

July 16, 1957

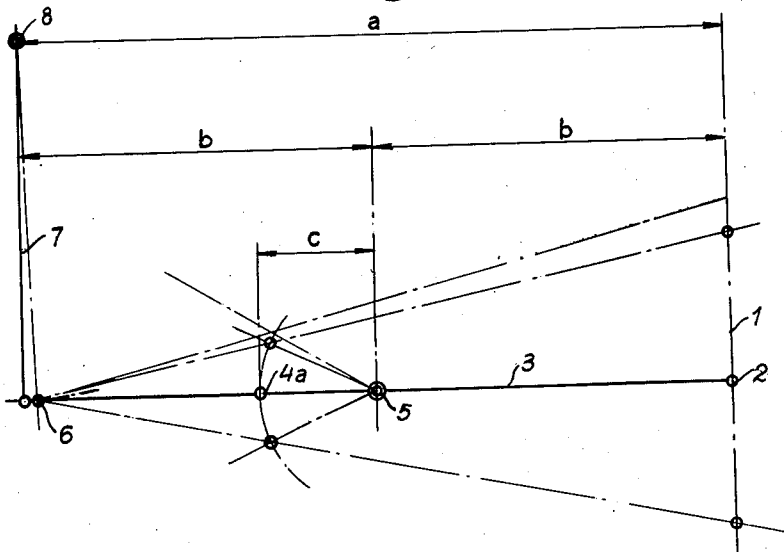
N. MARFORIO ET AL  
NEEDLE OPERATING DEVICE

2,799,236

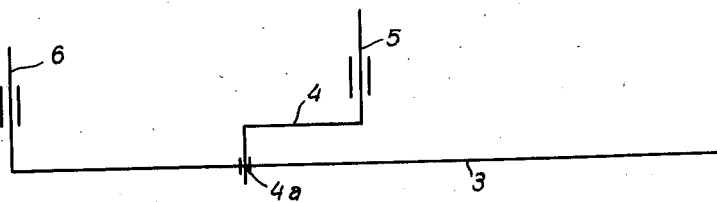
Filed May 10, 1955

3 Sheets-Sheet 1

*Fig. 1*



*Fig. 2*



July 16, 1957

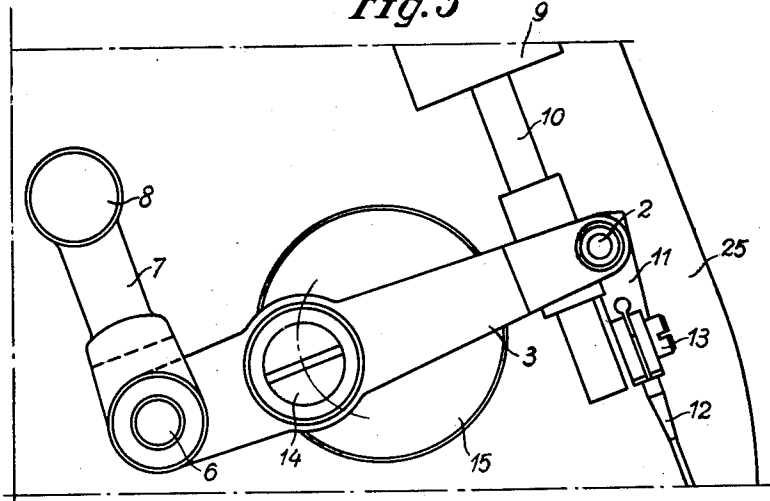
N. MARFORIO ET AL  
NEEDLE OPERATING DEVICE

