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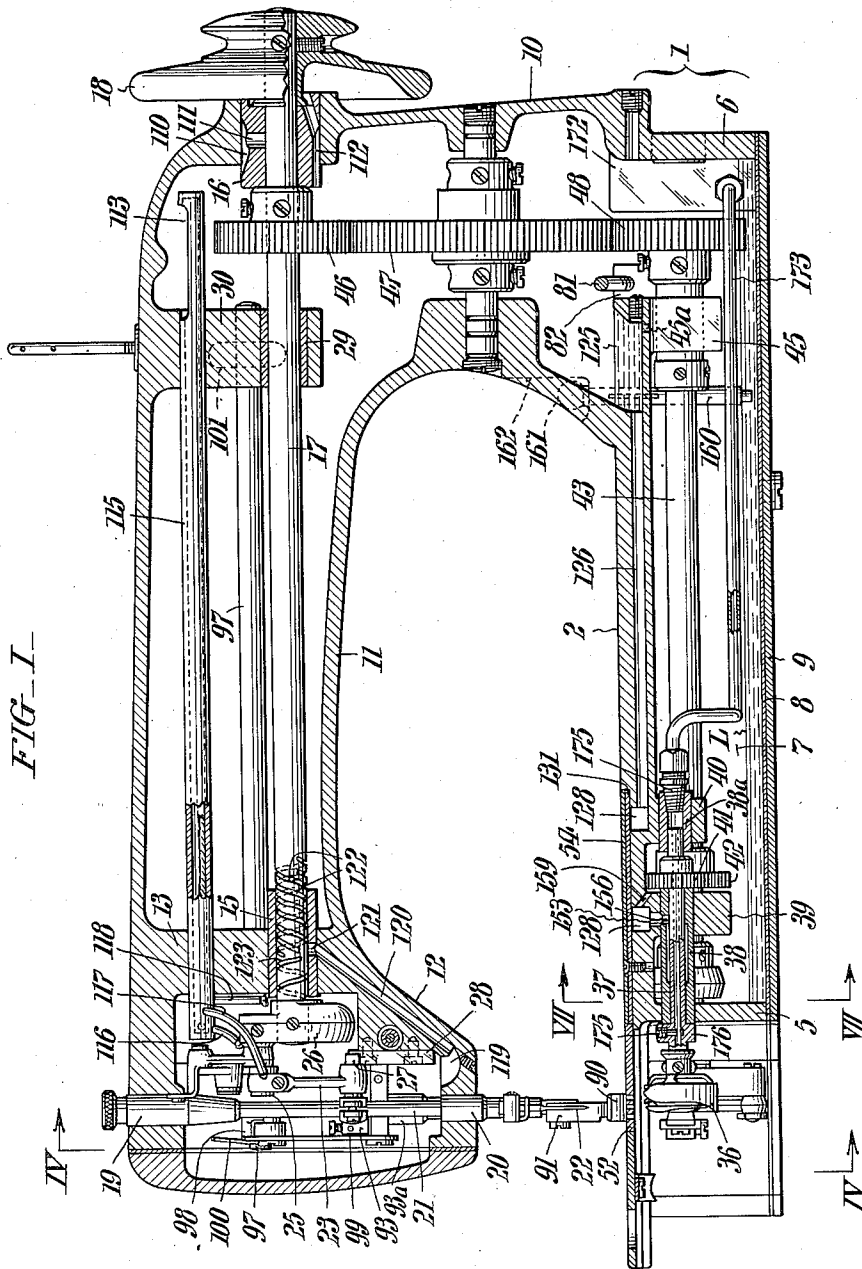
G. SAUER

2,345,992

SEWING MACHINE

Filed Dec. 30, 1939

4 Sheets-Sheet 1



WITNESSES:

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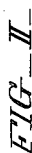
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4 Sheets-Sheet 2



