June 23, 1970 RYOTA MAEDA 3,516,373

SEWING MACHINE ATTACHMENT FOR PRODUCING MONOGRAMS

Filed Oct. 16, 1968 4 Sheets-Sheet 1

Fig. 1.

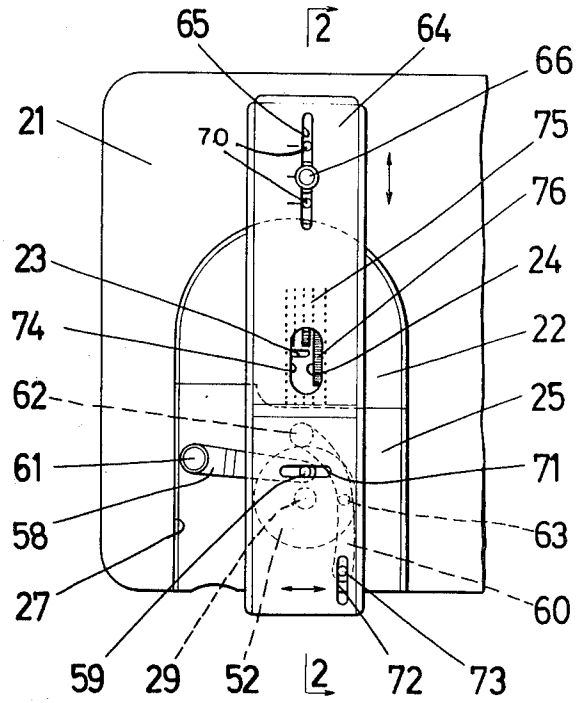
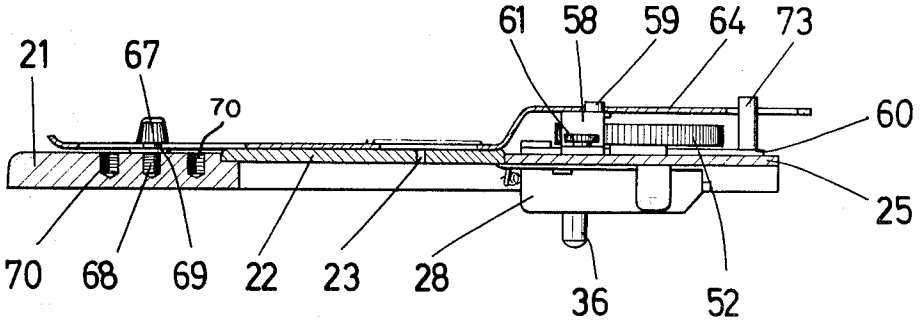


Fig. 2.



INVENTOR
RYOTA MAEDA
By. Nathan H. Evans
Frank H. Marks
ATTORNEYS

Fig. 3.

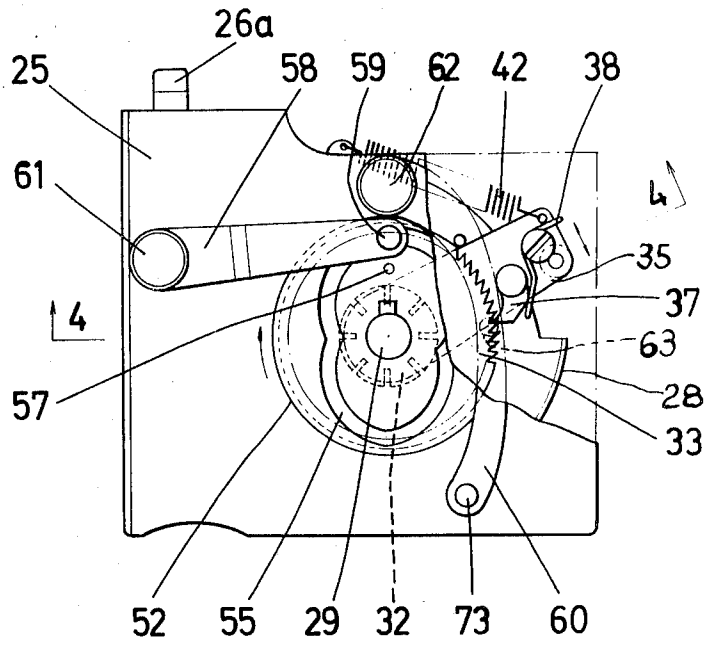

26a
25
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59
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4
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52
55
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73
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Fig. 4.

