July 2, 1940. R. KAIER 2,206,285

SEWING MACHINE

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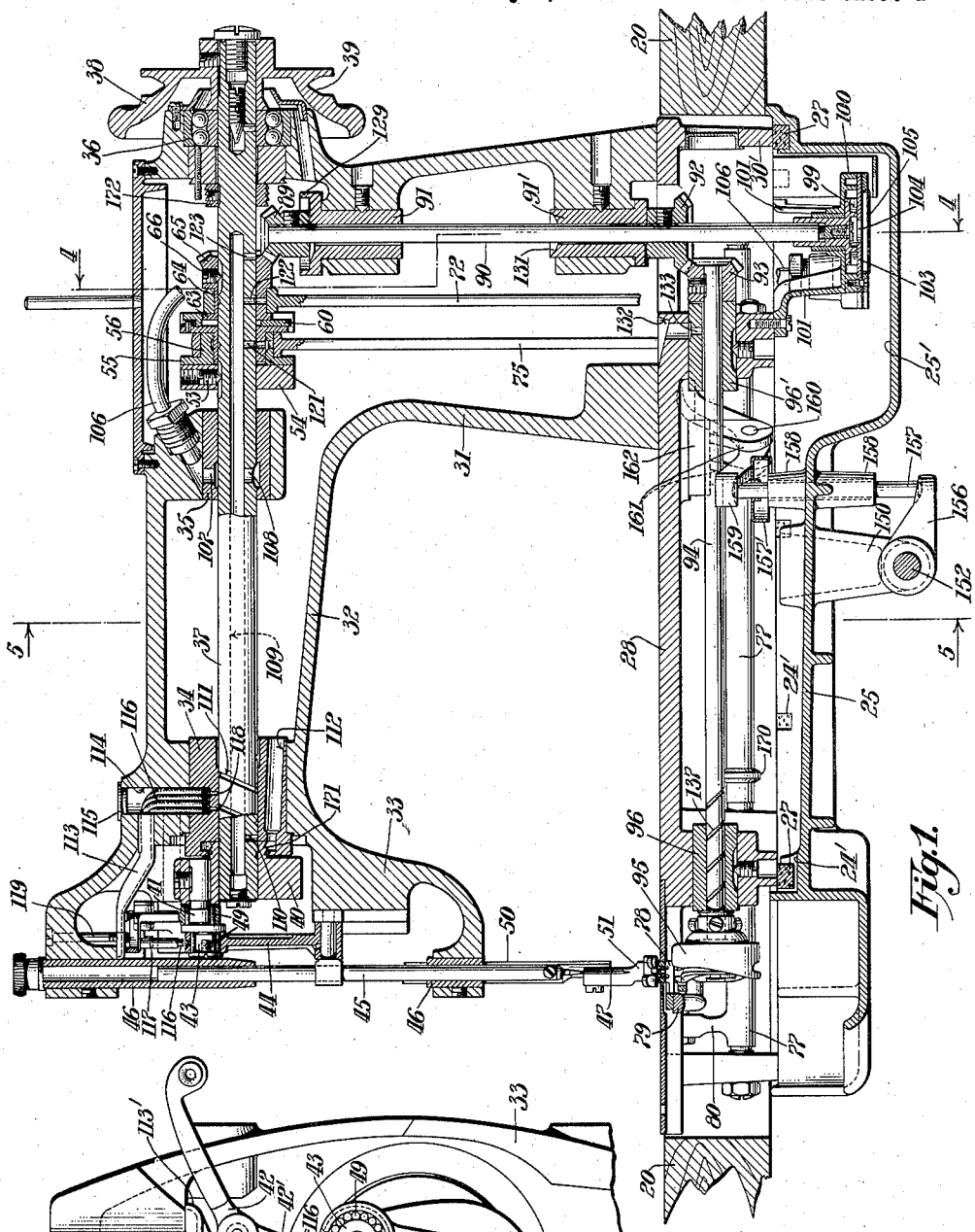


Fig. 1.

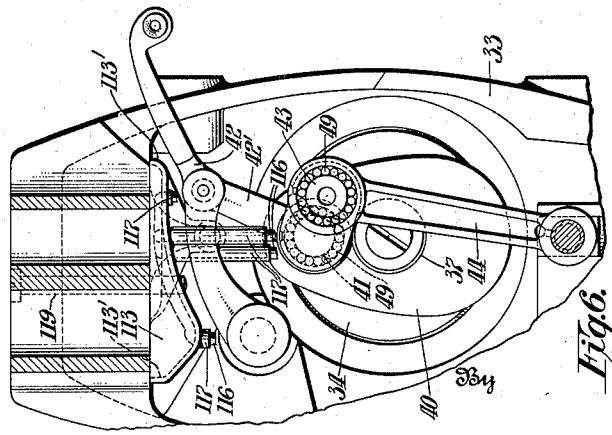


Fig. 6.

