May 3, 1932. N. V. CHRISTENSEN ET AL 1,857,041

SEWING MACHINE

Filed April 14, 1926 3 Sheets-Sheet 1

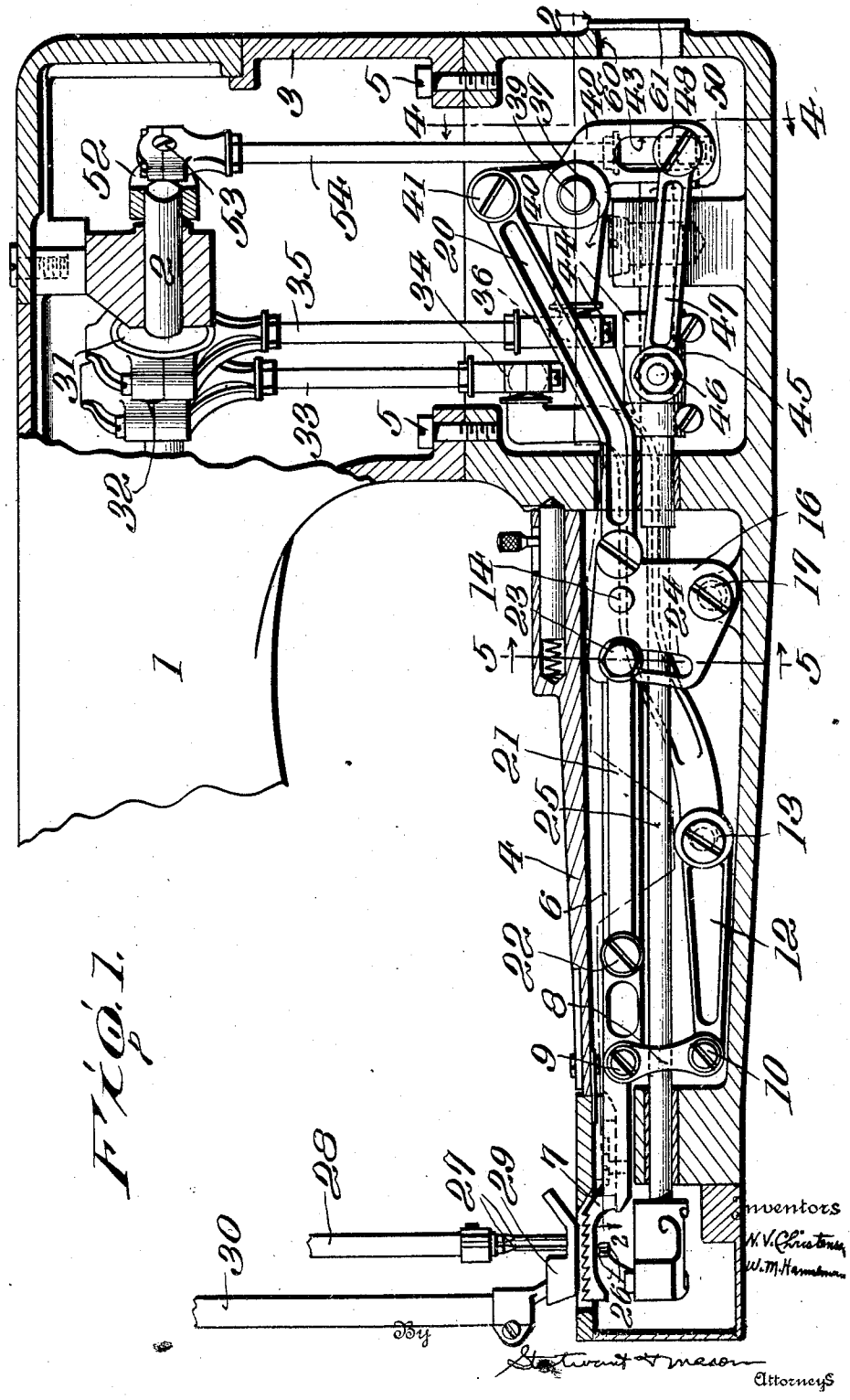

Fig. 1.