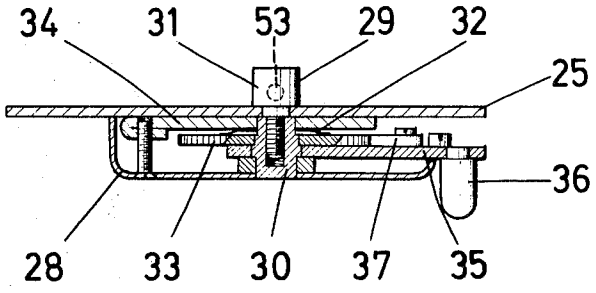

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37
35

Fig. 5.

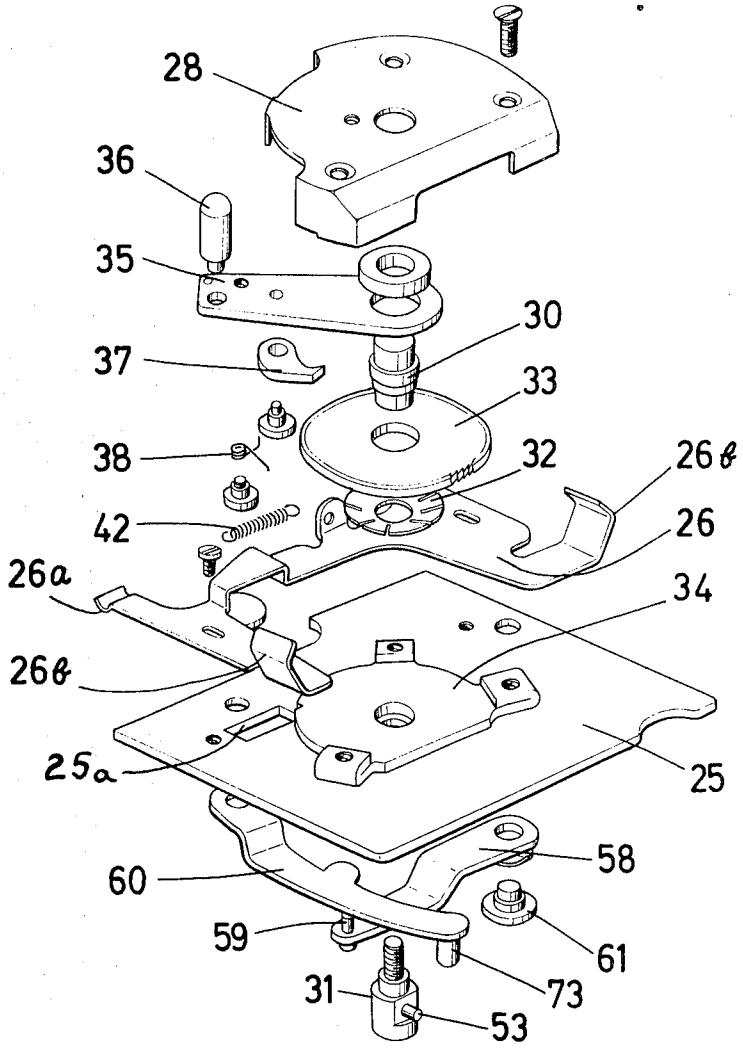
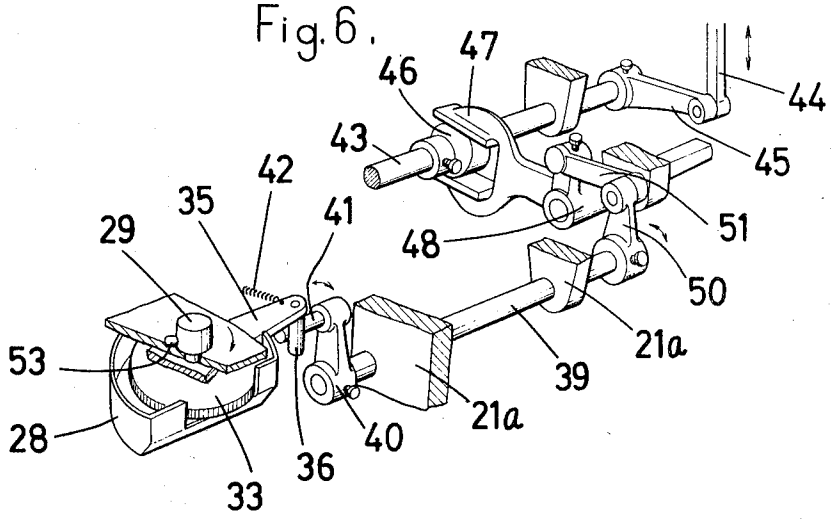

