

Oct. 9, 1945.

G. SAUER

2,386,349

SEWING MACHINE

Filed Nov. 9, 1942

6 Sheets-Sheet 1

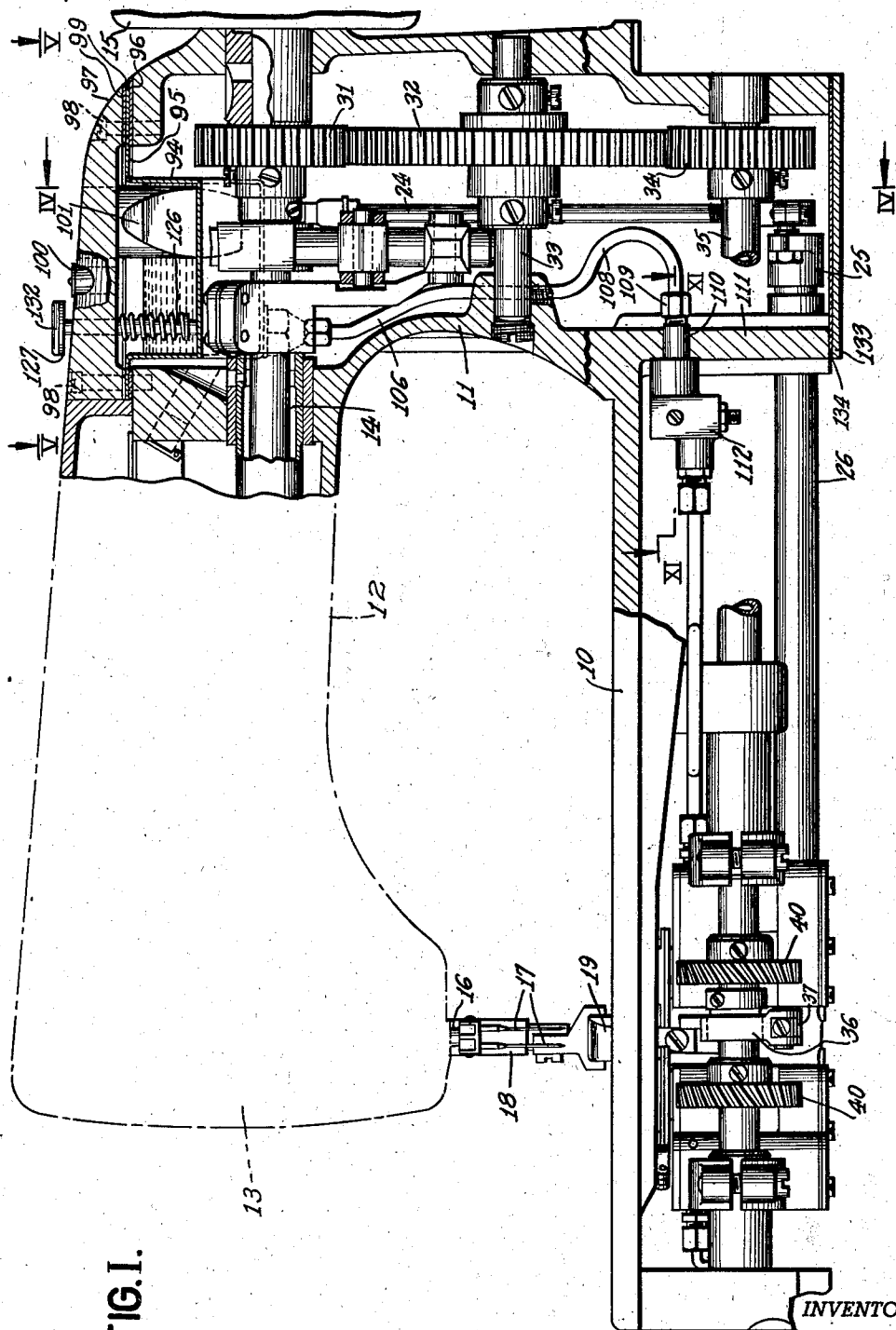


FIG. I.