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SEWING MACHINE

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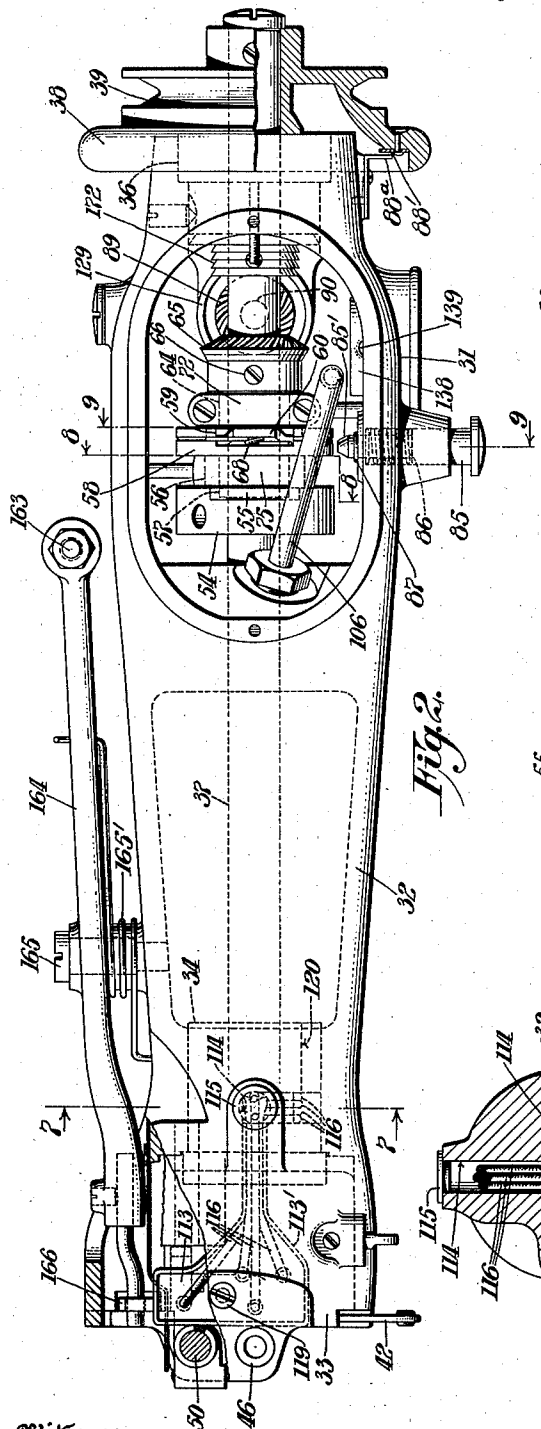


Fig. 2.

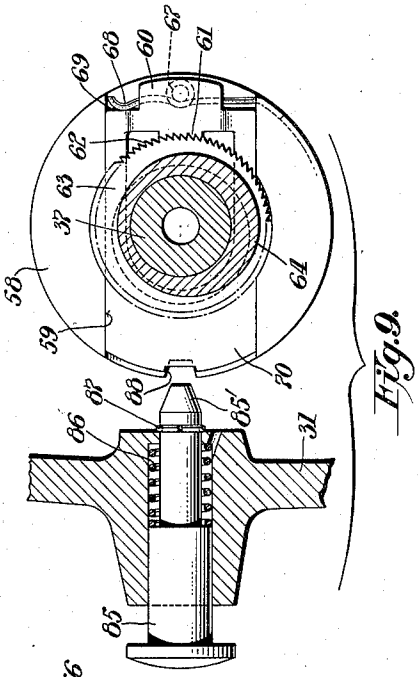


Fig. 9.

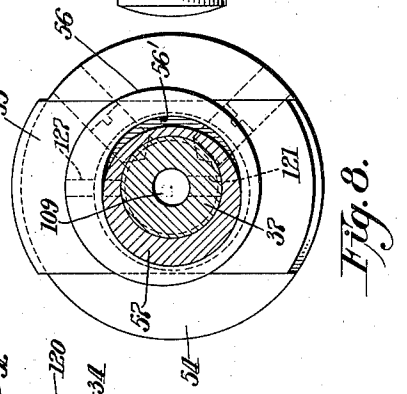


Fig. 8.

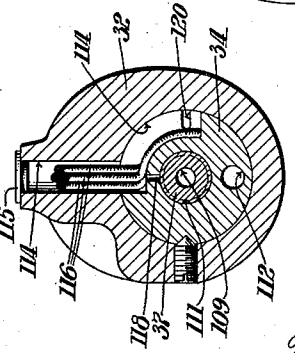


Fig. 7.

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SEWING MACHINE

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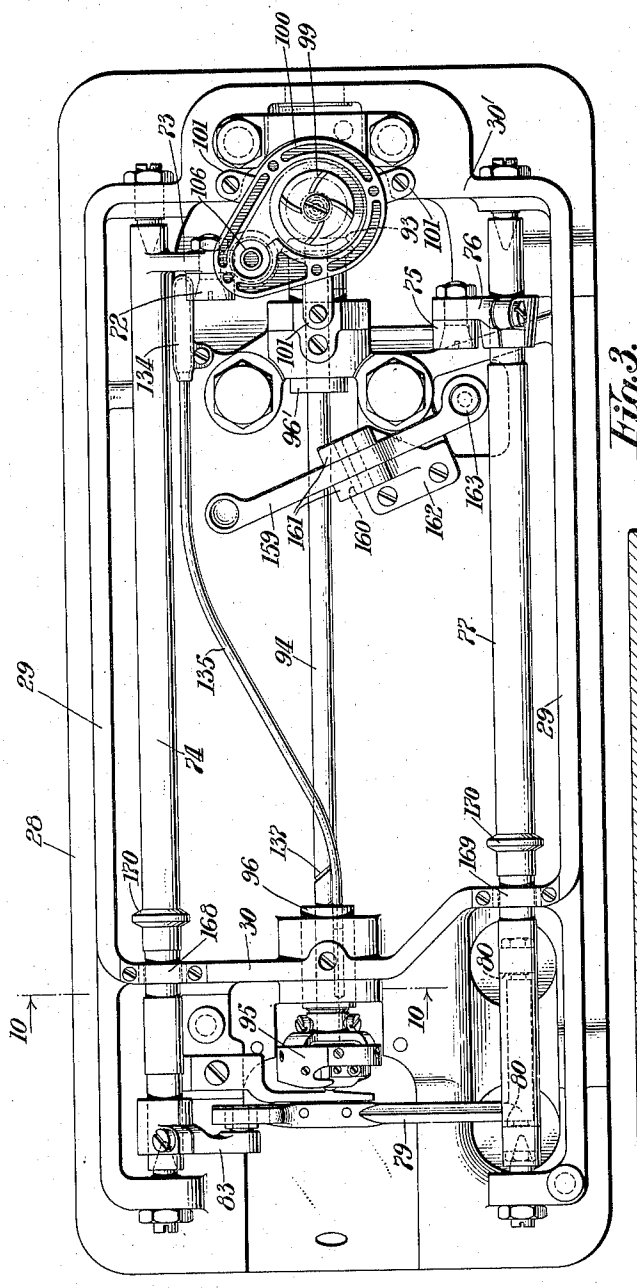


Fig. 3.

