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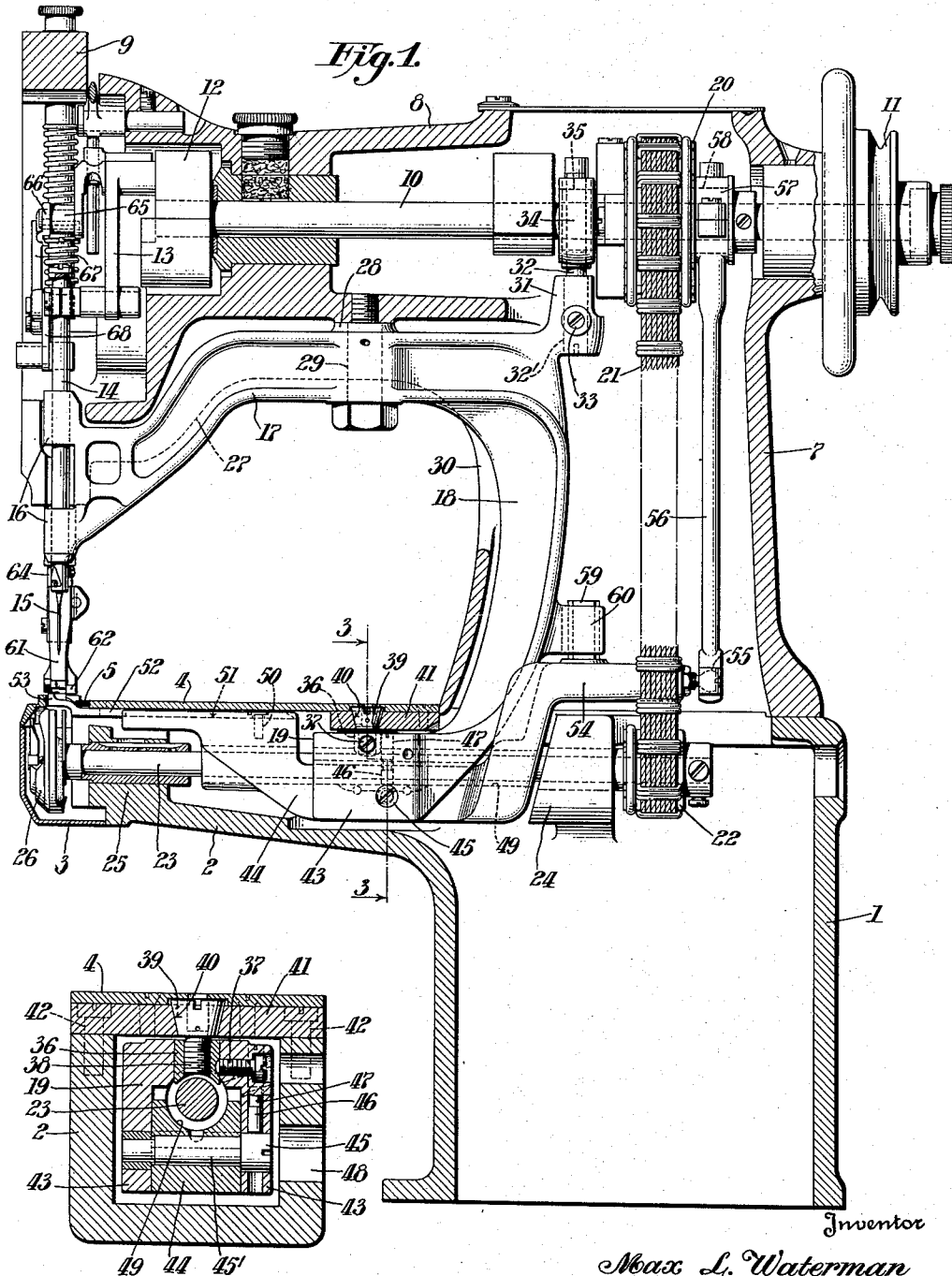
M. L. WATERMAN

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FEEDING MECHANISM FOR SEWING MACHINES