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SEWING MACHINE

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6 Sheets-Sheet 2

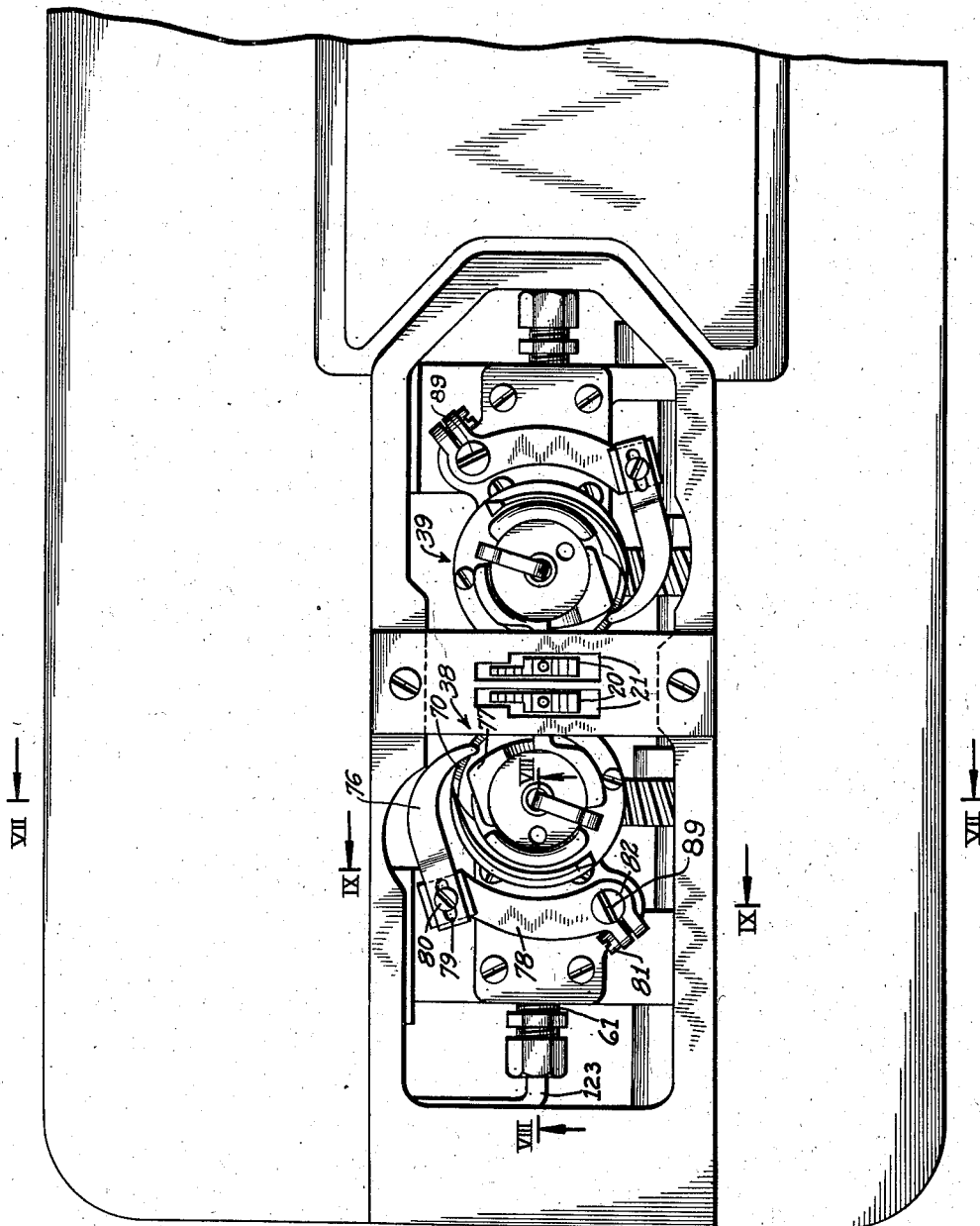


FIG. II.

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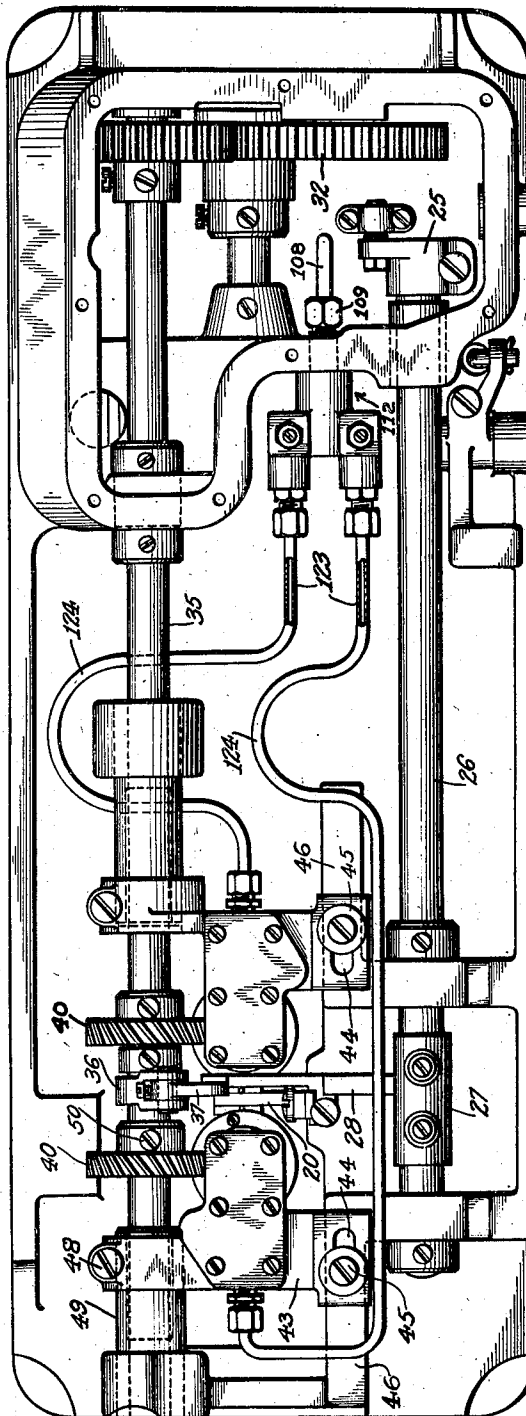
2,386,349

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FIG. III.



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SEWING MACHINE

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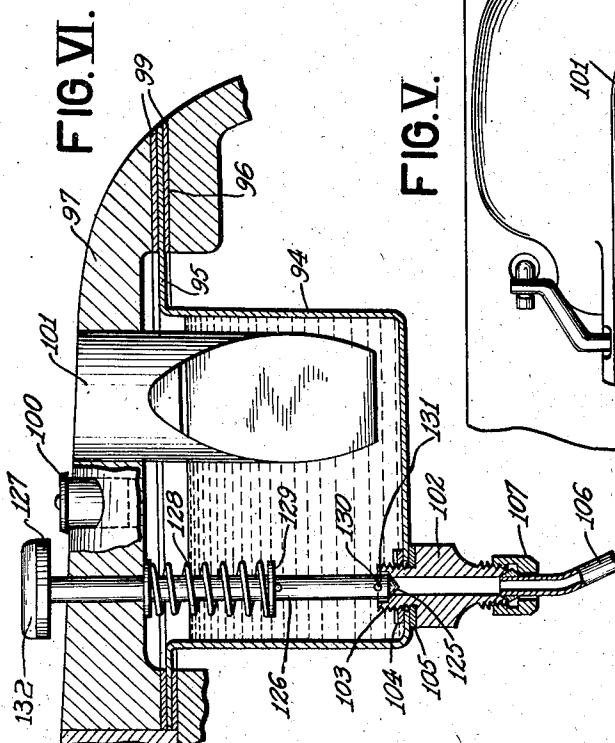
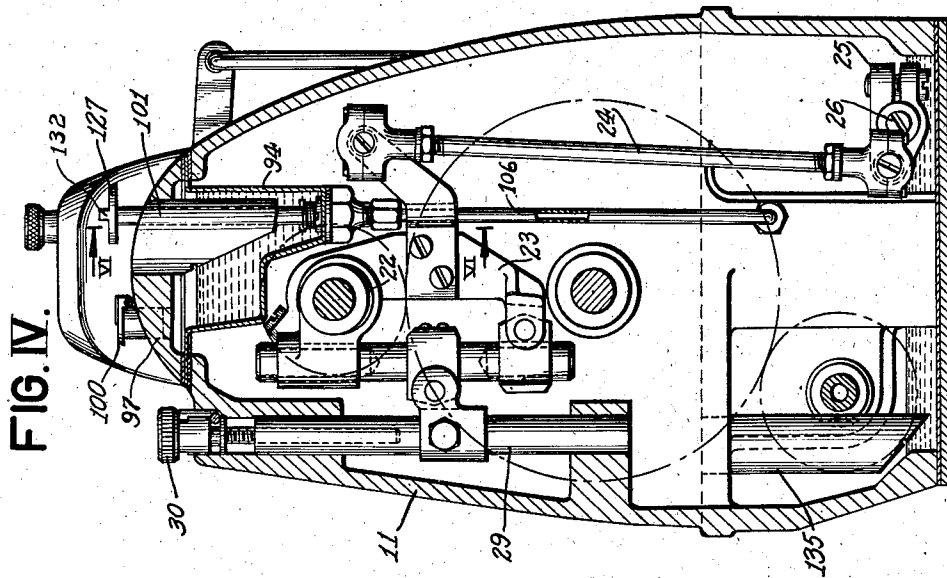
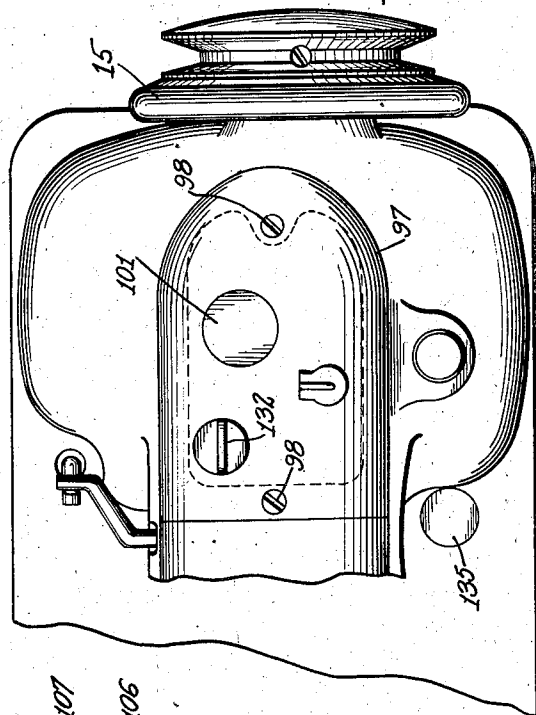


