

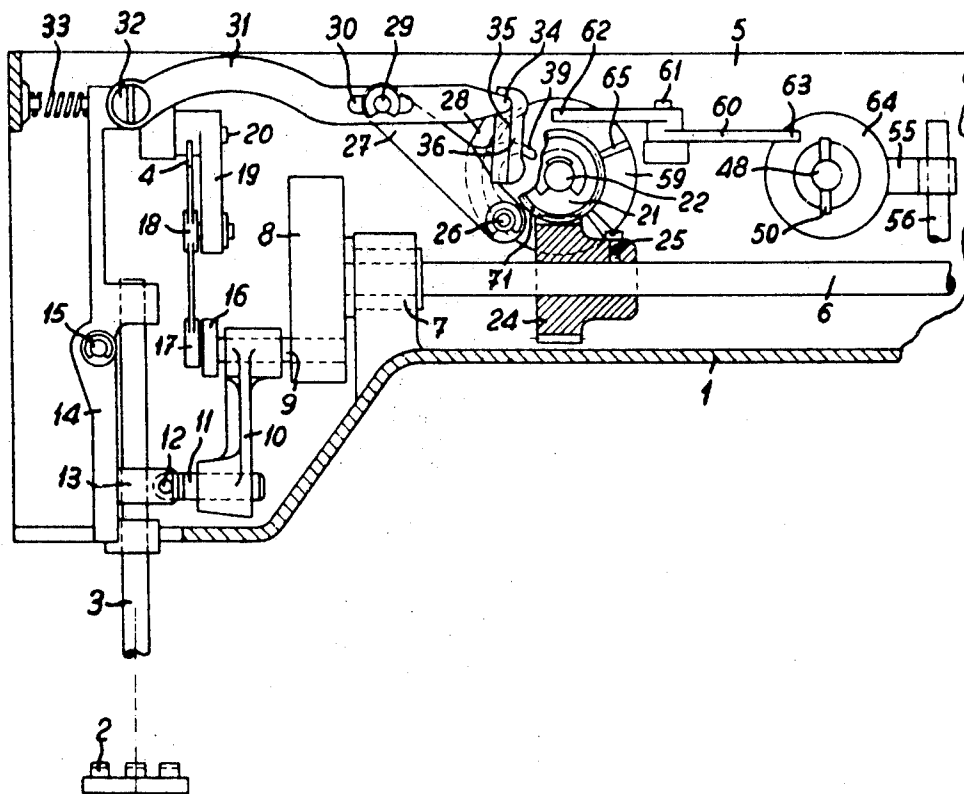
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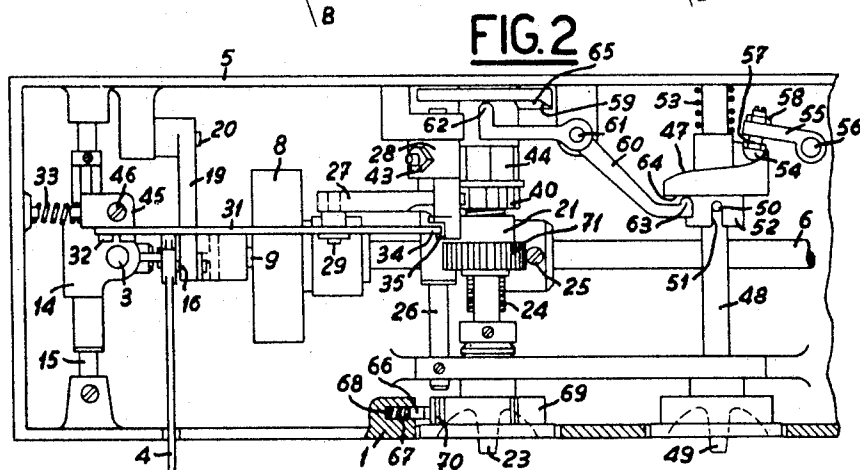
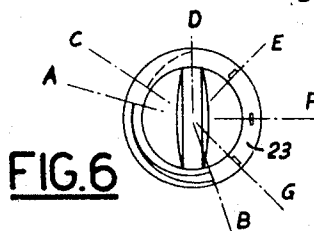
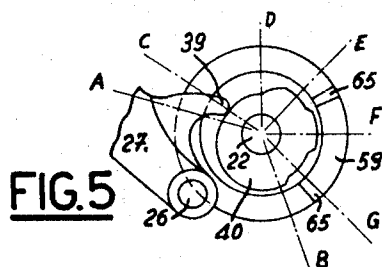
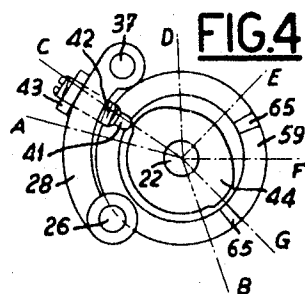
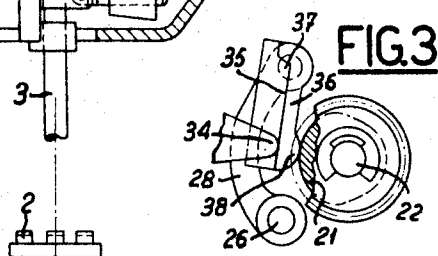
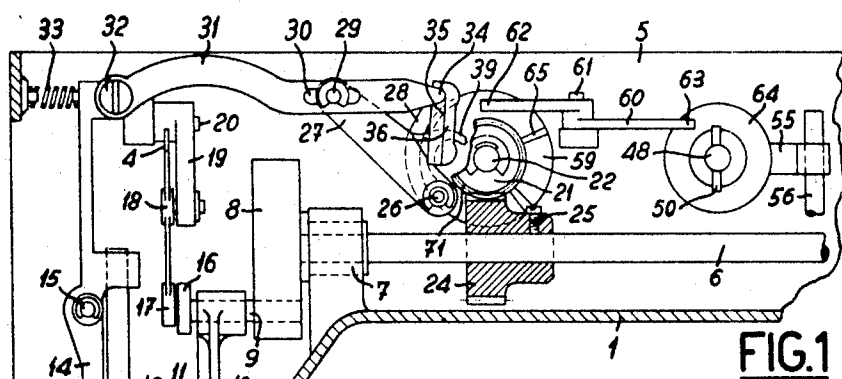
[54] **SEWING MACHINE**
6 Claims, Drawing Fig.

