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NEEDLE BAR GATE MECHANISM FOR ZIGZAG SEWING MACHINES

Filed Jan. 25, 1960

3 Sheets-Sheet 1

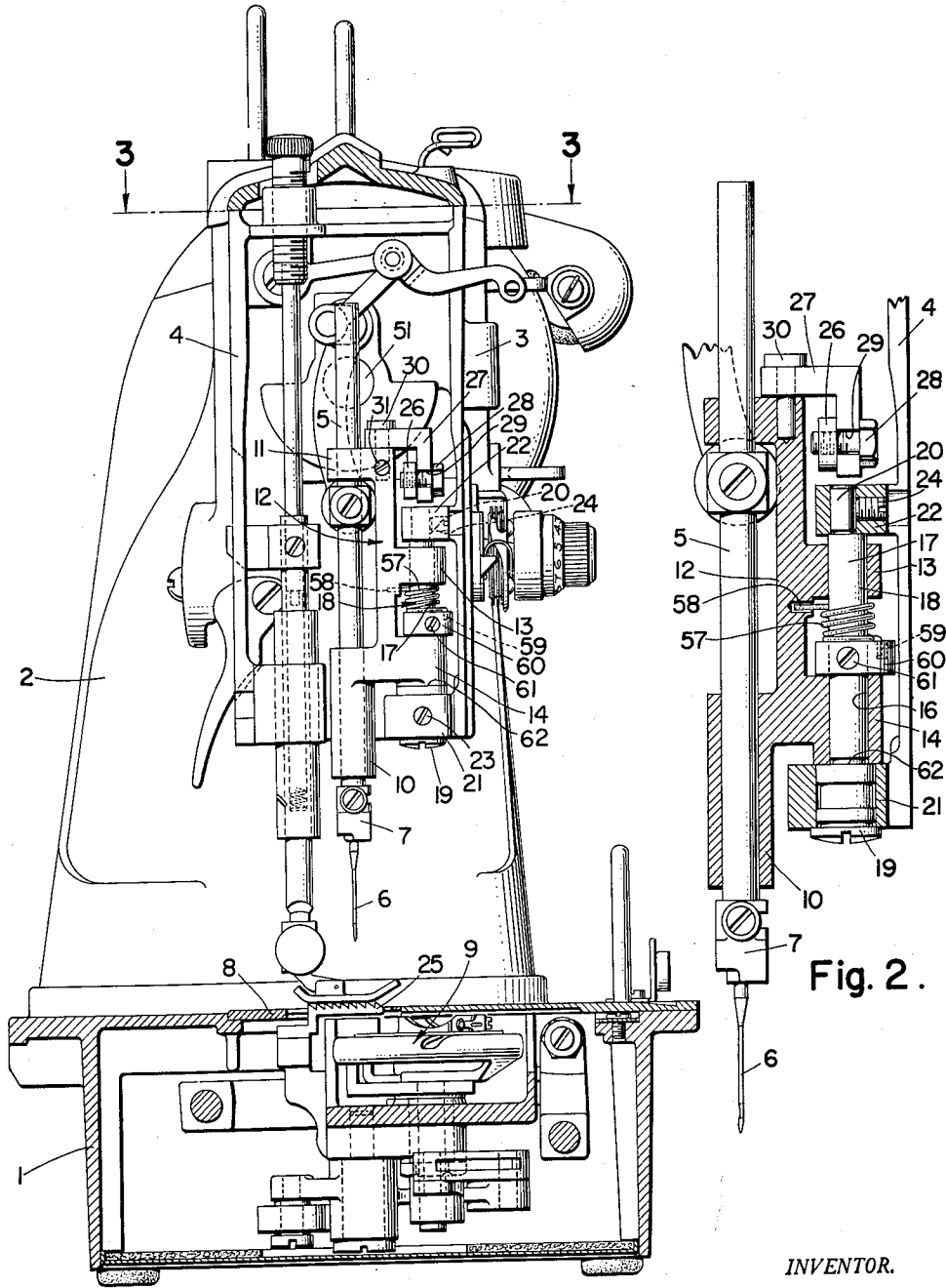


Fig. 2.