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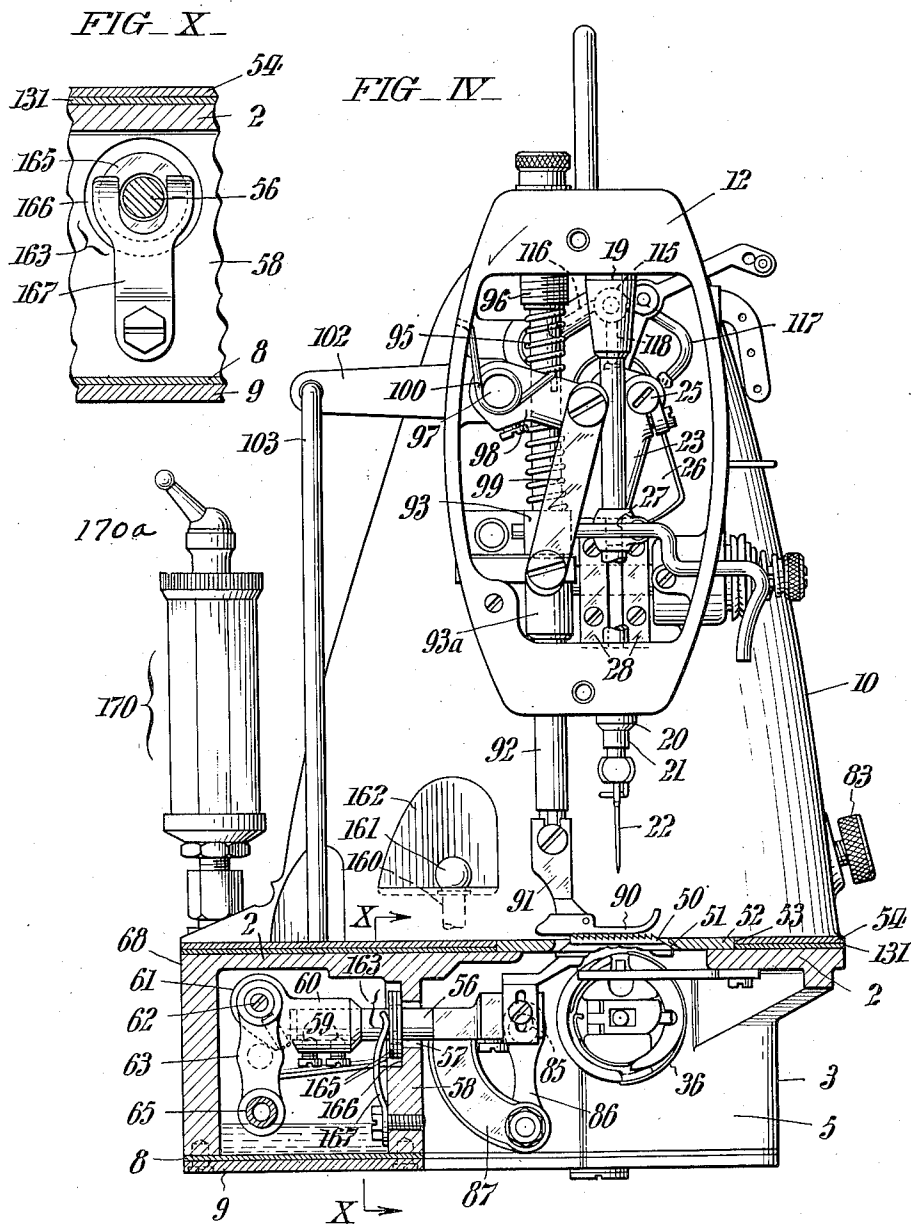
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4 Sheets-Sheet 3



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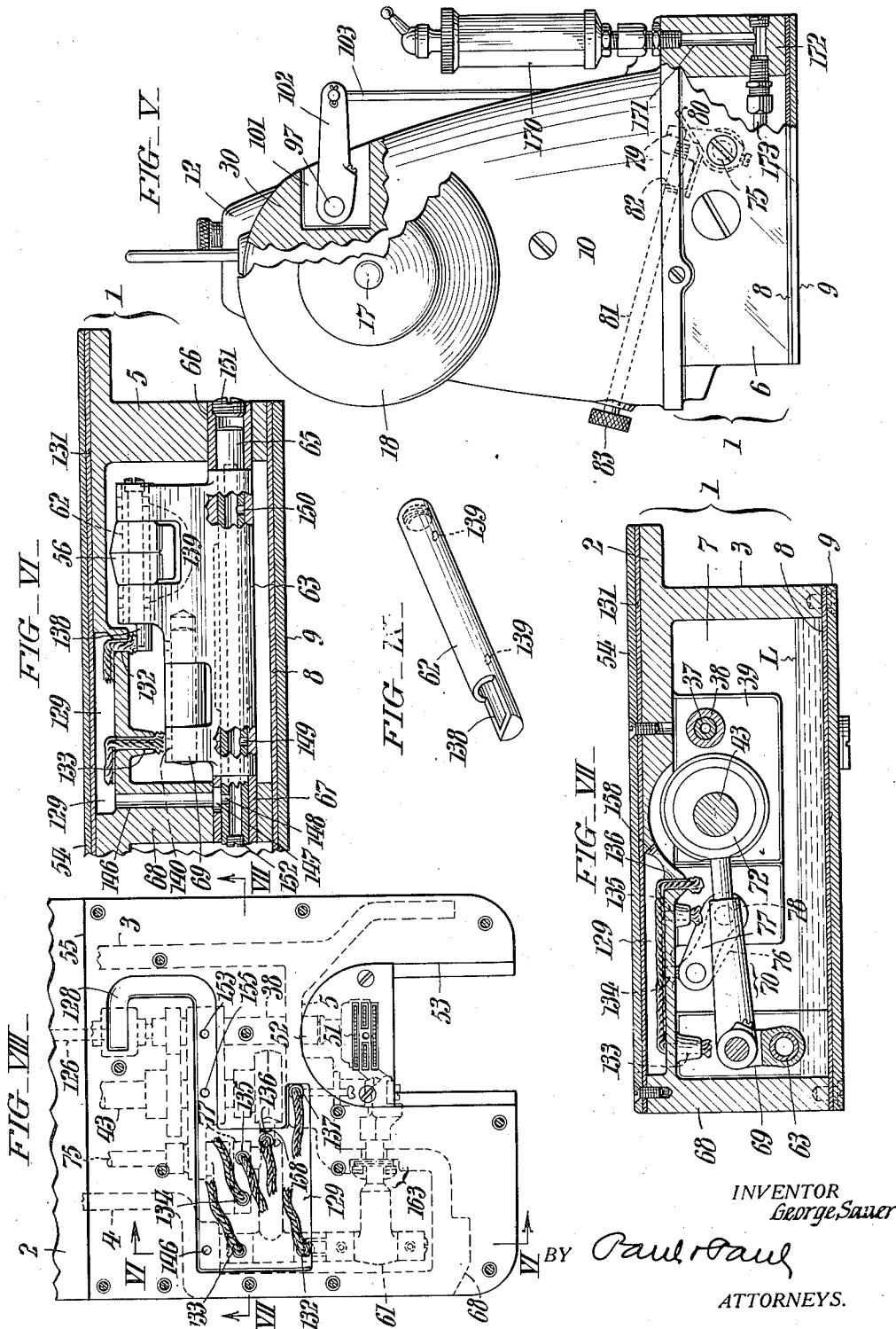
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4 Sheets-Sheet 4