[52] U.S. Cl. 112/158
[51] Int. Cl. D05b 3/02
[50] Field of Search 112/158,
73, 109, 111

[56] **References Cited**
UNITED STATES PATENTS
3,247,817 4/1966 Eguchi 112/158
Primary Examiner— Richard J. Scanlan, Jr.
Attorney— Waters, Roditi, Schwartz and Nissen

ABSTRACT: A sewing machine chiefly for sewing button-holes, wherein the transverse shifting and eccentricity of the needle-bar as required for zigzag stitching are controlled by two cams, preferably coaxial with the cam controlling the zig-zag motion. The first cam controls the position of an intermediate connecting rod in contact with a rocking slideway, so as to define the amplitude of said transverse movement, whereas the second cam controls the location of the pivot of said rocking slideway, so as to define the eccentricity of the transverse movement of the cradle carrying the needle bar. Advantageously, a further adjusting cam on said common shaft acts on the usual main cam controlling the direction and amplitude of the movements of the fabric-feeding claw.





U.S. PATENT 3,522,781
SEWING MACHINE

The present invention has for its object a sewing machine comprising a frame carrying a mechanism driving a claw feeding the piece to be sewn, a needle bar and a thread guide, of the type wherein the needle bar sliding inside a cradle is adapted to rock under the action of a cam controlling the zigzag motion of the needle and engaging a slideway the pivotal axis of which may be displaced with a view to adjusting the eccentricity of the needle, while a connecting rod transmits the pivotal movement of the slideway to cradle, said connecting rod engaging the slideway at an adjustable point defining the amplitude of the zigzag stitching and a main control cam allows adjusting the direction and amplitude of the movements of the feeding claw.

The present invention has for its object an improved sewing machine including two auxiliary cams to wit: a cam adjusting the point at which the connecting rod engages the slideway and a cam adjusting the position of the pivotal axis of the slideway, which cams are fitted on a common shaft so that a common control knob secured to said common shaft allows executing both adjustments.

The accompanying drawings illustrate diagrammatically and by way of example a preferred embodiment of a sewing machine according to the invention. In said drawings:

FIGURE 1 is an elevational, partly sectional view of the upper arm of said sewing machine.

FIGURE 2 is a plan view, partly in section of said upper arm.

FIGURE 3 is a detail view of the part of the mechanism controlling the zigzag motion of the needle, that is the breadth of the stitching.

FIGURE 4 is a detail view of the part of the mechanism controlling the eccentricity of the needle.

FIGURE 5 is a detail view of the part of the mechanism adjusting the amplitude of the zigzag motion.

FIGURE 6 is a front view of a knob controlling the sewing machine.