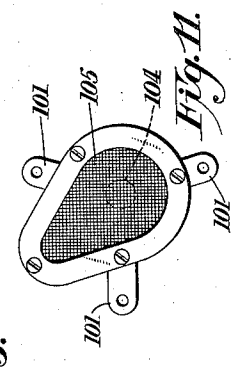


Fig. 11.

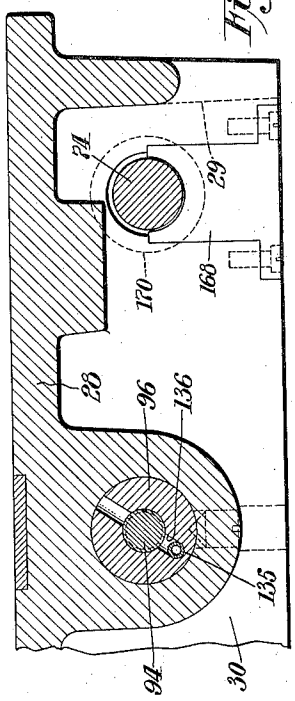


Fig. 10.

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SEWING MACHINE

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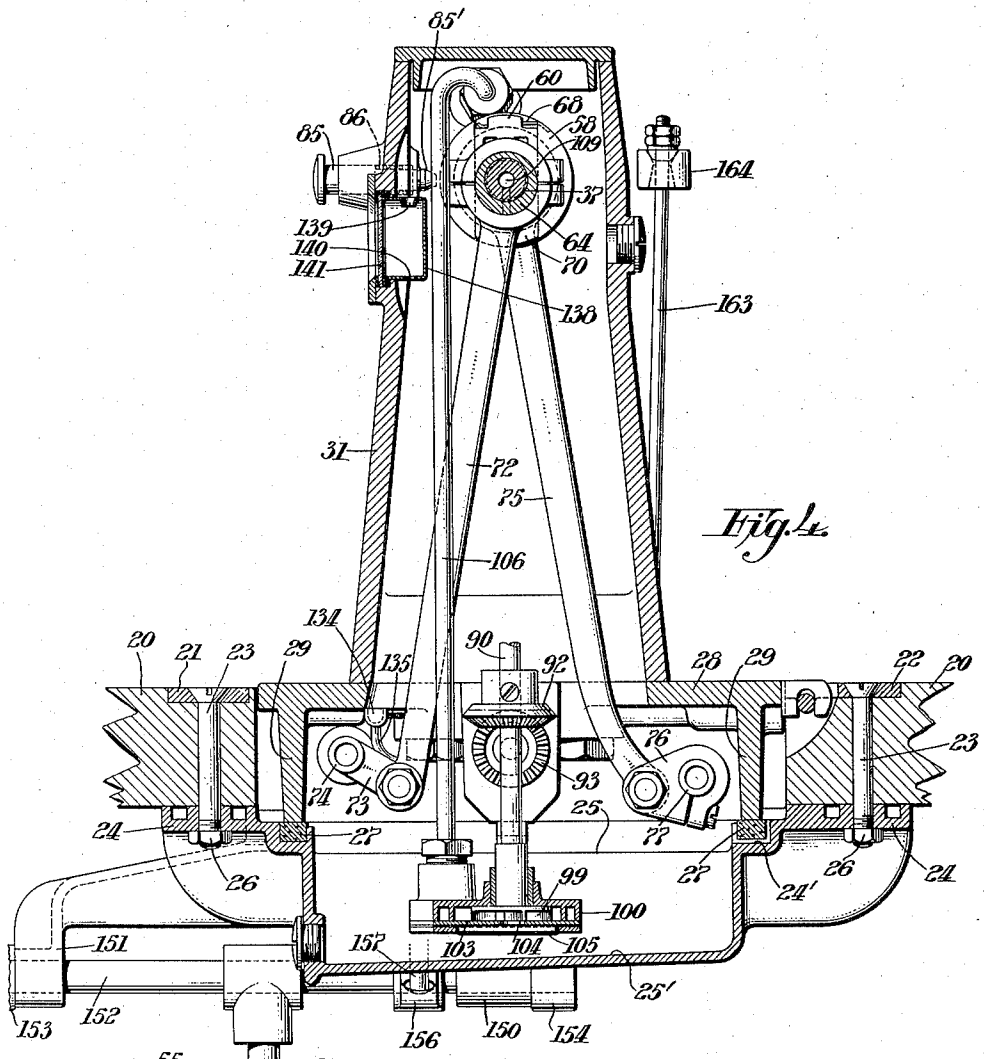


Fig. 4.