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SEWING MACHINE

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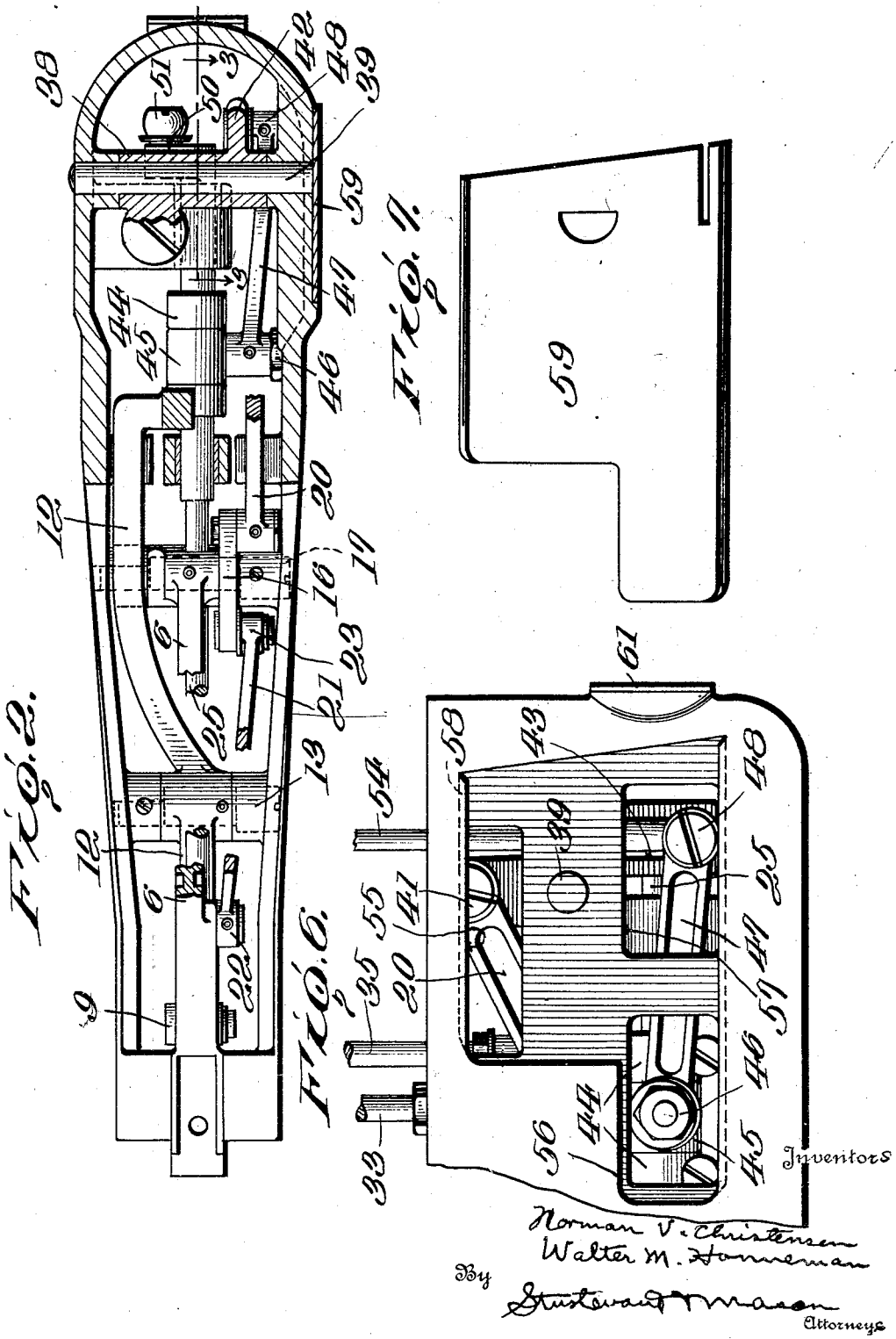