UNITED STATES PATENT OFFICE

2,345,992

SEWING MACHINE

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poration of Illinois

Application December 30, 1939, Serial No. 311,722

19 Claims. (Cl. 112—256)

This invention relates to sewing machines of the flat bed type and has reference more particularly to lock stitch sewing machines, although some of its features may be employed with advantage in other types of sewing machines.

My invention has for its chief object, the provision of a simple automatic circulating lubricating system such as hereinafter fully disclosed, to obviate the necessity for dependence upon the operators of sewing machines (most of whom have little or no knowledge of the inner workings of the machines) to keep the machines properly oiled with a view toward precluding break-downs and adding to the useful life of the machines.

Another object is to make it possible to maintain the oil in constant circulation in the machines without requiring the aid of oil displacing means other than afforded by the usual and necessary parts of the machine mechanism.

Another object of my invention is to secure the foregoing advantages and at the same time make it possible to enclose all the moving parts of the various machine mechanism, except for those which operate directly upon the work being sewed, within the frame of the machine, so as to avoid projections which might cause injury to the operators or with which the work might catch and tear.

Another aim of my invention is to prevent, by improved construction of the machine frame, the escape of any oil at the regions where the stitching and feeding implements protrude from the frame to the exterior where it would soil the work being sewed.

Other objects and attendant advantages of my invention will appear from the following detail description of the attached drawings, wherein

Fig. I is a view in vertical longitudinal section of a lock stitch sewing machine conveniently embodying the present improvements.

Fig. II shows the machine in top plan.

Fig. III is a horizontal plan section taken in a plane below the level below the work support of the machine.

Fig. IV is a view partly in elevation and partly in cross section taken as approximately indicated by the angled arrows in Figs. I and III, with the cover of the needle head removed to expose the parts at the interior.

Fig. V shows the machine in rear end elevation with portions broken out and in section to better illustrate important details of the frame construction.

Fig. VI is a fragmentary longitudinal detail sectional view taken as indicated by the angled arrows VI—VI in Figs. III and VIII.

Fig. VII is a cross section through the base of the machine taken as indicated by the angled arrows VII—VII in Figs. I, III and VIII.

Fig. VIII is a fragmentary view in plan of the top of the machine base which constitutes the work support, with a supplemental cover plate removed therefrom to expose channelling through which oil is distributed for the lubrication of certain of the moving parts of the mechanism within the machine base.

Fig. IX is a detail view in perspective of one of the pivot shafts embodied in the feed mechanism of the machine; and

Fig. X is a fragmentary detail sectional view taken as indicated by the angled arrows X—X in Figs. III and IV.

With reference first more particularly to Figs. I-IV, VI and VII, it will be observed that the machine chosen for exemplification of my invention has a hollow work-supporting base 1 with a top wall 2, front and rear side walls 3 and 4 and end walls 5 and 6. The hollow 7 of the base 1 is closed at the bottom, with interposition of a sealing gasket 8, by a removable cover plate 9 and is employed as a sump for oil which is normally maintained at the level indicated at L. Rising from the base 1 at one end is a hollow standard 10, which, at the bottom, communicates directly into the chamber 7 and with which is integrally formed a hollow arm 11. As shown, the arm 11 overreaches the base 1 and terminates at its free end in a hollow head 12. A crosswise partition 13 isolates the hollow of the head 12 from the hollow of the arm 11, which latter, at its rear end, communicates directly into the hollow of the standard 10 as best shown in Fig. I. Extending longitudinally through the arm 11 and journaled in bushings 15 and 16 set respectively into the partition 13 and the rear wall of the standard 10 is a rotary shaft 17. As shown, this shaft 17 protrudes to the exterior of the frame arm at its right hand end to the exterior and there carries a combined hand and belt wheel 18 by which the machine may be operated either manually or under power.

Confined to axial reciprocation in bushings 19 and 20 respectively at the top and bottom of the head 12, is a bar 21, which, at its lower end, carries a needle 22. Through a link connection 23 with a crank pin 25 on a disk 26 at the end of the shaft 17 within the hollow of the head 12, the needle bar 21 is given its reciprocating motion.

