Feb. 2, 1932. F. F. ZEIER 1,843,188

SEWING MACHINE

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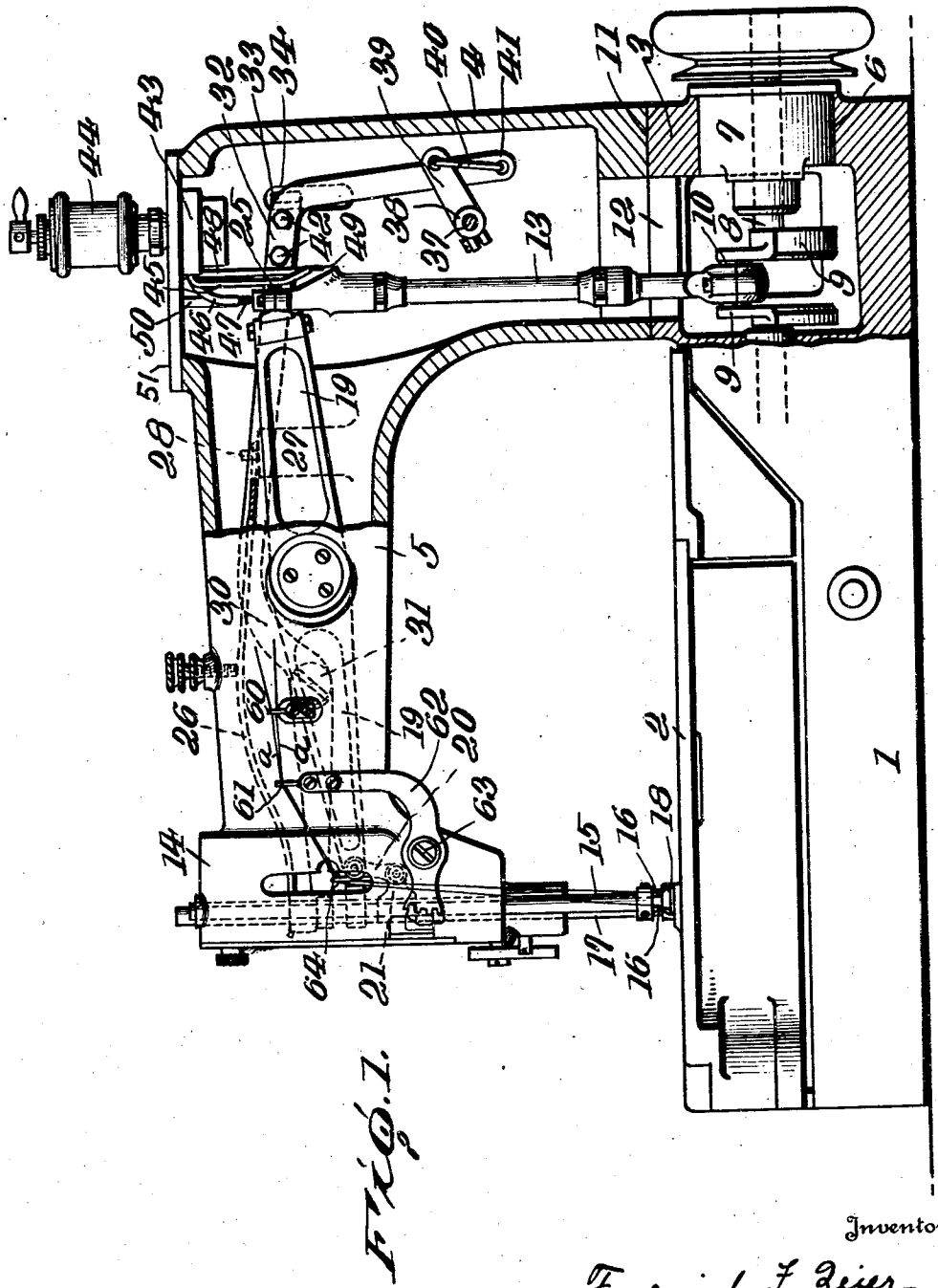


Fig. 1.