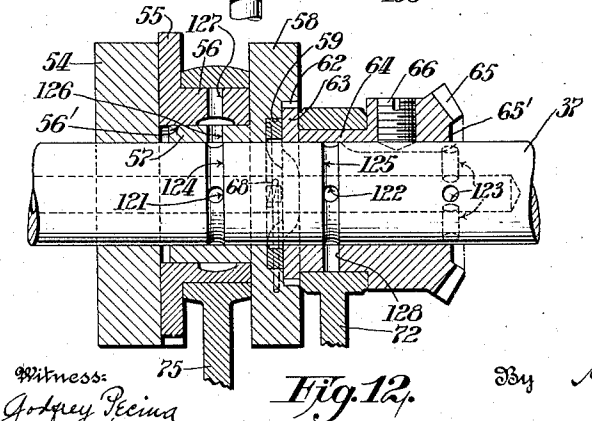


Fig. 12.

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SEWING MACHINE

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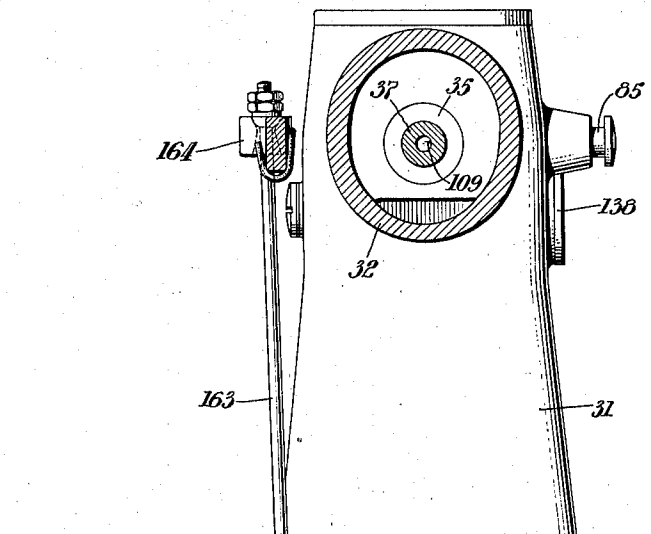


Fig. 5.

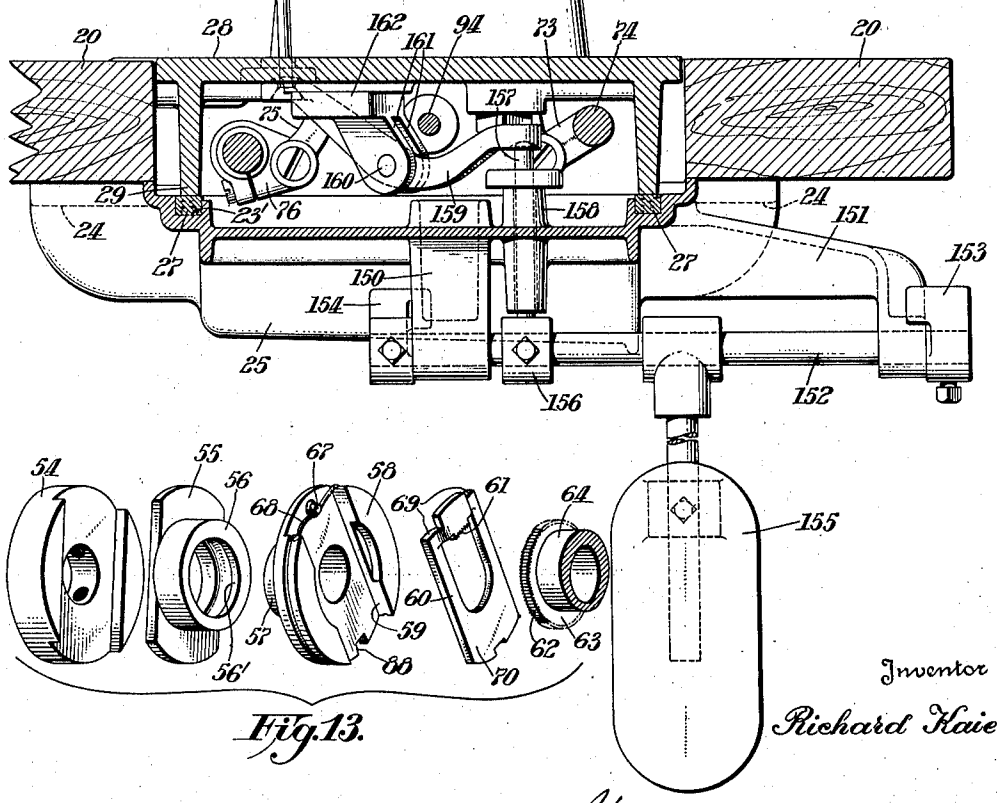


Fig. 13.