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38
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26b
42
26
26a
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26b
25a
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73
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Fig. 6.


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43
45
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41
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21a
53
39
28
21a
40
36
33

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SEWING MACHINE ATTACHMENT FOR PRODUCING MONOGRAMS

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Fig. 7.

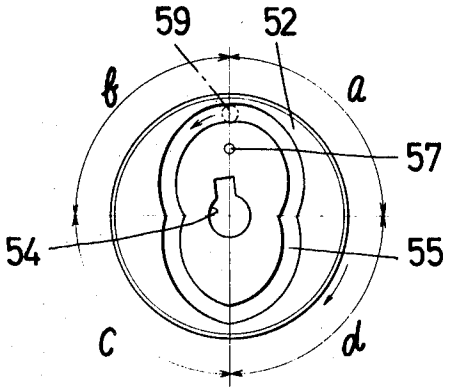


Fig. 8.

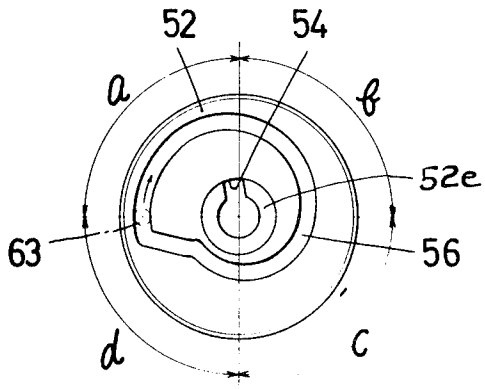


Fig. 9.

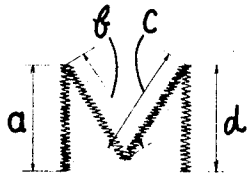
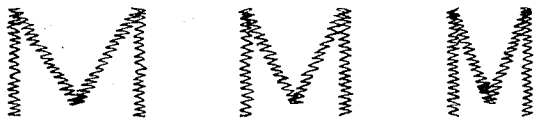


Fig. 10.



Fig. 11.



a b c

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3,516,373

SEWING MACHINE ATTACHMENT FOR PRODUCING MONOGRAMS

Ryota Maeda, Ann Arbor, Mich., assignor to Maruzen Sewing Machine Co. Ltd., Osaka, Japan

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Claims priority, application Japan, Oct. 19, 1967, 42/67,368, 42/67,369
Int. Cl. D05c 3/02
U.S. Cl. 112—102 9 Claims

ABSTRACT OF THE DISCLOSURE

A sewing machine attachment for producing monograms and other designs including a fabric feed plate attached to the bed of the machine for radial and lateral arcuate movement and having an opening defining a work area in registration with the needle hole in the bed. Movement of the feed plate is controlled by a double track cam which is intermittently driven by a ratchet wheel and pawl arrangement actuated by an oscillating member connected to the drive means of the machine. The feed plate moves in synchronism with the needle bar so that the feed plate and the fabric being operated on are arrested when the needle penetrates the fabric.

This invention relates to sewing machine attachments for producing monograms and other designs.

The general object of this invention is the provision of an improved attachment for producing monograms or other designs.

Another object of this invention is the provision of an attachment of the foregoing character which is simple and compact in construction and which may be readily attached, either to a zig-zag or conventional straight stitch sewing machine which has been structurally modified to provide drive means for the attachment.