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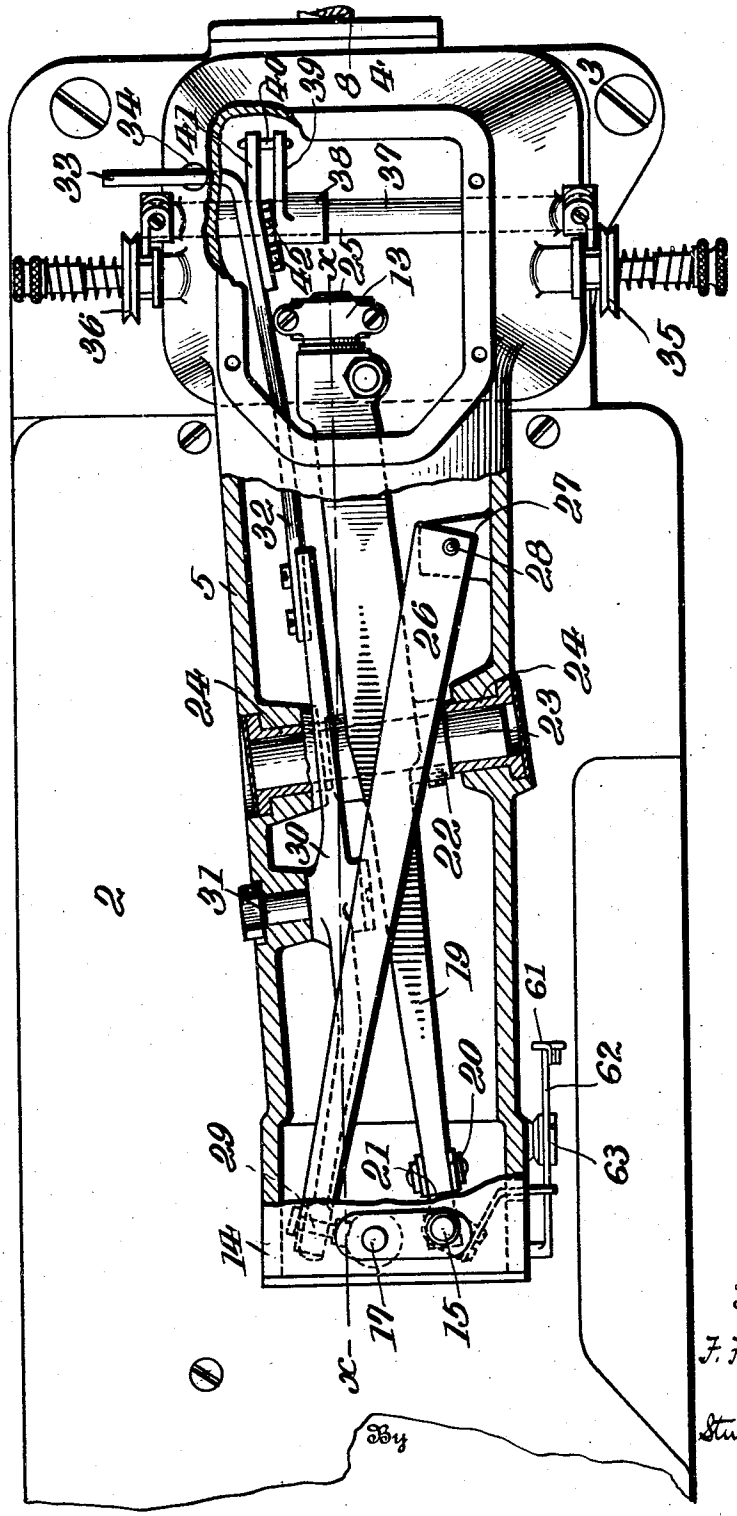
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Fig. 3.