Fig. 1.

WITNESS

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3 Sheets-Sheet 2

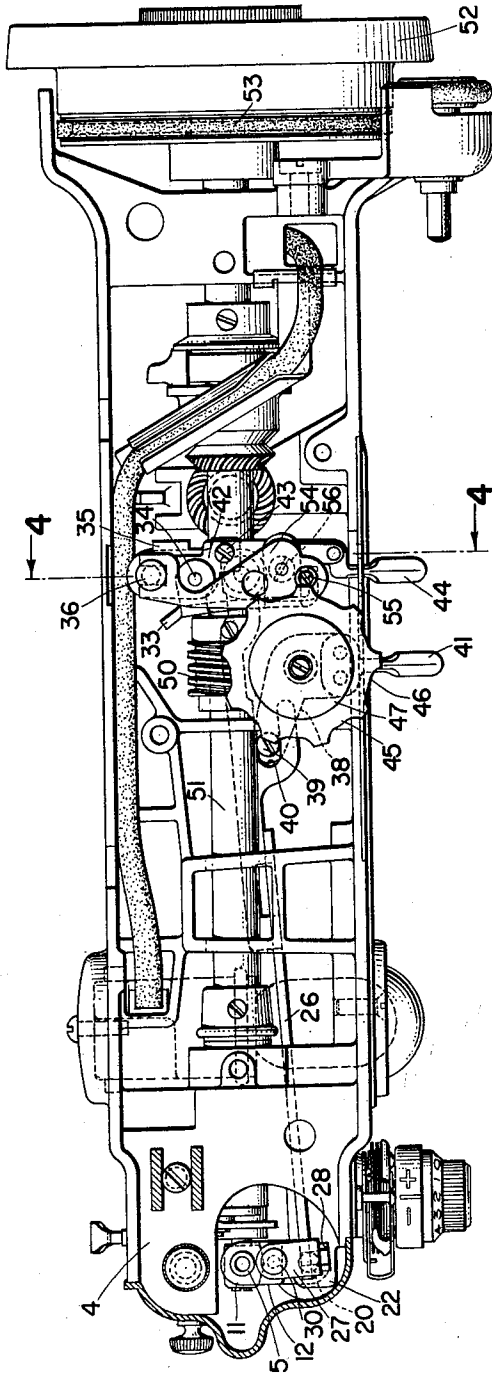


Fig. 3.

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3 Sheets-Sheet 3

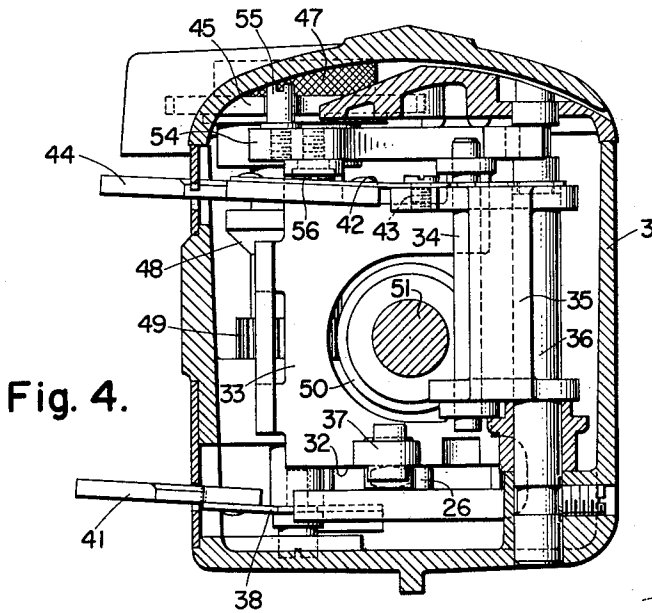


Fig. 4.

