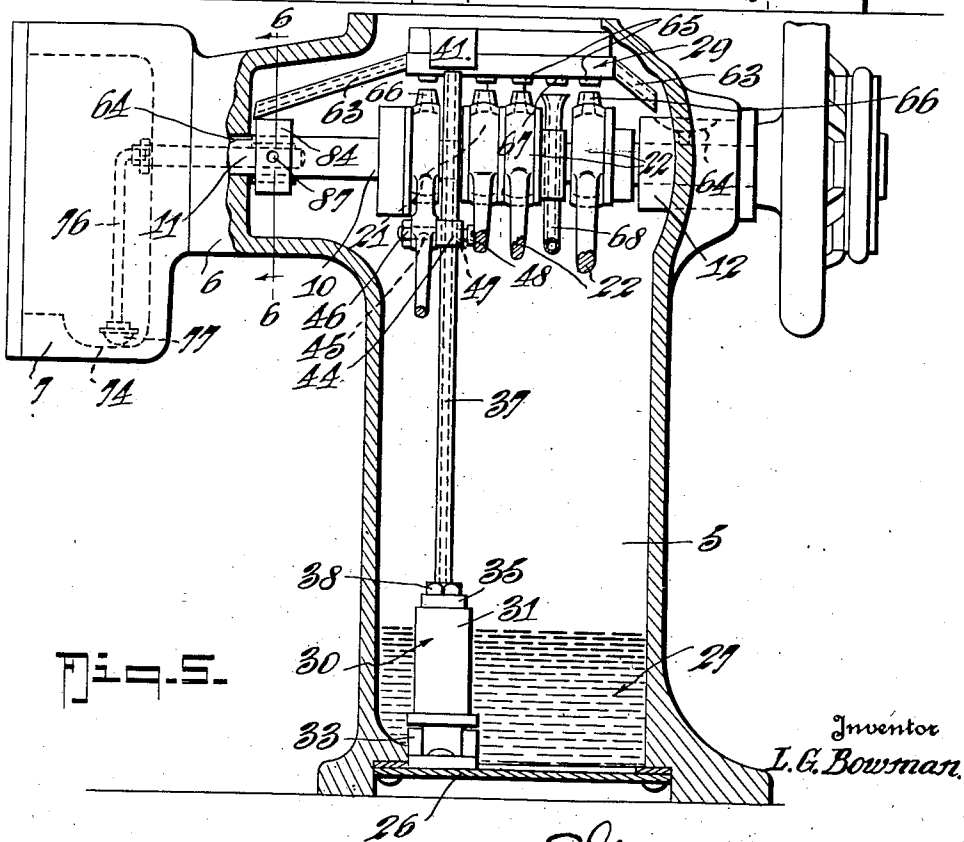


Fig. 5.

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UNITED STATES PATENT OFFICE

1,930,382

LUBRICATING MEANS FOR SEWING MACHINES

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Application June 27, 1931. Serial No. 547,429

7 Claims. (Cl. 184—6)

This invention relates to new and useful improvements in lubricating means for certain of the operating parts of sewing machines, and while capable of broader use, is particularly directed to the improvement of the lubrication facilities of sewing machines of the feed-off-the-arm type, an example of which is disclosed in my copending application Serial No. 463,217, filed June 23, 1930, and in the application Serial No. 512,661, filed by Horace F. Gruman January 31, 1931.

Among other objects, the invention seeks to provide novel means, including novel filtering means, for delivering lubricant to certain of the sewing machine parts and bearings.

Another object of the invention is to provide novel means for returning lubricant from receiving pockets in which it collects during the general lubricating function back into the main reservoir so that it may be refiltered and redistributed.

With these and other objects in view which will more fully appear, the nature of the invention will be more clearly understood by following the description, the appended claims, and the several views illustrated in the accompanying drawings.

In the drawings:—

Figure 1 is a top plan view of a feed-off-the-arm sewing machine embodying my invention, parts being broken away and in section.

Figure 2 is a side elevation of the machine with the work arm in the foreground, parts being broken away and in section.

