Aug. 25, 1959 F. GEGAUF 2,900,937

SEWING MACHINES

Filed June 10, 1954 2 Sheets-Sheet 1

Fig. 1

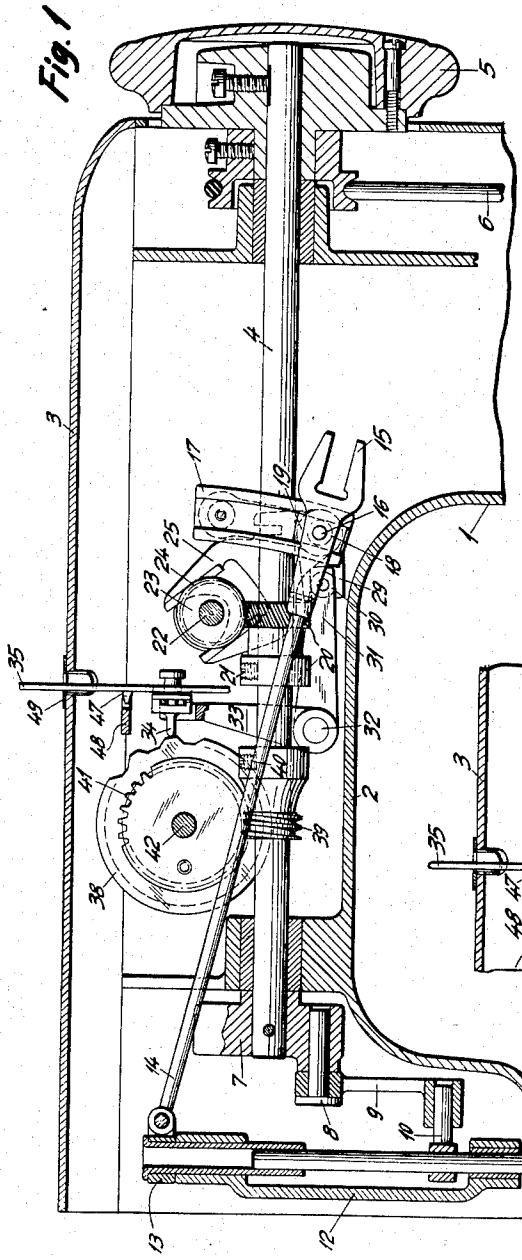


Fig. 4

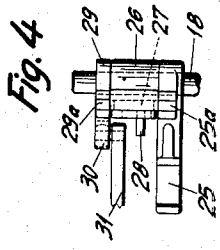


Fig. 3

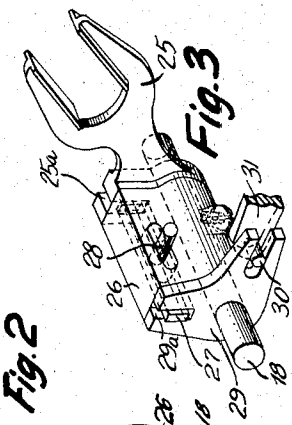
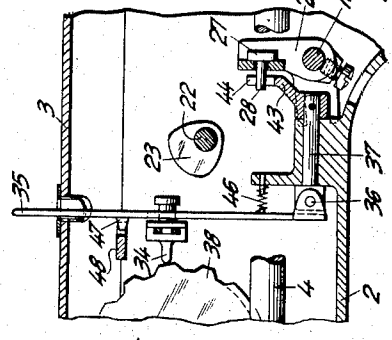


Fig. 2



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Filed June 10, 1954 2 Sheets-Sheet 2

