This invention relates to ornamental seam sewing machines and has for its primary object to facilitate adaptation of a sewing machine to produce a large variety of ornamental seams.

A more specific object of the invention is to provide a pattern-cam controlled needle-vibrating mechanism of an ornamental seam sewing machine with means for conveniently changing the pattern-cam control. Other and still more specific objects of the invention will be apparent from the following description and claims.

The invention consists in the devices, combinations and arrangements of parts hereinafter described in connection with the accompanying drawings, which illustrate a preferred embodiment of the invention and in which:

Fig. 1 represents a vertical longitudinal section, partly in front side elevation, of a sewing machine containing the present improvement. Fig. 2 is a rear side elevation of the sewing machine. Fig. 3 represents an enlarged transverse section of the machine bracket-arm on substantially the line 3—3 of Fig. 2, the cover-plate for the feed-controlling eccentric drive being also shown in section. Fig. 4 is a fragmentary view in vertical section substantially axially of the rearward end of the pattern-cam actuating cross-shaft and gear. Fig. 5 is a bottom plan view of the bracket-arm and of the pattern-cam mechanism supported thereby, the arm-standard and the bracket-arm head being shown in section. Fig. 6 is a substantially horizontal section of the pattern-cam and the rearward end portion of its carrying shaft. Fig. 7 represents a disassembled perspective of a pattern-cam, the spur-gear associated therewith and the rearward end portion of the pattern-cam shaft.

The sewing machine illustrated in the drawings is a modification of the ornamental seam sewing machine disclosed in the U. S. patent to P. M. Card, No. 2,216,096, Sept. 24, 1940. The sewing machine has the usual frame, including a work-supporting bed-plate 10, from one end of which rises the tubular standard 14 of a bracket-arm 12 which overhangs the bed-plate 10 and terminates at its free end in a head 13.

Rotatably journalled in the bracket-arm 12, and extending horizontally lengthwise thereof, is a main actuating shaft 14 carrying at one end a belt-pulley 15. At its opposite end, the shaft 14 carries a counterbalanced crank-disc 15 connected by the usual link 17 with a vertically reciprocatory and laterally vibratory needle-bar 18. Attached to the lower end of the needle-bar 18 is an eye-pointed thread-carrying needle 19. The needle-bar 18 is journalled for endwise reciprocation in a laterally swinging frame 20 pivotally hung at its upper end upon a fulcrum-pin 21 secured to the bracket-arm head 13. The fulcrum-pin 21 provides a pivotal axis for the frame 20 which is transverse to the axis of rotation of the main-shaft 14. The frame 20 is guided in its swinging movements by a headed guide-stud 22 which passes through an arcuate slot 23 provided in the lower end of the frame 20, said guide-stud 22 being disposed within the head 13 of the machine bracket-arm.

The swinging frame 20 is vibrated by a train of pattern-cam controlled connections with the main-shaft 14. To this end, the main-shaft 14 carries a worm 24 having its hub 25 detachably secured by screws 26 to a collar 27 fast on the shaft. This arrangement provides for adjustment of the worm angularly about the shaft 14, thereby to change the timing of the mechanism actuated by said worm.

The worm 24 is in driving engagement with a gear-wheel 28 carried by a horizontally disposed cross-shaft 29 for rotation therewith and performing one rotation for six rotations of the main-shaft 14; said cross-shaft 29 lengthwise extending transversely of the main-shaft 14 and being journalled for rotation in bearings provided in the bracket-arm 12. Secured upon the reduced rearward end 29' of the cross-shaft 29, by screws 30, is a pinion or driving spur-gear 31 disposed externally of the bracket-arm 12. As illustrated in Fig. 4 of the drawings, the rear bearing-boss 32 of the bracket-arm 12, in which the shaft 29 is journalled, is peripherally provided with a cylindrical seat 33 concentric with the axis of rotation of the cross-shaft 29.

Releasably clamped by a screw 34 upon the bearing-boss seat 33 is the split hub of a hanger 35; and rotatably journalled upon a stud-bolt 35 secured to the hanger 35 is an intermediate spur-gear 37. The intermediate gear 37 is in constant mesh with the driving spur-gear 31 and is free to roll about said driving gear upon angular movement of the hanger when the clamping screw 34 is loosened. The hanger 35 is pivotally connected by a screw 36 to one end of a shift-bar 39 having a longitudinal slot 40 to receive a bracket-arm bolt upon which is threaded a hanger-anchoring thumb-screw 41. The anchored shift-bar 39 supplements the hanger clamping screw 34 in fixedly securing the hanger in the operative position of the intermediate gear 37, said shift-bar also providing convenient means for angularly displacing the hanger 35.
upon release of the screws 34 and 41, and for temporarily securing the hanger 35 in swing-out position. Fig. 2 of the drawings illustrates in dot-dash lines, a throw-out position of the hanger 35 and its gear 37.