FIG. V.



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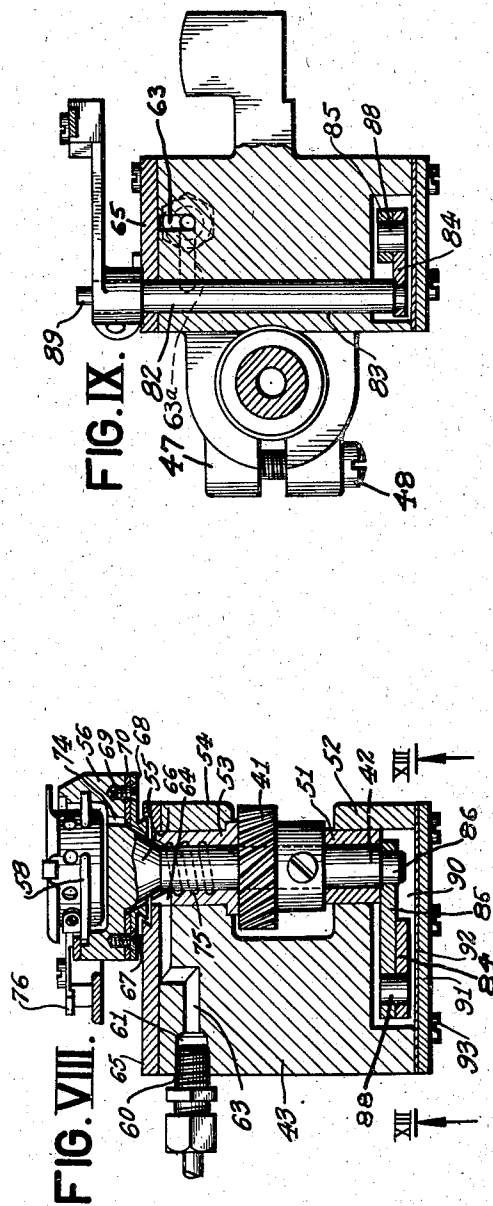
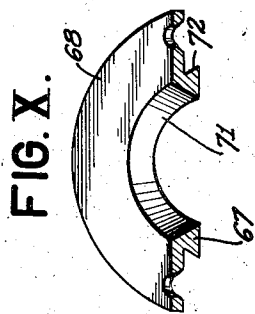
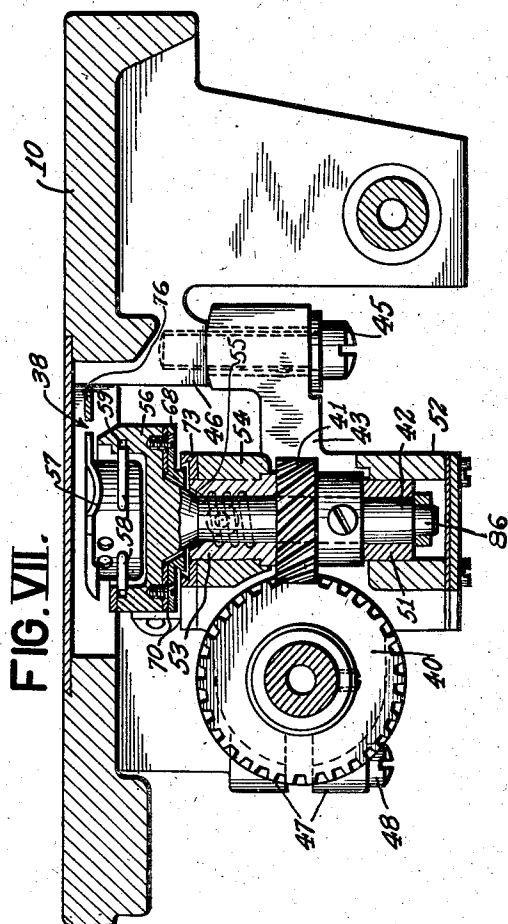
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SEWING MACHINE