A further object of this invention is the provision of an attachment which utilizes replaceable rotational cams for producing monograms or other designs corresponding to the patterns of the cams.

In accordance with my invention, I provide an attachment including a moveable fabric feed plate, the movement of which is governed by a rotating cam which is driven in synchronism with the movement of the needle bar so that movement of the fabric is momentarily arrested when the needle penetrates the fabric. The cam controls the synchronous movement of a pair of arms which are engaged with the feed plate so that the feed plate and with it the fabric are automatically moved both longitudinally and laterally of the machine bed to produce the monogram or design in accordance with the pattern of the cam.

The invention will be described in greater detail with reference to the appended drawings, in which

FIG. 1 is a fragmentary top plan view showing my invention in association with the bed of a sewing machine.

FIG. 2 is a cross sectional view taken substantially on line 2—2 of FIG. 1.

FIG. 3 is a fragmentary plan view, on an enlarged scale, illustrating the present invention, with parts broken away to illustrate structural details.

FIG. 4 is a cross sectional view taken substantially on line 4—4 of FIG. 3.

FIG. 5 is an exploded perspective view of the attachment in accordance with my invention, the same being shown in reverse position from that illustrated in FIG. 3.

FIG. 6 is a fragmentary perspective view illustrating the driving means for the attachment and the manner in which the attachment is coupled to the driving means.

FIG. 7 is a top plan view of a type of cam utilized in my attachment.

FIG. 8 is a bottom plan view of the cam illustrated in FIG. 7.

FIG. 9 is an exemplification of a monogram produced by the attachment, in accordance with my invention, when used on a zig-zag type sewing machine.

FIG. 10 is a view similar to FIG. 9 but showing the monogram produced by the attachment when used on a straight stitch type sewing machine, or a zig-zag type sewing machine in which the amplitude of the zig-zag stitch is maintained at zero, and

FIG. 11 illustrates the different shapes of monograms which may be produced with the attachment of my invention by varying the distance between the pivotal point of the fabric feed plate and the needle.

Referring to the drawings, and particularly to FIG. 1, the numeral 21 indicates the bed of a zig-zag type sewing machine which is provided with a conventional needle plate 22 having a needle hole 23 and elongated slots 24 through which extend the teeth of the fabric feeding member.

The attachment of my invention is intended to be positioned adjacent the needle plate 22, in the position normally occupied by the removeable closure plate in the bed of the machine. The attachment comprises a base plate 25 having a planar shape such as to be received in the opening 27 in the bed 21 and to abut the edge of the needle plate 22, as illustrated in FIG. 1. A spring plate 26, shaped substantially as illustrated in FIG. 5, is attached by means of screws to the underside of base plate 25. The spring plate 26 is provided with latching portions 26*a* which extend beyond the forward edge of the base plate 25 and which are adapted to engage in a recess, not shown, provided in the underside of the needle plate 22. The plate 26 also is provided with latching portions 26*b* disposed along opposite side edges of the plate 25 and these latching portions are adapted to engage against the side walls of the opening 27 provided in bed 21. Accordingly, it will be seen that the base plate 25 is detachably secured in the opening 27.

A shaft assembly, indicated generally by the numeral 29, is rotatably mounted in base plate 25. The shaft assembly 29 includes a portion 31 provided with a reduced threaded portion which is adapted to be received in a threaded opening in shaft portion 30. A spacer plate 34 is welded to the underside of the base plate 25 and is provided with reversely bent lugs, each having a threaded opening, for a purpose, as will be hereinafter explained. A ratchet wheel 33 is fixed on shaft portion 30 and a spring washer 32 is interposed between the plate 34 and the ratchet wheel 33 to provide resistance to the movement of the ratchet wheel.

