

Nov. 20, 1962

TATSUO DANNO

3,064,602

ZIGZAG SEWING APPARATUS IN SEWING MACHINES

Filed May 11, 1959

3 Sheets-Sheet 1

Fig. 1

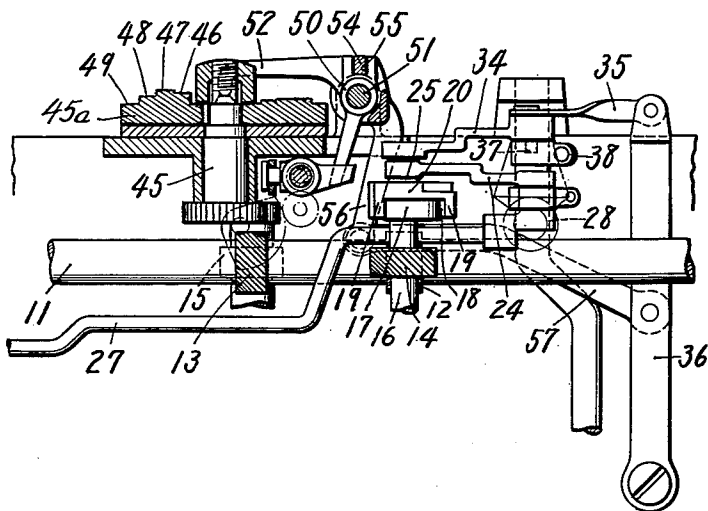
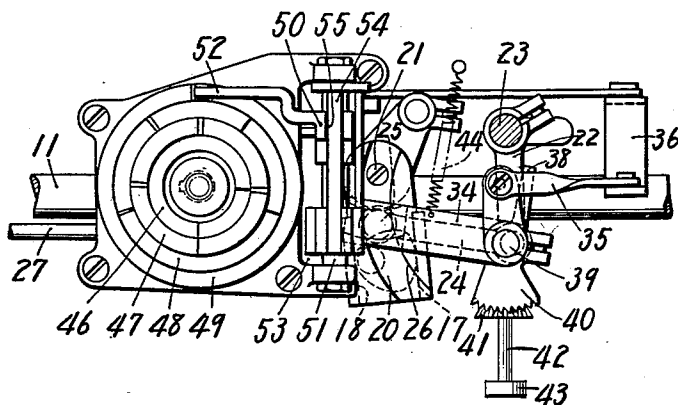


Fig. 2



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Fig. 3

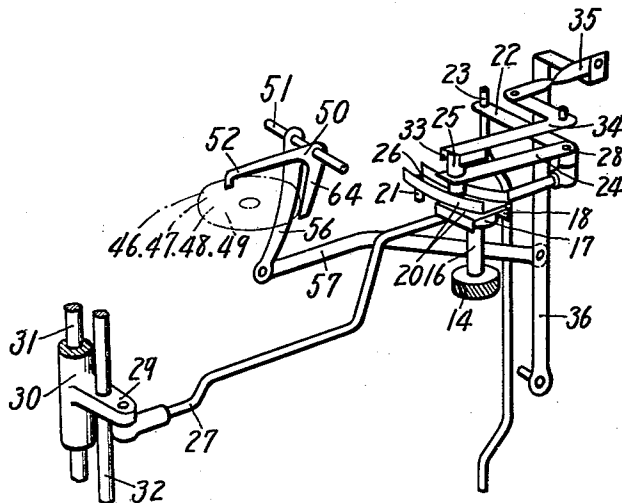


Fig. 7

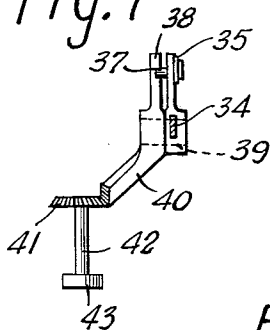


Fig. 8

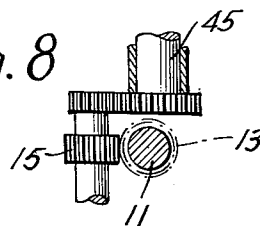
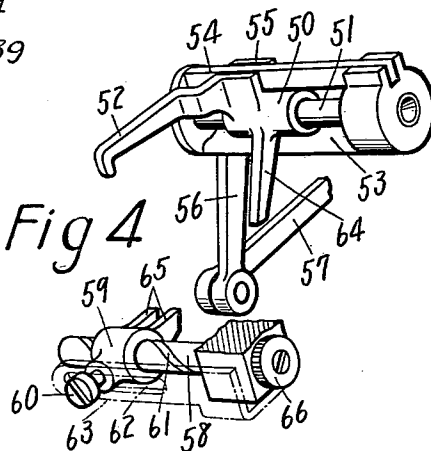