Rotation of the needle bar 21 within its bearings is prevented through engagement of the outer end of the lower pivot pin 27 for the link 23 in a vertically-grooved guide 28 interiorly of the head 12. From Fig. I it will be noted that the drive shaft 17 also has journal support in a sleeve 29 set into a pendant bearing lug 30 within the hollow of the needle arm 11. As shown in Fig. III, the front wall 5 of the base is angularly recessed as at 35 to accommodate the loop taker of the machine, which, in this instance, has the form of a rotary hook 36 and which cooperates with the needle 22 beneath the work support 2 in stitch formation. The rotary hook 36 is secured to the protruding end of a shaft 37 which extends through a bearing sleeve 38 fixed in the end wall 5 of the base. Within the chamber 7, the sleeve is supported in a bearing lug 39 pendant from the top wall 2 of the base, see Figs. I and II, while the inner end of the hook shaft 37 extending beyond the sleeve is journaled in a shorter sleeve or bushing 38a set into another pendant lug 40 within said base spaced from the lug 39. Through a pair of intermeshing spur gears 41 and 42, the hook shaft 37 is driven from a rotary shaft 43 which extends longitudinally of the chamber 7 and which is journaled in bearings respectively provided by the end wall 5, the lug 39 and a web projection 45 extending forwardly from the rear wall 4 within the base. By means of a train of intermeshing spur gears 46, 47 and 48 within the hollow of the standard 40, the lower shaft 43 is driven from the upper shaft 17 in the same direction and at the same speed. It is, however, to be noted that the ratio of the spur gears 41 and 42 is such as to determine two rotations of the hook shaft 37 for each rotation of the upper shaft 17 from which the needle bar 21 is actuated.

The feed mechanism of the machine includes a feed dog 50, the teeth of which operate upwardly through slots 51 in a throat plate 52 set into the inner end of a cut-out 53 in a cover plate 54 which is in turn set into a depression 55 in the upper surface of the top wall 2 of the base 1 at the front end of the latter, see Figs. I, IV and VIII. From Fig. IV, it will be observed that the feed dog 50 is secured, with capacity for vertical adjustment, to a carrier 56 having a cylindrical shank which extends inwardly through a clearance opening 57 in the longitudinally offset portion 58 of the front wall 5 of the base 1. The inner end of the carrier bar 56 is secured by set screws 59 in a socket member 60 having a transverse boss 61 in which a pin 62 is in turn secured for pivotal connection to the top of a rocker 63. This rocker 63 reaches upwardly from a rock shaft 65 journaled at its opposite ends in bushings 66 and 67 respectively set into the end wall 5 of the base and into the laterally offset portion 68 of the rear wall 4. Also secured to the rock shaft 65 within the chamber 7 is an upwardly extending arm 69, which, through a telescopic link 70 is connected to the strap 71 of an actuating eccentric 72 on the shaft 43. Under the influence of the eccentric 72 and the interposed parts just described, horizontal feeding movements are imparted to the feed dog 50. The means for regulating the feed throw of the feed dog 50 includes a regulating shaft 75 which is journaled in the lugs 39 and 45 hereinbefore referred to. An arm 76 on the left hand end (Fig. III) of the regulating shaft 75 is connected by a "lazy" bar 77 to a stud 78 on the sleeve member 70a of the telescopic link 70. At its

right hand end beyond the bearing lug 45, the shaft 75 is provided with another arm 79 which is subject to a torsion spring 80 and against which the inner end of an adjusting rod 81 abuts. As shown in Fig. V, the rod 81 has a screw thread engagement with a lug 82 within the base 1 and extends at an inclination through the front wall of the standard 10 to the exterior. At its outer end the rod 81 is provided with a knurled manipulating head 83. Lift movements are imparted to the feed dog 50 from a crank 85 at the outer (left hand) end of the lower shaft 43, said crank being connected through a vertical link 86 with a curved depending arm 87 on the carrier 56 for the feed dog 50. The construction and operation of the feed mechanism just described is identical with that featured in U. S. Patent No. 2,035,508, granted to me and to Clarence C. Smith on March 21, 1936, to which patent reference may be had for details if found necessary.

In its feeding action, the dog 50 reacts with a presser foot 90 pivotally connected to a shank member 91 at the lower end of a presser bar 92. As shown in Fig. IV, the presser bar 92 extends up through a bearing in the bottom of the needle head 12, and, within the hollow of the latter, carries a collar 93 against which the lower end of a helical compression spring 95 bears. At its top, the spring 95 abuts the upper bearing sleeve 96 for the rod 92, which sleeve is threaded for adjustment in the needle head 12 so that the pressure of the spring may be regulated as desired or required.