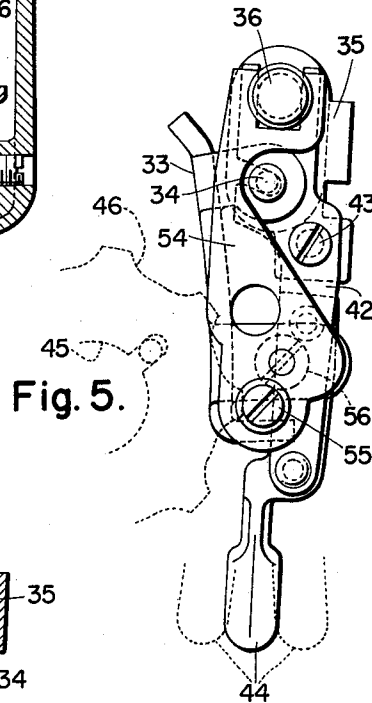


Fig. 5.

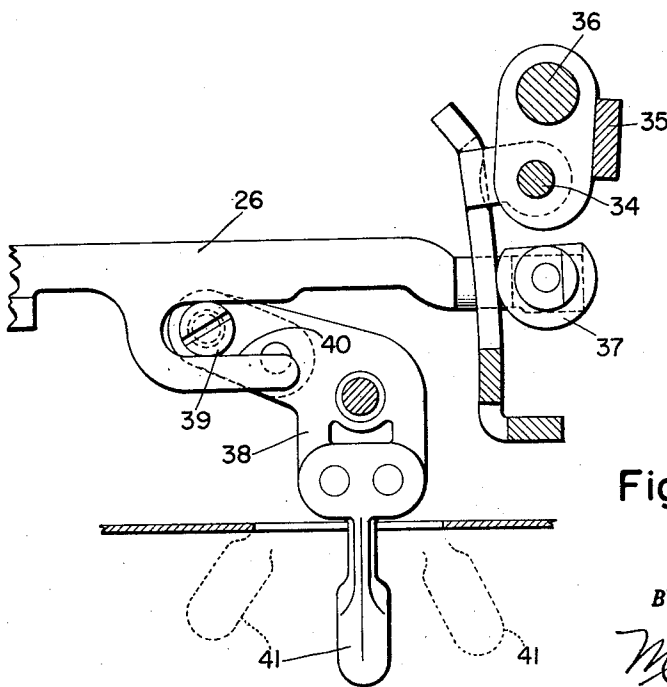


Fig. 6.

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1

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NEEDLE BAR GATE MECHANISM FOR ZIGZAG SEWING MACHINES

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Filed Jan. 25, 1960, Ser. No. 4,357

1 Claim. (Cl. 112-158)

The present invention relates to a zigzag sewing machine and has for an object to provide a new and improved zigzag mechanism for a sewing machine.

More particularly, the present invention relates to a zigzag sewing machine having a needle bar mounted for lateral vibration to define an ornamental stitch pattern, and in which the needle bar is spring biased in one direction of lateral vibration and is driven in the other direction of lateral vibration against the action of the spring by a stitch pattern cam. It is an object of this invention to provide in such a sewing machine a new and improved biasing means that is efficient, economical, dependable and durable, which can be adjusted to effect an optimum bias on the mechanism, and which is so constructed and arranged that lost motion in the connections has a minimum effect upon the resulting stitch pattern.

Having in mind the above and other objects that will be evident from an understanding of this disclosure, the invention comprises the devices, combinations and arrangements of parts as illustrated in the presently preferred embodiment of the invention which is hereinafter set forth in such detail as to enable those skilled in the art readily to understand the function, operation, construction and advantages of it when read in conjunction with the accompanying drawings in which:

FIG. 1 is a vertical sectional view transversely through the head end portion of a sewing machine in accordance with the present invention,

FIG. 2 is a fragmentary vertical sectional view through the needle-bar gate of the sewing machine of FIG. 1,

FIG. 3 is a horizontal sectional view taken substantially on the line 3-3 of FIG. 1,

FIG. 4 is a vertical sectional view taken substantially on the line 4-4 of FIG. 3,

FIG. 5 is a fragmentary detail view in top plan of the cam follower mechanism,

FIG. 6 is a fragmentary detail view, partially in top plan and partially in section, of the zigzag amplitude adjustment.

