

April 26, 1960

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2,934,029

EMBROIDERY ATTACHMENT FOR SEWING MACHINES

Filed March 26, 1957

2 Sheets-Sheet 1

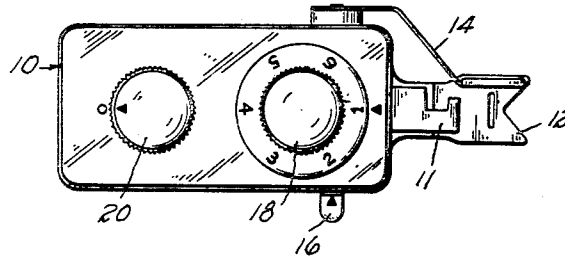


FIG. 1

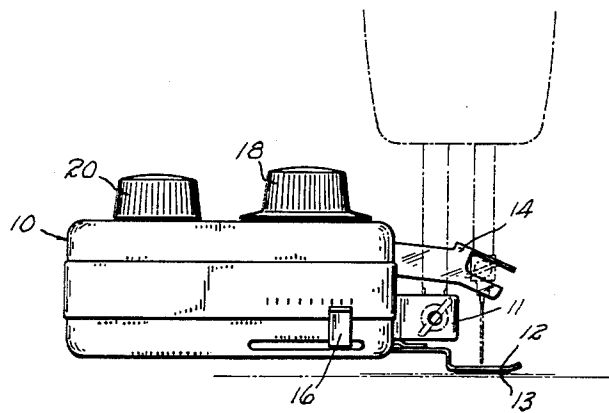


FIG. 2

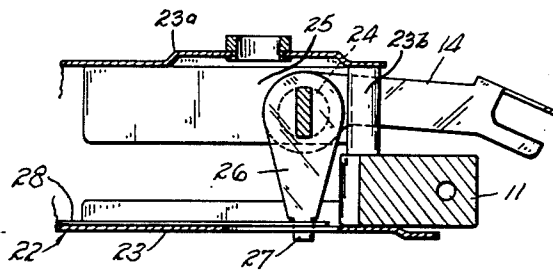


FIG. 6

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2 Sheets-Sheet 2

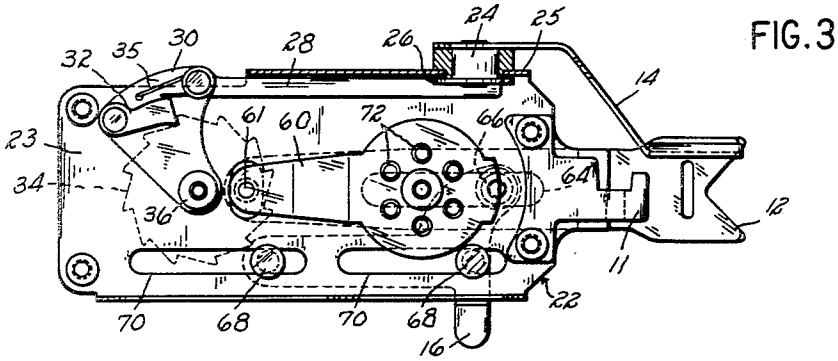


FIG. 3

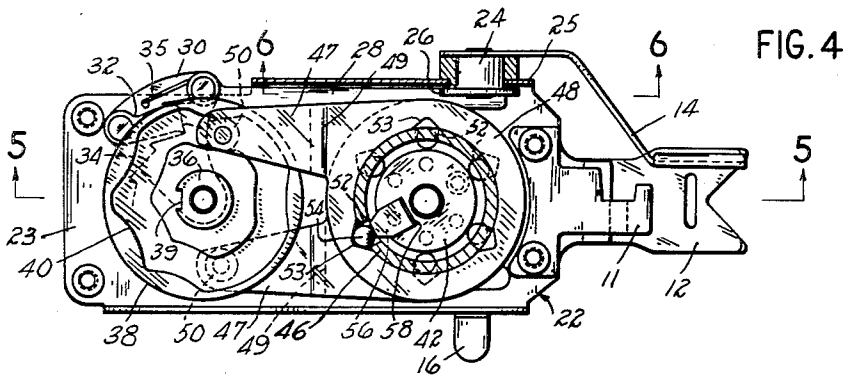


FIG. 4

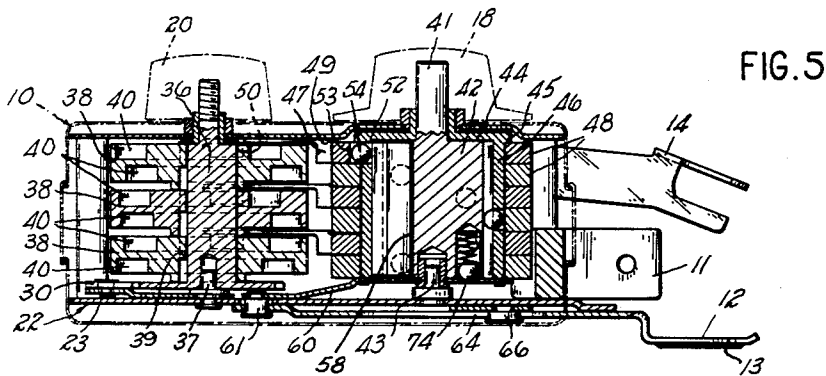


FIG. 5

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EMBROIDERY ATTACHMENT FOR SEWING MACHINES

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Application March 26, 1957, Serial No. 648,685

15 Claims. (Cl. 112-160)

This invention relates to a novel and improved embroidery attachment for sewing machines.