Fig. 5

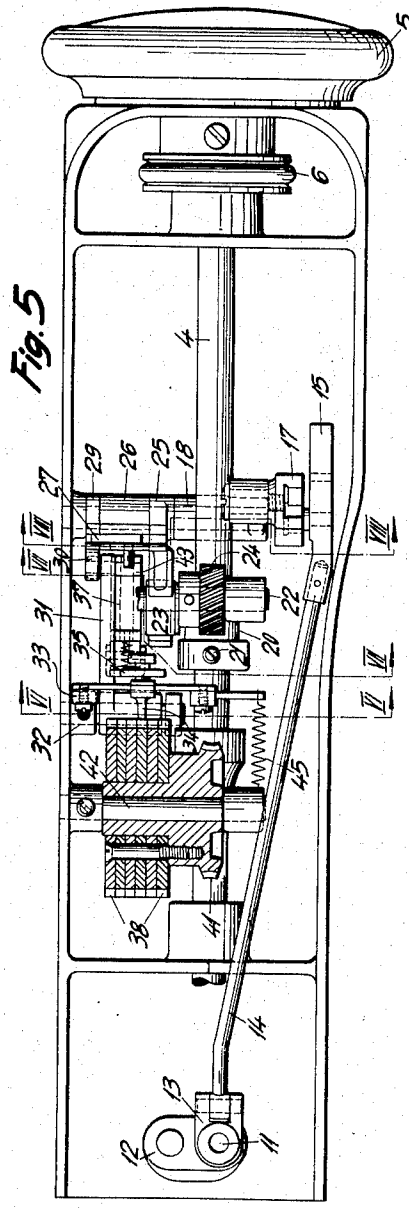


Fig. 8

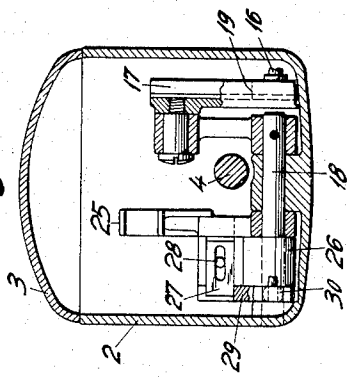


Fig. 7

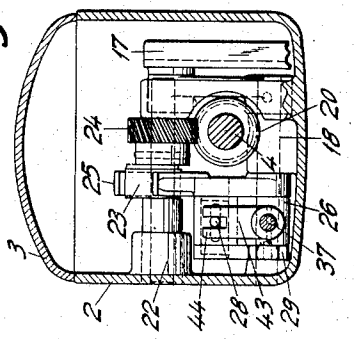
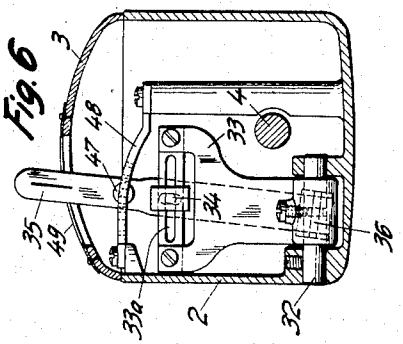


Fig. 6



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SEWING MACHINES

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16 Claims. (Cl. 112—158)

The present invention relates to a sewing machine and more particularly to a zig-zag sewing machine permitting production of decorative stitch patterns in addition to the zig-zag seams.

In known zig-zag sewing machines the cam producing the transverse oscillation of the needle usually rotates in the mouth of a fork, so that the transmission of the eccentric motion to the zig-zag elements is a forced one, resulting in the regularity of the needle deflection and thus of the zig-zag seam being guaranteed even at high-speed sewing.

More recently zig-zag sewing machines have been developed having exchangeable cams or having several cams assembled in order to render possible automatic sewing of ornamental stitches in addition to the usual zig-zag seam. Thereby the motion is transmitted from the cam, in order to produce the transverse needle deflection, over a feeler resiliently pressed against the cam. As such a transmission is not a forced one high-speed sewing is not possible with this type of machine.

The transmission by means of a cam and a feeler resiliently pressed against this cam, may be admissible for the production of ornamental seams owing to the lower sewing speed and the fact that such sewing of ornamental seams is rather rare compared with the wide use of zig-zag sewing. The motion transmission for the production of the transverse needle deflection in the largely used zig-zag sewing, however, must be a forced one for the afore-mentioned reasons. It is an object of the present invention to provide a zig-zag sewing machine permitting, owing to the guided transmission of the motion to the needle, sewing of zig-zag seams at highest speed and with optimum regularity.

It is a further object of the invention to provide means affording in a zig-zag sewing machine the production of ornamental stitch pattern at high-speed.