In its operative position, the intermediate spur-gear 37 is in mesh with a driving spur-gear 42 carried by the rearward end of a cam-shaft 43 disposed horizontally to extend transversely of the main-shaft 14. As illustrated in Figs. 6 and 7 of the drawings, the driven spur-gear 42 has its hub 44 provided with diametrically opposed slots 45 open at the inner end of said hub to receive a short driving pin 46 extending from diametrically opposite sides of the cam-shaft 43. The cam-shaft 43 is rotatably journaled in horizontally spaced bearing- bosses 47 (Figs. 3 and 5) of a supporting bracket 48 secured by screws 49 and 50 to the under side of the machine bracket arm 42. The cam-shaft 43 has a squared portion 51, adjacent the spur-gear 42, entering a correspondingly shaped aperture 52 of a pattern-cam 53; the pattern-cam 53 and the driven gear 42 both being removable secured upon the cam-shaft 43 by a nut 54 threaded upon the rearward end of said shaft. The described arrangement provides for convenient removal of the pattern-cam 53 and of the spur-gear 42, and the replacement thereof by a substitute pattern-cam and pinion.

Riding the irregular periphery of the pattern-cam 53 is a follower in the form of a roller 55 carried by a stud-pin 56 secured to a rock-lever 57. A spring 58 detachably anchored to the arm-standard 11 and connected to the rock-lever 57 yields the follower-roller 55 in engagement with the periphery of the pattern-cam 53. The rock-lever 57 has a split hub 59 clamped by a screw 60 upon a horizontal rock-shaft 61 journaled in spaced bearing-lugs 62 and 63 of the supporting bracket 48. The rock-shaft 61 is disposed substantially parallel to the cam-shaft 43; and successfully secured to the forward end of said rock-shaft is the hub of an upstanding segment-lever 64 endwise provided with a segmental slot 65. Pivotally connected, by a stud-bolt 66 to the segment-lever 64 for vertical adjustment in the slot 65 thereof, is one end of a link 67. The opposite end of link 67 is secured by receiving a pivot-pin 68 having a reduced eccentric portion 69 thereof secured by a screw 70 in the suitably apertured lower end of the swinging needle-bar frame 20.

The spur-gears 31 and 42 in the present case are of the same size and, as the cross-shaft 29 rotates at one-sixth the speed of rotation of the main-shaft 14, it will be understood that the needle 19 is reciprocated six times for each complete rotation of the pattern-cam 53.

Through the described connections with the swinging frame 20, the pattern-cam transmits lateral movements to the needle 19 and thereby induces reciprocation of the needle in separate paths determined by the shape of the pattern-cam. By replacing the pattern-cam 53 with others of different configuration and by changing the location of the hub of the selected pattern-cam, a variety of embroidery figures may be selectively produced by the machine and the number of stitches in the embroidery figures may be selectively varied.

As will be understood from the foregoing description, the present improvement provides convenient means both for quickly changing the rotation timing and for replacement of the pattern-cam. By swinging the intermediate gear 37 temporarily into the inoperative position thereof illustrated by dotted lines in Fig. 2, and by removing the cam-shaft nut 54, the driven gear 42 and the pattern-cam 53 may be replaced individually or together. The intermediate gear 37 is then secured in proper intermeshing relation with the selected driven gear as 42, thereby to drive the newly selected pattern-cam in the production of a different embroidery effect.

Any suitable work-feeding mechanism may be employed; the feeding mechanism illustrated in part in the drawings and contained in the present machine corresponding substantially with that more fully shown and described in the prior Patent No. 2,216,096 hereinafter mentioned.

Having thus set forth the nature of the invention what I claim is:

1. In an ornamental stitch sewing machine, a swinging needle-bar frame, a needle-bar journaled for endwise reciprocation in said frame, connections for reciprocating said needle-bar, a rotary pattern-cam, connections actuated by said pattern-cam for swinging said frame, a rotary driving gear, said pattern-cam comprising a pattern-cam rotating driven-gear, a rotary intermediate gear, supporting means for bodily movement of said intermediate gear angularly about the axis of rotation of one end of said driving and driven gears, means for securing said intermediate gear in intermeshing relation with said driving and driven gears, and means for providing for replacement of the gear disengaged from said intermediate gear upon angular movement of said supporting means.