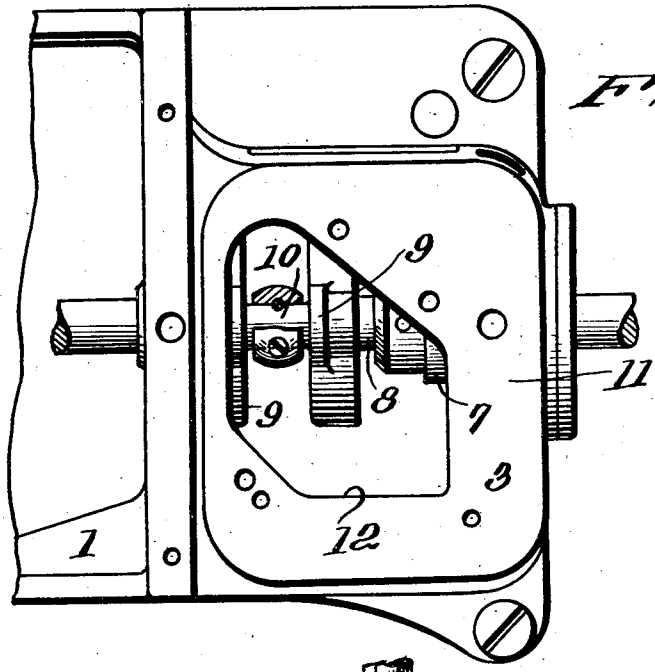
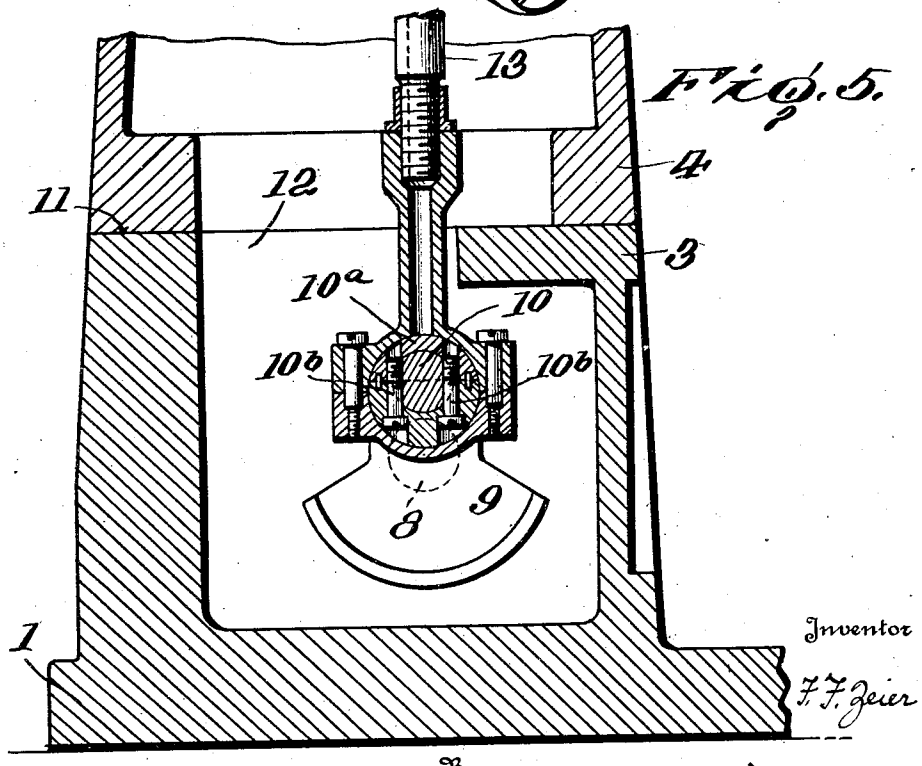


Fig. 5.