2,799,236

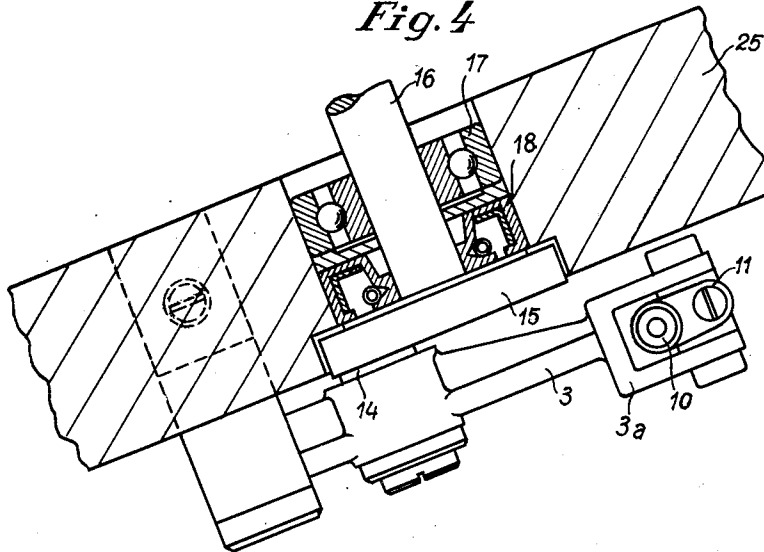
Filed May 10, 1955

3 Sheets-Sheet 2

*Fig. 3*



*Fig. 4*



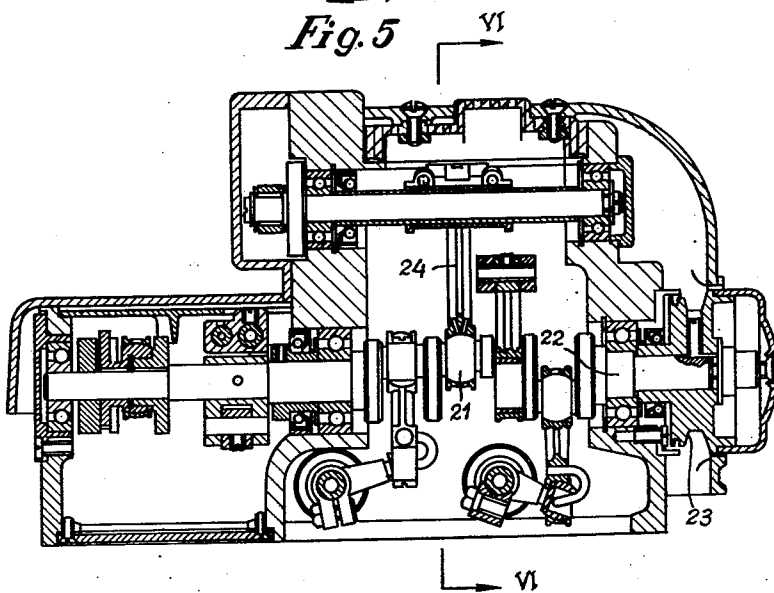
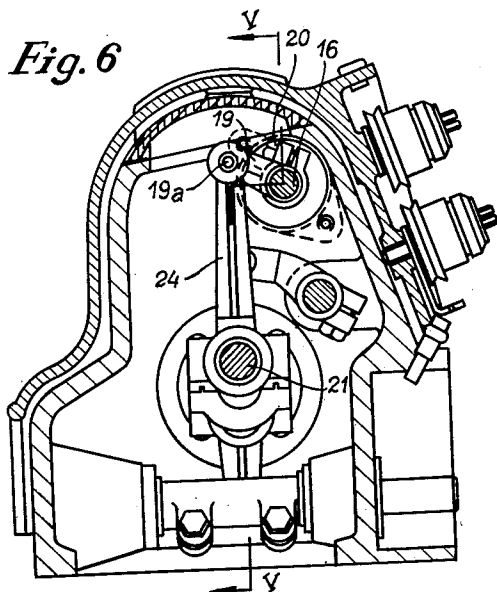
July 16, 1957

N. MARFORIO ET AL  
NEEDLE OPERATING DEVICE

2,799,236

Filed May 10, 1955

3 Sheets-Sheet 3



1

2,799,236

NEEDLE OPERATING DEVICE

Nerino Marforio, Giovanni Biffi, and Luigi Burlone, Milan, Italy, assignors to S. p. A. Virginio Rimoldi & C., Milan, Italy

Application May 10, 1955, Serial No. 507,418

Claims priority, application Italy February 4, 1955

6 Claims. (Cl. 112—221)

This invention relates to a needle operating device for sewing machines.

An object of this invention is to provide a device of this kind in which the needle is reciprocated on a rectilinear path exclusively through rotating means, thereby advantageously reducing the weight of the moving parts by suppression of the needle bar, improving lubrication of moving parts and facilitating machining.

A further object of this invention is to provide a needle operating device as outlined above, which is simple in construction and reliable in operation.

The needle operating device for sewing machines according to this invention comprises a needle actuating arm, guided at one end for substantially rectilinear motion, and pivoted at its other end to the needle, the latter being capable of rectilinear movement in a guide, and oscillating driven member pivoted at a point intermediate between the ends of the said arm.

The middle line on either side of which the needle actuating arm oscillates is substantially normal to the needle path. The axis of angular oscillation of the oscillating driven member is situated on the said middle line.

The axis of angular oscillation of the oscillating driven member is spaced from the path of the articulation between the actuating arm and needle by half the length of the needle bar actuating arm, between the end performing a rectilinear movement and the articulation.