Turning to the drawings the sewing machine includes a frame 1 carrying the entire mechanism driving the different parts of the sewing machine, that is the fabric feeding claw 2, the needle bar 3 carrying the needle which is not illustrated and the thread guide 4.

Said driving mechanism includes a shaft 6 extending horizontally within the upper arm of the sewing machine and guided at its left-hand end in a bearing 7 and a similar bearing at its right-hand side, which latter is not illustrated. Said shaft 6 carries a counterweight 8 to which is secured a trunnion 9 to which is pivotally secured in turn a connecting rod 10 controlling the axial movements of the needle bar 3.

Said connecting rod 10 is pivotally secured to a further trunnion 11 which is pivotally secured in its turn at 12 to a flange 13 rigid with the needle bar 3. Said needle bar 3 is slidably carried in a cradle 14 adapted to rock around a spindle 15 secured to the frame 1 of the sewing machine. The trunnion 9 carries also a crank 16 driving the foot 17 of the thread guide 4, an intermediate point 18 of which is pivotally secured to a link 19 pivotally secured in turn at 20 to the frame 1.

The transverse movements of the needle bar 3 controlling the zigzag stitching are controlled by a triangular cam 21 adapted to freely revolve around a spindle 22. Said spindle 22 is revolvably carried by the frame 1 and its front end carries a control knob 23. Said triangular cam 21 is rigid with a pinion 71 meshing with a worm wheel 24 secured to the horizontal shaft 6 by a locking screw 25. A second spindle 26 is carried in parallelism with the spindle 22 inside the frame 1 of the sewing machine. To said spindle 26 are pivotally secured two levers 27 and 28. The lever 27 (FIGS. 1 and 5) carries at its end 29 a trunnion engaging an elongated slot 30 formed in a connecting rod 31 pivotally secured at 32 to the rocking cradle 14. Said cradle is subjected to the pressure of a compression spring 33 which urges the cradle 14 clockwise. The right-hand projecting end 34 of the connecting rod 31 slidably engages a

slideway 35 formed on an arm 36 pivotally secured at 37 to the end of the other lever 28, as illustrated in **FIGURE 3**. Said arm 36 is provided with a boss 38 adapted to follow the outline of the triangular cam 21. As a matter of fact, under the pressure of the spring 33, the end 34 of the connecting rod 31 is urged towards the slideway 35, which keeps the boss 38 in contact with said triangular cam 21. The location of the projection 34 along the slideway 35 is defined by the position of the slot 30 of the trunnion 29 guiding the connecting rod 31, which position depends on the angular position of the lever 27. As illustrated in **FIGURE 5**, the lever 27 is provided with a projection 39 urged into contact with the outline of a further cam 40 keyed to the same spindle 22. Said cam 40 controls the breadth of the stitch, that is the amplitude of the zigzag stitching motion. Said lever 27 is subjected to the pressure of a spring which is not illustrated which urges said lever clockwise around the spindle 26, so as to ensure the permanent engagement of the projection 39 with the cam 40.

The lever 28 carrying the pivot 37 of the slideway 35 carries also a feeler 41 adjustably secured to it by a screw 42 and a nut 43, as illustrated in **FIGURE 4**. A spring which is not illustrated acts on the lever 28 so as to urge it to pivot clockwise and to make said feeler 41 engage the outline of a further cam 44 keyed to the same spindle 22, said cam being adapted to control the eccentricity of the needle bar.

To allow an adjustment of the position of the connecting rod 31 and of its projection 34 with reference to the slideway 35, the pivotal axis 32 between the connecting rod 31 and the cradle 14 is carried by an eccentric member 45 (**FIG. 2**) fitted inside a housing formed in the cradle 14, said eccentric member being locked in position by a screw 46.

The sewing machine illustrated includes of course a mechanism driving the claw feeding the fabric to be sewn, which mechanism is illustrated only to a partial extent in the accompanying drawings. In fact, only a fraction of the means adjusting said mechanism providing for the progression of the fabric to be sewn has been illustrated. Said adjusting means include a cam 47 carried by a spindle 48 to the end of which is secured a control knob 49 projecting to the front of the sewing machine. Said cam 47 is angularly rigid with the spindle 48 as provided by a pin 50 engaging a longitudinal notch 51 in a hub 52 rigid with the cam 47. A spring 53 holds said hub 52 in its position of engagement with said pin 50, while it allows an axial shifting of the cam 49 against the pressure of said spring 53. Said cam 47 is adapted to act through its outline on a follower 54 carried by an arm 55 secured to the upper end 56 of the shaft controlling the movements of the fabric feeding means of the sewing machine. Said projection 54 is adjustably secured by a screw 57 and a nut 58 on the arm 55.