In order that the presser foot 90 may be raised to facilitate insertion of the work beneath it initially, there is provided a control mechanism including a shaft 97 within the hollow of the overhanging arm 11, said shaft being journaled at its opposite ends in the partition 13 and in the lug 30, respectively. The left hand end of the shaft 97 (Fig. I) extends through the partition 13 into the hollow of the needle head 12 and there has and arm 98 (Fig. IV), which, through a link 99, is connected to a collar 93a which is slidable on the presser bar, and which is normally spaced from the lower face of the collar 93, so that during the operation of the machine, the presser bar is subject only to the influence of the spring 95. A torsion spring 100 surrounding the end of the shaft 97 within the head 12 tends to rotate the arm 98 clockwise in Fig. IV and through the link 99 causes the loosely mounted collar 93a on the presser bar 92 to be normally held in its lower position in engagement with the bottom of the needle head 12 and away from collar 93. Secured to the shaft 97 within a lateral recess 101 in the lug 30 in the hollow of the frame arm 11 (Figs. I, II and V), is an operating lever 102 which reaches outward from said arm for connection to a pendant link rod 103. This link rod 103 passes through a guide hole in the work support 2 and is connected at its lower end to one extremity of a motion translating lever 105 fulcrumed on a fixed stud 106 which extends outward from the inwardly recessed portion 107 of the rear side wall 4 of the base 1. The other extremity of the lever 105 is engaged from beneath by a pad at the top of the thrust rod 108 which may extend to an actuating knee press or foot treadle, not illustrated. Due to the lateral recessing of the side wall 4, it will be seen that the presser foot control connections are kept within the confines of the work support 2 with consequent avoidance of projections therebeyond. As previously pointed out, the hollow of the

base 1 of the machine is utilized as an oil sump. For the purpose of circulating the oil within the machine to lubricate the various enclosed parts, the oil is lifted from the supply as a consequence of the dipping therein of the gear 48 on the lower shaft 43. The oil thus lifted is further carried up by the gears 47, 46 and by the high speed rotation of the latter, dispersed in the form of a mist within the hollow of the standard 10 and the connecting hollow of the frame arm 11. Some of this dispersed oil finds its way into a pocket 110 at the top of the right hand end bearing 16 for the drive shaft 17 and is conducted through a port 111 to the shaft surface within said bearing, any excess oil being returned into the base by way of a duct 112 at the bottom of said bearing. Part of the dispersed oil is also caught by the open rear end 113 of a tube 115 which extends horizontally forward within the hollow of the frame arm 11 and through the partition 13 into the needle head 12. Wick filled tubes 116, 117 and 118 lead from the delivery end of the tube 115 and release oil from above onto the moving parts within the needle head 12. The excess oil thrown off by the needle operating mechanism is collected in a small sump 119 in the bottom of the needle head 12. Connecting with this sump 119 is an inclined duct 120 which leads upward to a lateral port 121 in the left hand end bearing bushing 15 for the shaft 17, which shaft, as shown in Fig. 1, is formed within the confines of said bearing with two relatively wide interlapping spiral grooves 122 pitched in one direction and also with a shorter and narrower oppositely pitched groove 123. As the shaft 17 rotates, the helical groove 122 functions as a pump to constantly lift the accumulating oil from the sump 119 in the needle head through the duct 120 into the bearing 15 to lubricate it and to discharge the excess from said bearing into the hollow of the frame arm 11 wherefrom it drains along the downwardly inclined slope at the bottom of said arm back into the base 1. At the same time, the smaller reversely pitched groove 123 slightly opposes the action of the longer groove 122 to maintain an oil seal within the bearing 15 and thus prevents air pumping when the shaft becomes worn. Some of the dispersed oil is, moreover, caught in a well 125 integrally formed with the machine frame within the standard 10 above the lower shaft 43. Leading horizontally from the well 125 through the top wall 2 of the machine base 1 is a duct 126 which delivers into a channel 128 formed in the depressed free end portion 55 of said top wall, see Figs. I, VI, VII and VIII. As shown, this channel 128 is broadened as at 129 for the purposes of a shallow distribution reservoir which is closed at the top by the removable cover plate 54 and sealed by a gasket 131. A plurality of wick filled holes 132, 133, 134, 135, 136 and 137 lead from the distribution reservoir and carry oil to the various parts of the mechanism within the base. As shown in Figs. VI and VII, the hole 132 is directly over the open protruding end 138 of the pivot pin 62 for the feed dog carrier 56, said pin being axially hollow and provided at the bottom with ports 139 (Figs. VI and IX) by which the oil is released into the bearings for said pin in the rocker 63. The oil release hole 133 is in turn positioned over a port 140 in the top of the rocker arm 69, while the holes 134 and 135 discharge oil into ports 141 and 142 at the pivots of the "lazy" bar 77, see Fig. III. Oil passing