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2 Sheets-Sheet 1



Inventor

Max L. Waterman

Witness
Joseph Peering

By Henry J. Miller

Attorney

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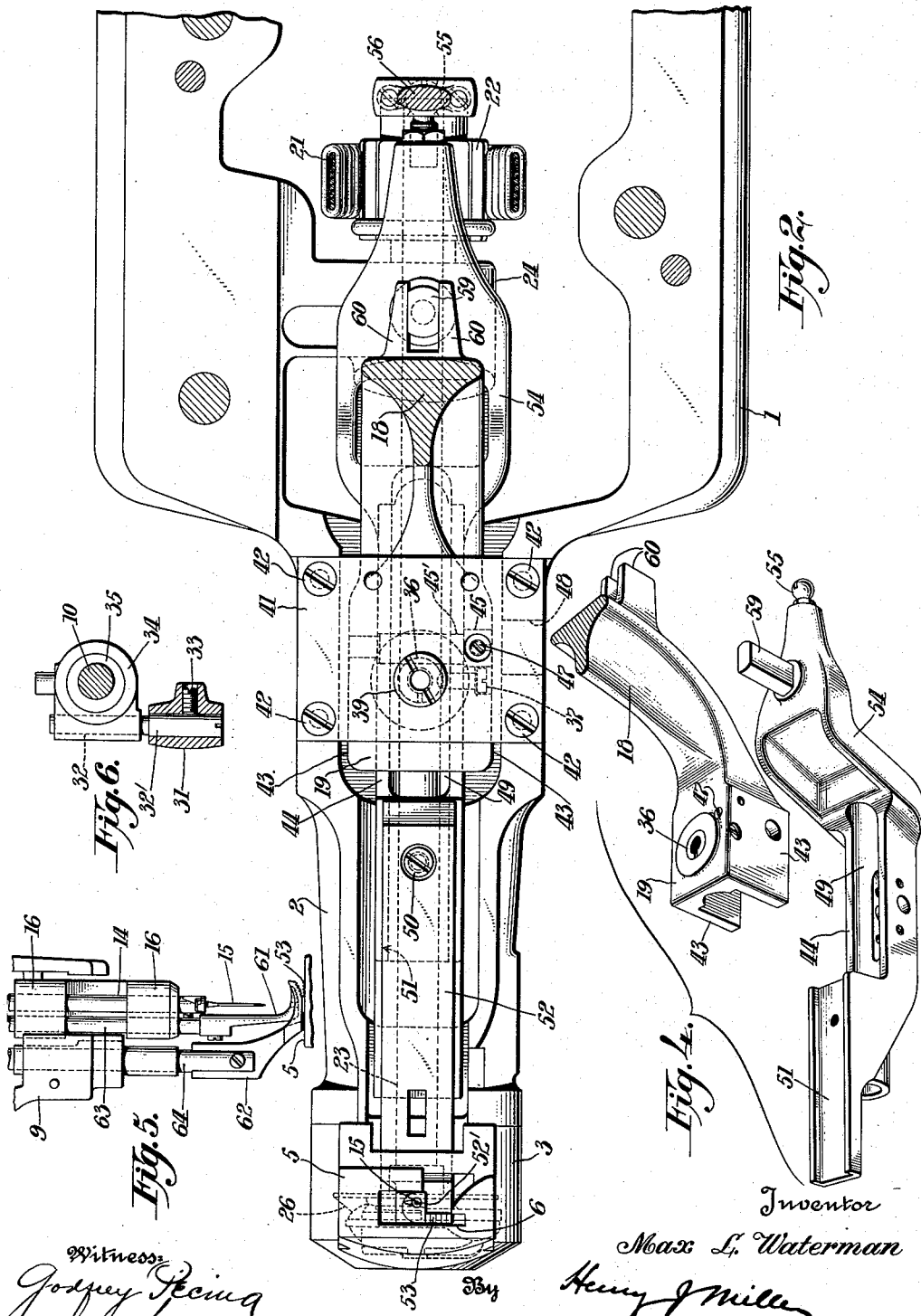
M. L. WATERMAN

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Witness:
Godfrey Reina

Inventor
 Max L. Waterman
Henry J. Miller
 Attorney

UNITED STATES PATENT OFFICE

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FEEDING MECHANISM FOR SEWING MACHINES

Max L. Waterman, Fairfield, Conn., assignor to
The Singer Manufacturing Company, Elizabeth,
N. J., a corporation of New Jersey

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This invention relates to feeding mechanisms for sewing machines and has for its primary object to provide improved means for advancing superposed plies of material past the stitch-forming mechanism of a sewing machine with a minimum of incidental relative displacement of said plies of material. Other and more specific objects of the invention will be apparent from the following description and claims.