The spindle 22 carries, in addition to the adjusting cams 40 and 44 a further adjusting cam 59. A lever 60 is pivotally secured at 61 to the frame 1. One end 62 of said lever 60 is held in contact with the bell-shaped outline of the cam 59. The other end 63 of said lever 60 is adapted to act on the plane transverse surface 64 forming the back of the cam 47.

It will be readily understood that by causing the sloping section 65 of the cam 59 to engage the lever 60, this produces an axial shifting of the cam 47 and consequently a corresponding adjustment of the means controlling the progression of the fabric to be sewn in the sewing machine. This cam 59 is formed in a manner such that it provides an easy control of the sewing of button holes in a semi-automatic manner on said sewing machine.

The angular setting of the different adjusting cams 40, 44 and 59 is provided in a manner such that their outline is superposed over a fraction of their angular movement, which is necessary so as to allow a semi-automatic sewing of button-holes through operation of the control knob 23. Said control knob 23 is illustrated in **FIGURE 6** with the different adjusting areas drawn on the latter:

Between the letters A and B, the adjusting area of the knob 23 serves for controlling the breadth of the stitch, that is the amplitude of the zigzag motion of the needle.

In the area extending between the letters C and D, the knob controls the eccentricity of the needle.

When it is desired to execute a button-hole, the operation is as follows:

Through operation of the control knob 23, the lefthand edge of the button-hole is stitched during the forward progression of the fabric in the sewing machine, while the knob has its reference mark E in registry with a stationary mark on the frame of the machine. When the left-hand edge has thus been stitched throughout its length, the knob 23 is brought into the position F, with a view to stitching the closing or connecting points between the two edges at the corresponding end of the button-hole. This being done, the knob 23 is brought into its position G, so as to provide for the stitching of the right-hand edge of the button-hole during a return movement of the fabric in the sewing machine. When said right-hand edge has been sewn, the knob 23 is returned into the position F for the execution of the connecting or closing stitches across the second end of the button-hole. The sewing of the button-hole is then stopped by returning the knob 23 into its position D.

The knob 23 is kept in a steady position in its different operative areas by a plunger piston 66 sliding inside a housing 67 formed in the frame 1, which housing encloses a spring 68 urging the piston 66 into contact with the periphery 69 of the knob 23. For this purpose, the periphery 69 is provided with positioning notches 70 ensuring stability of the knob 23 in the different angular positions required.

The general operation of the sewing machine described hereinabove is as follows:

The sewing machine being started, the shaft 6 is driven and controls the axial reciprocation of the needle bar 3 and consequently of the needle. As long as the knob 23 has its reference mark A in registry with the stationary reference mark carried by the sewing machine frame, the projection 34 on the connecting rod 31 registers with the pivotal point 37 of the slideway 35 or even possibly beyond said point, so that no movement can be transmitted to the connecting rod 31 and therefore the cradle 14 remains stationary. As soon as the knob 23 is shifted clockwise, this produces, by reason of the action of the cam 40 on the lever 27 a downward movement of the trunnion 29 urging the connecting rod 31 also downwardly, so that the projection 34 on the latter is brought into the area of the slideway 35, which leads to a reciprocatory rocking of the cradle 14, the amplitude of said reciprocation increasing until the knob 23 reaches the position B. When the knob 23 is caused to move within the area extending between C and D, the cam 44 adjusting the eccentricity of the needle bar acts on the lever 28 producing a shifting of the pivotal axis 37 of the slideway 35 which in its turn produces an eccentric shifting of the needle through the agency of the connecting rod 31 and of the cradle 14. At each point E, F, G, the knob 23 controls through the cam 59 the mechanism adjusting the fabric feeding means, the position E corresponding to a progression with close stitches whereas the positions F and G correspond to a receding movement, also with close stitches, the stitches having the same amplitude during forward and rearward progression. The outlines of the cams 40 and 59 are superposed over a portion of their periphery, so that for the positions E and G, the amplitude or the breadth of stitching may correspond to the breadth of one edge of the button-hole. In contradistinction, when the knob is in the position F, the amplitude or the breadth of the stitches is equal to the complete breadth of the button-hole, that is the breadth corresponding to the stitching of the connection between the two edges of said button-hole. Similarly, the outline of the cam 44 shifting the needle bar eccentrically is also superposed over the outlines of the two other cams 40 and 59, so as to produce an eccentric or lateral shifting of the needle whenever the stitching of the first edge is at an end and the stitching of the second edge of the button-hole is to begin.