A lever 35 is rockably supported on the shaft portion 30 and pivotally supports a pawl 37. A pin 36 is fixed on the end of the lever 35 in depending relation thereto, as illustarted in FIG. 4. The pawl 37 is biased by a spring 38 into engagement with the peripheral teeth of the ratchet wheel 33. Spring 42 connected to one end of the lever 35 and to a perforated lug formed in the spring plate 26, normally urges the lever 35 to its at-rest position illustrated in FIG. 3, the movement of lever 35 being arrested by reason of its abutment with a bent lug on the housing member 28 which is secured to the spacer plate 34, as by screws. Lever 35 is adapted to be rocked clockwise, as viewed in FIG. 3, through a short arc, as will be hereinafter explained. In such clockwise movement, the pawl 37 in engagement with a tooth on the ratchet wheel 33 will effect corresponding rotation of the ratchet wheel 33 and the shaft 29 which is fixed thereto.

A pattern cam **52**, illustrated in FIGS. 7 and 8, is provided with a central keyed aperture **54** to receive the shaft portion **31** which is provided with a laterally projecting pin **53** which keys the cam to the shaft portion **31**. The cam is preferably knurled peripherally and is provided on its upper face (FIG. 7) with a cam groove **55** and, on its lower face (FIG. 8), with a cam groove **56**. A reference mark **57** is provided on the upper face of the cam so that the cam may be rotated manually into alignment with a corresponding mark on the surface of the plate **25** to position the cam in starting position. A cam follower arm **58** is pivotally secured as by pin **61** to the plate **25** and, as will be seen by reference to FIG. 5, arm **58** has an offset portion at the end of which is fixed a pin **59**, the pin projecting on opposite sides of arm **58**. A second cam follower arm **60** has an end offset portion which is passed through a slot **25***a* in the plate **25** and the arm is secured as by pin **62** to the underside of plate **25**. However, the major portion of arm **60** is slideably supported on the upper surface of plate **25** as seen in FIG. 3. Arm **60** is provided intermediately thereof with an upstanding pin **63** and at its free end with another pin **73**. The pin **73** extends substantially to the height of pin **59** (FIG. 2).

When the cam **52** is to be mounted on the shaft portion **31**, arm **60** is moved manually to a position so as to effect registration of the pin **63** with the lower cam groove **56**. Referring to FIG. 8, is will be seen that the lower face of cam **52** is provided with a central boss portion **52***e* which positions this face to clear the arm **60**, as illustrated in FIG. 2. The pivotal connection of arm **58** is sufficiently loose so that the arm may be lifted over the cam and moved to a position where the pin **59** engages in the cam groove **55**. It will be understood that as the cam **52** is caused to be rotated, as will be hereinafter explained, the arms **58** and **60** will be caused to rock about their respective pivots in accordance with the configurations of the cam grooves **55** and **56** to effect longitudinal and lateral movement, respectively, of the fabric feed plate, presently to be described.

A fabric feed plate **64**, illustrated in FIGS. 1 and 2, comprises a main body portion provided with an elongated slot **65** in which is received a guide pin **66** having a knurled knob **67** and a threaded portion **68** with an intermediate neck portion **69**. The pin **66** is adapted to be screwed in one of a series of three threaded openings **70** in the bed **21** to slideably secure the feed plate **64** to the bed. By varying the position of the guide pin **66** in one of the three threaded apertures **70** movement of the feed plate **64** may be varied, as will be hereinafter explained. The body portion of the feed plate **64** is provided with an aperture **74** which, preferably, is slightly larger in size than the monogram or design intended to be produced by the cam **52**. Referring to FIG. 1, it will be seen that the aperture **74** is disposed generally in registration with the needle aperture **23**. The feed plate **64** is provided with a plurality of embossings or protuberances **75** surrounding the aperture **74** for holding the fabric to be operated upon. The opposite end of the feed plate **64** is upwardly offset so that as seen in FIG. 2 it will overlie cam **52** and the arms **58** and **60**. This offset portion of the feed plate **64** is provided with a pair of elongated slots **71** and **72** substantially at a right angle to each other, the slot **71** being adapted to receive the pin **59** and the slot **72** being adapted to receive the pin **73**.

In order to utilize the attachment of my invention on a conventional sewing machine, it is required that such machine be somewhat modified in structure so as to provide a power takeoff for actuating the monogram attachment. Referring to FIG. 6, the numeral **43** indicates a conventional drive shaft for the shuttle, said drive shaft being rotated through a crank **45** connected to a connecting rod **44** which is actuated by conventional means associated with the main drive shaft in the head

of the sewing machine, not shown. The foregoing arrangement is of conventional construction.

