June 20, 1933. W. W. DUNNELL, JR 1,914,943

NEEDLE BAR GUIDE FOR SEWING MACHINES

Filed Nov. 27, 1931

Fig. 1.

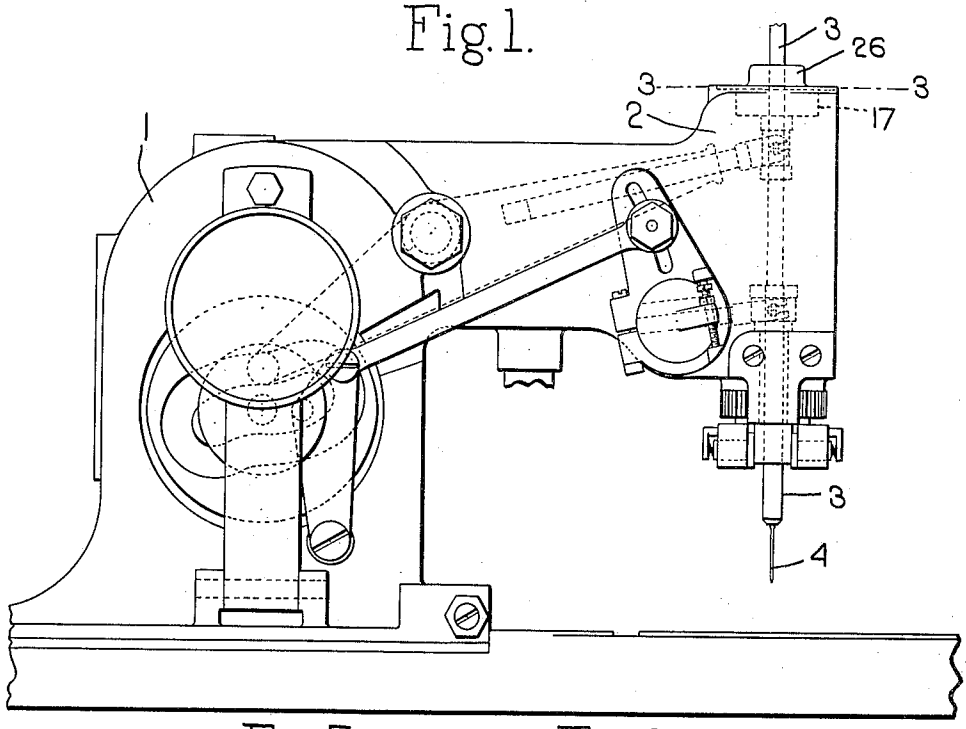


Fig. 5.

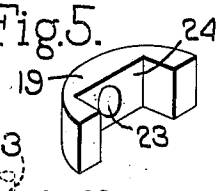


Fig. 6.

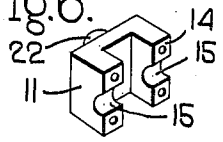


Fig. 2.

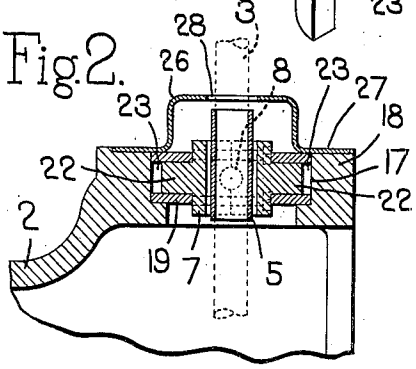


Fig. 3.