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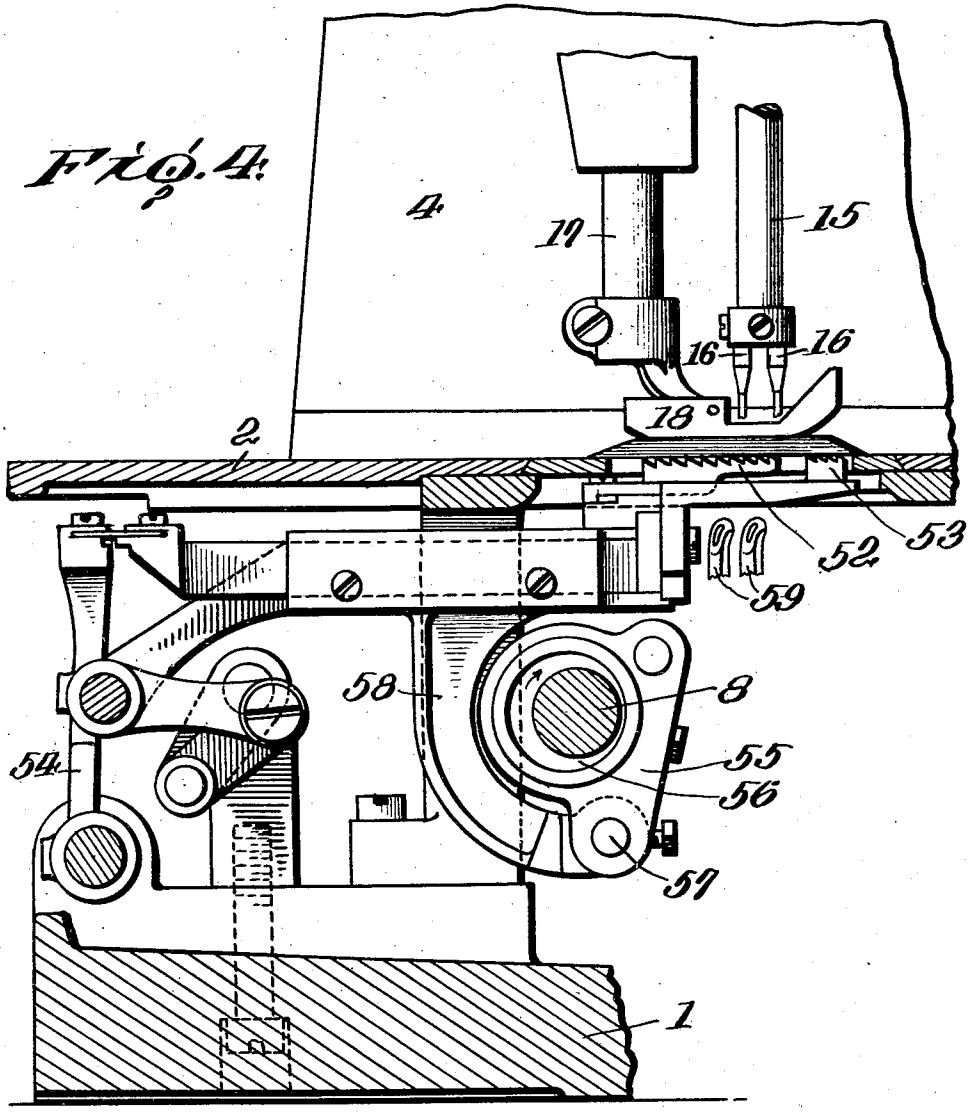
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Fig. 4.



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UNITED STATES PATENT OFFICE

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SEWING MACHINE

Application filed August 2, 1928. Serial No. 297,053.

The invention relates to new and useful improvements in sewing machines, and more particularly to a sewing machine wherein the actuated parts are enclosed within the framework of the machine.