The modified construction includes a drive shaft **39** which is journaled in suitable lugs **21***a* integral with the underside of the bed **21**. A crank **40** is fixed to one end of shaft **39**. The free end of the crank **40** is provided with a lateral extension **41** which is adapted to engage the pin **36**, as illustrated in FIG. 6, and, as will be hereinafter explained. Fixed to the other end of shaft **39** is a crank **50** connected by a connecting rod **51** to a bell crank **48** which is pivotally supported on a suitable lug integral with the bed **21**. The bell crank **48** includes a forked arm **47** which embraces a cam **46** fixed on shaft **43**. It will be apparent that movement of the cam **46** with shaft **43** will effect oscillation of crank **40** in timed relation with the operation of the machine, so that the movement of the lever **35** is synchronized with the movement of the needle of the machine. It will be understood that the drive means, just described, is a permanent part of the machine.

In operation, the conventional fabric advancing element of the machine is lowered to dispose the teeth thereof below the surface plane of the needle plate **22**, so as to afford free movement of the feed plate **64** over the surface of the needle plate. A pattern cam **52** corresponding to the monogram or design desired to be stitched on the fabric is placed in position on the shaft portion **31** with the pin **63** of arm **60** received in the lower cam groove **56**. The arm **58** is moved into position to locate pin **59** within the cam groove **55**. The cam **52** is then manually rotated by the operator to effect registration of the reference mark **57** with a co-operating reference mark on the base plate **25**. The feed plate **64** is then superimposed over the arms **58** and **60**, as illustrated in FIGS. 1 and 2, to effect registration of the pins **59** and **73** with the slots **71** and **72**, respectively. The feed plate **64** is then secured to the bed **21** by means of the guide pin **66**. The nature of the securement is such that the feed plate **64** may shift longitudinally within the limits of the slot **65** and also laterally about guide pin **66** as a pivotal axis. The area of the fabric which is to be stitched is then placed over the aperture **74** and the presser foot lowered to engage the fabric.

When the machine is operated, arm **40** will oscillate about the axis of shaft **39** and, in each operative stroke of the arm **40**, pin **41** will engage pin **36** and through the medium of the ratchet pawl **37** carried on the arm **35** will effect intermittent and stepwise advancement of the ratchet wheel in a clockwise direction, as viewed in FIG. 3. Correspondingly, the cam **52** is intermittently rotated so that the cam follower arms **58** and **60** are caused to move the feed plate **64** to continuously change the position of the fabric relative to the needle to stitch the desired monogram or design. The needle, of course, will move laterally through a predetermined amplitude to effect a zig-zag stitching.

To illustrate the manner in which the letter M is stitched, reference will be made to FIGS. 7, 8 and 9. The cam groove portions of the cam grooves **55** and **56** within the zones *a*, *b*, *c* and *d* will cooperate with the pins **59** and **63**, respectively, to move the arms **58** and **60** to effect movement of the feed plate **64** in such a manner as to guide the fabric to produce the stitching illustrated in FIG. 9. The portions of the letter M illustrated in FIG. 9, identified by the characters *a*, *b*, *c* and *d*, are formed, respectively, by the cam groove portions located in the zones correspondingly identified in FIGS. 7 and 8.

FIG. 10 illustrates the type of letter M produced on a straight stitch type machine utilizing the same cams shown in FIGS. 7 and 8.

The movement of pin 59 determines the longitudinal movement of the feed plate **64** while the movement of the pin **73** determines the lateral movement of said feed plate. The width of the monogram or design produced by the attachment of my invention may be varied, as illus-

trated in FIG. 11, by varying the position of the pin **66** in relation to the apertures **70**. For example, the letter M of maximum width, indicated by the *a* in FIG. 11, may be produced by positioning the pin **66** in the threaded aperture **70** shown at the extreme left in FIG. 2. The letter M of intermediate width indicated by *b*, is produced by placing the pin **66** in the intermediate position, illustrated in FIG. 2, and the letter M of minimum width, indicated by *c*, may be produced by placing the pin **66** in the threaded opening the right of the intermediate position. As will be apparent, the position of the pin **66** determines the axis about which the feed plate **64** will pivot in its lateral movement.