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SEWING MACHINE

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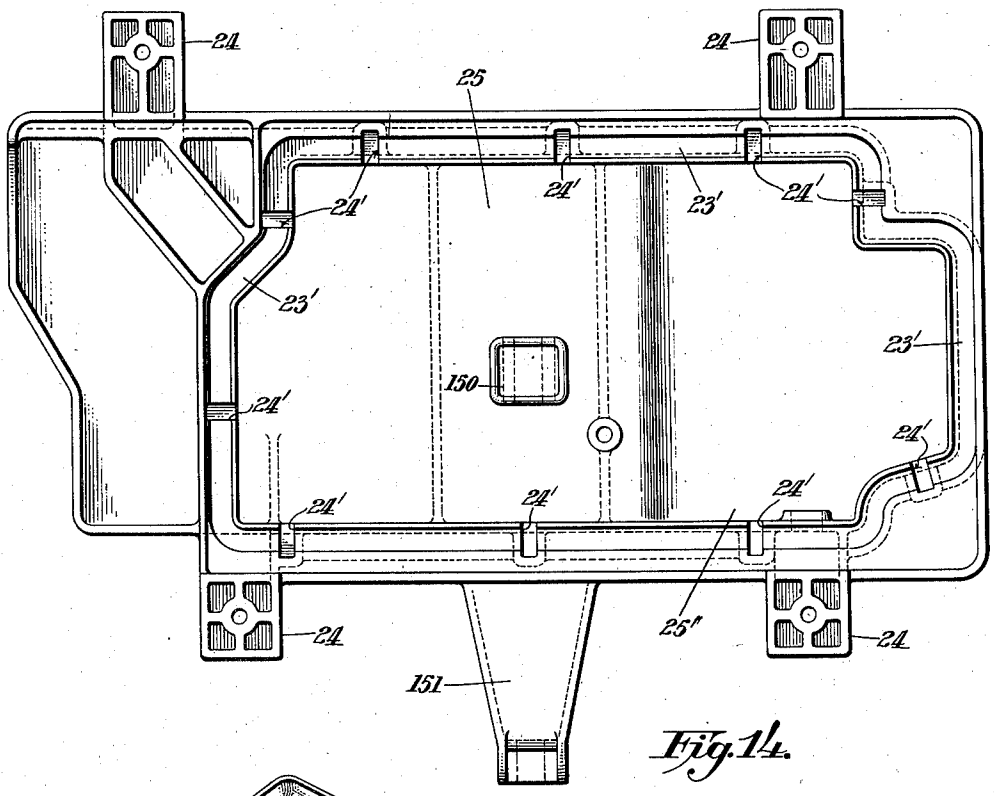


Fig. 14.

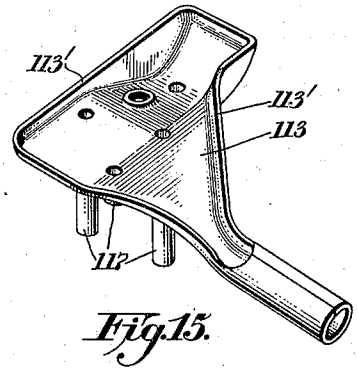


Fig. 15.

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Patented July 2, 1940

2,206,285

UNITED STATES PATENT OFFICE

2,206,285

SEWING MACHINE

Richard Kaier, Cranford, N. J., assignor to The Singer Manufacturing Company, Elizabeth, N. J., a corporation of New Jersey

Application July 9, 1937, Serial No. 152,707

15 Claims. (Cl. 112—256)

This invention relates to sewing machines and more particularly to high speed lock-stitch machines, and has for one of its objects the provision of an improved lubricating system which will properly lubricate the actuating parts of the machine when the machine is operating.

Another object of the invention is to provide improved mechanism which is actuated by the knee of the operator for lifting the presser-foot. A further object of this invention is to provide a new and novel means for supporting the machine on a power-table and to provide an improved base upon which the sewing machine rests.

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

In the drawings:

Figure 1 is a vertical section taken through the center of the machine.

Figure 2 is a top plan view of the bracket-arm with a cover-plate removed to show the actuating mechanism for the feed.

Figure 3 is a bottom plan view of the mechanism below the bed.

Figure 4 is a vertical section taken substantially along the line 4—4 of Figure 1.

Figure 5 is a vertical section along the line 5—5 of Figure 1, certain parts being shown in elevation.

Figure 6 is an enlarged face view of the take-up and needle-actuating mechanism located within the hollow head.

Figure 7 is a vertical section through the bracket-arm taken along the line 7—7 of Figure 2.

Figures 8 and 9 are sectional views taken substantially along the lines 8—8 and 9—9 of Figure 2, showing the eccentrics for actuating the feeding mechanism.

Figure 10 is an enlarged sectional view taken substantially along the line 10—10 of Figure 3.

Figure 11 is a plan view showing the screen which covers the oil pump.

Figure 12 is a vertical section taken through the feed eccentrics.

Figure 13 is a disassembled perspective view of the eccentric for imparting a feed-and-return movement to the feed-bar.

Figure 14 is a top plan view of the oil reservoir.

Figure 15 is a perspective view of the supporting plate for the wicks used to lubricate the mechanism in the head of the machine.

In the embodiment of this invention selected for illustration, 20 represents the top of a power-table which carries plates 21 and 22 through which the bolts 23 pass (Fig. 4). The bolts 23 also pass through the ears 24 (Fig. 14) formed on an oil pan or reservoir 25, and the nuts 26 hold the ears against the lower edge of the top 20.

The upper edges of the walls of the oil pan 25 are formed with a groove 23' and seated in the groove is a relatively thick gasket 27 of resilient material. Shallow slots 24' are also provided to drain oil which may seep into the groove 23' back into the reservoir. The machine has a bed 28 formed with depending side walls 29 and end walls 30 and 30'. These side and end walls form an enclosure and their lower edges rest upon the gasket 27 thereby forming a closed container.

Rising from the bed 28 is a standard 31 carrying a bracket-arm 32 which terminates in a hollow head 33. Journaled in the bearing bushings 34, 35, and the self-aligning ball-bearing 36 is a main actuating shaft or needle-bar shaft 37 carrying the usual balance-wheel 38 formed with the usual belt groove 39. Secured to the end of the shaft 37 which extends into the hollow head is a crank-disk 40 carrying a crank-pin 41 which actuates the link 42' of the needle-thread take-up mechanism 42 (Fig. 6). Carried by the crank-pin 41 is a second crank-pin 43 which is embraced by one end of the pitman 44, the other end of the pitman being operatively connected to the needle-bar 45 which is journaled in the bearings 46 and carries an eye-pointed needle 47. Interposed between each of the crank-pins 41 and 43 and the ends of the pitman 44 and link 42' are a series of small rollers or "needle bearings" 49 which serve to reduce friction between these elements and the crank-pins. Also journaled in bearings in the hollow head is the usual spring-urged presser-bar 50 carrying a presser-foot 51.