The afore-mentioned disadvantages of the transmission by means of a cam and a feeler resiliently held against the latter are prevented in the novel sewing machine and more particularly in a zig-zag sewing machine according to the invention to thereby produce decorative stitch patterns, in that two gears operating at different speeds with respect to each other are provided, one for the production of zig-zag seams and the other for the production of ornamental seams, the transmitting elements of said two gears being loosely arranged on the axle of the guide lever determinating the extent of the transverse needle deflection, and adapted to be selectively connected with said guide lever by means of a coupling member in order to use either one or the other of the gears for the production of the transverse needle deflection.

Other objects and advantages of the invention will become apparent from the description now to follow, of a preferred embodiment thereof shown by way of example in the accompanying, partly diagrammatic, drawings, in which:

Fig. 1 is a longitudinal section through the upper part

of a sewing machine comprising two gears for the transverse oscillation of the needle;

Fig. 2 is a partial longitudinal section through the upper part of the sewing machine serving to more clearly show certain moving parts;

Fig. 3 shows a detail of Fig. 1, illustrating two transmitting members loosely arranged on the axle of the guide lever;

Fig. 4 is a top plan view to Fig. 3 including coupling parts therefor;

Fig. 5 is a partly sectional top plan view to Fig. 1 with the upper cover plate removed and showing the arrangement of the complete mechanism, and

Figs. 6–8 are enlarged cross sections taken along the lines VI—VI, VII—VII and VIII—VIII, respectively, of Fig. 5.

In the drawings reference numeral 1 designates the hollow standard or frame post of the sewing machine carrying the upper or horizontal hollow arm 2 with the cover 3 closing said arm 2. In this arm 2 the upper drive shaft 4 of the machine is supported, this shaft carrying the conventional handwheel 5 and being rotatable by a transmission string 6 driven by the usual driving means (not shown). As visible in Fig. 1 this drive is transmitted, by means of the cam disc 7 to crank pin 8, the link member 9 and the driver 10 acting on the needle bar 11, so as to impart thereto a reciprocating longitudinal or up-and-down motion. The needle bar 11, which carries the sewing needle (not shown) is movably guided, according to common practice, in a swingable frame 12, which receives its oscillatory motion over a hinge 13 from a bar 14 forming an extension of a guiding fork 15 pivoted on a pin 16. By this oscillatory motion of the frame, the needle bar 11 receives in a known way, the transverse motion necessary for producing a zig-zag seam. The amplitude of this transverse motion can be varied in a known way from zero to a given upper limit, for which purpose a block 19 carrying the said pin 16 is slidably mounted in the conventional swingable guide lever 17, the latter being supported on a pivot shaft 18 journalled in hollow arm 2. Adjustment of the block 19 is possible, in known manner, by means of a rotatable knob (not shown) arranged at the outside of the machine frame 1, 2 and coupled to the mouth of the guiding fork 15.

The drive shaft 4 transmits its rotary motion to two gears. The spiral wheel 20 secured by the screw 21 on the shaft 4 drives the spiral wheel 24 mounted on a shaft 22 and carrying the cam 23. This cam 23 imparts to the fork 25, which is loosely arranged on the axle or shaft 18, the latter carrying guide lever 17, a pendulum motion. Fork 25 is provided with a slot 25*a* (Figs. 3 and 4), for a purpose later described.

In Figs. 2, 4, 7 and 8 reference numeral 26 designates a support rigidly mounted on said axle 18 and provided with a slidable coupling member 27 having a pin 28. Moreover a two-arm transmission lever 29 is loosely mounted on axle 18 (Figs. 1, 3, 4, 5, 7 and 8), which transmission lever has one arm provided with a slot 29*a* (Figs. 3 and 4), the other arm being bifurcated to receive a roll 30. The latter is rigidly mounted in the arm 31 of a two-arm lever loosely mounted on the axle 32 within hollow support 2 and having its other arm 33 provided with a feeler 34 adjustable in a slot 33*a* (Fig. 6).