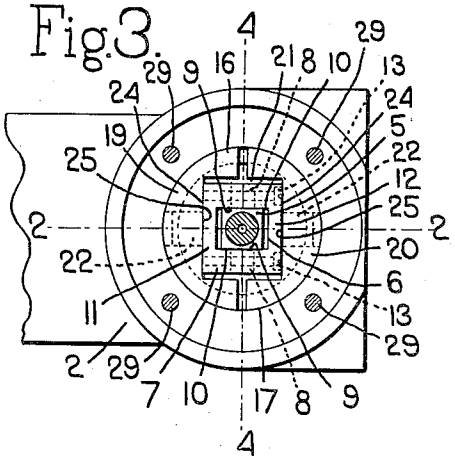
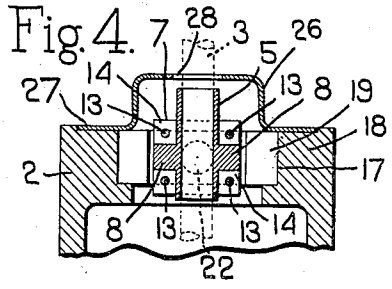


Fig. 4.



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UNITED STATES PATENT OFFICE

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NEEDLE BAR GUIDE FOR SEWING MACHINES

Application filed November 27, 1931. Serial No. 577,460.

This invention relates to all sewing machines of that type in which the needle bar motion is not pure reciprocation during the stitch-forming operation. In this class of sewing machines, it is customary to provide a guide for the end of the needle bar farthest from the needle which is supported or mounted in the sewing machine frame by means of a ball and socket joint, such universal joint connection permitting any necessary movement of the needle bar during the stitch-forming operation.

The present invention relates to the pivoted or swivelled guide assembly for the end of the needle bar farthest from the needle and has for its object to provide a needle bar guide assembly which permits translation, rotation, and three-dimensional freedom of motion of the needle bar through and about one fixed point; meaning thereby, a needle bar guide assembly which permits the needle bar to reciprocate, and to rotate or oscillate about its own axis continuously or intermittently; which permits this axis to assume any position with respect to the vertical within a solid angle, the vertex of which coincides with the fixed point previously referred to and subsequently specified, at the intersection of the trunnion axes of the guide assembly, through which point the axis of the needle bar passes at all times; and which is simple and inexpensive to manufacture, easy to assemble, presents no lubrication difficulties, and by means of which the needle bar is accurately guided without the possibility of being cramped due to maladjustment of the guide assembly.

In order to give an understanding of the invention I have illustrated in the drawing a selected embodiment thereof which will now be described after which the novel features will be pointed out in the appended claims.

Fig. 1 is a side view of a part of a sewing machine of the most familiar type having my improvements applied thereto;

Fig. 2 is a fragmentary detail view through the needle bar guide assembly, said Figure being taken on substantially the line 2—2, Fig. 3;

Fig. 3 is an enlarged section on the line 3—3, Fig. 1 with the cap member removed;

Fig. 4 is a section on the line 4—4, Fig. 3;

Fig. 5 is a perspective view illustrating one part of the two-part supporting member;

Fig. 6 is a perspective view illustrating one part of the two-part gimbal member.

Inasmuch as the present invention relates simply to the guide assembly for the end of the needle bar farthest from the needle I have not thought it necessary to illustrate in detail a complete sewing machine but have shown only sufficient parts thereof to enable the invention to be understood.

In the drawing 1 and 2 indicates the general shape of frame of a sewing machine of the most familiar type in which the needle bar 3 is mounted for impure reciprocation, said needle bar carrying the usual needle 4. This sewing machine is of the type in which the needle bar has, in addition to its reciprocation, a three-dimensional movement combined with continuous or intermittent rotation during the stitch-forming operation, this additional compound movement being in a direction normal to the progression of the stitch formation during the entire sewing operation. To provide for this freedom of movement it is customary to employ a guide for the end of the needle bar farthest from the needle which frequently has been in the form of a ball and socket joint, an assembly costly to manufacture, difficult to lubricate, and dangerously susceptible to maladjustment. The present invention has for its object to provide an improved form of infinite freedom guide for the end of the needle bar farthest from the needle eliminating all previous undesirable characteristics.