The present invention is herein disclosed as embodied in a sewing machine that forms the subject matter of the co-pending United States patent application of Ralph E. Johnson Serial No. 4,430, filed January 25, 1960, now Patent No. 3,051,107, granted August 28, 1962, to which reference may be had for a more complete understanding of the machine.

With reference to the drawings there is illustrated a sewing machine having a bed 1, a standard 2 rising from one end of the bed and carrying a bracket arm 3 that terminates in a head 4 overhanging the bed.

A needle bar 5 having a needle 6 secured to its lower end by a needle clamp 7 is mounted in the head 4 for endwise reciprocation and for lateral vibration. Upon endwise reciprocation of the needle bar 5, the needle 6 penetrates work on the throat plate 8 of the bed 1 and cooperates with a vertical axis oscillatory hook 9 in the bed 1 in the formation of lock stitches. Upon lateral vibration of the needle bar 5, the needle 6 is moved laterally of the line of feed of the work so that upon alternate stitches it will penetrate the work at laterally spaced points to define an ornamental stitch pattern.

The needle bar 5 is mounted for endwise reciprocation

2

in vertically spaced bearing lugs 10 and 11 of a swinging needle bar gate 12. To provide for lateral vibration of the needle bar, the gate 12 also includes vertically spaced upper and lower bearing lugs 13 and 14 having bores 15 and 16 for receiving an intermediate portion 17 of a pivot rod 18 and thereby mounting the gate 12 on the pivot rod 18 for pivotal movement about the axis of the intermediate portion 17 of the pivot rod 18.

The pivot rod 18 includes a head 19 at its lower end and a reduced portion 20 at its upper end. For mounting the pivot rod 18, the head 19 includes a pair of vertically spaced bosses 21 and 22 which receive respectively the head 19 and reduced portion 20 of the pivot rod 18, and in which they are secured by set screws 23 and 24.

Mounted in the bed 1 is a feeding mechanism including a feed dog 25 that defines the line of feed. Pivotal movement of the needle bar gate 12 about the axis of the intermediate portion 17 of the stud 18 moves the needle bar 5 laterally of the line of feed to effect an ornamental stitch pattern. Pivotal movement is imparted to the needle bar gate 12 by a pitman 26 adjustably connected at its one end to a bracket 27 by means of a screw 28 extending through a slot 29 in the bracket and threaded into the pitman. The bracket 27 is pivotally connected to the needle bar gate 12 by means of a pin 30 secured in a bore in the gate 12 by a set screw 31. At its other end, the pitman 26 extends loosely through a slot 32 in a plate 33 that is pivotally mounted on a pin 34 that, in turn, is carried by a bracket 35 pivoted on a stud 36 in the bracket arm 3. On the side of the plate 33 opposite from the needle bar 5, there is mounted on the pitman 26 a block 37 that abuts against the adjacent face of the plate. The end of the pitman 26 is adapted to be shifted along the slot 32 in the plate 33 to vary the zigzag amplitude by a bell-crank lever 38 having at one end a pin 39 engaging in a slot 40 in the pitman and at the other end a handle 41 that is accessible to the operator. A locking plate 42 is secured to the top of the bracket 35 by a screw 43 and has a handle 44 extending forwardly to a position accessible to the operator for pivoting the bracket 35 and thereby shifting the pivot pin 34 to vary the field or center of the zigzag pattern.

Oscillation is imparted to the plate 33 by a rotary stitch pattern cam 45 having a peripheral pattern surface 46. The cam 45 is releasably secured by a nut 47 upon the top of a cam shaft 48. The cam shaft 48 is journaled in the bracket arm 3 and has a worm wheel 49 meshing with a worm 50 on the main shaft 51. The main shaft is journaled longitudinally in the bracket arm 3 and has a belt pulley 52 about which is entrained a belt 53 for driving the machine. A cam follower 54 is slidably pivoted on the stud 36 and has a follower element 55 tracking the cam surface 46. The follower 54 is pivotally connected to the plate 33 by a pivot screw 56.