An object of the invention is to provide a sewing machine having a hollow overhanging arm wherein the needle actuating lever is a lever of the first order located entirely within the overhanging arm and disposed in a vertical plane intersecting a vertical plane containing the main actuating shaft at an acute angle.

A further object of the invention is to provide a sewing machine of the above type wherein the actuating link for reciprocating the needle lever lies substantially in the line of intersection of the plane.

A further object of the invention is to provide a sewing machine of the above type wherein the treadle controlled parts for lifting the presser foot and extending along the overhanging arm are arranged within the arm.

A still further object of the invention is to provide a machine of the above type wherein the tensions are released by a control mechanism largely located within the overhanging arm.

A still further object of the invention is to provide a machine of the above type wherein the overhanging arm is detachably mounted on the supporting bed.

These and other objects will in part be obvious and will in part be hereinafter more fully disclosed.

In the drawings which show by way of illustration one embodiment of the invention:—

Fig. 1 is a view partly in front elevation and partly in vertical section showing a machine embodying the improvements.

Fig. 2 is a top plan view with parts in horizontal section and parts broken away to show the structure within the overhanging arm and supporting standard therefor.

Fig. 3 is a plan view of a portion of the supporting bed showing the part to which the standard supporting the overhanging arm is detachably connected.

Fig. 4 is a sectional view through a portion of the bed and work support showing the location of the feed and looper to the main actuating shaft.

Fig. 5 is a vertical sectional view through the lower part of the lever and through the crank and link for actuating the needle bar.

The invention is directed to a sewing machine which includes a supporting bed carrying a cloth plate and a throat plate on which is detachably mounted a hollow standard carrying a hollow overhanging arm. Located beneath the cloth plate and within the supporting bed is the main actuating shaft which actuates the usual parts beneath the cloth plate. In the present machine there is a looper beneath the cloth plate which cooperates with a needle carried by a needle bar mounted for reciprocation in the outer end of the overhanging arm. The needle bar is reciprocated by a needle lever which is located in the hollow overhanging arm and extends to a point so that the lever may be reciprocated by a link cooperating with a crank on the main actuating shaft. This link is disposed in the hollow standard and extends through an opening in the bottom of the hollow standard into the supporting bed where it engages the crank. The needle lever is fulcrumed intermediate its ends and is arranged so that the end thereof connected to the needle bar lies substantially in a vertical plane at right angles to the feed end containing the center of the needle bar. The other end of the lever lies in a vertical plane containing the main actuating shaft. This vertical plane is in rear of the vertical plane containing the needle bar which was just referred to. The plane containing the actuated end of the needle lever passes substantially through the center of the presser bar and, of course, is in rear of the needle bar. The needle lever, therefore, lies in a vertical plane which cuts the vertical plane containing the axis of the actuating shaft at an acute angle.

The crank for actuating the needle lever is directly beneath the end of the needle lever and the link lies substantially in the intersecting lines of said planes. The presser bar and needle bar are all housed within the

needle head which is carried at the outer end of the overhanging arm. The needle lever is mounted on a shaft the axis of which is at right angles to the plane of oscillation of the lever. The presser foot is raised by a treadle or knee controlled lever which likewise lies in the overhanging arm and is movable in a plane substantially parallel with the plane of oscillation of the needle lever. This lever is fulcrumed to swing about an axis which is parallel to the fulcrumed axis of the needle lever. The end of the lever controlling the presser foot extends out through an opening in the side wall of the standard. Tension devices are mounted on the standard for the needle and looper threads and a controlling means is provided for releasing the tensions on the threads when the presser foot is raised. This controlling mechanism includes a shaft extending through the standard and the shaft is oscillated by connections with the lever which raises the presser foot. Also mounted in the overhanging arm is a leaf spring which bears on the presser bar for holding the presser foot on the throat plate. All of the parts are housed within this overhanging arm and standard so that they are protected against dust and dirt. Furthermore, the actuated parts are positively driven and are so disposed that there is no cramping of the members on their supporting bearings.