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6 Sheets-Sheet 5



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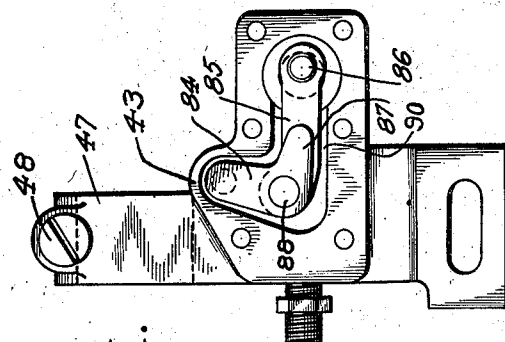
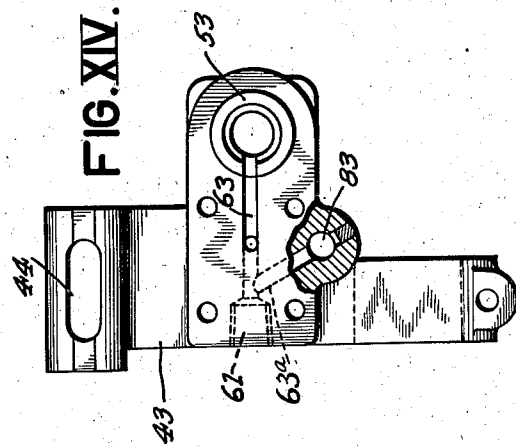
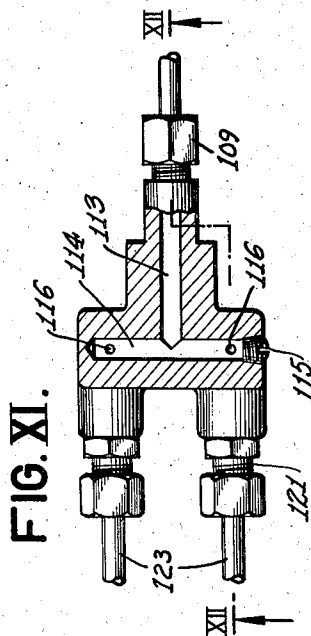
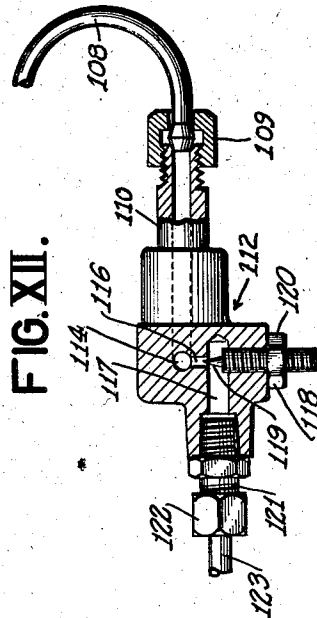
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2,386,349

SEWING MACHINE

Filed Nov. 9, 1942

6 Sheets-Sheet 6



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UNITED STATES PATENT OFFICE

2,386,349

SEWING MACHINE

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Application November 9, 1942, Serial No. 464,954

6 Claims. (Cl. 112-256)

This invention relates to sewing machines of the lockstitch type and more particularly to provisions for lubricating the raceway of a vertical axis hook, or a plurality of such hooks, and for lubricating and supporting associated devices.

A primary object of the invention has been to provide a particularly simple construction of the character indicated which is readily accessible for inspection, filling and repair, is adapted to supply the lubricant to the raceway at a substantially uniform rate regardless of the amount of oil available in a reservoir, forming part of the system, is readily regulatable as to rate of oil flow, and has various other advantages, to be hereinafter pointed out.

More specifically, an object of the invention has been to provide a relatively large reservoir for oil intended expressly for the lubrication of the raceway and other surfaces associated with a vertical axis rotary hook, the construction and arrangement being such that the rate of flow of the oil to the raceway is affected to a minimum extent by variations in head resulting from the constantly changing amount of oil in the reservoir. This has been accomplished by locating the reservoir at a point remote from the hook and at an elevation substantially above that of the raceway and other surfaces to be lubricated.

Another specific object has been to provide, in a lubrication system of the character indicated, simple, effective and readily accessible regulating means for controlling the amount of lubricant to be delivered to the hook raceway, depending upon the requirements of a particular machine. This regulating means is such, moreover, that the supply of oil to each of a plurality of hooks from a single reservoir may be effectively controlled.

A further specific object has been to provide, in combination with the individual flow regulating means for a plurality of hooks, a main flow control means which is conveniently located and may be readily and quickly operated to render the lubrication system effective or ineffective at will.

Still another object has been to so construct and arrange the connections between the reservoir and the hook raceways as to prevent, or reduce to a minimum, the danger of trapping air bubbles and thus interfering with the operation of the system. Toward this end a portion of the duct system leading downwardly from the reservoir has been disposed substantially vertically so that any trapped air will rise freely and escape into the reservoir.

A still further object has been to provide sim-

ple means for enabling adjustment of the hook or hooks transversely of the direction of feed. The lubricant conducting connections from the reservoir to the hook raceways are such as to enable this adjustment. They are such, furthermore, as to avoid all danger of leakage of the lubricant resulting from relative adjustment of the parts.

There are numerous special features of the construction which tend toward simplicity in manufacture, assembly and operation and which render the various devices more reliable and effective for their intended purposes. Among such features is the provision of means for bringing about the delivery of lubricant upwardly and outwardly to the hook raceway from a point beneath the same and closer to the hook axis. The lubricant so delivered is conveyed from the elevated reservoir to a surface on the hook shaft which functions effectively, upon rotation, to direct the lubricant in the manner indicated. Provision is also made for directing a portion of the lubricant to various other surfaces on the hook assembly requiring lubrication, as, for example, to the bearings for the hook shaft and to certain escapement devices.

Another special feature is a particularly advantageous arrangement of the escapement mechanism associated with each rotary hook. This is disposed in an enclosed chamber in the bottom of the hook saddle or frame, thereby enabling the retention of a quantity of the lubricant about some of the moving parts of the mechanism, the latter being conveniently operated by connections from the lower end of the hook shaft. The arrangement is such, moreover, as to facilitate removal and replacement of certain exposed parts of the escapement mechanism and to permit adjustment or replacement of such parts without completely dismantling the escapement mechanism or removing the enclosure for the other parts of the mechanism.

Other objects, features and advantages of the invention will appear from the detailed description of an illustrative form of the same which will now be given in conjunction with the accompanying drawings, forming part of the specification, in which:

Fig. I is a view partly in side elevation and partly in vertical section through a machine embodying the invention, a portion of the overhanging arm of the machine being shown in broken lines to avoid unnecessary details.

Fig. II is a somewhat enlarged view, in plan, of the work supporting portion of the machine

with certain cover plates removed to show the hook units beneath.

Fig. III is a bottom plan view of the machine with a cover plate at the base of the standard removed to disclose certain parts enclosed thereby.

Fig. IV is a transverse, vertical section along the line IV—IV of Fig. I.

Fig. V is a plan view, along the line V—V of Fig. I, showing a portion of the top of the machine.

Fig. VI is an enlarged sectional view along the line VI—VI of Fig. IV.

Fig. VII is a transverse, vertical section through the base of the machine, along the line VII—VII of Fig. II.

Fig. VIII is a vertical section through one of the hook units as viewed along the line VIII—VIII of Fig. II.

Fig. IX is a transverse, vertical section through said hook unit, along the line IX—IX of Fig. II.