through the hole 136 serves to lubricate the feed advance eccentric 71; and that escaping through the hole 137 drips into a duct 143 leading down into the left hand end bearing for the shaft 43. A wick filled tube 145 extending laterally from the duct 143 carries oil for release upon the feed lift crank 86 on the protruding end of the shaft 43 likewise as shown in Fig. III. Also leading down from the reservoir 129 through the wall portion 68 of the base 1 is a duct 146 which delivers oil into a port 147 in the bearing 66 for the feed rocker shaft 65 which is hollow, see Fig. VI, and which receives the oil from the port 147 through a connecting port 148 in said shaft. By way of other lateral ports 149 and 150 in the shaft 65, some oil finds its way to the surfaces of the rocker 63 requiring lubrication. The rocker shaft 65 is closed at one end by a screw plug 151 and the axial duct of said shaft by a screw plug 152. Another pair of holes 153 and 155 leading from the bottom of the reservoir 129 release oil into ports 156 and 157 which extend down through the lug 39 to the bearings respectively for the rotary hook shaft 38 and the lower actuating shaft 43 of the machine. The hole shown at 158 in Figs. VII and VIII prevents the distributing reservoir from becoming air bound, and oil discharges through still another hole 159 onto the gears 41 and 42. The right hand end bearing 45 for the shaft 43 is lubricated by oil passing directly down through a duct 45a from the well 125.

The excess oil dripping from the lubricated parts drips back into the main supply within the bottom of the housing 2 and is recirculated by the action of the gears 46-48. In order that the oil level in the base of the machine may be checked from time to time, there is provided a gauge rod 160 which extends down into the base 1 and which at its top has a knob 161 accessible for convenience of grasping it within a recess 162 formed in the wall of the standard 10, see Figs. I and IV. Leakage of oil from the base 1 at the clearance opening 57 through which the feed dog carrier 56 extends is prevented by a moving sealing means 163 which, as shown in Figs. III, IV and X, comprises a plurality of washers 165 which snugly surround the cylindric shank of the carrier 56 and which are pressed against the face of a machined recess 166 in the inner side of the wall 58 by a leaf spring 167. At its lower end the spring 167 is secured to the wall portion 58, and at its upper end is bifurcated to straddle the shank of the feed dog carrier bar 56.

In order that the more delicate parts of the rotary hook 36 may be lubricated with a different lighter grade of oil from that used for the other moving parts of the machine, I have provided a separate source of supply for such oil in the form of a glass gravity feed cup, which is shown at 170 in Figs. II, IV and V as being mounted on the top of the base 1 in the rear of the standard 10. At the bottom, the cup 170 communicates into a vertical duct 171 in an enlargement 172 at one corner of the base 1 within the chamber 7. Leading from the duct 171 within the chamber 7 is a tube 173 by which the oil from the cup 170 is conducted to a nipple 175 screwed axially into the inner or cap bearing for the hook shaft 37 as shown in Figs. I and III. As further shown in Fig. I, the hook shaft 37 is hollow and open within its inner bearing to receive the oil conveyed into said bearing by the tube 173. The internal construction of the rotary hook 36 may be as shown in U. S. Patent No. 2,035,984, granted

to me on September 7, 1936, so that the oil may reach the bearing surfaces between its rotating and non-rotating parts. As a means for controlling the flow of oil to the rotary hook, there is provided a regulating screw 175 which engages radially into a collar enlargement 176 on the hook shaft 37 immediately behind the hook and externally of the end wall 5 of the base 1. As shown, the inner end of the screw 175 is diametrically reduced and passes into the duct of the hook shaft to partially obstruct said duct. This construction is advantageous not only by reason of its simplicity, but in that it permits accurate adjustment of the oil flow to the hook without necessitating disassembling of the latter for the purpose.

Having thus described my invention, I claim:

1. In a sewing machine, a frame having a work supporting base and an overhanging arm both of which are hollow and inter-communicating, a hollow head at the free end of said arm, and a partition separating the hollow of the arm from that of the head; a shaft within the arm and extending through a bearing in the partition into the head; needle operating mechanism within the head actuated from the shaft; means for carrying oil from a supply within the base to the needle operating mechanism, and pump means formed between the contacting surfaces of the shaft and its bearing within the confines of the latter for drawing excess oil released by the needle operating mechanism within the head and accumulating in the bottom of the latter and discharging it into the hollow of the frame arm for gravitation back into the machine base.

2. In a sewing machine, a frame having a work supporting base and an overhanging arm both of which are hollow and inter-communicating, a hollow head at the free end of said arm, and a partition separating the hollow of the arm from that of the head; a shaft within the arm and extending through a bearing in the partition into the head; needle operating mechanism within the head actuated from the shaft; means for carrying oil from a supply within the base to the needle operating mechanism, and a spiral groove between the contacting surfaces of the shaft and its bearing within the confines of the latter, whereby, during rotation of the shaft, the excess oil released by the needle operating mechanism within the head and accumulating in the bottom of the latter is pumped from the head and discharged into the hollow of the arm for gravitation back into the machine base.

3. In a sewing machine, a frame having a work supporting base and an overhanging arm both of which are hollow and intercommunicating, a hollow head at the free end of said arm, and a partition separating the hollow of the arm from that of the head; a shaft within the arm and extending through a bearing in the partition into the head; needle operating mechanism within the head actuated from the shaft; means for carrying oil from a supply within the base to the needle operating mechanism, and a spiral groove between the contacting surfaces of the shaft and its bearing within the confines of the latter, whereby, during rotation of the shaft, the excess oil accumulation released by the needle operating mechanism is pumped from the head and discharged into the hollow of the arm for gravitation back into the machine base; and a narrower reversely pitched groove also between the contacting surfaces of the shaft and its bearing with-

in the confines of the latter to partially oppose the action of the first groove and thereby fluid-seal the bearing.