The needle bar 3 extends through and is guided by a needle bar guiding element 5 which is shown as rectangular in cross section. This needle bar guide is located within an opening 6 formed in a gimbal member 7, said needle bar guide permitting axial motion and rotation of the needle bar and being pivoted in the gimbal member to oscillate in a plane at right angles to the center line of the trunnions of said gimbal member. For this purpose said guide is provided with two oppositely-disposed trunnions 8

that find bearing in the opposite sides of the gimbal member 7, and the sides 9 of the guide 5 from which the trunnions 8 extend, have a lateral bearing against the sides 10 of the opening 6.

The dimension of the opening 6 in a direction at right angles to the trunnions 8 is sufficiently larger than the corresponding dimension of the guide 5 so that said guide is permitted to oscillate as far as necessary in the gimbal member on the trunnions 8.

The gimbal member is divided to form the two parts 11 and 12, said parts being connected together by screws 13 as shown. The division between the parts 11 and 12 may be in the plane of the center line of the guide through the trunnions 8, and the meeting faces 14 of the two parts 11 and 12 are then provided with semi-cylindrical grooves 15 which together form the openings to receive the trunnions 8.

The gimbal member 7 is in turn pivotally supported in a two part supporting member 16, which, in the type of machine chosen for illustration, may be received in a recess 17 formed in the upper portion 18 of the frame 2. The recess 17 may be a circular recess as shown, in which case the supporting member 16 would have a corresponding shape. Said member 16 might then be divided as shown to form the two parts 19 and 20. The supporting member 16 is provided with an opening 21 in which the gimbal member 7 is received and said gimbal member is provided with the two oppositely-disposed trunnions 22 which find bearing in the two parts 19 and 20 of the supporting member, the latter having apertures 23 to receive the trunnions.

The dimensions of the opening 21 are such that the sides 24 of the opening in which the apertures 23 are formed bear against the corresponding sides 25 of the gimbal member; but the other sides of the opening 21 are spaced from the corresponding sides of the gimbal member which permits the gimbal member to oscillate as far as necessary in the opening on the trunnions 22. The center line of the trunnions 22 always intersects the center line of the trunnions 8 and the center line, or axis, of the needle bar 3 passes at all times through this point of intersection previously referred to, the position of which always remains fixed relative to the frame 2 of the machine.

The supporting member 16 is retained in the recess 17 by means of a cap member 26, the latter being provided initially with a slightly retroflexed flange 27 which rests on the peripheral portion 19 of the supporting member 16 and overlies the top of the frame 2 as shown best in Fig. 2. This cap member 26 may be provided with an opening 28 through which the needle bar 3 may extend, and is retained in position by means of suitable screws 29 which are screwed through the flange 27 and into the frame 2, thus straining the initial retroflexion of the flange and clamping the supporting member 16 immovably to the frame.

I claim:

1. In a sewing machine, the combination with a frame, of a supporting member suitably mounted therein and divided into two sections, said supporting member having a suitable opening, a gimbal member situated within said opening and provided with trunnions bearing in the two parts of the supporting member, said gimbal member also having a suitable opening, a needle-bar-guiding member situated within the opening of the gimbal member and having trunnions bearing in the gimbal member, the axes of the trunnions of the gimbal member and of the needle-bar-guiding member being in the same plane and at right angles to each other, and a reciprocating needle bar extending through and guided by the needle-bar-guiding member, the axis of the needle bar passing through the intersection of the two above-named axes.

2. In a sewing machine, the combination with a frame, of a supporting member suitably mounted therein and divided into two sections, said supporting member having a suitable opening, a gimbal member situated within said opening and provided with trunnions bearing in the two parts of the supporting member, said gimbal member also having a suitable opening, a needle-bar-guiding member situated within the opening of the gimbal member and having trunnions bearing in the gimbal member, said trunnions being situated at right angles to those of the gimbal member, a reciprocating needle bar extending through and guided by the needle-bar-guiding member, and a cap member overlying and secured to the frame and resting on the peripheral portion of the supporting member thereby to retain the latter.