Figure 3 is a vertical cross section taken on the line 3—3 on Figure 1.

Figure 4 is a vertical longitudinal section taken on the line 4—4 on Figure 1.

Figure 5 is a vertical longitudinal section taken on the line 5—5 on Figure 3, parts being shown in elevation.

Figure 6 is a detail vertical cross section taken on the line 6—6 on Figure 5.

Figure 7 is a detail vertical longitudinal section taken on the line 7—7 on Figure 6.

Figure 8 is a detail vertical longitudinal section taken on the line 8—8 on Figure 6.

Figure 9 is a detail plan view illustrating the lubricant distributor cup, one distributor element alone being shown.

Figure 10 is an enlarged detail vertical cross section taken on the line 10—10 on Figure 1.

Like reference numerals designate corresponding parts throughout the several figures of the drawings.

Referring to the drawings, I have shown my invention as applied to a sewing machine which includes a main frame comprising a hollow standard or casing 5, an overhanging arm 6 which supports a stitching head 7, a front horizontal arm 8 which extends from the casing or standard 5 and parallels the overhanging arm 6, and a rearwardly extending work arm 9 which is adapted to contain one or more 4-motion loopers and a 4-motion feed dog.

Journaled in the upper end of the hollow casing or standard 5 and extending along the overhanging arm 6 is a main shaft 10 which is rotatably mounted in bearings 11 and 12 provided therefor in the frame, and journaled in the front horizontal arm 8 and extending into the front portion of the hollow casing or standard are two rock shafts 13 and 14 respectively. Journaled on the rock shaft 13 is a sleeve 15 and journaled on the rock shaft 14 is a sleeve 16. The rock shaft 13 and sleeve 15 are provided for imparting the four motions to the looper or loopers, and the rock shaft 14 and the sleeve 16 are provided for imparting four motions to the feed dog.

The rock shaft 13 and sleeve 15 are oscillated from the main shaft 10 through the medium of separate driving connections which are respectively designated 17, 18, and the rock shaft 14 and the sleeve 16 are oscillated by separate connections which are respectively indicated by 19, 20. The connections 17, 18, 19 and 20, each includes an eccentric 21 secured to the main shaft 10 and a driven element 22, such as an eccentric strap or link, which is directly connected to the eccentric. Each eccentric strap 22 is pivotally connected as at 23 to a link or arm specifically designated 24 forming a part of the connections 17, 18, 19 and 20 and which is in turn operatively connected with the associated shaft 13 or 14, or sleeve 15 or 16, the connection 18 including an intermediate lever 25, and therefore an additional pivotal connection 23 is employed.

The bottom of the standard or casing 5 is sealed by a closure 26 and a lubricant supply 27 is located within the hollow casing or standard 5 and immediately above the closure 26. A wick 28 is associated with each of the pivotal connections 23, one end of the wick being disposed within the lubricant supply 27 and the other end being operatively connected to the pivotal connection 23 whereby lubricant will, by capillary attraction, be fed upwardly along the wick for the purpose of properly lubricating said piv-

otal connection 23. It will be noted that the connections 23 are disposed above the lubricant supply, and that the main shaft 10 is disposed above the connection 23. The shaft 10 is located so far above the lubricant supply that practice has demonstrated that lubricant will not feed upwardly along the wick by capillary attraction from the lubricant supply to the main shaft. For this reason a lubricant filtering and distributing receptacle 29 is mounted within the upper portion of the hollow casing or standard 5 at a point adjacent the shaft 10 (see Figures 1, 3, 5 and 10). The means employed for supplying lubricant to the receptacle and for distributing the lubricant to the parts to be lubricated will become apparent as the description progresses.

In order to avoid the necessity of frequently examining the receptable 29 to see if it contains sufficient lubricant, I have provided means for automatically discharging lubricant from the reservoir 27 into the receptacle.