It will be apparent that any desired monogram or design may be produced through the use of different cams, each having cam grooves capable of producing the desired movements of the levers **58** and **60**. The fabric to be stitched is supported on the feed plate **64** and is held in operating position by the presser foot of the machine. With the fabric feeding member of the machine retracted below the surface of the bed **21**, the feed plate **64** and with it the fabric may move freely over the bed as it is being stitched to form the monogram or design. As was hereinabove noted, the attachment is intermittently actuated and its movement is synchronized with the movement of the needle bar so that the fabric is maintained momentarily in an arrested position each time the needle passes through the fabric.

Various changes coming within the spirit of my invention may suggest themselves to those skilled in the art; hence, I do not wish to be limited to the specific embodiments shown and described or uses mentioned, but intend the same to be merely exemplary, the scope of my invention being limited only by the appended claims.

I claim:

1. A sewing machine attachment for making a monogram or other design comprising a fabric feed plate adopted to be supported on the bed of the machine for radial and arcuate lateral movement, said feed plate having an opening defining a work area substantially in registration with the needle bar and the needle hole in said bed, and cam controlled means operatively connected with the drive means of said sewing machine and with said feed plate for moving said feed plate in a predetermined pattern in relation to said needle hole and in synchronism with the movement of said needle bar, said cam controlled means including a base plate adapted to be supported in the bed of the machine, a rotatable pattern cam having first and second cam grooves and supported on said base plate, and first and second cam follower arms pivoted on said base plate and operatively engaged with said first and second cam grooves respectively, each of said follower arms having an upstanding pin at one end and said feed plate having two slots, each receiving a respective pin whereby said follower arms are operatively connected to said feed plate.

2. The invention as defined in claim **1** including means for intermittently driving said cam.

3. The invention as defined in claim **1** in which the means for intermittently driving the cam includes a ratchet wheel and pawl.

4. The invention as defined in claim **1** in which the means for intermittently driving the cam includes a ratchet wheel and a lever carrying a pawl, and including an oscillatable member driven by said drive means for actuating said lever in a direction to rotate said ratchet wheel.

5. In combination with a sewing machine, an attachment for making a monogram or other design comprising, a fabric feed plate adapted to be supported on the bed of the machine for radial and arcuate lateral movement, said feed plate having an opening defining a work area substantially in registration with the needle bar and needle hole in said bed, a base plate adapted to be supported in the bed of the machine, a ratchet wheel supported on said base plate, a lever carrying a pawl adapted to cooperate with said ratchet wheel, a rotatable pattern cam having first and second cam grooves and keyed to said ratchet wheel, first and second cam follower arms pivoted on said base plate and operatively engaged with said first and second cam grooves, respectively, each of said arms being operatively connected to said feed plate, the movement of said lever being adapted to effect rotational movement of said ratchet wheel in one direction, means for intermittently actuating said lever, said means including an oscillatable member engageable with said lever, a cam mounted on the shuttle shaft of the machine, a rockable crank arm having a fork cooperating with said cam, means operatively connecting said oscillatable member with said crank arm whereby rotational movement of said shuttle shaft will rock said oscillatable member to intermittently drive said ratchet wheel and said pattern cam to move said feed plate in a predetermined pattern in relation to said needle hole and bar.

6. The invention as defined in claim **1** in which said first arm effects movement of said feed plate in a radial direction and said second arm effects movement of said feed plate in an arcuate lateral direction.

7. The invention as defined in claim **1** including variable positionable means for securing said feed plate to the bed of the machine whereby to vary the arcuate lateral movement of the feed plate.

8. The invention as defined in claim **1** in which the feed plate has a plurality of embossings to engage the fabric placed thereover.

9. The invention as defined in claim **1** in which the fabric feed plate has an upwardly offset portion arranged to overlie the cam and follower arms.

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ALFRED R. GUEST, Primary Examiner