Fig. X is a detail view showing, partly in perspective and partly in vertical section, half of a base plate associated with the improved rotary hook.

Fig. XI is a detail view, in horizontal section along the line XI—XI of Fig. I, showing a manifold member employed in the lubricant conduit system.

Fig. XII is a vertical section along the broken line XII—XII of Fig. XI.

Fig. XIII is a bottom view of one of the hook frames with its bottom plate removed, as indicated by the line XIII—XIII of Fig. VIII, and

Fig. XIV is a top plan view of said hook frame with a portion of the frame broken away for purposes of better illustration.

The invention has been illustrated herein as applied to a lockstitch sewing machine of the type disclosed in the pending application of Oscar Quist, Ser. No. 326,828, filed March 30, 1940, and now matured into Patent No. 2,329,484, dated September 14, 1943. It will be understood, however, that the invention is intended for, or susceptible of, application to other types of vertical axis rotary hook machines having any desired number of needles and rotary hooks and having other forms of work feeding mechanism and the like.

Referring now to the drawings, the machine may suitably be provided with a frame having a base portion 10, the upper surface of which constitutes a work support. At one end of the base there is provided an upwardly extending hollow standard 11 at the upper end of which is carried a laterally projecting hollow arm 12 which extends over the work support and terminates in a needle head portion 13. Journaled in suitable bearings, provided in the upper portion of the standard 11 and in the overhanging arm 12, is a main drive shaft 14 having at its outer end, beyond the outer wall of the standard, a combined hand wheel and pulley 15 by means of which power is supplied to the machine.

Suitable connections are provided from the shaft 14 for operating a needle bar 16 appropriately mounted in the needle head and carrying at its lower end one or more needles 17. The specific connections provided for operating the needle bar and the particular means employed for supporting the bar form no part of the present invention and are, therefore, not fully disclosed herein. The arrangement may suitably be such as disclosed in the above-mentioned Quist application, in which the needle bar is not only re-

ciprocated in a substantially vertical direction, upon each revolution of the shaft 14, but is also oscillated to swing its lower end in the direction of feed. This swinging movement may be of any selected, variable magnitude and is for the purpose of assisting in the feeding of the work. However, the needle feed action may be eliminated, if desired. Also mounted in the needle head is a spring-urged presser bar 18 carrying a presser foot 19, of any suitable construction, at its lower end. Any convenient means may be employed for urging the presser bar downwardly, to retain the presser foot yieldingly in engagement with the work, and for disabling the presser bar whenever desired.

Any appropriate means may be employed for feeding the work across the work support. A feed dog 20 (Fig. II), adapted to extend upwardly through openings 21 in a throat plate, may be arranged to cooperate with the presser foot for this purpose. This feed dog may be of the four-motion type and may receive its feeding and return movements through operating connections from the shaft 14, including an eccentric 22 (Fig. IV) adapted to oscillate a rock member 23 having an arm connected by a link 24 with an arm 25 secured to a rock shaft 26 which extends lengthwise of the base 10 and is journaled in suitable bearings provided thereon. A feed rocker arm 27 (Fig. III), secured to the shaft 26, carries at its upper end a feed bar 28 having mounted thereon the feed dog 20. This mechanism for imparting the feed and return movements to the feed dog may suitably be interconnected, by means of the rock member 23, with the devices for imparting the feed movement to the needles 17, as more fully explained in the above-mentioned Quist application. The length of the feed stroke of both the needles and the feed dog may be varied by adjustment of the bar 29 through rotation of a thumb screw 30. Lifting and lowering of the feed dog may be accomplished through other connections with the shaft 14, including a gear 31, secured to the shaft and arranged to drive a transmitting gear 32 mounted on a horizontally disposed shaft 33 in the standard 11, which is in turn adapted to drive a gear 34 secured to a shaft 35. The latter is mounted for rotation in suitable bearings in the base of the machine. Gears 31 and 34 are of identical construction so that the shaft 35 will be given one revolution for each revolution of the shaft 14. Suitable connections, including an eccentric secured to the shaft 35 and cooperating with a strap member 36 pivotally connected with a downwardly extending arm 37 of the feed bar, serves to impart the lifting and lowering movements to the feed dog, all as more fully set forth in said Quist application.

The shaft 35 also serves to operate the rotary hooks which are designated generally at 38 and 39 in Fig. II. For this purpose there is secured to the shaft 35 at the appropriate points a pair of spiral gears 40 (Figs. I and III) adapted to mesh with spiral pinions 41 secured to shafts 42, which shafts support and drive, and form integral parts of, the rotary components of the hooks. The relation between the gears 40 and pinions 41 is such that the hook shafts will be given two revolutions for each revolution of the shaft 35.

Inasmuch as the two rotary hook units are of substantially the same construction and differ only in the particular configuration and arrangement of certain parts, on account of their right and lefthand relationship, only one of these units

will be described in detail. Considering the unit 38, this comprises a frame or bracket 43 which is adjustably mounted on the under side of the base 10 of the machine. For this purpose one end of the hook frame is provided with an elongated slot 44 adapted to receive a screw 45 threaded into a lug 46 extending downwardly from the work supporting portion of the base. The opposite end of the saddle is forked, as indicated at 47 (Fig. VII), and is adapted to be clamped, by means of a screw 48, about a bearing sleeve 49 (Fig. III) in which the shaft 35 is journaled. By loosening the screws 45 and 48, the hook frame may be shifted longitudinally of the base, i. e., transverse to the line of feed of the work. This permits a variation in the spacing of the needles in a multiple needle machine and permits adjustment of the rotary hook with respect to its cooperating needle in either a single or multiple hook machine. When the hook frame is adjusted in the manner indicated, the associated driving gear 40 will also need to be adjusted and for this purpose it is simply necessary to loosen a set-screw 50 which secures the driving gear to the shaft 35.

The hook shaft 42 is journaled at its lower end in a bushing 51, carried by a portion 52 of the frame, and it is journaled at its upper end in a bearing 53, mounted in a portion 54 of the frame. The driving pinion 41 secured to the hook shaft is disposed between the two portions 52 and 54 of the frame and is fitted snugly between the two bearing sleeves 51 and 53 which take the end thrusts of the shaft. At its upper end the shaft 42 is flared outwardly to provide a frusto-conical section 55 which extends into the main body 56 of the rotating component of the hook. The shaft 42, section 55, and main body 56 are preferably formed as an integral unit, although they may be formed in two or more separate parts, if desired. Within the usual cavity in the top of the hook body there is disposed a stationary bobbin carrier 57 which is held against rotation with the rotary component, by appropriate means of well known construction. The bobbin carrier is provided with an interrupted rib 58 adapted to cooperate with a raceway 59 formed in the wall of the rotary component 56. It is the lubrication of this raceway which constitutes an important purpose of the present invention.