Coiled about the intermediate portion 17 of the pivot rod 18 between the bearing lugs 13 and 14 is a torsion spring 57. The spring 57 has the upper end 58 disposed behind the needle bar gate 12 and the lower end 59 seated in a bore in a collar 60 mounted on the pivot rod 18 between the spring 57 and the bearing lug 14 and secured in angularly adjusted position thereon by a set screw 61.

As seen in FIG. 3 the spring 57 is stressed to bias the needle bar gate 12 in a counterclockwise direction. Thus, the action of the spring 57 tends to pull the pitman 26 to the left, which through the block 37 causes the plate 33 to pivot in a clockwise direction about the axis of the pin 34. Through the pivotal connection at the screw 56, clockwise movement of the plate 33 causes a similar movement of the cam follower 54 to bring and resiliently to hold the follower element 55 into tracking engagement

with the cam surface 46 of the cam 45. When the cam surface 46 presents an increasing radius to the follower 55, it is moved in a counterclockwise direction to impart a clockwise motion to the needle bar gate 12 against the action of the spring 57. When the cam surface 46 presents a decreasing radius to the follower 55, the spring 57 is effective to move the needle bar gate 12 in a counterclockwise direction to the extent permitted by engagement of the follower element 55 with the cam surface 46.

By the use of a torsion spring arranged in accordance with this invention, assembly of the machine has been simplified. With the needle bar gate 12 and the collar 60 and spring 57 roughly aligned in the desired relation, the pivot rod 18 is inserted from the bottom. After threading the pivot rod 18 through the various elements, it is locked in the assembled relation by the set screws 23 and 24. Then, the collar 60 is turned in the pivot rod 18 to wind the spring 57 and thereby stress it to obtain the desired bias. The collar 60 is then locked in adjusted position by the set screw 61. The collar 60 not only serves as an adjustable anchor for one end of the spring 57 thereby providing for adjustment of the bias of the spring 57, but also serves together with the shoulder 62 on the pivot rod 18 between the head 19 and intermediate portion 17 for preventing endplay of the needle bar gate 12 on the pivot rod 18.

Another advantage of the present construction is that, because the spring 57 operates directly on the needle bar gate 12, the effect of lost motion in the various connections in the system is reduced, thus producing a more uniform stitch pattern.

Numerous alterations of the structure herein disclosed will suggest themselves to those skilled in the art. However, it is to be understood that the present disclosure relates to a preferred embodiment of my invention which is for purposes of illustration only and not to be construed as a limitation of the invention. All such modifications are intended to be included within the scope of the appended claim.

Having thus described the nature of my invention what I claim herein is:

In a zigzag sewing machine having a frame, spaced bearing bosses in said frame, a pivot rod mounted in said bearing bosses and having a head at one end, a reduced portion, and a shoulder between said head and said reduced portion, a needle bar gate having spaced bearing lugs mounted for oscillation on the reduced portion of said pivot rod between said bearing bosses, a needle bar mounted in said needle bar gate for endwise movement along an axis parallel to and spaced from the axis of said pivot rod, a pitman, means for connecting said pitman to said needle bar gate for imparting oscillation to said needle bar gate upon endwise movement of said pitman, a rotary cam journaled in said frame and having a peripheral cam surface, cam follower means for tracking said cam surface, means for adjustably connecting said pitman to said cam follower means for imparting variable endwise movement to said pitman, and means for biasing said cam follower into tracking engagement with said cam and for preventing movement of said needle bar gate endwise of said pivot rod comprising a torsion spring coiled about said pivot rod between said spaced bearing lugs, a collar rotatably mounted on said pivot rod between said spring and the one of said bearing lugs adjacent to said head of said pivot rod for securing said one of said bearing lugs between said shoulder and said collar, and means for releasably securing said collar in angularly adjusted position on said pivot rod, said spring being anchored at its ends to said needle bar gate and to said collar.

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