The lateral displacement and adjustment of the feeler 34, which cooperates with one of a number of cam discs 38 for producing ornamental stitches, is obtained by means of a hand lever 35 connected by means of a hinge pin 36 (Figs. 2 and 6) with an axle bolt 37 which in turn is thus swingable in two directions.

The cam discs 38 are driven by a worm 39 rigidly

secured on the shaft 4 by means of a screw 40 and driving at reduced speed a worm wheel 41 mounted on an axle 42 together with the cam discs 38 (Figs. 1 and 5).

An arm 43 is mounted on the mentioned axle bolt 37 (Figs. 2 and 7), and has its forked end 44 engaged by the coupling pin 28 of the coupling member 27. In Fig. 5 reference numeral 45 designates a spring co-operating with the arm 33 of the two-arm lever 33, 31 for pressing the feeler 34 in the direction of the cams 38. A stationary strip 48 (Figs. 1, 2 and 6) is provided at one side with a number of notches and a spring 46 (Fig. 2) serves to press the stop 47 of the lever 35 into the notch corresponding to the selected cam disc. A dial 49 is provided on the cover 3 of the upper arm 2 near the lever 35, and this dial comprises a number of marks corresponding to the number of different cams.

The operation of the afore-described machine is the following:

As already mentioned the cam disc 23 rotating on the shaft 22 imparts a pendulum motion to the fork 25 loosely mounted on the axle 18. If the coupling element 27, which is slidably arranged in a groove of the support 26 rigidly mounted on the axle 18, is inserted into the slot 25*a* of the fork 25 (Figs. 3 and 4) by means of the levers 35 and 43 (Fig. 2), the guide lever 17 receives the well-known, guided oscillatory motion for the production of zig-zag seams.

In this case the lever 29, which is actuated over the levers 31 and 33, the feeler 34 and the operating cam 38, oscillates loosely on the axle 18.

If, however, the coupling member 27 is moved, by means of the levers 35 and 43, in the direction opposite to the afore-mentioned direction, and thus brought into engagement with the slot 29*a* of lever 29, the guide lever 17 will receive its oscillatory motion over the cam gear for the production of ornamental seams. Thereby the fork 25 is out of engagement with the support 26 rigidly mounted on the axle 18 and effects a free swinging motion on the latter.

By means of the described displacement of the coupling member 27 in the one or the other direction the guide lever 17 is thus coupled to the elements of the one or the other of the afore-described gears, which two gears operate at different speeds. As is obvious, only one of the two gears may co-operate with the guide lever 17 at the same time.

Thus the sewing of zig-zag seams may take place at highest speed with optimum regularity owing to the guided transmission of the motion to the needle.

On the other hand the combination according to the present invention renders possible the production of ornamental seams at high speed, if, when the guiding gear is used, the knob arranged at the outside of the machine is actuated by hand. This is a further important advantage of the machine according to the invention.

Of course several elements of the described embodiment may be changed without departing from the invention. For example the actuating lever 43 for the coupling member 27 could be formed as an independent, additional lever adapted to be actuated (as lever 35) from the outside of the machine. Moreover the two separately driven gears may be of such a construction that the motion of the second gear is transmitted by the driven shaft of the first gear. The coupling itself may be obtained in many different ways. For example the represented coupling member may be replaced by a coupling catch adapted to be switched either to the left or to the right.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent, is:

1. In a sewing machine having a hollow, substantially horizontal arm in which is journalled a substantially horizontal drive shaft, a needle bar, and a frame for guiding said needle bar and arranged for swinging movement relative to said drive shaft; means connecting said needle bar and said frame in driving relation to said drive shaft