Referring more in detail to the drawings, the machine comprises a supporting bed 1 on which is mounted a cloth plate 2. This supporting bed as shown in Figs. 1 and 3 is provided with an integral base member 3 on which the standard 4 of the machine is mounted. This standard carries the overhanging arm 5. The base member 3 is provided with a circular opening 6 in which a sleeve 7 is fitted. This sleeve 7 is provided with a bushing which serves as a bearing for the main actuating shaft 8. The main actuating shaft 8 is formed with integral cranks 9 having a connecting pin 10. The sleeve 7 is of sufficient size so that when it is removed the cranks may be withdrawn through the opening closed by the sleeve. This base member 3 extends all the way around the standard as shown in Fig. 3 thus forming a supporting surface 11 for the standard. There is an opening 12 through this base member which is more or less restricted and the link or strap 13 actuated by the crank extends upwardly through this opening 12. The standard is secured to the base member by suitable screws or bolts which are threaded into the base member. This standard 4 is hollow and the link 13 extends up through the hollow standard. The overhanging arm is also hollow and carries a needle head 14 at the outer end which is likewise hollow. Mounted for reciprocation in the needle head is a needle bar 15 carrying needles 16, 16. Also mounted in the needle head is a presser bar 17 carrying a presser foot 18. The needle bar is oscillated by a needle lever 19 which is connected by means of link 20 to a lug 21 carried by a collar fixed to the needle bar. This lever 19 is fulcrumed intermediate its ends. Said lever is provided with a sleeve 22 which is mounted on a shaft 23 and the shaft 23 is in turn mounted in suitable bushings 24, 24 at the opposite ends of the shaft. The overhanging arm is provided with inwardly projecting portions in which the bushings are fixed. The link or strap 13 is connected to a ball stud 25 secured to the end of the needle lever 19. The needle lever 19 is arranged in a vertical plane cutting a vertical plane containing the main actuating shaft at an acute angle. The vertical plane containing the actuating shaft is indicated by the broken line x—x in Fig. 2. This link or strap 13 lies substantially in the intersecting line of these two planes. The axis of the needle bar lies in the vertical plane in which the needle lever oscillates. The axis of the needle lever is perpendicular to this plane, and therefore, the axis of the shaft 23 is slightly inclined to a vertical plane passing centrally through the overhanging arm. When the main shaft is actuated the crank therein by a direct pull and thrust will vibrate the needle lever 19 without any resulting twisting of the lever or the supporting shaft therefor. The needle lever will also reciprocate the needle bar without any lateral twisting strain thereon.

As clearly shown in Fig. 5 the link or strap 13 engages an eccentric sleeve 10a which is in the form of a split sleeve secured to the crank 10 by means of screws 10b. This eccentric sleeve is detachably connected to the crank pin and by removing the screws and reversing the position of the sleeve, that is, placing the center of the sleeve outside the center of the crank pin instead of inside the center of the crank pin as viewed in Fig. 5 the throw of the crank is increased. By interchanging eccentric sleeves having different eccentricities, the proper crank throw can be obtained for any desired needle throw.

The presser bar is held depressed by a leaf spring 26. Said spring is mounted on an abutment lug 27 and held thereon by a pin 28 passing through an opening in the spring. This spring at its opposite end bears on a pin 29 fixed to a collar which is attached to the presser bar. There is a screw carried by the overhanging arm which bears against the leaf spring intermediate its ends in the usual manner whereby the yielding pressure of the presser foot against the material being stitched may be varied.

The presser bar may be lifted from the material by a lever 30. This lever is pivotally mounted on a fulcrum stud 31 which is attached to the overhanging arm. The free

end of this lever extends underneath the pin 29 and when the free end of the lever is raised it will engage the pin and raise the presser foot from the material. This lever 30 swings on an axis which is parallel with the axis of the needle lever and extends in a general direction parallel with said needle lever. The lever 30 is provided with an extension 32, the end of which is bent as indicated at 33, which projects through an opening 34 on the standard. In the end of this lever there is an eye to which a flexible member is connected for the purpose of depressing the lever, thus swinging the same on its fulcrum and raising the presser bar. This flexible member may be connected to a treadle or knee shift for the purpose of raising the presser foot.