Referring now to Figs. VII to X, inclusive, means, to be hereinafter described, are provided for delivering lubricant at an appropriate rate to a fitting 60 having screw-threaded engagement with a recess 61 at one side of the hook bracket or frame 43. A passage 63 in the frame places the recess 61 in communication with a notch 64 in the upper end of the bearing sleeve 53. On its inner surface, the upper end of this bearing sleeve is flared outwardly to conform with the frusto-conical section 55 of the hook shaft but it is spaced slightly from the latter to provide an annular channel for the flow of the lubricant along the surface of this frusto-conical section. At the top of the main body of the hook frame, there is secured a plate 65 which closes the top of a portion of the passage 63. This plate is provided with an annular opening 66 surrounding the upper end of the bushing 53. Above the end of this bushing the opening 66 is enlarged to provide a small annular pocket surrounding a portion of the frusto-conical section 55. Into this pocket extends a downwardly projecting portion 67 of an annular plate 68 secured by screws 69 to

the under surface of the main body 56 of the rotary component of the hook. A needle guard 70 (Figs. II, VII and VIII) may be secured to the hook by a plate portion inserted between the plate 68 and the main body 56. The inner, annular surface 71 of the plate 68 is of frusto-conical form, conforming with that of the section 55 of the hook but spaced slightly therefrom, so as to provide a small annular channel, for the passage of the lubricant, in continuation of that formed at the upper end of the sleeve 53. The downwardly projecting portion 67 is formed, also, with an outer frusto-conical surface 72, inclined in the opposite direction from the surface 71. Surface 72 is spaced slightly from a corresponding frusto-conical surface 73 formed at the inner edge of the enlarged portion of the opening 66 in the plate 65, and serves to sling or impel downwardly, during rotation of the hook, any oil which reaches the surface 72. One or more small outlet ports 74 extending through the bottom of the main body 56 of the hook serve to deliver oil from the channel between the surfaces 55 and 71 to the interior of the hook body.

It will be apparent that oil delivered to the recess 61 and through the passage 63 to the surface 55 will, upon rotation of the rotary component of the hook, be distributed upwardly and outwardly along this surface by centrifugal action and will be forced through the passage 74 to the interior of the rotary component and thence to the raceway 59. Any oil which tends to accumulate in the small pocket formed in the upper surface of the plate 65 will, upon rotation of the hook, be forced downwardly by centrifugal action due to the configuration of the surface 72 and the escape of the lubricant at this point is avoided without the provision of any closely fitting sealing means due to the relationship of surfaces 72 and 73. A spiral groove 75 formed in the inner surface of the bushing 53 permits some of the lubricant to pass downwardly along the outer surface of the shaft to lubricate the upper bearing and the teeth of the driving gears. However, during rotation of the shaft, this lubricant will be forced upwardly by the viscous pump action of the spiral groove so as to prevent objectional leakage of the lubricant from the base of the bushing.

Each hook unit is provided with an escapement mechanism adapted to function in a well known manner. This mechanism may comprise a finger 76 (Fig. II) oscillated upon each cycle of operation of the machine to carry its end into engagement with a projection 77 on the bobbin carrier for the purpose of turning the latter slightly against the frictional drag of the rotary hook. This is to permit the thread loop to be released from the usual projection on the stationary component of the hook which normally holds the latter against rotation. Finger 76 is adjustably carried by an arm 78 by means of an elongated slot 79 in the finger and a retaining screw 80. The arm 78 is secured by means of a clamping screw 81 to the upper end of a rock shaft or pin 82. The latter is vertically disposed (Fig. IX) in a hole 83 which extends vertically through the hook saddle and forms a bearing for the rock shaft. At the lower end of the rock shaft there is secured a two-armed member 84, of bell-crank shape, having pivotally attached thereto, at its elbow, one end of a pitman 85 whose opposite end is apertured to form a strap cooperating with an eccentric 86 provided at the lower end of the hook shaft 42. The arm 87 of the member

84 extends beneath the pitman 85 and serves to retain the latter in proper engagement with the eccentric 86. In the assembly of these parts, after the pitman 85 has been applied to the eccentric, the member 84 is raised with the rock shaft 82 to the proper position, at the same time engaging the bearing aperture in the arm 84 with the pivot pin 88, which has a tight fit in the pitman. Arm 78 is then pressed downwardly over the shaft 82 until the bottom of its forked end engages the top plate 65 of the hook unit and it is there clamped in position. During this adjustment of the arm 78 the shaft 82 is held raised in its proper position by means of pliers which may conveniently be engaged with a tongue 89 extending upwardly from the end of the shaft 82 above the surface of the arm 78.

As best shown in Figs. VII, VIII and IX, the escapement operating members 84 and 85 are disposed in an L-shaped chamber or recess 90 provided in the bottom of the frame 43, this chamber being closed by a plate 91 and a gasket 92 secured by screws 93 to the bottom of the frame. A passage 63a (Fig. XIV) formed through a portion of the frame communicates at one end with the oil passage 63 and at its opposite end with the interior of the hole 83. In this way, a portion of the oil delivered through the fitting 60 is supplied to the bearing for the rock shaft 82. This oil, descending along the rock shaft, enters and may eventually fill the chamber 90 at the base of the hook frame, or, if this is otherwise filled, it will be kept constantly replenished. Thus, all of the relatively moving parts of the escapement mechanism will be thoroughly lubricated. Moreover, some of the oil from the chamber 90 will work upwardly into the bearing 51 and thus lubricate the lower end of the hook shaft. Accordingly, the lubricant delivered to the hook frame through the fitting 60 will be supplied to all of the relatively sliding surfaces of the hook unit, some going to the hook raceway and to the upper bearing for the hook shaft, as well as to the driving pinion on the latter, and some going to the rock shaft 82 and thence into the chamber 90 and serving in part to lubricate the escapement mechanism and the lower bearing for the hook shaft.

By reference to Figs. VIII and XIII, it will be noted that the construction and arrangement of the escapement mechanism and other parts associated with the hook shaft is such that the latter may be readily removed and re-inserted through the top of the hook frame without removing the plate 91 which closes the recess 90. To remove the shaft, it is simply necessary to loosen the set-screw which retains the pinion 41 and the shaft may then be lifted out. The connection between the eccentric 86 and the strap portion of the pitman 85 permits ready disengagement and re-engagement, for this purpose. Furthermore, the lower end of the eccentric 86 is tapered slightly or beveled, as shown in Figs. VII and VIII, to facilitate its introduction into the opening in the pitman 85. As will be seen in Fig. XIII, the recess 90 is of such narrow dimension that the pitman 85, when disconnected from the eccentric, cannot be displaced very far from its normal path of movement, so that the beveled end of the eccentric may always be readily inserted in the strap opening. Moreover, the relation between the opening 66, in the plate 65, and the portion 67, of plate 68, is such as to permit the indicated removal and assembly of the hook shaft.