Fixed to the shaft 37 by a set-screw 53 is a disk 54 which slidably carries a plate 55 having an eccentric 56 made integral therewith. Carried by and rotatable relative to the shaft 37 is a second eccentric 57 which extends into the centrally located aperture 56' in the feed-advancing eccentric 56. The aperture 56' is elongated transverse of the direction of movement of the plate 55. Made integral with the adjusting eccentric 57 is a disk 58 formed with a slideway 59 which receives a slidable locking plate 60 formed with teeth 61 which are adapted to en-

gage the teeth 62 on a disk 63 formed on the feed-lift eccentric 64 which is made integral with a gear 65 and fixed to the shaft 37 by a set-screw 66. The disk 58 is provided with a stud 67 which carries a spring 68 one of the ends of which reacts against the shoulder 69 of the locking plate 60 and the other end reacts against the periphery of the disk 58. The action of the spring 68 urges the plate 60 so that the teeth 61 and 62 are normally in engagement. In order to more effectively lock the disk 58 and eccentric 57 to the disk 63 and eccentric 64 when the machine is operating at high speed the end 70 of the plate 60, which is on the opposite side of the shaft 37 from the teeth 61, is made heavier than the end carrying the teeth so that centrifugal force will assist in holding the teeth 61 and 62 in engagement.

The feed-lift eccentric 64 actuates the pitman 72 which is connected to an arm 73 on the rock-shaft 74 (Figs. 3 and 4). The feed-advance eccentric 56 actuates a pitman 75 which is connected to the arm 76 on the rock-shaft 77. A feed-dog 78 which cooperates with the presser foot 51 to advance the material is carried by a feed-bar 79, which has one of its ends pivotally connected to the upstanding arms 80 on the rock-shaft 77 and its other end operatively connected to the arm 83 on the rock-shaft 74. From the above it will be obvious that the eccentric 64 will impart to the feed-dog 79 a rising-and-falling movement and the eccentric 56 will impart a feed-and-return movement to the feed-dog. In order that the operator may vary the amount of feeding movement imparted to the feed-dog, a shouldered plunger 85 extends through an opening in the wall of the standard 31 and is spring urged outwardly by means of the spiral spring 86 which reacts between the wall of the standard and the shoulder of the plunger. A split ring 87 enters a groove in the plunger to limit the outward movement of the plunger. To adjust the feed-advance eccentric the operator pushes the plunger 85 inwardly and rotates the balance-wheel 38. When the notch 88 in the disk 58 is opposite the plunger 85 the end 85' of the plunger enters the notch and engages the locking plate 60 (Fig. 9) and slides it against the action of the spring 68 so that the teeth 61 are disengaged from the teeth 62 thereby unlocking the disk 58 from the disk 63. The disk 58 and adjusting cam 57 are held stationary by the end 85' of the plunger 85 and when the shaft 37 is turned the movement of the eccentric 57 shifts the plate 55 and eccentric 56 in a right line and relative to the shaft to vary the amount of movement imparted to the pitman 75 and feed-dog 79. To indicate the number of stitches per inch to which the feeding mechanism has been adjusted, a pointer 88^a is fixed to the standard 31 and a semi-circular plate 88' having suitable indicia thereon is fixed to the balance-wheel 38.

Cooperating with the gear 65 which is fixed to the shaft 37 is a second gear 89 secured to the upper end of a vertical shaft 90 journaled in bearings 91 and 91' carried by the standard 31. Also secured to the vertical shaft is a second gear 92 which meshes with a gear 93 fixed to one end of a hook-shaft 94 which is journaled in the bearings 96 and 96' carried by the bed 28, and there is secured to the other end of the shaft a hook 95 of the well known lock-stitch type. The gear ratio between the gears 65 and 89 is as 1 is to 1½ and the ratio between the gears 92 and 93 is as 1½ is to 2. Therefore the hook 95 makes two complete revolutions for each reciprocation of the needle.

To flood lubricate the machine a centrifugal oil pump is driven by the vertical shaft 90 and is located below the level of the oil in the sump 25' of the reservoir 25. This pump comprises an impeller 99 fixed to the vertical shaft 90 and a casing 100 which surrounds the impeller and is held in position by arms 101 which are fixed to the bed of the machine. A plate 103 provided with an intake aperture 104 and a screen 105 is secured to the casing 100. A conduit pipe 106 (Fig. 4) conducts the oil discharged by the pump to the bushing 35 from which it is delivered through the aperture 107 in the bushing 35 and radial duct 108 to the longitudinal bore 109 in the shaft 37.

The bearing bushing 34 is lubricated through a radial duct 110 which delivers oil to the end of the bushing nearest the hollow-head and the shaft 37 is formed with a spiral groove 111 which forces the oil along the bushing and back into the bracket-arm. If any oil should leak from the front of the bushing, it is caught and returned through the bushing by the conduit 112.

To lubricate the take-up and needle-bar actuating mechanism which are located within the hollow head a supporting plate 113 having turned up edges 113' (Fig. 15) extends through an aperture in the arm 32 and communicates with a well 114 closed at the top by a cap 115. This plate is held in position by a screw 119 which extends through the upper portion of the hollow head. Wicks 116 have their ends located in the well 114 and their other ends threaded through pipes 117 which depend from the plate 113, the ends of the wicks extending slightly below the lower ends of the pipes. This holds the ends of the wicks in such a position that the oil is wiped off by the moving parts within the hollow head. Oil is supplied to the wicks by means of two ducts 118 in the bushing 34. When the machine is operating the oil is under pressure due to the centrifugal pump and the action of the spiral groove 111 in the shaft 37. This pressure causes the oil to rise through the ducts 118 and saturate the wick 116. The excess oil flows over the ends of the wicks down through the well 114 (Fig. 7) and is drained back into the bracket-arm through a conduit 120 arranged longitudinally of the bushing 35.