Mounted on the standard are tensions for the needle thread, one of which is indicated at 35. Also mounted on the standard are tensions for the looper thread, one of which is indicated at 36. These tensions are adapted to be released by suitable devices which are controlled by a shaft 37. The shaft 37 is provided with a sleeve 38 carrying an arm 39 and the arm 39 is connected by means of a link 40 with a depending member 41 rigidly bolted to the outer end of the extension 32 by bolts 42. The tension releasing mechanism forms no part of the present invention per se, but it is shown described and claimed in the application of Norman V. Christensen, Serial Number 303,282, filed August 31, 1928.

As a means for lubricating the actuating parts connected to the needle lever, an oil reservoir 43 has been provided. This oil reservoir is supplied with oil from a supply cup 44. Extending from the oil reservoir 43 are two pipes 45 and 46. These pipes are each provided with a wick so that oil flowing from the reservoir along the wick will accumulate in drop form at the end of the wick which projects from the end of the pipe. The pipe 45 is so positioned that as the needle lever moves up and down through the rotation of the crank the upper end of the link 13 will make wiping engagement with the wick and take the drop of oil therefrom. The upper end of the link is provided with a suitable passage leading to the ball head on the end of the lever and thus the ball head and link are lubricated. There is also a passage extending through the link 13 to which a lubricant is supplied from the wick 47 in the pipe 46. This, of course, is brought about when the link 13 moves up and is oscillating the needle lever and brings the link into engagement with the wick. There is a pipe 48 which terminates adjacent the wick 49 in the pipe 45. There is also a pipe 50 which terminates adjacent the wick 47. These pipes 48 and 50 extend to the cap plate at the top of the machine and are accessible for supplying oil directly to the pipes. The cap plate indicated at 51 in the drawings is firmly screwed to the upper end of the standard. Therefore, the parts within the standard are not readily accessible. When it is desired to start the machine the main actuating shaft is turned until the needles are at their lowest position. At this time the link 13 is at the extreme upper position and when so positioned, oil fed to the pipe 48 will pass into the recess at the top of the link and thus flood the ball joint connection with the link. Likewise oil fed to the pipe 50 passes through the link and leads to the crank, thus flooding the parts at the crank. As soon as the machine is in operation then the further lubrication will be automatically supplied through the parts making contact with the wicks. This oiling arrangement for the machine forms no part of the present invention, but is shown described and claimed in the application of Norman V. Christensen, Serial Number 291,534, filed July 10, 1928.

As shown in Fig. 4 of the drawings, the axis of the main shaft 8 is located in a vertical plane well in rear of the feed dogs 52, 53 carried by the feed bars. The feed bars are moved back and forth by a rock lever 54 and suitable means is provided for giving a differential movement to the feed dogs. The feed bars are raised and lowered by an eccentric strap 55 cooperating with an eccentric 56 on the main shaft. This eccentric strap is pivoted at 57 to an arm 58 carried by the main feed bar. This feeding mechanism forms no part of the present invention and is only referred to very briefly in order to show the position of the main actuating shaft relative to the feeding mechanism. Cooperating with the needles 16 are loopers 59, 59. These loopers have an oscillating and rocking movement in the usual manner. By the placing of the main shaft well back of the needles there is ample room for the movements necessary to be imparted to the loopers. Furthermore, the main shaft is so positioned that by a direct lift it raises the feed dogs into engagement with the material. Notwithstanding the advantages incident to the placing of the main actuating shaft relative to the needle the needle bar is reciprocated by a needle lever which lies in the plane of the needle bar so that it imparts no lateral strain thereto and this needle lever in turning is operated by a direct connection between the end of the needle lever and the crank in the main actuating shaft. The needle lever being pivoted intermediate its ends and being a lever of the first order will impart reciprocations to the needle bar from a crank wherein the throw of the crank is the same as the extent of reciprocation of the needle bar. Furthermore, the connection with the needle bar is at the end thereof which is directly above the standard carrying the overhanging arm, and, therefore, the stand-

ard may be made relatively small in cross section, thus giving ample room beneath the overhanging arm for the manipulation of the material.