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SEWING MACHINE

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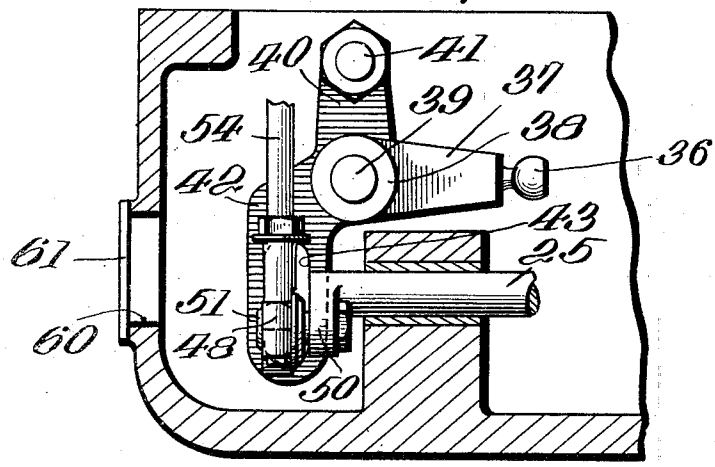
FIG. 3.



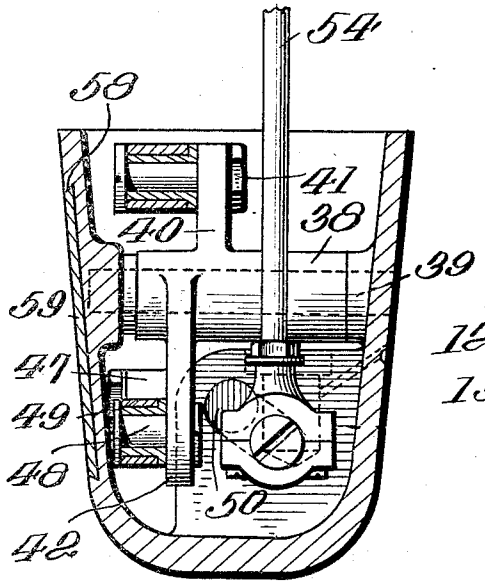
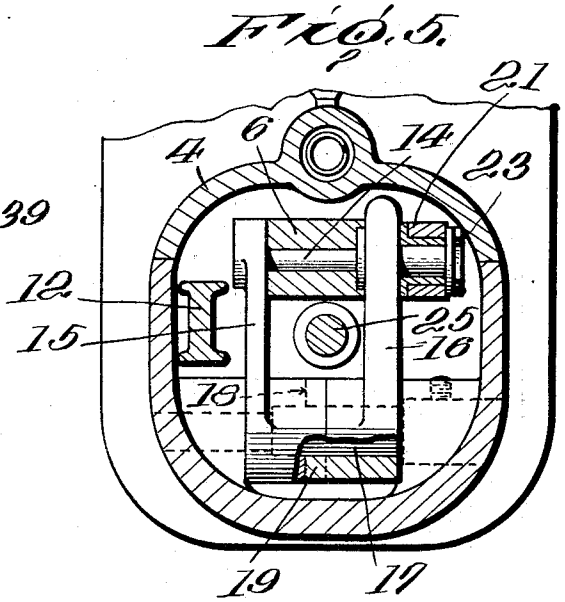


FIG. 4.

FIG. 5.



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UNITED STATES PATENT OFFICE

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SEWING MACHINE

Application filed April 14, 1926. Serial No. 101,985.

The invention relates to new and useful improvements in sewing machines, and more particularly to a sewing machine having a cylindrical work supporting arm on which tubular articles are stitched.

An object of the invention is to provide a sewing machine of the above type having a four-motion feed dog and a four-motion looper, with actuating devices therefor wherein all of the movements imparted to the feed dog and the looper are derived from two eccentrics and a crank on the main shaft.