The invention consists in the devices, combinations and arrangements of parts of the feeding mechanism hereinafter described in connection with the accompanying drawings, which illustrate a preferred embodiment of the invention and in which:

Fig. 1 represents a vertical longitudinal section, partly in front elevation, of a sewing machine containing the improved feeding mechanism. Fig. 2 is an enlarged top plan view of the work-supporting arm and a portion of its supporting standard, with the work-arm cover-plate removed. Fig. 3 represents a transverse vertical section of the work-arm, substantially on the line 3—3 of Fig. 1. Fig. 4 illustrates, in perspective and in disassembled relationship, the lower end portion of the oscillatory feed-frame and the feed-lift rocker. Fig. 5 is a fragmentary front end elevation of the machine. Fig. 6 represents a detail view of the feed-frame actuating device.

The present invention constitutes an improvement on the "unison" feeding mechanism disclosed in the U. S. patent to A. Rontke, No. 989,538, Apr. 11, 1911, to which reference may be had for an understanding of details of construction of the sewing machine not herein fully described.

Referring to the drawings, the sewing machine has a hollow base 1 from which extends laterally a tubular work-supporting arm 2 closed at its free end by a removable end-cap 3. The top of the work-arm 2 has the usual removable cover-plate 4 in abutting relation with a throat-plate 5 suitably secured upon the work-arm so as to be disposed closely adjacent to the free end thereof, said throat-plate being provided with a stepped feed-slot 6. Rising from the base 1 is the hollow standard 7 of a bracket-arm 8 terminating at its free end in a head 9 overhanging the free end of the work-arm 2.

Journalled horizontally in the bracket-arm 8 is a rotary main actuating shaft 10, carrying at one end a belt-pulley 11 and at its opposite end a crank 12, the latter being connected by a link 13 to a needle-bar 14 carrying at its lower end a

needle 15. The needle-bar 14 is journalled for vertical reciprocation in spaced bearing-lugs 16 provided at the free-end of the upper arm 17 of an inverted C-shaped feed-frame 18, said feed-frame having a relatively short lower arm 19.

Carried by the main-shaft 10 is a peripherally grooved belt-pulley 20, connected by a clip-belt 21 to a similarly grooved pulley 22 secured upon one end of a loop-taker shaft 23 disposed substantially parallel to the main-shaft 10. The loop-taker shaft 23 is rotatably journalled in a bearing-lug 24 within the frame-base 1 and also in a bearing-lug 25 adjacent the free end of the work-arm 2, said shaft 23, at its end opposite to the pulley 22, carrying a loop-taker 26 for cooperation with the needle 15 in the formation of stitches. The pulleys 20 and 22 are preferably so proportioned that the loop-taker 26 performs two rotations for each reciprocation of the needle 15.

The upper arm 17 of the feed-frame is disposed between depending flanges, as 27, at the under side of the bracket-arm 8 and is provided, intermediate the ends of said arm 17, with a vertically apertured bearing-boss 28 receiving a feed-frame fulcrum-stud 29 which is threaded into the under side of the bracket-arm 8. The arm 17 of the feed-frame extends into the bracket-arm standard 7 through a slot 30 in said standard, said feed-frame extending downwardly within the standard 7 and having its lower arm 19 disposed within the work-arm 2.

Rising from the upper inner end of the feed-frame to extend into the bracket-arm 8 is a vertically apertured boss 31 receiving the eccentric lower portion 32 of a driver-pin 32 adjustably secured in the boss 24 by a set-screw 33. The driver-pin 32 is slidably embraced by a suitably socketed portion of an eccentric-strap 34 which also embraces an eccentric 35 carried by the main-shaft 10, said eccentric being adjustable as to eccentricity in any usual or suitable manner and functioning to oscillate the feed-frame 18 horizontally about the fulcrum-stud 29.

The lower arm 19 of the feed-frame is vertically apertured above the loop-taker shaft 23 to receive a bushing 36 secured by a set-screw 37. Threaded vertically into the bushing 36 is a fulcrum-screw 38 having a tapered head 39. The screw-head 39 is pivotally disposed in a correspondingly shaped aperture 40 provided in a fixed plate 41 secured by screws 42 upon the work-arm 2. The pivotal axis accorded by the fulcrum-screw 38, 39, for the lower arm 19 of the feed-frame, is of course in vertical alignment

with the pivotal axis of the upper arm 17 of said feed-frame.

The arm 19 of the feed-frame has depending side flanges 43 disposed at opposite sides of the loop-taker shaft 23, between which flanges is pivotally supported a two-armed feed-lift rocking member 44. The rocking member 44 is hung upon an eccentric portion 45' of a horizontally disposed fulcrum-pin 45, said fulcrum-pin 45 being disposed below the loop-taker shaft 23 and rotatably adjustable in aligned bearing-apertures provided in the feed-frame flanges 43. The fulcrum-pin 45 is secured in adjusted position by means of a set-pin 46 engaged by a set-screw 47 alined therewith. Access to the fulcrum-pin 45 is afforded by an aperture 48 in the front wall of the work-arm 2, and it will be understood that, when the set-screw 47 is loosened, the fulcrum-pin 45 may be turned to adjust the pivotal axis of the rocking member 44.