for imparting to said needle bar a reciprocable longitudinal movement and a transverse swinging movement, said connecting means including first means for producing zig-zag stitches and second means for producing ornamental stitches, respectively, carried out by a needle when joined to said needle bar, respective sets of gear means accommodated in said horizontal arm and operatively connecting said drive shaft with said first means and said second means, respectively, a swingable guide lever including a pin for attachment with said connecting means and slidable within said guide lever, whereby upon slidable displacement of said pin on said guide lever the amplitude of motion of said connecting means may be varied, an axle journalled in said hollow arm and supporting said guide lever, said first means including a cam driven by one set of said gear means for transmitting motion from said drive shaft to said cam, a fork loosely seated on said axle and actuatable by said cam to thereby impart swinging movement to said fork, a support fixedly mounted on said axle and provided with coupling means arranged for sliding displacement thereon, an operating lever connected to said coupling means, said fork being provided with a slot registrable with said coupling means upon selective displacement of said operating lever in one direction, whereby said guide lever is coupled through said axle with said fork and is oscillated to impart through said connecting means movements to said needle bar and frame for producing said zig-zag stitches, said second means including a plurality of cam disc means in driving relation with said drive shaft through another set in said gear means, said operating lever including a transmission lever, and feeler means cooperable with a predetermined cam disc means upon displacement of said operating lever in an opposite direction, in which said coupling means is brought in registry with a slot provided in said transmission lever so that movements thereof are transmitted from said predetermined cam disc means onto said feeler and thence through said transmission lever an guide lever to said connecting means and needle bar for producing said ornamental stitches.

2. In a sewing machine having a substantially horizontal drive shaft, a needle bar, and a swingably supported frame for said needle bar; means connecting said needle bar and said frame in operative relation to said drive shaft whereby to said needle bar a reciprocable longitudinal movement and a transverse swinging movement are imparted for producing zig-zag stitches and ornamental stitches, respectively, by a needle when carried by said needle bar, respective means interconnecting said drive shaft with operable means provided adjacent the latter for moving said connecting means to cause said zig-zag stitches and said ornamental stitches, respectively, said operable means including a swingable guide lever with a member for attachment with said connecting means, an axle supporting said guide lever, said operable means comprising first means and second means in driving relation with said drive shaft, said first means including a driven cam, a fork loosely seated on said axle and actuatable by said cam to thereby impart swinging movement to said fork, coupling means supported by said axle and arranged for sliding displacement thereon, a manually operated lever connected to said coupling means for actuating same, said fork being provided with a slot registrable with said coupling means upon selective displacement of said manual lever in one direction, whereby said guide lever is coupled through said axle with said fork and oscillates said connecting means for producing said zig-zag stitches, said second means including a plurality of driven cam disc means, a transmission lever provided with a slot, and feeler means cooperable with a predetermined cam disc means upon displacement of said manual lever in an opposite direction, whereby said coupling means is brought in registry with said slot of said transmission lever and movements thereof are trans-

mitted from said predetermined cam disc means through said guide lever to said connecting means for producing said ornamental stitches.

3. In a sewing machine having within a hollow arm a substantially horizontal drive shaft, a needle bar driven by said shaft, and a swingably supported frame for said needle bar; rod means operatively connecting said frame of said needle bar with said drive shaft whereby besides a reciprocable longitudinally movement also a transverse swinging movement is imparted to said needle bar for producing zig-zag stitches and ornamental stitches, respectively, by a needle when carried by said needle bar, respective gear means continuously driven by and interconnecting said drive shaft with operable means provided adjacent the latter for moving said rod means to cause said zig-zag stitches and said ornamental stitches, respectively, guide means common to said operable means and swivelly connected to said rod means, an axle arranged to support said guide means, said operable means comprising first means and second means adapted to be operatively coupled with said drive shaft, said first means including a cam, a fork loosely seated on said axle and actuatable by said cam to thereby impart swinging movement to said fork, coupling means supported by said axle and arranged for sliding displacement thereon, a manually operated lever connected to said coupling means for actuating same, said fork being provided with a slot registrable with said coupling means upon selective displacement of said manual lever in one direction, whereby said guide means is coupled with said fork and transfers oscillations therefrom to rod means for producing said zig-zag stitches, said second means including at least one cam disc means, a transmission lever provided with a slot, and feeler means connected to said manual lever and cooperable with said cam disc means upon displacement of said manual lever in an opposite direction, whereby said coupling means is brought in registry with said slot of said transmission lever and movements imparted thereto from said cam disc means are transmitted through said guide means to said rod means for producing said ornamental stitches.