A further object of the invention is to provide a sewing machine of the above type wherein the parts actuated by the eccentrics and the crank may be detached therefrom, after which the entire work supporting arm with the remainder of the feeding mechanism and looper mechanism assembled therein may be removed, and a different arm with a feeding mechanism including a differential feed dog and a looper mechanism substituted therefor.

A further object of the invention is to provide a sewing machine of the above type wherein the feeding mechanism includes devices wherein the feed dog may be leveled or tilted as desired, or the working position thereof raised and lowered.

A still further object of the invention is to provide a sewing machine of the above type wherein the feed bar is supported at the rear end thereof by two independent rocking arms, one at each side thereof, which rocking arms are positively connected so as to maintain their positions relative to each other.

A further object of the invention is to provide a machine of the above type wherein the work supporting arm and the parts of the frame on which said arm is mounted, are provided with suitably covered openings through which access may be readily had to adjustable parts in the looper actuating mechanism, for adjusting and for initially assembling.

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—

Figure 1 is a view partly in section and partly in side elevation showing a portion of the machine having the improvements applied thereto;

Fig. 2 is a view partly in section and partly in plan on the line 2—2 of Fig. 1, the cover plate and end cap of the arm being removed and parts broken away;

Fig. 3 is a detail in section on the line 3—3 of Fig. 2;

Fig. 4 is a detail in section on the line 4—4 of Fig. 1;

Fig. 5 is a detail in section on the line 5—5 of Fig. 1;

Fig. 6 is a view of a portion of the front of the detachable arm and showing the uncovered openings through which access may be had to certain of the actuating parts;

Fig. 7 is a plan view of a cover plate for closing the openings in the work supporting arm.

The invention is directed broadly to a sewing machine having a suspended work supporting arm, and preferably a machine of the type shown in the Patent No. 1,741,095, granted Messrs. Christensen and LeVesconte, December 24, 1929.

The machine of the present application includes a supporting base or frame, which is provided with an overhanging portion at the upper end to which the main frame 1 of the machine is integrally attached. Located in this main supporting frame 1 is a main actuating shaft 2 which is driven by a suitable belt wheel at the opposite end of the shaft from that shown in Fig. 1. This main frame of the machine has an integral depending portion 3. This depending portion is open at its lower end. Detachably mounted on the depending portion is a work supporting arm 4. The work supporting arm closes the lower end of the depending portion, and said arm projects laterally from said depending portion, thus forming a suspended substantially cylindrical work supporting arm on which tubular articles may be stitched and formed. The work supporting arm is secured to the depending portion by screws 5.

In the preferred form of the invention, the material is wrapped around the arm and is fed off from the end of the arm as it is stitched.

Mounted in the work supporting arm 4 is a feed bar 6 on which is mounted a feed dog 7. This feed bar extends lengthwise of the work supporting arm. It is mounted adjacent the outer end thereof on supporting links 8. These links are pivoted to the feed bar at 9 and are also pivoted at 10 to a lever 12. The lever 12 is mounted on a fulcrum pin 13. This fulcrum pin 13 has an eccentric portion on which the lever swings as a fulcrum, and the pin is capable of being adjusted in different set positions for raising or lowering the fulcrum point of the lever. By raising or lowering the fulcrum point of the lever 12, the links 8 are raised or lowered and thus it is that the working position of the feed dog is raised or lowered. The feed bar at the rear end thereof is mounted so as to slide on a pin 14. This pin 14 is mounted in the upper end of swinging arms 15 and 16. These arms 15 and 16 are mounted on an eccentric portion of the pin 17, which pin is mounted in lugs in the work supporting arm and capable of being adjusted therein and set in different adjusted positions. This eccentric pin permits the swinging arms to be raised or lowered. This will raise or lower the rear end of the feed bar. Thus it is that the feed dog may be tilted or leveled as desired. The construction of the feed bar and the mounting of the same thus far described, is similar to that shown in our Patent No. 1,763,952, granted June 17, 1930. These swinging arms 15 and 16 in the present embodiment of the invention are provided with positive means for connecting the same. The hub of the arm 15 is provided with radial grooves 18, while the hub of the arm 16 is provided with radial projections 19. These projections fit in the grooves and lock the two arms together, so that they are bodily oscillated together. These arms are swung back and forth on their pivot pins by means of a link 20. A link 21 is pivoted at 22 to the feed bar 6. This link 21 is pivoted at 23 to a lug which is adjustable in a segmental slot 24 formed in the swinging arm 16. As noted above, the feed bar slides back and forth on the pin 14, and the pin 14 can move back and forth in the forked end of the feed bar. The link 20 oscillates the swinging arms 15 and 16, and the arm 16, through the link 21, will move the feed bar back and forth.