To this end, I have provided a lubricant pump 30 which I have located within the supply or reservoir 27. This pump includes a cylinder 31 which is pivoted at its lower end through the medium of a horizontal pin 32 to a bracket 33 fixed to the closure 26. Formed in the lower portion of the cylinder is one or more ports 34 and this port, or ports, is always located below the lubricant level of the main supply 27. Mounted for reciprocations within the cylinder 31 is a piston 35 having an axial passage or bore 36. A lubricant discharge tube 37 has its lower end extended into the upper end of the piston 35 and in registration with the passage 36 of said piston. This connection is maintained through the medium of a clamping screw 38.

The lubricant discharge tube 37 extends upwardly and has its upper end portion 39 curved so that the discharge end 40 of the tube will serve, in nozzle fashion, to project a jet of lubricant upwardly against the under face of the lateral hood extension 41 extending from the hood or cover 42 with which the receptacle 29 is provided. In this manner the lubricant is kept in a more or less constant state of agitation which greatly reduces tendencies to thicken or gum up. In order to further assure efficient lubrication of the parts of the machine with lubricant free of grit and other undesirable foreign matter, I have provided a filtering screen 43 which is mounted in the receptacle 29 in the manner clearly indicated in Figures 3 and 10, being so positioned that all lubricant projected into the receptacle through the tube 37, 39, 40, must past through and be filtered thereby. It will be noted by reference to the figures referred to that the screen is positioned longitudinally in the hooded receptacle on an incline with its lower edge in the corner of the receptacle nearest the tube nozzle 40, thus dividing the receptacle into a wide filtered lubricant trough separated by the screen from a narrow non-filtered lubricant trough. The screen 43 may be soldered or otherwise secured in the receptacle.

The tube 37 is pivotally connected to one of the driving pitmen 22. This pivotal connection includes a block 44 having a shank 45 which is journaled in one of the pitmen or driven elements 22 and is held against accidental displacement by a nut 46. The block 44 is formed with a recess 47 for receiving the tube 37 and a clamping screw 48 is threaded into the block 44 for engagement with the tube 37 so as to retain the same against movements relative to the block.

Consequently when the main shaft 10 is rotated, the pump 30 will be operated to discharge lubricant from the main supply 27 into the receptacle 29 and thereby automatically maintain a suffcient quantity of lubricant in said receptacle. It will be observed that the pivotal connection between the tube 37 and the pitman 22 will move in a substantially circular path, that is, the pivotal connection has and up and down movement and also a lateral movement. The up and down movement functions to reciprocate the piston 35 and the lateral movement is permitted by reason of the cylinder 31 being pivoted to oscillate about the horizontal pivot 32.

It will be observed by reference to Figures 1 and 4 that the bearings 49 for the left hand ends of the shafts 13, 14 are provided with lubricant receiving ports 50. Mechanical means is provided for distributing lubricant to these ports. It will be understood that the opposite ends of the shafts 13 and 14 are also mounted in bearings equipped with lubricant receiving ports. Mechanical means may likewise be provided for distributing lubricant to the bearing ports last mentioned but I have found it practical to rely, for this lubrication, upon the lubricant running down the frame wall and thrown off the driving connections during their operations.

The rock shaft 13 has secured thereon rocker arms 51 and 52, the former being connected pivotally as at 53 to the feed lift affecting link 54 and the latter being connected pivotally as at 55 to the feed travel affecting link 56. The rock shaft 14 carries a rocker arm 57 which is pivotally connected as at 58 to the looper sidethrow or needle avoiding movement affecting shaft 59 and this shaft also carries a crank arm 60 which is link connected as at 61 to a crank 62 on the shaft 59 for the purpose of imparting the necessary rocking motion to the shaft 59 for moving the looper back and forth.

The receptacle 29 is provided with a delivery duct 63 at each end thereof which ducts deliver lubricant to the main shaft bearings 11 and 12 through the receiving ports 64 with which the bearings are provided. Along one side at its bottom the receptacle is provided with a plurality of depending apertured delivery bosses 65, each of which delivers lubricant, by action of gravity, and directly, to a receiving port 66 in one pitman or strap element 22.