2. In an ornamental stitch sewing machine, a swinging needle-bar frame, a needle-bar journaled for endwise reciprocation in said frame, connections for reciprocating said needle-bar, a rotary pattern-cam, connections controlled by said pattern-cam for swinging said frame, a rotary driving gear, means for replacing said gear, a pattern-cam rotating driven-gear, a rotary intermediate gear, supporting means for bodily movement of said intermediate gear angularly about the axis of rotation of one end of said driving and driven gears, means for securely interlocking said intermediate gear in intermeshing relation with said driving and driven gears, and means for providing for replacement of the gear disengaged from said intermediate gear upon angular movement of said supporting means.

3. In an ornamental stitch sewing machine, a swinging needle-bar frame, a needle-bar journaled for endwise reciprocation in said frame, connections for reciprocating said needle-bar, a rotary pattern-cam, connections controlled by said pattern-cam for swinging said frame, a rotary driving gear, means for replacing said gear, a pattern-cam rotating driven-gear, a rotary intermediate gear in constant intermeshing engagement with said driving gear, supporting means for said intermediate gear journaled coaxially with and for bodily movement of said intermediate gear about the axis of rotation of said driving gear, releasable means for securely interlocking said intermediate gear in intermeshing relation with said driving gear, and means for removably securing said driving gear for rotation with said pattern-cam.

4. In an ornamental stitch sewing machine having a swinging frame, a needle-bar journaled for endwise reciprocation in said frame, means for reciprocating said needle-bar, and pattern-cam controlled connections for swinging said frame, the improvement which consists in the provision of pattern-cam actuating mechanism including a rotary driving gear, a driving gear replaceably secured for driving said pattern-cam, said hanger journaled for angular movement about the axis of rotation of said driving gear, a rotary intermediate gear carried by said hanger in mesh with said driving gear, and means for securely interlocking said hanger in a position thereof in which said intermediate gear is in driving engagement with said driven gear.
said pattern-cam for swinging said frame, a rotary driving gear, means for rotating said gear, a rotary driven gear coaxial with said pattern-cam, releasable means securing said driven gear and pattern-cam for rotation in unison and providing for removal and replacement of said pattern-cam and driven gear, a rotary intermediate gear in constant intermeshing engagement with said driving gear, supporting means providing for bodily movement of said intermediate gear angularly about the axis of rotation of said driving gear, and releasable means for securing said intermediate gear in intermeshing engagement with said driving and driven gears.

5. A sewing machine having a work-support and a bracket-arm overhanging said work-support, a horizontally disposed rotary actuating shaft extending lengthwise of said bracket-arm, a swinging needle-bar frame supported by said bracket-arm, a needle-bar journaled for endwise reciprocation in said swinging frame, connections for reciprocating said needle-bar from said actuating shaft, a horizontally disposed cross-shaft journaled in said bracket-arm transversely of and deriving rotation from said actuating shaft, a driving spur-gear carried by said cross-shaft, a hanger journaled coaxially of said cross-shaft, an intermediate spur-gear rotatably journaled upon said hanger and in constant mesh with said driving spur-gear, a driven gear and a pattern-cam coaxially journaled upon said bracket-arm for unison rotation, means for replaceably securing a pattern-cam and driven gear in the operative positions thereof, means for anchoring said hanger in a position thereof in which said intermediate gear is in driving engagement with said driven gear, and connections for vibrating said needle-bar frame from said pattern-cam.

6. A sewing machine having a work-support and a bracket-arm overhanging said work-support, a horizontally disposed rotary actuating shaft extending lengthwise of said bracket-arm, a swinging needle-bar frame supported by said bracket-arm, a needle-bar journaled for endwise reciprocation in said swinging frame, connections for reciprocating said needle-bar from said actuating shaft, a horizontally disposed cross-shaft journaled in said bracket-arm transversely of and deriving rotation from said actuating shaft, a driving spur-gear carried by said cross-shaft, a hanger journaled coaxially of said cross-shaft, a bearing for said hanger, means for releasably clamping said hanger upon said bearing in angularly different positions of said hanger, a shift-bar pivotally connected to said hanger and endwise adjustable anchored to said bracket-arm, a rotary cam-shaft disposed substantially parallel to said cross-shaft, a driven spur-gear replaceably secured to said shaft for rotation therewith and in mesh with said intermediate gear, a pattern-cam secured for rotation with said shaft and replaceable independently of said driven spur-gear, and connections for vibrating said needle-bar frame from said pattern-cam.

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