The shaft 37 is provided with radial ducts 121, 122 and 123 which communicate with the bore 109 and supply oil to the feed-actuating eccentrics and gear 65. The shaft 37 is provided with circumferential grooves 124 and 125 communicating with the ducts 121 and 122 (Fig. 12). The groove 124 constantly conducts oil to the holes 126 and 127 which supply oil to the bearing surface of the feed-advancing eccentric 56. The groove 125 communicates with a hole 128 which supplies oil to the feed-lift eccentric 64. The ducts 123 feed an excess of oil to the gear 65 and are partially closed by the hub of the gear 65 so that some of the oil is fed to the face of the gear 65' (Fig. 12) from which it is thrown by centrifugal force to the teeth of the gear. The upturned flange 129 (Fig. 1) of the bushing 91 catches some of the excess oil and conducts it between the shaft 90 and bushing 91 for the purpose of lubrication. The bushing 91' is also formed with a cavity 131 which catches some of the excess oil for the purpose of lubricating the bearing surface of the bushing 91'. The bearing surface of the bushing 96' is lubricated from a well 132 which is kept filled by the excess oil from the

gears and eccentrics and the oil is fed through the duct 133 to the bearing surface of the bushing 96'.

The front bushing for the shaft 94 is lubricated from an open topped receptacle 134 (Figs. 3 and 4) carried by the bed of the machine. This receptacle collects the excess oil and it is conveyed to the bearing surface of the bushing 96 by a tube 135 (Figs. 3 and 10) and oil hole 136. To prevent the oil from escaping at the hook end of the bearing the shaft 94 is formed with a spiral groove 137 which conveys the excess oil back into the reservoir 25.

To indicate whether or not the pump is working properly and oil is being supplied to the bearing surfaces a cup-shaped member 138 is inserted in the standard 31 of the machine (Fig. 4). The member 138 is provided with an aperture 139 in its top wall and an aperture 140 in its bottom wall. The inside of the member 138 is painted white and it is provided with a transparent cover 141. When the machine is operating, excess oil is thrown off by the moving parts and some of this oil flows down the inner side of the standard 31, through the aperture 139 and out through the aperture 140. The operator by simply glancing at the member 138 when the machine is operating can tell whether or not the lubricating system is in operation.

In order that the feed-rock shafts 74 and 77 may be readily assembled in the machine the end wall 30 is provided with two inserts 168 and 169 (Figs. 3 and 10) which are detachably held in place by screws. To prevent the oil from running along the rock-shafts and through the opening in the wall 30 through which they pass these rock-shafts are each provided with oil-slings 170. The needle-bar shaft 37 is also provided with an oil-sling 171 (Fig. 1) which is adapted to sling the oil into the groove in the bushing 34 from whence it is conducted back into the arm of the machine through the conduit 112. A sling 172 is also provided to prevent an excess of oil from passing to and through the bearing 36.

To provide knee-control means for raising and lowering the presser-foot there is formed on the reservoir a lug 150 and an arm 151 in which is journaled a rock-shaft 152. Adjustable stops 153 and 154 carried on the ends of the shaft limit its movement in either direction. Fixed to the shaft 152 intermediate its bearings is a lever 155 which is adapted to be engaged by the knee of the operator and adjustably secured to the shaft is an arm 156 which engages one end of a rod 157 extending through a suitable aperture in a boss 158 formed on the reservoir 25. The boss 158 extends above the lever of the oil in the reservoir and the rod 157 is provided with a cap 157' to prevent oil that may splash on the rod from running down and through the aperture in the boss. The other end of the rod 157 engages one end of a lever 159 which is secured, intermediate its ends, by a pivot-pin 160 to the ears 161 of a member 162 fixed to the bed 28 of the machine. The other end of the lever 159 is connected to one end of a rod 163 which has its other end connected to a lever 164 pivoted at 165 to the arm 32 of the machine and urged to its normal position by a spring 165'. The lever 164 is connected to the presser-bar by a link 166 in the usual and well known manner. From the above description it will be obvious that the operator may raise or lower the presser-foot by shifting the lever 155.

From the foregoing description considered in connection with the accompanying drawings, the construction, manner of operation and several advantages of my improved sewing machine will be clearly and fully understood. It is apparent that such a machine has a wide variety of uses, and it will be understood that the form, construction and arrangement of the elements employed may be varied. Therefore, the privilege is reserved of resorting to all such legitimate changes therein as may be fairly embodied within the spirit and scope of the appended claims.

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

1. A sewing machine having in combination, a frame, operating mechanism journaled therein, means for supplying oil to and through some of said mechanism and in excess of the amount required, an indicator carried by the frame of the machine, and means for causing some of the excess oil to flow through said indicator after it has been thrown off by said mechanism.

2. A sewing machine having in combination, a frame, operating mechanism journaled therein, means for automatically supplying oil to and through said mechanism and in excess of the amount required, an indicator carried by the frame of the machine, said indicator comprising a cup-shaped member with an opening at its top and bottom to permit some of the excess oil which is thrown off by said operating mechanism to pass through said member.

3. A sewing machine having in combination, a frame including a bracket-arm and head, a shaft journaled in bushings in said bracket-arm, take-up and needle-bar actuating mechanism located within said head, an oil reservoir, means for supplying oil during the operation of the machine from said reservoir to a well in one of the bushings carrying said shaft, a supporting plate located in the head of the machine and wicks carried by said plate, said wicks having their ends extending into the well in said bushing and their other ends in a position to be engaging by the needle-bar and the take-up actuating mechanism.