At the other side of its bottom, the receptacle is equipped with a single apertured delivery boss 67 for delivering lubricant to a distributing duct 68 which in turn delivers the lubricant to a distributer cup 69 secured at 70 to the roof of the frame arm 8. The cup 69 is provided with a plurality (six being shown) by depending apertured bosses 71 through each of which one end of a twisted wire distributer element 72 is projected and secured by solder or otherwise as at 73 to the inside bottom face of the cup. The free end of the elements 72 are projected into suitable position for dripping lubricant into the ports 50 and onto the pivotal connections 53, 55, 58, and 61. I have found that distributer elements of the character described preferably formed of twisted copper wire provide very effective means for delivering the lu-

bricant to the parts to be lubricated, the twisted wire providing a good grip for the lubricant causing it to follow the wire to the end and the spiral twist serving to speed the travel of the lubricant along the twisted element. It will be observed that these elements may be employed to distribute lubricant to points other than those specifically disclosed herein, also that the parts to be lubricated herein disclosed are exemplary only, and that the lubricating system may be employed on machines of various types. By forming the delivery apertures of the receptacle 29 and cup 69 in depending bosses, the tendency of the lubricant to collect on and flow uncontrolled over the bottom surfaces of these parts is eliminated, assuring delivery of the lubricant in the desired controlled manner.

An excess lubricant collection well 74 is provided in the sewing head 7, and a similar well 75 is provided in the elbow of the work arm 9, and these wells serve to collect any excess of lubricant delivered to the parts to be lubricated. See Figures 2, 6, 7 and 8.

A suction duct 76 is provided and has its receiving end screen protected as at 77 and emersed in the lubricant in the well 74. The duct 76 is connected at its delivery end in a hollow tube 78 carried in the wall 79 which divides the sewing head 7 and the overhanging arm 6. The bore in the tube 78 opposite the connection with the duct 76 is plugged as at 80 and this bore communicates through a lateral delivery port 81 into one arm of an angled tube 82 rockably mounted on the end of the tube 78 which projects into the overhanging arm. A piston 83 is reciprocably mounted in the extended arm of the member 82 and carries a strap 84 which encircles an eccentric 85 mounted on the main shaft 10 so that as the shaft 10 rotates the eccentric will cause the piston to reciprocate.

The piston strap is provided with an annular recess 86 and a delivery port 87, and the piston is provided with a bore and counterbore generally designated 88 controlled by a spring loaded check valve 89 so that reciprocation of the piston will draw the excess lubricant collected in the well 74 through the tube 78 and deliver it through the bore 88, recess 86 and port 87 back into the overhanging arm 6 where it may gravitate back into the main supply or reservoir 27. The load on the check valve may be varied by adjustment of the apertured screw 90.

By provision of the above described mechanism, the excess lubricant collected in the sewing head is automatically pumped back into the main supply of lubricant. Similar means is provided for pumping back excess lubricant collected in the work arm, and I will now proceed to describe this mechanism.

A suction duct 91 has its receiving end screen protected as at 92 and emersed in the excess lubricant collecting well 75 in the work arm 9. The other end of the duct 91 is extended upwardly to and horizontally through the frame arm 8 and is secured as at 93 in the receiving bore 94 of a pump casing 95 suitably secured to the roof of the machine frame. A tube or cylinder 96 is secured in the casing 95 in axial alinement with the bore 94 and a piston 97 is reciprocable in the cylinder. The piston is bored and counterbored to provide a lubricant passage, and passage of lubricant through the piston is controlled by a spring loaded check valve 98, the spring load of which is controllable by varying the longitudinal adjustment of the delivery tube 99 which is threaded in the end of the piston and from which the pumped lubricant is returned to the main supply 27. The piston 97 is reciprocated by reason of the link connection as at 100 with the intermediate lever 25.

In the foregoing description, I have disclosed novel means for filtering and distributing lubricant to sewing machine operating parts and novel means for collecting excess lubricant and returning it to the main supply to be again distributed over operating parts of the machine. While I have disclosed a single distributer cup for receiving lubricant from the filtering and distributing receptacle, it will be understood that a number of said cups may be employed, if desired, and positioned at suitable points within the machine frame.