We turn now to the means for supplying lubri-

cant continuously, as required, to the fitting 60 of each hook unit of the machine. Referring to Figs. I, IV and VI, there is provided at the top of the vertical standard 11 a relatively large lubricant reservoir 94. This may suitably be formed of sheet metal, or an appropriate plastic or the like, and provided with a flange 95 adapted to be clamped between a flat surface 96 provided at the top of the standard 11 and the under surface of a cap or closure member 97 which is secured by screws 98 to the top of the standard. Suitable gaskets 99 may be provided above and below the flange to insure a tight seal. In order to provide maximum lubricant capacity at a substantial elevation above the work support, the reservoir may, in transverse cross section, have an L-shaped configuration, as illustrated in Fig. IV. The reservoir may be filled with the desired lubricant through an opening 100 in the closure member 97, this opening being normally closed by a spring cap. A gauge of any suitable type is preferably provided to indicate readily and at all times the extent to which the reservoir is filled. A plug 101, formed of Lucite or similar material, extending through the closure member 97 and having its lower end of tapered or wedge-shaped construction may advantageously be employed for this purpose. The construction and operation of such a gauge is more fully disclosed and is claimed in my application Ser. No. 337,499, filed on May 27, 1940, and issued as Patent No. 2,301,460 on November 10, 1942.

The lubricant may be discharged from the reservoir 94 through an apertured fitting 102, preferably extending through the bottom of the reservoir at its lowest point. This fitting, which constitutes a valved outlet port, has a screw-threaded neck 103 extending through an opening in the reservoir bottom and is clamped in place by a nut 104. A gasket 105 between the underside of the reservoir and a shoulder on the fitting serves to prevent leakage of the oil around the fitting. At its lower end the member 102 is connected with a tube or conduit 106 formed of any suitable material, such as brass or a plastic composition or the like, this conduit being attached to the fitting by means of a suitable coupling 107. For a considerable distance downwardly from the reservoir the conduit 106 is disposed in a substantially vertical position and is free from sharp bends. This insures the ready escape of any air bubbles which may become trapped in the conduit. Such air bubbles will rise freely through the vertical tubing and be released into the reservoir. At its lower end the conduit has a portion 108 which is curved over a sweeping arc and carries at its terminal a coupling 109 adapted to receive the screw-threaded end of a tube 110 which passes through a vertical wall 111 forming a downward extension of the inner wall of the standard 11. Tube 110 forms part of a manifold member 112 which, as best shown in Figs. XI and XII, is provided with a passage 113 adapted to deliver the lubricant into a cross channel 114. This, to facilitate manufacture, is closed at one end by a removable screw plug 115. Small ports 116 extend downwardly from the cross channel 114 and communicate with separate channels 117 formed in branched extensions of the manifold member. For the purpose of regulating the flow of oil through each of the small ports 116 into its related channel 117, a suitable valve is provided. Each of these valves comprises an adjustable screw-threaded plug 118 having a conical point 119 at its inner end adapted to close the port

116 to any desired extent. The plug may be retained in any desired position by means of a lock nut 120. In each of the extensions provided with the channels 117 there is inserted a nipple 121 adapted to be connected by a coupling 122 with a conduit 123. The conduits 123 are connected with the respective fittings 60, above described, associated with the two hook frames. Each of the conduits 123 is provided with a large loop section 124 to permit adjustment of the hook frames, in the manner previously explained, without disturbing in any way the connection of the conduits with the hook frames or with the reservoir or with any other member.

Returning now to the reservoir (Figs. IV and VI), convenient means is provided for either opening or closing, at will, the valve associated with the fitting 102. For this purpose a conical valve surface 125 is provided at the lower end of a long valve stem 126 which projects upwardly through the closure member 97 and is provided at its upper end with a suitable knob 127. A spring 128, acting between the under surface of the closure 97 and a washer 129 carried by the valve stem, urges the latter downwardly. A pin 130 extending through the valve stem, adjacent its lower end cooperates with the upper end of the fitting 102 and may either engage the main flat portion of the top of this member or may register with a pair of V-notches 131 formed in the rim of the member. When the valve stem is in the position indicated in Fig. VI, in which the pin 130 registers with the notches 131, the valve 125 is seated and the flow of lubricant into the conduit 106 is cut off. However, if the valve stem is rotated through a small angle, it will be cammed upwardly, as a result of the pin 130 riding up the sides of the V-notches and onto the flat portion of the top of member 102, thereby opening the valve and permitting the flow of lubricant into the conduit 106. The knob 127 may suitably be formed with a rib 132 or some other indicating means to show whether the valve is closed or open.

The lower end of the standard (Fig. I) is preferably closed by a bottom plate 133 and a gasket 134 to provide a lubricant chamber serving as a reservoir for a suitable lubricant for the various bearing surfaces within the standard and, if desired, in other parts of the machine also. The gear 34, secured to the shaft 35, may be arranged to dip into the lubricant in this chamber and disperse it throughout the standard. The lubricant may also be dispersed to a certain extent by the rocking of the arm 25. A gauge 135, having its upper end flush with the top of the work supporting surface, adjacent the standard, and which may suitably be of the type disclosed in the above-mentioned Sauer application, may be provided to show at all times the level of the lubricant within the chamber.