The needle threads are indicated at *a*, *a* in the drawings. These needle threads pass through separate tensions provided therefor, thence through a thread guide 60, and thence through an eye 61 carried by a lever 62 pivoted at 63. The lever 63 has a rack engaging a corresponding rack attached to the presser bar. Thus, it is that when the presser bar is raised by the varying thicknesses of material beneath the presser foot the eye 61 is shifted for varying the control of the threads. The threads after passing the eye 61 pass through a thread eye 64 which is mounted on the needle bar and moves up and down therewith. The threads pass from this eye 64 to the needles.

From the above it will be apparent that a sewing machine has been devised wherein all the actuated parts for the needle are housed within the frame structure and are not only positively actuated, but are so mounted and positioned as to prevent any cramping action on the parts. This all contributes to a very high speed machine, and one wherein there is little vibration produced by the oscillating members.

It is obvious that minor changes in the details of construction and the arrangement of parts may be made without departing from the spirit of the invention as set forth in the appended claims.

Having fully described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. In a sewing machine a supporting frame, a main actuating shaft mounted in the lower portion of said frame provided with an actuating crank, a needle bar mounted for reciprocation on said frame, a needle lever pivoted intermediate its ends and connected to said needle bar, a link connected to the other end of said needle lever and to said crank, said needle lever and needle bar being disposed in a vertical plane intersecting a vertical plane containing the main actuating shaft at an acute angle, said link being disposed substantially in the line of intersection of said planes.

2. In a sewing machine a supporting bed structure, a hollow standard carried thereby, a hollow overhanging arm mounted on said standard, a needle bar mounted for reciprocation on said arm, a needle lever located in said hollow overhanging arm and pivoted intermediate its ends, means for connecting said needle lever to said needle bar, a main actuating shaft mounted in said supporting bed and provided with a crank, a link disposed in said standard and connecting said needle lever to said crank, said needle lever and needle bar being disposed in a vertical plane intersecting a vertical plane containing the actuating shaft at an acute angle, said link being disposed substantially in the line of intersection of said planes.

3. In a sewing machine a hollow standard, a hollow overhanging arm mounted at the upper end of said standard, a hollow needle head mounted at the outer end of said arm, a needle bar reciprocating in said needle head, a presser bar mounted within said needle head, a needle actuating lever mounted in said overhanging arm and pivoted intermediate its ends, means for connecting said lever to said needle bar, means extending through the hollow standard for actuating the lever, a presser lifting lever mounted in the overhanging arm and connected to the presser bar, said hollow standard having an opening and said presser lifting lever having an extension extending through said opening whereby the same is accessible for lifting the presser bar, and tension releasing means including a shaft mounted in the hollow standard, and devices located in said hollow standard for connecting said shaft to said presser bar lifting lever.

4. In a sewing machine a supporting frame, a main actuating shaft mounted therein and having a crank, a hollow standard, a hollow overhanging arm carried by said standard, a hollow needle head carried by said overhanging arm, a needle bar in said needle head, a needle actuating lever disposed in said overhanging arm and connected with the needle lever, a link disposed in said standard and connecting said crank to said needle lever, means for pivotally supporting said needle lever, and an eccentric sleeve detachably and reversibly connected to said crank with which said link cooperates in its connection to the crank.

In testimony whereof, I affix my signature.

FREDERICK F. ZEIER.