It is of course to be understood that the details of structure and arrangements of parts may be variously changed and modified without departing from the spirit and scope of my invention.

I claim:—

1. In a sewing machine wherein is provided a frame including a sewing head, and a main shaft rotatable in bearings in the frame and projecting into the sewing head; a lubricant reservoir within the frame, means including a pump operated from the main shaft for supplying lubricant from the reservoir to the main shaft bearings, a well in the sewing head for collecting excess lubricant, and means including a pump operated from the main shaft for returning lubricant from the well to the reservoir.

2. In a sewing machine wherein is provided a frame including an overhanging arm and a sewing head carried by the arm and separated therefrom by a dividing wall; a lubricant reservoir, means to apply lubricant to parts of the machine, a well in the sewing head for collecting excess lubricant, a member mounted in the dividing wall and having a lubricant passage therein and a lateral port, a suction duct communicating between the well and the lubricant passage, a hollow elbow rockably mounted on the member in communication with the passage thereof through the port, an eccentric mounted on the main shaft, a plunger having a lubricant delivery duct therethrough and reciprocable in an arm of the elbow, a check valve controlling flow of lubricant through the piston, and means connecting the piston and the eccentric for driving the former from the latter.

3. In a sewing machine wherein is provided a frame including an overhanging arm and a sewing head carried by the arm and separated therefrom by a dividing wall; a lubricant reservoir, means to apply lubricant to parts of the machine, a well in the sewing head for collecting excess lubricant, a member mounted in the dividing wall and having a lubricant passage therein and a lateral port, a suction duct communicating between the well and the lubricant passage, a hollow elbow rockably mounted on the member in communication with the passage thereof through the port, an eccentric mounted on the main shaft, a plunger having a lubricant delivery duct therethrough and reciprocable in an arm of the elbow, a check valve controlling flow of lubricant through the piston, and a strap forming a driving connection between the piston and the eccentric, said strap having a lubricant

delivery port therein and an annular recess communicating between the strap port and the piston duct for the purpose described.

4. In a sewing machine wherein is provided a frame including an overhanging arm and a sewing head carried by the arm and separated therefrom by a dividing wall; a lubricant reservoir, means to apply lubricant to parts of the machine, a well in the sewing head for collecting excess lubricant, a member mounted in the dividing wall and having a lubricant passage therein and a lateral port, a suction duct communicating between the well and the lubricant passage, a hollow elbow rockably mounted on the member in communication with the passage thereof through the port, an eccentric mounted on the main shaft, a plunger having a lubricant delivery duct therethrough and reciprocable in an arm of the elbow, a spring loaded check valve controlling flow of lubricant through the piston, means to vary the spring load on the check valve, and means connecting the piston and the eccentric for driving the former from the latter.

5. In a sewing machine wherein is provided a hollow frame including a base, a standard, an overhanging arm and a sewing head carried thereby, a forwardly extended arm, a work arm and a front arm joining the forwardly extended arm and the work arm, and operative parts in said arms; a lubricant reservoir mounted in the base, a filtering and distributing receptacle mounted at a high point in the frame and having means associated therewith for distributing lubricant to the operative parts, means for delivering lubricant from the reservoir to the receptacle to be first filtered therein and then distributed to certain of the operative parts, a second distributer receptacle mounted in the front arm and having associated therewith means for distributing lubricant to said certain other operative parts, and means to deliver lubricant from the first receptacle to the second receptacle.

6. In a sewing machine wherein is provided a hollow frame including a base, a standard, a sewing head, a work arm, and operative parts to be lubricated; a lubricant reservoir; means to distribute lubricant from the reservoir to parts to be lubricated; a waste lubricant collecting well in each of the work arm and the sewing head; and means to return lubricant from the wells to the reservoir.

7. In a sewing machine wherein is provided a hollow frame including a base, a standard, a sewing head, a work arm, and operative parts to be lubricated; a lubricant reservoir; means to distribute lubricant from the reservoir to parts to be lubricated; a waste lubricant collecting well in each of the work arm and the sewing head; and an individual pumping mechanism associated with each well for returning lubricant collected by said well back to the reservoir.

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