4. A sewing machine having a substantially horizontal hollow arm with a drive shaft journalled therein, a needle bar actuatable by said drive shaft to perform a reciprocable longitudinal movement, and a needle bar frame swingably supported by said arm; comprising rod means connecting said frame of said needle bar in operative relation with said drive shaft whereby said needle bar performs besides said longitudinal movement a transverse swinging movement for producing zig-zag stitches and ornamental stitches, respectively, by a needle when carried by said needle bar, operable means positioned about and adjacent said drive shaft and journalled in said hollow arm, respective gear means driven by said drive shaft for actuating said operable means and to move said rod means thereby causing said zig-zag stitches and said ornamental stitches, respectively, a swingable guide lever attached to said rod means, an axle supported in said arm and oscillatably carrying said guide lever, said operable means comprising first means and second means, said first means including a cam in driving relation to said drive shaft, a fork loosely seated on said axle and engageable by said cam to thereby impart swinging movement to said fork, coupling means supported by and arranged for sliding displacement relative to said axle, a manually operated lever extending beyond said arm and connected to said coupling means for actuating same, said fork being provided with means engageable with said coupling means upon selective displacement of said manual lever in one direction, whereby said guide lever is coupled with said fork and oscillates said axle and through said guide lever said rod means for producing said zig-zag stitches, said second means including at least one cam disc means in driving relation with said drive shaft, a transmission lever connected to said manual lever, and feeler means

cooperable with said cam disc means upon displacement of said manual lever in an opposite direction, whereby said coupling means is brought into engagement with said transmission lever, so that movements thereof are transmitted through said guide lever to said rod means for producing said ornamental stitches, said cam engaging said fork in the latter displacement position of said manual lever and causing said fork to idly swing on said axle.

5. A sewing machine having a substantially horizontal hollow arm with a drive shaft journalled therein, a needle bar actuatable by said drive shaft to perform a reciprocable longitudinal movement, and a needle bar frame swingably supported in said arm; comprising rod means operatively connecting said frame with said drive shaft whereby said needle bar performs besides said longitudinal movement a transverse swinging movement for producing zig-zag stitches and ornamental stitches, respectively, operable means positioned adjacent said drive shaft and journalled in said hollow arm, respective sets of gear means rotated by said drive shaft, a swingable guide lever attached to said rod means, an axle supported in said arm and oscillatably carrying said guide lever, said operable means comprising first means and second means, said first means including a cam in operative connection with one set of said gear means, a fork loosely seated on said axle and engageable by said cam to thereby impart swinging movement to said fork, coupling means including a fixed support on said axle and arranged for sliding displacement relative to the latter, a manually operated lever extending through an opening of said arm and connected to said coupling means for displacing same in two directions, respectively, for producing said stitches, selectively, said fork being provided with means engageable with said coupling means upon predetermined displacement of said manual lever in one direction relative to said arm, whereby said fork is coupled with said guide lever and then to said rod means, said second means including at least one cam disc means in operative relation with another set of said gear means, and further means cooperable with said cam disc means and connected to said manual lever to thereby couple when the latter is moved in an opposite direction said coupling means with a portion of said further means and through the latter with said guide lever and said rod means.

6. A sewing machine according to claim 5, said further means including a feeler for contact with said one cam disc means, and a transmission lever loosely seated on said axle, said coupling means being engageable with a portion of said transmission lever upon movement of said manual lever in said opposite direction, whereby said transmission lever is coupled to said axle, which then takes up the swinging movements of said transmission lever initiated by said feeler and said cam disc means for transmission to said swingable guide lever and said rod means.

7. A sewing machine according to claim 6, wherein said feeler connected to said manual lever is further connected to said transmission lever by means of a double-armed lever.

8. A sewing machine according to claim 6, including a plurality of cam disc means, means for guiding said feeler upon movement of said manual lever, and stop means on said manual lever for facilitating adjustment of position of said feeler relative to said cam disc means.

9. A sewing machine according to claim 5, wherein each set of said gear means is provided with a driven shaft extending substantially perpendicular to said drive shaft and substantially parallel to said axle, said driven shafts being journalled in an inner wall defining the space of said hollow arm.