4. A sewing machine according to claim 1, wherein the needle head extends below the arm and is formed at the bottom with a sump for the accumulating excess oil; and wherein a duct formed in a wall of the head leads upward from the well to the pump means.

5. In a sewing machine, a frame having a work supporting base and an overhanging arm both of which are hollow and intercommunicating, a hollow head at the free end of said arm, and a partition separating the hollow of the arm from that of the head; a shaft within the arm and extending through a bearing in the partition into the head; needle operating mechanism within the head actuated from the shaft; means for carrying oil from a supply within the base to the needle operating mechanism; a sump in the bottom of the head for collecting excess oil released from the needle operating mechanism; a duct leading up within the partition to the surface of the shaft within the bearing; and a spiral groove between the contacting surfaces of the shaft and its bearing within the confines of the latter whereby, during the rotation of the shaft, the excess oil accumulation is pumped from the sump in the head and discharged into the hollow of the frame arm for gravitation back into the base.

6. In a sewing machine a frame including a bed, a standard, and an overhanging arm terminating in a hollow needle head having a portion extending below said overhanging arm, an oil sump in the region of said standard, and means extending along said overhanging arm for conveying oil taken from said sump to mechanism in said needle head, a needle actuating shaft journaled in bearings in said overhanging arm, a sump at the bottom of said needle head for collecting oil released from the mechanism, a duct extending from said needle head sump to carry oil directly to one of said bearings to lubricate it and a pump for inducing flow of the oil through said duct.

7. A sewing machine according to claim 6, wherein the bearing and shaft are so constructed as to operate the pump to lift the oil from said needle head sump directly into the bearing for lubricating the same.

8. A sewing machine according to claim 6, wherein the overhanging arm is hollow, and wherein surplus oil directly drawn into the bearing will be discharged from the end of the bearing away from the needle head.

9. In a sewing machine, a frame having a work supporting base and an overhanging arm both of which are hollow and intercommunicating, a hollow head at the free end of said arm, and a partition separating the hollow of the arm from that of the head; a shaft within the arm extending through a bearing in the partition into the head; needle operating mechanism within the head actuated from the shaft; means for carrying oil from a supply within the base to the needle operating mechanism; a sump in the bottom of the needle head below the level of the needle arm for collecting oil released from the needle operating mechanism; pump means within the bearing constructed and arranged to lift oil from the sump to lubricate said bearing and to discharge the excess oil into the needle arm for drainage back to the supply in the machine base;

and a duct leading from said sump to said bearing.

10. In a sewing machine, a frame having a hollow work supporting base and an overhanging arm both of which are hollow and intercommunicating, a hollow head at the free end of said arm, and a partition separating the hollow of the arm from that of the head; a shaft within the arm extending through a bearing in the partition into the head; needle operating mechanism within the head actuated from the shaft; means for carrying oil from a supply in the base to the needle operating mechanism; a sump in the bottom of the head below the level of the needle arm for collecting oil released from the needle operating mechanism; pump means formed between the contacting surfaces of the shaft and its bearing for lifting oil from the sump directly to the bearing to lubricate said bearing and to discharge the excess oil into the frame arm for gravitation to the supply in the machine base; and a duct leading from said sump to said bearing.

11. In a sewing machine, a frame having a work supporting base and an overhanging arm both of which are hollow and intercommunicating, a hollow head at the free end of said arm, and a partition separating the hollow of the arm from that of the head; a shaft within the arm extending through a bearing in the partition in the head; needle operating mechanism in the head actuated from the shaft; means for carrying oil from a supply within the base to the needle operating mechanism in the head; a sump in the bottom of the head below the level of the needle arm for collecting oil released from the needle operating mechanism; and pump means formed by a spiral groove between the contacting surfaces of the shaft and its bearing for lifting oil from the sump to said bearing to lubricate it and for discharging the excess into the needle arm for gravitation back to the supply in the machine base.

12. In a sewing machine, a frame with a flat hollow work supporting base constituting a reservoir for a main supply of lubricating oil, a hollow overhanging arm sustained by a hollow standard rising from one end of the base and terminating in a hollow head, the hollows of the base standard and arm being in direct communication but the hollow of the head being separated by a partition from the hollow of said arm; needle operating mechanism within the head; a drive shaft within the arm extending through a bearing in the partition to the needle actuating mechanism; a feed element and actuating mechanism therefor within the base; means for elevating oil from the main supply in the base and dispersing it in the form of a mist within the standard; an open well within the standard for catching some of the oil so dispersed from the main supply; an oil flow duct leading from the well through the top wall of the base and terminating in an auxiliary reservoir of larger area above the feed actuating mechanism; a plurality of individual wick tubes for conducting the oil from the bottom of the auxiliary reservoir to different parts of the feed actuating mechanism; a horizontal tube within the arm receiving some of the oil dispersed within the standard as aforesaid from the main supply in the base and extending through the partition into the head to discharge such oil from the needle mechanism; a sump in the bottom of the needle head for collecting oil released from the needle operating mechanism; and pump means within the bearing for lifting oil from the

sump directly to said bearing to lubricate it and for discharging the excess oil from said bearing into the needle arm for gravitation into the open well and into the supply in the machine base.