Of course, when the sewing machine is used while its control knob 23 lies in the area extending between A and B, said machine is capable of executing any standard stitching or zig-

zag stitching with an independent adjustment of the length of stitching through operation of the control knob 49.

Numerous modifications of the sewing machine described hereinabove may be conceived. Thus, the cradle 14 carrying the needle bar 3, instead of pivoting around a horizontal pivotal axis 15, may be adapted to rock around a vertical axis extending in parallelism with the needle bar 3.

In the case of a simpler sewing machine, the further adjusting cam 59 and the lever 60 may be omitted: the stitching of the button-hole is then executed by operating in addition to the knob 23 provided for the change in amplitude of the zigzag stitching and for the eccentricity of the needle bar the knob 49 defining the progression of the fabric feeding means with a view to stitching with close stitches. The second edge of the button-hole would then be executed by causing the fabric to be sewn to pivot through 180° around the needle when the first edge has been sewn.

I claim:

1. A sewing machine comprising a frame, a fabric feeding claw, a thread guide, a needle bar adapted to be shifted eccentrically and to execute a transverse movement for zigzag stitching, a mechanism controlling the operation of said claw, thread guide and needle bar and including a main control cam adapted to adjust the direction and amplitude of the movements of the fabric feeding claw, a cradle inside which the needle bar is slidably carried and pivotally secured to the frame, a connecting rod coupled to said cradle for controlling the angular position of the cradle, a rocking member including an adjustable pivot and having an adjustable point of engagement with said connecting rod for controlling said connecting rod, a first cam controlling said rocking member to produce the transverse movement of the needle bar, two coaxial cams adjusting respectively the point of engagement between the connecting rod and the rocking member to define the amplitude of the transverse movement of the needle bar and the position of the pivot of said rocking member, to define the eccentricity of the needle bar, a common shaft for said adjusting cams and a common control knob carried by said shaft.

2. A sewing machine as claimed in claim 1, wherein said common shaft carries also the first cam controlling the transverse stitching motion and the mechanism includes a horizontal shaft, a gear controlled by said horizontal shaft, and a pinion coaxially rigid with said first cam.

3. A sewing machine as claimed in claim 1, wherein said common shaft carries also the first cam controlling the transverse stitching motion and the mechanism includes a horizontal shaft, a gear controlled by said horizontal shaft and a pinion coaxially rigid with said first cam, said machine comprising furthermore a transverse spindle carried by the frame in parallelism with the common shaft, a first lever pivotally carried by said spindle, carrying the pivot of the rocking member and provided with a projection following the second-mentioned coaxial cam defining the eccentricity of the needle bar, a second lever pivotally carried by the spindle adapted to act transversely through its free end on the connecting rod and provided with a projection following the outline of the first coaxial cam defining the amplitude of the transverse movement of the needle bar.

4. A sewing machine as claimed in claim 1, wherein said common shaft carries also the first cam controlling the transverse stitching motion and the mechanism includes a horizontal shaft, a gear controlled by said horizontal shaft and a pinion coaxially rigid with said first cam, said machine further comprising a further cam rigid with said common shaft and adapted to adjust the position of the main cam controlling the direction and amplitude of the movements of the fabric feeding claw for the sewing of button-holes.

5. A sewing machine as claimed in claim 1, wherein said common shaft carries also the first cam controlling the transverse stitching motion and the mechanism includes a horizontal shaft, a gear controlled by said horizontal shaft and a pinion coaxially rigid with said first cam, said machine comprising furthermore a further cam rigid with said common shaft and adapted to adjust the position of the main cam controlling the direction and amplitude of the movements of the

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fabric feeding claw, the cams carried by the common shaft being set angularly with reference to one another in a manner such that their action is superposed over a fraction of their angular shifting to allow the semi-automatic sewing of button-holes through selective operation of the cams under control of the knob on said common shaft.

6. A sewing machine as claimed in claim 1, wherein said common shaft carries also the first cam controlling the transverse stitching motion and the mechanism includes a horizontal shaft, a gear controlled by said horizontal shaft and a pinion coaxially rigid with said first cam, said machine comprising furthermore a further cam rigid with said common

shaft, the main cam controlling the direction and amplitude of the fabric feeding claw being slidably carried by a transverse shaft, an operating knob on said transverse shaft, an auxiliary lever pivotally secured to the frame, provided with a projection following the further cam, said auxiliary lever engaging through one end the main control cam to shift the latter axially in accordance with the angular setting of said further cam thereby to make the latter control the direction and amplitude of the movements of the fabric feeding claw for the sewing of the edges of a button-hole and a spring urging the main cam into a predetermined axial position against the action of the auxiliary lever.

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