The feed-lift rocker 44 has a segmental recess 49 in its face adjacent to and loosely surrounding the loop-taker shaft 23, thereby providing the necessary clearance to accommodate the vertically rocking and bodily sidewise movements of said feed-lift rocker. Secured by a screw 50 upon a grooved seat 51 provided in one arm of the feed-lift rocker 44 is a work-feeding element or dog in the form of a feed-plate 52 having its free end overhanging the loop-taker 26 and provided with work-engaging teeth 53 adapted to operate through the throat-plate feed-slot 6. The feed-plate 52 also has the usual needle-aperture 52'.

The other arm 54 of the feed-lift rocker 44 is upwardly stepped lengthwise and has secured to its free end a ball-shaped member 55 embraced by the lower end of a pitman 56, of which the upper end has a split strap 57 embracing a feed-lift eccentric 58 upon the main shaft 10. In the present case, the feed-lift rocker arm 54 extends between the runs of the belt 21 and the pitman 56 is disposed at the side of said belt opposite to the feed-frame 18. Extending upwardly from the feed-lift rocker arm 54 is a post 59 embraced by spaced arms 60 projecting from the feed-frame 18, thereby steadying sidewise movements of the feed-lift rocker 44 with the feed-frame 18.

Opposed to the feed-plate 52 is an upper feeding foot 61 partaking of the sidewise movements of the feed-frame 18, said feeding foot 61 rising and falling alternately with a pressure-foot 62. The feeding foot 61 is carried by a feed-bar 63 journaled for vertical reciprocation in the feed-frame bearing lugs 16, while the presser-foot 62 is carried by a presser-bar 64 vertically movable in the bracket-arm head 9. The feed-bar 63 and the presser-bar 64 are reciprocally actuated toward and from the work-support by a crank 65 carried by the main-shaft 10. The shaft-crank 65 is connected by a link 66 to one arm of a bell-crank lever 67 pivotally mounted upon the presser-bar 64. The other arm of the bell-crank lever 67 is connected by a link 68 with the feed-bar 63. These connections correspond substantially with the disclosure in the Rontke Patent No. 989,538 hereinbefore mentioned.

The operation of the improved feeding mechanism will be apparent from the foregoing description, it being understood that the feed-dog 53 and the feeding-foot 61 clamp the work therebetween and advance the work while the presser-foot 62 is raised, said presser-foot descending to engage and hold the work upon the work-support during the idle return movements of the feed-dog and feeding foot. As the feed-dog 53, as well

as the feeding foot 61, are moved away from the work preparatory to their return movements they do not impose any back-drag thereupon. The needle 15 is timed so that it is in the work during the feeding movement thereof, thereby further insuring against relative slippage of the work-piles.

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

1. In a sewing machine, an oscillatory plural-armed, feed-frame, means for oscillating said feed-frame, a needle-bar journaled in one of the arms of said feed-frame for endwise reciprocation, a needle carried by said needle-bar, means for reciprocating said needle-bar, a feed-dog mounted upon another arm of said feed-frame for movement relative thereto, and means for actuating said feed-dog.

2. In a sewing machine, an oscillatory feed-frame, means for oscillating said feed-frame, a needle-bar journaled in said feed-frame for endwise reciprocation, a needle carried by said needle-bar, a rocking member pivotally mounted upon said feed-frame, a work-feeding element carried by said rocking member, and means for rocking said member.

3. In a sewing machine, an oscillatory feed-frame, means for oscillating said feed-frame, a needle-bar journaled in said feed-frame for endwise reciprocation, a needle carried by said needle-bar, a feed-bar journaled in said feed-frame for endwise reciprocation, a feeding foot carried by said feed-bar, a rocking member pivotally mounted upon said feed-frame, a feed-dog opposed to said feeding foot and carried by said rocking member, and means for rocking said member.

4. In a sewing machine, a work-support, a substantially C-shaped feed-frame providing spaced arms, a pivotal support for said feed-frame, means for oscillating said feed-frame upon said support, a needle-carrying bar journaled in one of the arms of said feed-frame, means for reciprocating said needle-carrying bar, a feed-dog supported upon another arm of said feed-frame for movement relative thereto, means for imparting work-engaging and -releasing movements to said feed-dog, and a presser-foot opposed to said work-support.