4. In combination, an oil pan having upturned edges, a sewing machine frame carried thereby and having a bed formed with depending side and end walls which rest upon a sound absorbing gasket carried by the upturned edges of the oil pan to form an oil tight enclosure, one of said end walls forming a partition, lower stitch-forming and feed actuating mechanism located on one side of said partition and within the enclosure, and a rotary hook, feed-bar and feed-dog and shafts having movement about their longitudinal axes extend through the partition and connecting said hook and feed-bar to the actuating mechanism within the chamber located on the other side of said partition and outside of the enclosure.

5. In combination, a table-top having an opening therein, an oil pan formed with upturned edges and secured to said table-top and located beneath said opening, a sewing machine frame having a bed formed with depending side and end walls which extend through the opening in said table-top and rest by gravity upon said pan to form a lubricant chamber, the top of said sewing machine bed being flush with the table-top, stitch-forming instrumentalities carried by said frame and located outside of said lubricant chamber and at one side of one of the end walls formed on the bed, and mechanism carried by said frame

for actuating said instrumentalities, said mechanism being located on the other side of the end wall and within the lubricant chamber.

6. In combination, an oil pan mounted beneath an opening in a table-top, a gasket of sound-absorbing material resting on said oil pan, a sewing machine with a frame including a bed which extends through said opening and is seated upon said gasket, said frame having no direct metallic connection with the oil pan and being free to vibrate relative to said pan, the oil pan and frame forming a dust and lint proof chamber which houses the actuating mechanism of the sewing machine.

7. A sewing machine having, in combination, a frame including a bracket-arm and a hollow head, a bushing carried by said frame and located adjacent said hollow head, said bushing being formed with an oil well, a needle-bar actuating shaft journaled in said bushing and formed with a longitudinal bore, an oil reservoir, a pump for supplying oil from said reservoir through the bore in said shaft to the well in said bushing, take-up actuating mechanism located within said hollow head and a wick having one of its ends depending in said well and its other end in a position to be engaged by said take-up actuating mechanism.

8. A sewing machine having, in combination, a frame including a bracket-arm and a hollow head, a bushing carried by said frame and located adjacent said hollow head, said bushing being formed with an oil well, a needle-bar actuating shaft journaled in said bushing and formed with a longitudinal bore, means for supplying oil to the bore in said shaft, radial ducts leading from the bore in said shaft to the bearing surface of said bushing, ducts in said bushing connecting the bearing surface with said well, a spiral groove on said shaft for forcing oil through said ducts and into said well, needle-bar and take-up actuating mechanism located within the hollow head, and wicks having their ends depending in said well and their other ends held in a position to be engaged by the take-up and needle-bar actuating mechanism.

9. A sewing machine having an arm terminating in a hollow head, take-up and needle-bar actuating mechanism located within said head, a plate having a portion which extends into an opening in said arm, a plurality of depending pipes carried by said plate, wicks having their ends threaded into said pipes and their other ends extending into the arm of said machine and means for supplying oil during the operation of the machine to the ends of the wicks which extend into the arm.

10. In combination with a table-top having an opening therein, an oil-pan adapted to be attached beneath the opening in the table-top and having upturned edges, a sewing machine having a frame which rests upon the edges of said oil-pan and forms an enclosure, vibration absorbing means interposed between said frame and the upturned edges of said oil-pan, said sewing machine frame having no direct metallic connection with the oil-pan and the weight of said sewing machine being carried entirely by said vibration absorbing means whereby said sewing machine may vibrate relative to said pan without imparting said vibrations to the oil-pan and the table by which it is supported.

11. In combination, an oil-pan mounted beneath an opening in a table-top, sound absorbing material carried by said pan, a sewing machine with a frame including a bed which extends through said opening and rests upon said sound absorbing material, said frame having no direct metallic connection with the oil-pan and being free to vibrate relative to said pan, the oil-pan and frame forming a dust and lint proof chamber which houses the actuating mechanism of the sewing machine and means within said chamber for lubricating the actuating mechanism of the sewing machine.

12. In combination, a table-top having an opening therein, an oil-pan formed with upturned edges and secured to said table-top and located beneath said opening, a sewing machine frame having a bed which extends through the opening in said table-top and rests upon said pan, the top of said sewing machine bed being flush with the table-top, and a layer of vibration absorbing material interposed between said bed and said pan, said sound absorbing material forming the sole support of said sewing machine.

13. In combination, an oil-pan having upturned edges, a sewing machine frame located above said oil-pan and forming with said oil-pan a dust and lint proof chamber, sewing machine actuating mechanism located within said chamber, said mechanism including a needle-bar actuating shaft formed with a longitudinal bore, three bearings in which said needle-bar shaft is journaled, a pump also located within said chamber, means for supplying oil under pressure from said pump to the middle bearing for said needle-bar shaft, eccentrics carried by said needle-bar shaft, ducts for conducting the oil from said longitudinal bore to the bearing surfaces of said eccentrics, a gear carried by said shaft, and a duct located relatively to said gear so as to conduct oil from said longitudinal bore to the face of said gear from whence it is thrown to the teeth of said gear by centrifugal force.

14. In combination, a sewing machine table having an opening therein, an oil-pan secured to the under side of said table beneath said opening forming therewith a pocket, a sewing machine having a bed formed with depending side and end walls which are received in said pocket and rest by gravity upon said oil-pan, a resilient gasket disposed between said pan and said depending side and end walls, and means carried by said machine for supplying oil from said oil-pan to the actuating mechanism of the machine.

15. In combination, an oil-pan having upturned edges, a sewing machine having a bed formed with depending side and end walls which cooperate with said bed to form a chamber, means within said chamber for supplying lubricant to the actuating mechanism of said machine, and means for pivotally securing said machine so that it may be tilted relative to said pan about a point located above the lower edges of said depending side and end walls.

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