Also mounted in the work supporting arm is a looper shaft 25. This looper shaft 25 is mounted so as to oscillate in suitable bearings formed integral with the work supporting arm. On the forward end of the looper supporting shaft 25 are loopers 26. Two loopers are shown in the drawings for the reason that two needles 27, 27 are shown, and of course, there is a looper for each needle when making independent lines of stitches. The needles are carried by a needle bar 28 and the material is held on the work support by a presser foot 29 carried by a presser bar 30. As noted above, the feed dog is moved back and forth and up and down, and this is known as a four-motion feed dog. The looper also oscillates into and out of the needle thread loops, and is given a lateral movement to avoid the needle. This is true of both loopers. This can well be referred to as a four-motion looper, as it moves forward, thence laterally, then back and then laterally to its starting position. This is a well known type of looper movement. The looper is oscillated by an oscillation of the looper shaft, and the looper is moved laterally by an endwise movement of the looper shaft.

Mounted on the main shaft 2 are two eccentrics 31 and 32. An eccentric strap 33 cooperates with the eccentric 32 and is connected to a ball stud 34 on the inner end of the lever 12. As the eccentric 32 rotates, it will, through the eccentric strap 33, oscillate the lever 12 and thus raise and lower the outer end of the feed bar.

Cooperating with the eccentric 31 is an eccentric strap 35. This eccentric strap at its lower end is connected to a ball stud 36 mounted on an arm 37. The arm 37 is formed integral with a sleeve 38. The sleeve 38 is mounted on a bearing pin 39 mounted in lugs formed as a part of the detachable work supporting arm 4. When the eccentric rotates, the arm 37 will be raised and lowered through the eccentric strap connection therewith, and this will oscillate the sleeve 38. The sleeve 38 is provided with an upwardly projecting arm 40. The link 20 is pivoted at 41 to this upwardly projecting arm. As the sleeve 38 is oscillated, this arm 40, through the link 20, will oscillate the arms 15 and 16, and through the link 21, will impart an endwise movement to the feed bar.

Also mounted on the sleeve 38 is a depending arm 42. This depending arm 42 is provided with a slot 43. The looper shaft 25 is provided with spaced collars 44, 44, which are rigidly secured to the looper shaft. Located between these spaced collars is a short sleeve 45 which is loose on the looper shaft so that the looper shaft may oscillate in this short sleeve 45. The sleeve 45 has a pin 46 projecting radially therefrom, and a link 47 is connected to this pin 46. A pin 48 is mounted in the slot 43 of the arm 42, and is capable of being adjusted to different positions in said slot, and rigidly clamped in said positions. Mounted on this pin 48 is a bearing sleeve 49. The link 47 engages this bearing sleeve. As the sleeve 38 oscillates, it will swing the arm 42 back and forth, and through the link 47, will move the looper shaft endwise. By adjusting the position of the pin

48, the amount of endwise movement imparted to the looper shaft may be varied, and thus the amount of needle avoiding movement given to the looper varied. From the above it will be apparent that the eccentric 31 which oscillates the sleeve 38 performs two functions. It not only moves the looper shaft endwise, but it also moves the feed bar endwise. The pin 39 is set sufficiently low in the work supporting arm 4 so as to provide a substantially straight line drive to the feed bar and to the looper shaft.