5. A sewing machine having a frame including a work-support and a bracket-arm overhanging said work-support, a substantially C-shaped feed-frame providing spaced arms, substantially alined pivotal supports for said feed-frame arms upon said bracket-arm and said work-support, means for oscillating said feed-frame, a needle-carrying bar and a feeding-foot carrying bar journaled for endwise reciprocation in one of the arms of said feed-frame, means for reciprocating said bars, a rocking member pivotally mounted upon the other arm of said feed-frame, a feed-dog carried by said rocking member, and means for rocking said member.

6. A sewing machine having a frame including a work-supporting arm free at one end thereof and a bracket-arm overhanging said work-support, a rotary actuating shaft journaled in said bracket-arm, a rotary loop-taker shaft journaled in said work-arm, driving means connecting said shafts, a substantially C-shaped feed-frame providing spaced upper and lower arms, a pivotal support for the upper arm of said feed-frame upon said bracket-arm, a pivotal support for the lower arm of said feed-frame upon said work-arm, a bar journaled for endwise reciprocation in

the upper arm of said feed-frame, a work-feeding element carried by said bar, means for reciprocating said bar from the bracket-arm shaft, a rocking member, a pivotal support for said rocking member upon the lower arm of said feed-frame providing a fulcrum-axis transverse to the pivotal axis of said feed-frame, a feed-dog carried by said rocking member, means for oscillating said frame, and means for rocking said member.

7. A sewing machine having a frame including a tubular work-arm free at one end thereof, a reciprocatory needle, means for reciprocating said needle, a rotary loop-taker shaft journaled within and extending lengthwise of said work-arm, an oscillating feed-frame having side flanges disposed within said work-arm and at opposite sides of said shaft, a pivotal support for said feed-frame upon said work-arm providing a fulcrum-axis substantially parallel to the path of needle-reciprocation, a rocking member disposed between said feed-frame flanges, a pivotal support for said rocking member upon said feed-frame and providing a fulcrum-axis transverse to the axis of oscillation of said feed-frame, a feed-dog carried by said rocking member, means for oscillating said feed-frame, and means for rocking said member.

8. A sewing machine having a frame including a tubular work-arm free at one end thereof, a vertically reciprocatory needle, means for reciprocating said needle, a rotary loop-taker shaft journaled within and extending lengthwise of said work-arm, an oscillating feed-frame having a pivotal axis substantially parallel to the path of needle reciprocation, a vertical-axis pivotal support for said feed-frame upon said work-arm at one side of said loop-taker shaft, a rocking member, a feed-dog carried by said member, a horizontal-axis pivotal support for said rocking member upon said feed-frame at the side of said loop-taker shaft opposite to said feed-frame pivotal support, means for oscillating said feed-frame, and means for rocking said member.

9. A sewing machine having a frame including a tubular work-supporting arm free at one end and a bracket-arm overhanging said work-supporting arm, a loop-taker disposed within said work-arm adjacent to the free end thereof, a rotary loop-taker actuating shaft journaled within and extending lengthwise of said work-arm, means for rotating said shaft, an oscillatory frame, a pivotal support for said frame providing a pivotal axis substantially parallel to the path of needle reciprocation, a rocking member surrounding said loop-taker shaft, a pivotal support for said rocking member upon said oscillatory frame providing a fulcrum-axis transverse to the pivotal-axis of said frame, and a feed-dog carried by said rocking member.

10. In a sewing machine, an endwise reciprocatory needle, an oscillatory feed-frame, means for supporting said feed-frame for oscillatory movements about a fulcrum-axis substantially parallel to the path of needle-reciprocation, means for oscillating said feed-frame, a feeding foot journaled in said feed-frame for reciprocation in a path substantially parallel to the fulcrum-axis of said feed-frame, means for actuating said feeding foot upon said feed-frame, a rocking member pivotally mounted upon said feed-frame, a feed-dog opposed to said feeding foot and carried by said rocking member, and means for rocking said member.

11. In a sewing machine, a reciprocatory needle, an oscillatory plural-armed feed-frame having its fulcrum-axis substantially parallel to the path of needle-reciprocation, opposed feed-elements mounted upon different arms of said feed-frame for movement relative thereto, means for oscillating said feed-frame for imparting work-advancing and return movements to said feed-elements, and means for imparting oppositely directed work-engaging and -releasing movements to said feed-elements upon and relative to said feed-frame.

MAX L. WATERMAN.