Fig. 4



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Fig. 5

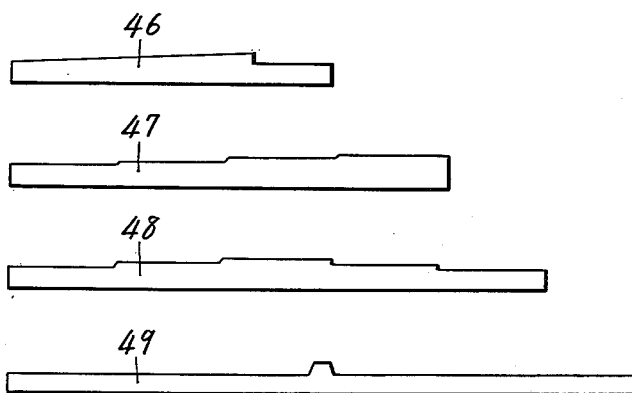
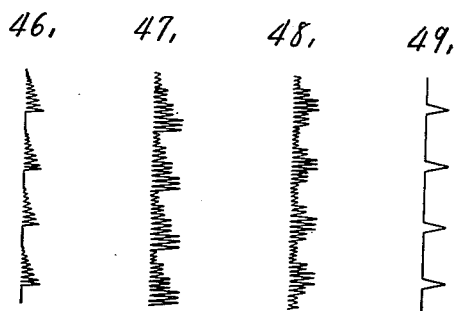


Fig. 6



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ZIGZAG SEWING APPARATUS IN SEWING MACHINES

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1 Claim. (Cl. 112-158)

The present invention relates to zigzag sewing apparatus in sewing machines. The object of the present invention is to provide means to sew in various zigzag forms by the use of a simple structure and easy operation.

With this object in view, the present invention provides a zigzag sewing apparatus in a sewing machine, wherein concentric cam surfaces of different shapes are formed on a disc driven by a main shaft, and upon another shaft driven by the main shaft is fixed a cam cooperable with a finger for the concentric cam surfaces, and the finger is provided with means to move it in the radial direction of the concentric cams.

Other and further objects of the present invention will become apparent from the following specification and claim taken together with the accompanying drawings, in which

FIG. 1 is an elevation view, partly in section, of a zigzag sewing apparatus in a sewing machine according to the present invention.

FIG. 2 is a plan view of FIG. 1.

FIG. 3 is a diagrammatic perspective view of a zigzag sewing apparatus in a sewing machine according to the present invention.

FIG. 4 is a perspective view of an operating mechanism for concentric cam surfaces.

FIG. 5 is a view of the developed cam surfaces.

FIG. 6 is a view showing zigzag seams sewed by a zigzag sewing apparatus in a sewing machine according to the present invention; and

FIGS. 7 and 8 show details of the structure of the sewing machine of FIG. 1.

In these drawings reference numeral 11 indicates a main shaft installed in an arm of a sewing machine. On the main shaft 11 are mounted helical gears 12 and 13, which mesh with helical gears 14 and 15 respectively. On the shaft 16 of the gear 14 is fixed a cam 17, which is fitted in a groove 18 formed between a pair of downward projections 19 of a follower 20, one end of which is pivoted by a pin 21 to a fixed part of the sewing machine. A connecting piece 22 loosely mounted on a fixed rod 23 and an oscillating lever 24 are connected with each other, and a pin 25 fixed at the end of the oscillating lever 24 is fitted in an arc shaped groove 26 of the follower 20. The oscillating lever 24 and an operating rod 27 for operating a needle bar 32 are connected by a pin 28, and the other end of the operating rod 27 is pivoted to an arm 29 of a tube 30, in which a shaft 31 is rotatably fitted, and the needle bar 32 is fitted in the arm 29. By means of the cam 17 and the follower 20 the needle bar 32 is oscillated through the oscillating lever 24 and operating rod 27.

The pin 25 is fitted into a groove 33 formed at one end of a bell-crank 34, and the other end of the bell-crank 34 is connected by a connecting piece 35 with the upper end of an oscillating lever 36, the lower end of which is pivoted by a pin to a fixed part of the sewing machine. On the end of one arm of the bell-crank 34 a stopper 37 is fixed, and a control lever 38 is fitted in a pin 39 so as to co-operate with the stopper 37. The control lever 38 is provided with a sector gear 40 meshing with a gear 41, and a shaft 42 for the gear 41 is provided

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with a knob 43. The lever 24 is pulled towards the pin 21 by a spring 44. Thus the position of the pin 25 can be controlled by turning the knob 43 through co-operation of the stopper 37 and the lever 38.