On the end of the looper supporting shaft 25 there is a crank 50 carrying a ball stud 51 (see Fig. 2). On the end of the main shaft 2 is a collar 52 which is fixed to the shaft by a clamping screw. This collar 52 carries a crank 53 in the form of a ball stud. A link 54 engages the crank 53 and also engages the ball stud 51 on the crank 50 attached to the end of the looper supporting shaft. As the main shaft rotates, the link 54 will be moved endwise, and said link will oscillate the looper supporting shaft.

It will be noted from the above that we have provided the main shaft with two eccentrics and a crank, and devices are provided which are actuated thereby for imparting four motions to the feed dog, and four motions to the looper. Furthermore, it will be noted that the only parts of the feeding mechanism and the looper mechanism which extend up into the depending member of the frame are the eccentric rods 33 and 35 and the link 54. These parts may be readily disconnected from the eccentrics and the crank which actuate the same. After these have been disconnected from their actuating parts, the work supporting arm 4 may be readily disconnected from the depending member and removed from the machine. Another arm can be readily substituted for the one taken off, in which a differential feeding mechanism is located, that is, a feeding mechanism not only having a main feed dog, but an auxiliary feed dog. By this substitution, the machine may be quickly changed over to a machine which is ready to operate on knit material, so far as the feeding mechanism and looper mechanism are concerned.

The work supporting arm is provided with an opening 56 through which the pin 46 is readily accessible. The work supporting arm is also provided with an opening 55 through which the pin 41 is readily accessible. Again, the work supporting arm is provided with an opening 57 through which the pin 48 is accessible, so that it can be adjusted in the slot 43. The work supporting arm is provided with a dove-tailed recess 58. A cover plate 59 is adapted to be inserted in said dove-tailed recess, and covers all three of the openings 55, 56 and 57. In the right-hand end of the work supporting arm, as viewed in Fig. 1, there is an opening 60, which facilitates the insertion of the looper supporting shaft in setting up the machine. This opening is closed by a cover plate 61.

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

Having thus described the invention, what we claim as new and desire to secure by Letters-Patent, is—

1. A sewing machine including a main frame having a depending member open at its lower end, a detachable work supporting arm connected to and closing the lower end of said depending member, a feed bar extending lengthwise of said work supporting arm, a feed dog carried thereby, a looper shaft extending lengthwise of said work supporting arm, a looper carried thereby, a main shaft in said frame extending over said depending member, an eccentric on said main shaft, a lever in said work supporting arm for raising and lowering the feed dog, an eccentric rod cooperating with said eccentric and connected to said lever, a second eccentric on said main shaft, a sleeve mounted on a pin supported in said work supporting arm, an arm projecting laterally from said sleeve, an eccentric rod cooperating with said second eccentric and connected to said arm for oscillating said sleeve, a second arm mounted on said sleeve, and devices connecting said second arm to said feed bar for moving said feed bar endwise, a third arm mounted on said sleeve, and devices connected to said third arm and to the looper shaft for moving the looper shaft endwise, a crank on said main shaft, and devices actuated by said crank for oscillating said looper supporting shaft.

2. A sewing machine including a main frame having a depending member open at its lower end, a detachable projecting work supporting arm connected to and closing the lower end of said depending member, a feeding mechanism located in said work supporting arm including a feed dog, a looper mechanism located in said work supporting arm including a looper, a main shaft in said frame extending over said depending member, an eccentric on said main shaft, devices actuated by said eccentric for raising and lowering the feed dog of said feeding mechanism, a second eccentric on said main shaft, devices actuated by said second eccentric for imparting back and forth movements to the feed dog and for imparting needle avoiding movements to the looper, a crank on said main shaft, and devices actuated by said crank for oscillating said looper.