The operation of the machine is believed to be clear from the foregoing. A brief résumé, however, will now be given. Periodically, say once or several times a day, depending upon the extent of use of the machine, a suitable lubricant, preferably of a light, stainless type, is introduced through the filling opening 100 into the reservoir 94 until the transverse indicating line on the gauge 101 is reached. Whenever required, additional lubricant, preferably of a somewhat heavier type, may also be introduced into the reservoir at the base of the hollow standard. A suitable opening, not shown, may be provided in the wall of the standard for this purpose. When-

ever the machine is idle, the valve 125 will be closed by positioning the indicator 132 on the knob 127 in the direction shown in Fig. V. When it is desired to start the machine after an idle period, the knob 127 is rotated slightly, through about 90°, to carry the pin 130 out of the V-notches 131 and onto the flat upper surface at the top of the fitting 102. This will permit the flow of oil from the reservoir through the conduit 106 to the manifold 112. From the transverse channel 114 of the latter a portion will pass through each of the vertical ports 116. The rate of flow through these ports should be suitably regulated, by proper adjustment of the screw plugs 118, so that just the right amount of oil to supply the lubrication requirements of the vertical hooks will be delivered to the latter. A portion of this lubricant will be passed through the channel 63 and the opening 64 to the frusto-conical surface 55, at the upper end of the hook shaft, and upon rotation of the latter will be forced upwardly and outwardly by centrifugal action and delivered through the passage 74 to the interior of the hook and thence to the raceway. When the rotary hook is stationary, between the formation of successive seams or lines of stitching, the oil will simply accumulate in the small clearance space around the conical surface 55 and in the small pocket in the top of plate 65. It will be understood that during these brief idle periods of the hooks, the valve 125 will be left open. However, the flow of oil will not be sufficient at these times to cause any substantial loss of lubricant around the depending portion of the plate 68. The frusto-conical surface 72 of the latter will, during rotation of the hook, serve to throw or impel the oil downwardly into the small pocket and from the latter into the passages communicating with the raceway. This not only prevents the escape of the lubricant during the periods of operation but also provides space for the subsequent accumulation of oil during idle periods. A part of the oil delivered to the surface 55 will descend through the spiral groove 75 into the bearing 53 and provide adequate lubrication of the latter. Some of this oil will find its way even to the teeth of the gear 41. During rotation of the hook shaft, however, there is a tendency to impel the oil upwardly within the bushing 53, due to the sense of the spiral groove 75, so that no appreciable amount of oil will escape from the bushing. Another part of the oil delivered to the recess 61 in the hook frame will be diverted through the passage 63a to the bearing aperture 83 in which the rock shaft 82 is mounted. Thus, this rock shaft is adequately lubricated and any excess lubricant descending along the shaft is delivered into the small L-shaped chamber 90 at the bottom of the hook frame. This oil will serve to lubricate the operating linkage for the escapement mechanism, including the eccentric 86. A portion of this oil will also find its way into the bearing sleeve 51 to lubricate the lower end of the hook shaft 42. Should it be desired, for any reason, to adjust the hook units with respect to each other or to the line of stitching, the adjustment may be very simply effected by loosening and subsequently tightening the screws 45 and 48, which retain the hook frame, and the set-screws 50, which retain the gears 40 in proper relation on the shaft 35. It is not necessary to disconnect, or disturb in any way, the conduits which deliver the lubricant to the hook frames.

While an illustrative form of the invention has

been described in considerable detail, it will be understood that numerous variations may be made in the construction and arrangement of the several parts without departing from the general principles and scope of the invention. The terms and expressions used herein have been employed as terms of description and not of limitation.

What I claim is:

1. A lockstitch sewing machine having a base with a work supporting surface, a standard rising from one end of said base, a rotary hook unit mounted in said base with its axis normal to said work supporting surface, said hook unit having a rotary component and a stationary component with a raceway therebetween, said rotary component including an axially extending driving shaft, bearing means for said shaft, a lubricant reservoir carried by said standard above said work support, a conduit extending from said reservoir to said hook for delivering oil to a surface on said rotary component, said surface being so constructed and arranged as to induce a pumping action upon the oil to force it into said raceway, means forming an annular lubricant collecting pocket extending about said surface, and means for delivering lubricant from said pocket in one direction to said raceway and in another direction to said bearing means for said shaft.

2. A lockstitch sewing machine having a base with a work supporting surface, a standard rising from one end of said base, a rotary hook unit mounted in said base with its axis normal to said work supporting surface, said hook unit having a rotary component and a stationary component with a raceway therebetween, said rotary component including an axially extending driving shaft, bearing means for said shaft, a lubricant reservoir carried by said standard above said work support, a conduit extending from said reservoir to said hook for delivering oil to a surface on said rotary component, said surface being so constructed and arranged as to induce a pumping action upon the oil to force it into said raceway, means forming an annular lubricant collecting pocket extending about said surface, and means responsive to the condition of rest or rotation of said rotary component for delivering lubricant from said pocket alternately to said raceway and to said bearing means for said shaft.

3. In a lockstitch sewing machine having a base with a work support, a rotary hook unit having a frame, a rotary component including a shaft having its axis normal to said work support and a stationary component, upper and lower bearings in said frame for said shaft, said rotary and stationary components having a horizontally disposed raceway therebetween, escapement means arranged to engage said stationary component during each cycle of the machine, said escapement means including a rock-shaft journaled in said frame, connections from said rotary com-

ponent for oscillating said rock-shaft, a lubricant reservoir spaced from said hook unit and disposed above the level thereof, means for delivering lubricant from said reservoir to said hook unit and for directing the lubricant so delivered to said bearings for said shaft, to said raceway and to said rock-shaft and the operating connections therefor.

4. In a sewing machine a vertical axis rotary hook, said hook comprising a rotary component including a shaft and a stationary component having a rib in bearing engagement with a raceway in said rotary component, a bearing for said shaft, a main lubricant reservoir disposed at a point remote from said rotary hook, and lubricant conducting means for delivering lubricant from said reservoir to a surface at the periphery of said rotary component, the construction and arrangement being such as to provide passages through which the lubricant so delivered to said surface will be discharged therefrom alternately to said raceway upon rotation of said rotary component and to said bearing when said component is at rest.

5. In a sewing machine, a vertical axis rotary hook comprising rotary and stationary components, a shaft adapted to support and actuate said rotary component, a bracket in which said shaft is journaled, a lubricant-containing recess in the lower end of said bracket into which said shaft extends, escapement means cooperating with said stationary component, actuating means for said escapement means housed in said recess and connected with said shaft, the connection between said shaft and said actuating means comprising an eccentric at the lower end of said shaft wholly within the projection of the periphery of said shaft, said actuating means including a part having an axially sliding fit with respect to said eccentric so as to permit removal and replacement of said shaft from above with consequent engagement and disengagement of said connection with said actuating means without access to said recess.

6. In a sewing machine, a vertical axis rotary hook comprising rotary and stationary components, a shaft adapted to support and actuate said rotary component, a bracket in which said shaft is journaled, a lubricant-containing recess in the lower end of said bracket into which said shaft extends, escapement means cooperating with said stationary component, actuating means for said escapement means housed in said recess and connected with said shaft, the connection between said shaft and said actuating means comprising an eccentric at the lower end of said shaft wholly within the projection of the periphery of said shaft, said actuating means including a part having an axially sliding fit with respect to said eccentric so that engagement and disengagement thereof may be effected by a simple upward axial sliding movement of said shaft.

GEORGE SAUER.