The centre of oscillation of the oscillating driven member is spaced from the axis of the pivot connecting the said member to needle by about one-sixth the length of the needle actuating arm, between its end performing a rectilinear movement and the axis of articulation of the arm to the needle.

In order to insure a rectilinear needle movement, the maximum angle of oscillation of the driven oscillating member is about 60°.

According to an embodiment of this invention the guided end of the needle actuating arm is pivoted to a further arm capable of oscillation, the axis whereof is in its middle position substantially normal to the axis of the actuating arm, the arm length being such that the movement of its end connected to the needle actuating arm is practically rectilinear.

In order to oscillate the driven member its shaft is keyed to an arm pivoted to one end of a connecting rod pivoted at its other end to a crank of the main crank-shaft driving the machine.

The invention shall be described with reference to the accompanying drawings, wherein:

Figures 1 and 2 show diagrammatically in elevational and plan view the operating principle of the needle actuating device according to this invention;

Figures 3 and 4 show in side elevational and part sectional plan view a needle operating device according to this invention.

Figures 5 and 6 show in sectional view, the Figure 5 along the line V—V of the Figure 6 and the Figure 6

2

along the line VI—VI of Figure 5, a sewing machine embodying the improvement according to this invention.

Referring to the drawings, in the diagrams shown in Figures 1 and 2, the dash-and-dot line 1 indicates the path of the pivot 2 connecting the needle to the actuating arm 3 which is pivoted at 4a to a crank 4 of which the oscillation shaft is denoted by 5.

In order to obtain a rectilinear movement of the pivot 2 one of the requirements to be met is for the end 6 of the actuating arm 3 to perform a rectilinear movement in a direction substantially normal to the line 1. For this purpose the end 6 might be guided in a rectilinear guide. However, it is more expeditious to hinge the arm end to an arm 7 capable of oscillating, the axis whereof is denoted by 8 on the drawing, of a length such that the arc of oscillation of the end 6 may be considered under every practical aspect a straight line portion.

The spacing *a* between the path of the pivot of the needle holder and the line parallel with said path extending through the centre of oscillation of the arm 7 is twice the spacing between the line 1 and the line parallel therewith extending through the centre of oscillation 5 of the driven crank 4.

Moreover, the spacing between the centres of oscillation 4a and 5 equals about 1/6 of the spacing *a*.

The angle of angular oscillation of the crank 4 should be limited in order to maintain the path of the pivot 2 rectilinear. Conveniently, the maximum angle of oscillation should be 60° at the specified proportions in size of the various parts.

Referring now to Figures 3 and 4, 25 denotes the frame of the sewing machine carrying a member 9 having a directional guide 10 for a slide 11 having secured thereto a needle 12 by a set screw 13.

The slide 11 has attached thereto by means of the pivot 2 the forked end of the arm 3. The end 6 of the arm 3 is hinged to the arm 7 oscillating about a pivot 8 carried by the stationary machine frame.

At an intermediate point of the arm 3, spaced from the said ends by an extent defined by the above specified proportions in size, an eccentric 14 is pivoted, which is provided on the disc 15 keyed to a shaft 16 journalled in the bearing 17 carried by the machine frame 25.

An oil packing 18 is interposed between the bearing 17 and disc 15.

As shown in Figures 5 and 6, the shaft 16 has bolted thereto at 20 an arm 19 which is pivoted at 19a to a connecting rod 24, the big end of which is journalled on a crank 21 on the main machine shaft 22 driven by a pulley 23 by an electric motor not shown on the drawings.

What we claim is:

1. In a sewing machine, a needle control device comprising in combination a needle actuating arm, first pivotally connected guide means for guiding one end of said arm along a first substantially rectilinear path, a needle-holder pivoted to the other end of said arm, second guide means for guiding said needle-holder along a second substantially rectilinear path, a member pivoted intermediate the ends of said arm and having an axis of oscillation, means for imparting rotative oscillatory movement to said member thereby to oscillate said needle actuating arm, said member being pivotally connected to said arm at a point on said arm spaced from said axis of oscillation a selected distance for oscillating said arm on either side of a selected median plane substantially corresponding to the rectilinear path of the first mentioned end of the arm, said needle path being disposed substantially normal to the median plane on either side of which the needle actuating arm oscillates.