13. In a sewing machine, a frame having a work support and an overhanging arm with a hollow needle head at its free end; needle actuating mechanism within the head; a drive shaft on the arm and extending through a bearing in the rear wall of the head to the needle actuating mechanism; means for conducting lubricating oil to the moving parts of the needle actuating mechanism; a sump in the bottom of the head for collecting oil released from the needle actuating mechanism; a duct extending up from the sump to the interior of the bearing; and pump means jointly provided by the shaft and its bearing for drawing oil from the sump through the duct and directly to said bearing to lubricate it.

14. In a sewing machine, a frame having a work support and an overhanging arm with a hollow needle head at its free end; needle actuating mechanism within the head; a drive shaft on the arm and extending through a bearing in the rear wall of the head to the needle actuating mechanism; means for conducting lubricating oil to the moving parts of the needle actuating mechanism; a sump in the bottom of the head for collecting oil released from the needle actuating mechanism; a duct extending up from the sump to the interior of the bearing; and pump means formed by a spiral groove on the shaft within the confines of the bearing for drawing oil from the sump through the duct to said bearing to lubricate it.

15. In a sewing machine, a frame having a work support and an overhanging arm with a hollow needle head at its free end; needle actuating mechanism within the head; a drive shaft on the arm and extending through a bearing in the rear wall of the head to the needle actuating mechanism; means for conducting lubricating oil to the moving parts of the needle actuating mechanism; a sump in the bottom of the head for collecting oil released from the needle actuating mechanism; a duct extending up from the sump to the interior of the bearing; and pump means formed by a spiral groove on the shaft within the confines of its bearings for drawing oil from the sump through the duct to said bearing to lubricate it; and means for maintaining an oil seal at the bearing including a shorter reversely pitched spiral groove on said shaft also within the confines of the bearing.

16. In a sewing machine, a frame having a work support with a hollow standard which sustains an intercommunicating hollow needle arm with a needle head at its free end; a source of oil supply in the lower part of the standard; needle actuating mechanism within the head; a drive shaft within the arm and extending through a bearing to the needle actuating mechanism; means for conducting lubricating oil to the moving parts of the needle actuating mechanism from the supply in the base; a sump in the bottom of the head for collecting oil released from the needle actuating mechanism; a duct extending up from the sump to the interior of the bearing; and pump means within the bearing for drawing oil from the sump through the duct directly to the bearing to lubricate said bearing and to discharge the excess oil into the hollow of the arm for drainage back to the supply in the base.

17. In a sewing machine, a frame with a hol-

low work supporting base constituting a supply reservoir for lubricating oil, and with a hollow overhanging arm sustained by a standard rising from one end of the base and terminating in a hollow head; needle actuating mechanism within the head; a drive shaft for the needle actuating mechanism extending through a bearing in a wall of the head; a feed element and actuating mechanism therefor within the base; and an oil circulating system including means in constant contact with the oil in said supply reservoir operable during running of the machine to elevate oil within the frame from the supply, means for conducting the elevated oil to the needle actuating mechanism in the head, and pump means incorporated with the drive shaft to withdraw, from the bottom of the needle head, accumulating excess oil released from the needle actuating mechanism and forcing such oil through said bearing to lubricate it, and means to conduct the excess oil discharged from the bearing to the feed actuating mechanism in the base en route to the supply reservoir.

18. In a sewing machine, a frame with a hollow work supporting base constituting a supply reservoir for lubricating oil, and with a hollow overhanging arm sustained by a standard rising from one end of the base and terminating in a hollow head; needle actuating mechanism within the head; a drive shaft for the needle actuating mechanism extending through a bearing in a wall of the head; and an oil circulating system including means in constant contact with the oil in said supply reservoir and operative dur-

ing running of the machine to elevate a surplus of oil within the frame from the supply, pump means incorporated with the drive shaft and effective during the operation of the machine to withdraw, from the bottom of the needle head, accumulating excess oil released from the needle actuating mechanism and forcing such oil through the bearing to lubricate it, and means for conducting the excess oil discharged from the bearing back to the supply reservoir.

19. In a sewing machine, a frame with a hollow work supporting base constituting a supply reservoir for lubricating oil, and with a hollow overhanging arm sustained by a standard rising from one end of the base and terminating in a hollow head; needle actuating mechanism within the head; a drive shaft for the needle actuating mechanism extending through a bearing in a wall of the head; and an oil circulating system including means in constant contact with the oil in said supply reservoir operable during running of the machine to elevate oil within the frame from the supply, means for conducting the elevated oil to the needle actuating mechanism in the head, and pump means formed on the drive shaft within the confines of the bearing, and effective only during the operation of the machine to withdraw, from the bottom of the needle head, accumulating excess oil released from the needle actuating mechanism and forcing said oil through the bearing to lubricate it, and means to conduct the excess oil discharged from the bearing back to the supply reservoir.

GEORGE SAUER.