3. In a sewing machine, the combination with a frame, of a supporting member suitably mounted therein and divided symmetrically into two sections, said supporting member having a suitable opening therethrough, a gimbal member situated within the opening and provided with trunnions finding a bearing in the two parts of the supporting member, said gimbal member having two surfaces contiguous with two surfaces of the supporting member which prevent movement of the gimbal member in the opening axially of the trunnions, said gimbal member also having a suitable opening, a needle-bar-guiding member situated within the opening of the gimbal member and having trunnions journalled in the gimbal member, which trunnions are situated at right angles to those of the gimbal member, said needle-bar-guiding member and gimbal member having contiguous surfaces which prevent movement of

the needle-bar-guiding member in the opening of the gimbal member axially of the trunnions of the needle-bar-guiding member, and a needle bar moving with impure reciprocation extending through and guided by said needle-bar-guiding member.

4. In a sewing machine, the combination with a frame, of a supporting member immovably mounted in said frame and provided with an opening, a gimbal member situated within said opening and provided with oppositely-disposed trunnions finding a bearing in the supporting member, said gimbal member and supporting member having contiguous surfaces which prevent movement of the gimbal member within the opening axially of the trunnions while permitting the gimbal member to oscillate freely on its trunnions, said gimbal member also having an opening, a needle-bar-guiding member situated within the opening of the gimbal member and having trunnions finding bearing in the gimbal member and extending at right angles to those of the gimbal member, said needle-bar-guiding member and gimbal member having contiguous surfaces which prevent movement of the needle-bar-guiding member axially of its trunnions while permitting free oscillation of this member on its trunnions, and a needle bar moving with impure reciprocation extending through and guided by the needle-bar-guiding member.

5. In a sewing machine, the combination with a frame, of a supporting member suitably mounted therein and comprising two separable complement sections, said supporting member having a central opening, a gimbal member situated within said opening and provided with trunnions bearing in the two sections of the supporting member, said gimbal member also having a central opening, a needle-bar-guiding member situated within the opening of the gimbal member and having trunnions bearing in the gimbal member, said last mentioned trunnions being situated at right angles to those of the gimbal member, and a reciprocating needle bar extending axially through and guided by the needle-bar-guiding member.

6. In a buttonhole sewing machine, a reciprocating needle bar, a needle-bar-guiding member through which said needle bar reciprocates in the direction of its axis and in which it is capable of rotation about its axis, a gimbal member supporting the needle-bar-guiding member for swinging movement about an axis which intersects the axis of the needle bar but which extends at right angles thereto, and a supporting member supporting the gimbal member for swinging movement about another axis that also extends at right angles to the needle bar and intersects at all times both the axis of the needle bar and the axis of the gimbal member, whereby the needle bar can have three-dimensional freedom of movement about the intersection of the axes and freedom of rotation about the same point.

7. In a buttonhole sewing machine, a frame, a reciprocating needle bar, a bearing for the needle bar mounted on the frame and permitting three-dimensional freedom of movement of said needle bar, a protecting cap for clamping the bearing to the frame, said cap having an initially retroflexed flange which rests on said bearing, and means for attaching said flange to the frame, which means flexes the retroflexed flange and thereby applies a clamping pressure to the bearing.

8. In a buttonhole sewing machine, a frame, a reciprocating needle bar, a bearing therefor, a protecting cap for covering the bearing and clamping it to the frame, said cap having an initially retroflexed flange which engages the bearing, and means for clamping the retroflexed flange to the frame outside of the bearing thereby flexing said flange and applying through the cap a clamping pressure to the bearing.

9. In a buttonhole sewing machine, a reciprocating needle bar, a guide for the same permitting free swinging movement thereof in any lateral direction about a fixed point, rotation about the same point and translation through said point, said guide comprising elements having plane and cylindrical bearing surfaces only.

In testimony whereof, I have signed my name to this specification.

WILLIAM W. DUNNELL, JR.