3. A sewing machine including a main frame having a depending member open at its lower end, a detachable projecting work supporting arm connected to and closing the

lower end of said depending member, a feeding mechanism located in said work supporting arm including a feed dog, a looper mechanism located in said work supporting arm including a looper, a main shaft in said frame extending over said depending member, an eccentric on said main shaft, devices actuated by said eccentric for raising and lowering the feed dog of said feeding mechanism, a second eccentric on said main shaft, devices actuated by said second eccentric for imparting back and forth movements to the feed dog and for imparting needle avoiding movements to the looper, a crank on said main shaft, and devices actuated by said crank for oscillating said looper, all of the devices for actuating the feed dog and the looper being mounted for operation in the work supporting arm, whereby when said devices are disconnected from the eccentrics and the crank on the main shaft, said work supporting arm may be detached from the machine.

4. A sewing machine including a main frame having a depending member open at its lower end, a detachable projecting work supporting arm connected to and closing the lower end of said depending member, a feeding mechanism and a looper mechanism mounted in said work supporting arm, said feeding mechanism including a feed bar, and a feed dog carried thereby, said looper mechanism including a looper shaft and a looper carried thereby, a pin extending across said work supporting arm beneath said depending member, a sleeve mounted on said pin, a main shaft in the frame extending over said depending member, an eccentric on said main shaft, an eccentric rod cooperating therewith and connected to said sleeve for oscillating the same, an arm projecting upwardly from said sleeve, devices connected to said arm for moving said feed bar back and forth, an arm projecting downwardly from said sleeve, and devices connected to said downwardly projecting arm for moving said looper shaft endwise.

5. A sewing machine including in combination, a main frame having a depending member open at its lower end, a work supporting arm connected to said depending member and adapted to close the lower end thereof, a looper mechanism and a feeding mechanism located in said work supporting arm, driving connections extending from said depending member for actuating said feeding mechanism and said looper mechanism, said work supporting arm having independent openings in the side face thereof through which access may be had to certain of the parts of the feeding mechanism and looper mechanism and the devices for actuating the same, and a single cover plate for closing said openings.

6. A sewing machine including in combination, a main shaft, a looper having an oscillating and a needle avoiding movement, a feed dog having an up and down and a back and forth movement, means for actuating the looper and feed dog including three eccentric members on said main shaft, and devices connecting one of said members to the feed dog for raising and lowering the same, devices for connecting a second of said eccentric members to the looper for oscillating the same, and devices for connecting the third eccentric to the feed dog and the looper for simultaneously imparting back and forth or feeding movements to the feed dog, and needle avoiding movements to the looper.

7. A sewing machine including in combination, a main frame, having a depending member, a work supporting arm connected to said depending member and suspended thereby, a feed dog in said work supporting arm having an up and down and a back and forth movement, a looper in said work supporting arm having an oscillating and a needle avoiding movement, a main shaft in said frame, three eccentric members on said main shaft, devices for connecting one of said eccentric members to the feed dog for raising and lowering the same, devices connecting a second eccentric member to the looper for oscillating the same, and devices connecting the third eccentric member to the looper and the feed dog for simultaneously imparting feeding movements to the feed dog and needle avoiding movements to the looper.

8. A sewing machine including a work supporting arm, a feed bar extending lengthwise of said arm, a feed dog carried thereby, swinging arms for supporting the inner end of the feed bar, said arms having inter-engaging parts for rigidly connecting said arms, whereby said arms swing together, a main shaft, a rocking member oscillated thereby, a link connected to the rocking member and moved endwise thereby, said link being pivoted to said swinging arms for rocking said arms, and devices connecting one of said arms to the feed bar for moving the feed bar back and forth, said arms having a pin for slidingly supporting the feed bar whereby the feed bar may be given an endwise movement relative to said pin.

In testimony whereof, we affix our signatures.

NORMAN V. CHRISTENSEN.
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