2. In a sewing machine, a needle control device comprising, in combination a needle actuating arm, first pivotally mounted guide means for guiding one end of said

3

arm along a first substantially rectilinear path, a needle-holder pivoted to the other end of said arm, second guide means for guiding said needle-holder along a second substantially rectilinear path, a member pivoted intermediate the ends of said arm and having an axis of oscillation, means for imparting rotative oscillatory movement to said member thereby to oscillate said needle actuating arm, said member being pivotally connected to said arm at a point on said arm spaced from said axis of oscillation a selected distance for oscillating said arm on either side of a selected median plane substantially corresponding to the rectilinear path of the first mentioned end of the arm, said needle path being disposed substantially normal to the median plane on either side of which the needle actuating arm oscillates, and the axis of oscillation of the member pivoted intermediate the ends of the needle actuating arm lying in a plane extending through the median plane on either side of which the needle actuating arm oscillates.

3. In a sewing machine, a needle control device comprising, in combination a needle actuating arm, first pivotally mounted guide means for guiding one end of said arm along a first substantially rectilinear path, a needle holder pivoted to the other end of said arm, second guide means for guiding said needle-holder along a second substantially rectilinear path, a member pivoted intermediate the ends of said arm and having an axis of oscillation, means for imparting rotative oscillatory movement to said member thereby to oscillate said needle actuating arm, said member being pivotally connected to said arm at a point on said arm spaced from said axis of oscillation a selected distance for oscillating said arm on either side of a selected median plane substantially corresponding to the rectilinear path of the first mentioned end of the arm, said needle path being disposed substantially normal to the median plane on either side of which the needle actuating arm oscillates, the axis of oscillation of said member pivoted intermediate the ends of the needle actuating arm lying in a plane extending through the median plane on either side of which the needle actuating arm oscillates, said needle-holder being pivotally connected to said arm at a first pivot disposed in a plane corresponding to said second path, and the first guide means being pivotally mounted at a second pivot spaced from said first pivot, the distance along said arm between said first pivot and said axis of oscillation substantially corresponding to substantially one-half of the horizontal distance between said first and second pivots measured along said arm.

4. In a sewing machine, a needle control device comprising, in combination a needle actuating arm, first pivotally mounted guide means for guiding one end of said arm along a first substantially rectilinear path, a needle-holder pivoted to the other end of said arm, second guide means for guiding said needle-holder along a second substantially rectilinear path, a member pivoted intermediate the ends of said arm and having an axis of oscillation, means for imparting rotative oscillatory movement to

4

said member thereby to oscillate said needle actuating arm, said member being pivotally connected to said arm at a point on said arm spaced from said axis of oscillation a selected distance for oscillating said arm on either side of a selected median plane substantially corresponding to the rectilinear path of the first mentioned end of the arm, said first guide means and said needle-holder being pivotally connected to said arm a selected distance, and the distance between said axis of oscillation and the point of connection between said member and said arm corresponding to substantially one-sixteenth the distance along said arm between said pivot connections of said first guide means and said needle-holder to said arm.

5. In a sewing machine, a needle control device comprising, in combination a needle actuating arm, first pivotally mounted guide means for guiding one end of said arm along a first substantially rectilinear path, a needle-holder pivoted to the other end of said arm, second guide means for guiding said needle-holder along a second substantially rectilinear path, a member pivoted intermediate the ends of said arm and having an axis of oscillation, means for imparting rotative oscillatory movement to said member through a selected angle of oscillation thereby to oscillate said needle actuating arm, said member being pivotally connected to said arm at a point on said arm spaced from said axis of oscillation a selected distance for oscillating said arm on either side of a selected median plane substantially corresponding to the rectilinear path of the first mentioned end of the arm, said angle of oscillation of the member pivoted between the ends of said arm comprising substantially 60°.

6. In a sewing machine, a needle control device comprising, in combination a needle actuating arm, first pivotally mounted guide means for guiding one end of said arm along a first substantially rectilinear path, a needle-holder pivoted to the other end of said arm, second guide means for guiding said needle-holder along a second substantially rectilinear path, a member pivoted intermediate the ends of said arm and having an axis of oscillation, means for imparting rotative oscillatory movement to said member, thereby to oscillate said needle actuating arm, said member being pivotally connected to said arm at a point on said arm spaced from said axis of oscillation a selected distance for oscillating said arm on either side of a selected median plane substantially corresponding to the rectilinear path of the first mentioned end of the arm, said angle of oscillation of the member pivoted between the ends of said arm comprising substantially 60°.

#### References Cited in the file of this patent

##### UNITED STATES PATENTS

1,840,571	Eames	Jan. 12, 1932
2,184,436	Saxe	Dec. 26, 1939

##### FOREIGN PATENTS

908,438	Germany	Oct. 4, 1954
---------	---------	--------------