On a shaft 45 driven by reduction gears (not shown) is fixed a disc 45a having thereon concentric cam surfaces 46, 47, 48 and 49, and a slider 50 slidably mounted on a shaft 51 is provided with a finger 52 which co-operates with the cam surfaces 46, 47, 48 or 49. The shaft 51 is rotatably mounted on a supporting frame 53, and a beam 54 fixed on the supporting frame 53 is slidably fitted in a groove 55 of the slider 50, and a leg 56 formed on the supporting frame 53 and the oscillating lever 36 are connected with each other by a connecting rod 57. Upon a shaft 58 is slidably mounted a slider 59, and a set screw 60 on slider 59 has one end engaged in a helical groove 61 of the shaft 58 and the other end extends through an elongated opening 62 of a guide frame 63, and an arm 64 of the slider 50 is inserted between a pair of projections 65 formed on the slider 59.

When a knob 66 of the shaft 58 is turned, the slider 59 slides on the shaft 51 according to the sliding motion of the slider 59, the finger 52 moving in the radial direction of the concentric cam surfaces 46, 47, 48 and 49. Thus, the finger 52 can be brought in contact with any of concentric cam surfaces 46, 47, 48 and 49. The mechanism of the vertical reciprocating motion of the needle bar 32 for straight sewing, due to the revolution of the main shaft 11 is the same as that in a conventional sewing machine.

When the knob 43 is turned, the stopper 37 is pushed by the control lever 38, and the bell-crank 34 turns and moves the pin 25 along the arc shaped groove 26, and the oscillating lever 36 turns to turn the supporting frame 53, the finger 52 coming in contact with the concentric cam surfaces 46, 47, 48 or 49. When the main shaft 11 is stopped and the finger 52 is lifted by turning the knob 43, the arm 64 will move between projections 65 and the finger 52 can be moved in the radial direction of the concentric cam surfaces by turning the knob 66. When the finger 52 is moved away from the concentric cam surfaces, the needle bar 32 sews in a definite zigzag shape by the action of the cam 17, and if the pin 25 is moved until it is over the pin 21, the needle 32 sews in straight line. The amplitude of oscillation of the needle bar 32 is determined by the position of the pin 25.

When the finger 52 is brought into contact with any of the concentric cam surfaces 46, 47, 48 and 49 by turning the knob 43, the finger 52 oscillates in the vertical direction depending on the profile of the concentric cam surface, and causes oscillation of the lever 36 through the supporting frame 53 and the connecting rod 57. At that time the pin 25 moves along the arc shaped groove 26 to cause oscillating movement of the needle 32 by the agency of the corresponding cam surfaces 46, 47, 48 or 49. In this case, movement of pin 25 along groove 26 relative to the cam 17 serves for changing the amplitude of the oscillation of the needle 32.

In FIG. 6, 46₁, 47₁, 48₁ and 49₁ show zigzag seams sewn when using the concentric cam surfaces 46, 47, 48 and 49 respectively.

It is thought that the invention and its advantages will be understood from the foregoing description and it is apparent that various changes may be made in the form, construction and arrangement of the parts without departing from the spirit and scope of the invention or sacrificing its material advantages, the form hereinbefore described and illustrated in the drawings being merely a preferred embodiment thereof.

Having thus described my invention, what I claim and desire to secure by Letters Patent of the United States is:

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In a sewing machine, the combination of a substantially circular cam having a plurality of concentric cam profiles on the flat surface thereof, a rotating shaft on which said cam is mounted, a cam follower rotatably mounted on said sewing machine for oscillation toward and away from the surface of said cam, said cam follower comprising a finger, said finger having an arm depending therefrom, a shaft on which said finger and arm are slidably mounted, said shaft extending in a direction perpendicular to said rotating shaft on which said cam is mounted and being spaced therefrom, a supporting frame on which said shaft is mounted, said supporting frame being rotatably mounted on the sewing machine, a bar on said supporting frame parallel to said shaft, said finger having a notch therein slidably engaged around said bar, a leg on said supporting frame, means connected to said follower for sliding said follower and comprising a helically grooved manually rotatable shaft on said sewing machine, a slider slidably mounted on said grooved shaft and engaged with said arm depending from said finger, said slider having a pin therethrough engaged in the groove of said helically grooved shaft, and a guide parallel to said grooved shaft with which said pin is engaged for guiding said slider along said shaft while preventing rotation of said slider, a needle bar for positioning the needle of said sewing machine, adjustable cam means connected to said needle bar and driven from

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the drive for said sewing machine for driving said needle bar, and connecting means connecting said cam follower and said leg on said supporting frame for moving said adjustable cam means in response to the oscillation of said cam follower, and follower rotating means connected to said connecting means for moving said connecting means manually for rotating said cam follower toward and away from said cam.

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