10. A sewing machine according to claim 9, one of said driven shafts carrying said cam of said first means, the other driven shaft supporting said cam disc means of said second means.

11. A sewing machine according to claim 5, wherein said cam disc means and said cam are positioned at one longitudinal side of said drive shaft, said guide lever and connecting rod means extending at the opposite longitudinal side of said drive shaft.

12. A sewing machine according to claim 5, said coupling means being constituted by a pin arranged for sliding movement in a groove provided in said support, a bifurcated lever linked to said manual lever and engaging said pin for displacement in said groove, said fork being provided with a slot arranged in the path of displacement of said pin and for engagement therewith in said one position of said manual lever, whereby said fork is coupled to said axle and thence to said guide lever.

13. A sewing machine according to claim 12, said further means including a feeler, and a transmission lever loosely seated on said axle and provided with a slot, said manual lever when displaced into said opposite direction causes through said bifurcated lever sliding displacement of said pin into engagement with said slot of said transmission lever to thereby couple said axle to said cam disc means of said second means, said feeler being connected to said manual lever and being cooperable with said cam disc means to perform movements thereby, said feeler being operatively connected to said transmission lever to transfer said feeler movements via said transmission lever to said axle and said guide lever.

14. A sewing machine comprising a frame, a needle bar pivotally carried by said frame and mounted for endwise reciprocation and for lateral swinging movements, a drive shaft, connecting means connecting said needle bar and said frame in operative relation to said drive shaft to impart to said needle bar movements for producing zig-zag stitches and ornamental stitches, operable means adjacent said drive shaft for moving said connecting means to cause zig-zag stitches and ornamental stitches, said operable means including a swingable guide lever having a member attached to said connecting means, an axle supporting said guide lever, said operable means further including first means and second means in driving engagement with said drive shaft, a fork loosely seated on said axle and actuated by said first means to impart swinging movement to said fork, said guide lever being coupled through a manual lever operated coupling means mounted on said axle with said fork oscillating said connecting means for producing zig-zag stitches, said second means including a plurality of driven cam disc means, a transmission lever provided with a slot, and feeler means cooperable with a predetermined cam disc means upon displacement of said manual lever in an opposite direction to bring said coupling means into registry with said slot of said transmission lever and to transmit movements from said predetermined cam disc means through said guide lever to said connecting means for producing said ornamental stitches.

15. The sewing machine of claim 14, wherein said first means includes a driven cam, said fork being actuated by said driven cam, said cam disc means and said cam being positioned at one longitudinal side of said drive shaft.

16. A sewing machine comprising a frame, a drive shaft journalled in said frame, a needle bar pivotally carried by said frame and actuable by said drive shaft, rod means connecting said needle bar in operative relation with said drive shaft to produce movements for producing zig-zag stitches and ornamental stitches, operable means positioned about and adjacent said drive shaft and journalled in said hollow arm, respective gear means driven by said drive shaft for actuating said operable means and to move said rod means thereby causing said zig-zag stitches and said ornamental stitches, respectively, a swingable guide lever attached to said said rod means, an axle supported in said arm and oscillatably carrying said guide lever, said operable means comprising first means and second means, said first means including a cam in driving relation to said drive shaft, a fork loosely seated on said axle and engageable by said cam to thereby impart swinging movement to said fork, coupling means supported by and arranged for sliding displacement relative to said axle, a manually operated lever extending beyond said arm and connected to said coupling means for actuating same, said fork being provided with means engageable with said coupling means upon selective displacement of said manual lever in one direction, whereby said guide lever is coupled with said fork and oscillates said axle and through said guide lever said rod means for producing said zig-zag stitches, said second means including at least one cam disc means in driving relation with said drive shaft, a transmission lever connected to said manual lever, and feeler means cooperable with said cam disc means upon displacement of said manual lever in an opposite direction, whereby said coupling means is brought into engagement with said transmission lever, so that movements thereof are transmitted through said guide lever to said rod means for producing said ornamental stitches, said cam engaging said fork in the latter displacement position of said manual lever and causing said fork to idly swing on said axle.

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