It is an object of the invention to provide a sewing machine embroidery attachment for producing a wide variety of stitches on a conventional sewing machine having novel and improved means for operating the cloth feed blade in a selected one of a plurality of predetermined patterns of movement.

It is a further object of this invention to provide an embroidery attachment of the type described wherein the pattern of movement of the cloth feed blade may be varied without the necessity of replacing or substituting templates, cams or the like.

It is another object of this invention to provide an embroidery attachment of the type described which is relatively simple and economical in construction yet which is rugged and capable of accurate performance over long periods of use.

Other objects will be in part obvious, and in part pointed out more in detail hereinafter.

The invention accordingly consists in the features of construction, combination of elements and arrangement of parts which will be exemplified in the construction hereafter set forth, and the scope of the application of which will be indicated in the appended claims.

In the drawings:

Fig. 1 is a top view of an embroidery attachment constructed in accordance with the invention;

Fig. 2 is a side elevational view of the attachment of Fig. 1 mounted on a sewing machine fragmentarily shown in broken lines;

Fig. 3 is an enlarged top view, partly in section, of the base portion of the attachment of Fig. 1 with the housing removed;

Fig. 4 is an enlarged top view, partly in section, of the attachment of Fig. 1 with the housing removed;

Fig. 5 is a cross sectional view substantially along the line 5-5 of Fig. 4; and

Fig. 6 is a fragmentary cross sectional view substantially along the line 6-6 of Fig. 4.

With reference to the drawings, the external appearance of an embodiment of the invention is shown in Figs. 1 and 2. As shown in Figs. 1 and 2, the attachment is enclosed in a housing 10 and is provided with a clamp 11 for mounting the attachment on the presser foot bar of a conventional sewing machine. Extending forwardly from the bottom of the attachment is a pivotally mounted cloth feed blade 12 having a plurality of ridges 13 extending longitudinally thereof. As will be later apparent, the feed blade 12, in the specific embodiment shown, engages the top of the cloth and is effective to move the cloth laterally, while the usual sewing machine feed dogs engaging the underside of the cloth effect forward or reverse feeding of the cloth. A pivotally mounted actuating lever 14, which, as shown in Fig. 2, is adapted to be connected to the needle bar of the sewing machine, is provided for the transmission of motive power to the operative elements of the attachment, as will be herein-

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after described in detail. A stroke adjustment lever 16 extends through the side of the housing and is selectively adjustable to varying the magnitude of movement of the feed blade. A manually rotatable pattern selector knob 18 is provided for the selection of one of a plurality of predetermined patterns of feed blade movement and a manually rotatable reset knob 20 is operable to set the attachment in starting condition preparatory to a stitching operation.

Coming now to the operating mechanism of the attachment and with particular reference to Figs. 3-6, the attachment is mounted on a frame 22 having a base 23 secured to the clamp 11 and a top member 23a supported on base 23 by posts 23b. The actuating lever 14 is secured to a stud 24 journaled in down-turned flange 25 extending partially along one edge of the top member 23a. As most clearly shown in Fig. 6, the stud 24 is connected at its inner end to a lever arm 26 which, in turn, is connected by a tongue and slot connection 27 to one end of a link 28, the other end of which is pivotally connected to a crank arm 30 carrying a pivoted pawl 32. The pawl is biased by a spring 35 into engagement with a ratchet wheel 34 fixed to shaft 36. In the specific embodiment, the ratchet wheel is formed integrally with the shaft 36. The shaft 36 is rotatably supported on a stud 37 which also pivotally mounts the crank 30 and which itself is mounted on the base of the frame. The reset knob 20 is mounted for rotation with the shaft 36.

A plurality of disc-shaped positive motion cams 38 are mounted coaxially of the shaft 36 in vertical stacked relation and are drivingly connected to the shaft by means of a key and slot connection 39. Each cam has an endless cam track 40 recessed in each face thereof. In the specific embodiment, there are three cam discs 38 and hence six cam tracks.

A second shaft 42 of relatively large diameter is rotatably mounted on a stud 43 supported on the base 23 with the shaft 42 being disposed in parallel spaced relation with the shaft 36. The selector dial 18 is mounted on the extension 41 for rotation with the shaft 42. Disposed coaxially about the shaft 42 for oscillation relative thereto is a cup-shaped driven member 44 comprising a radially extending flange 45 from which depends an annular skirt portion or sleeve 46 which is spaced radially from the shaft 42.

A plurality of cam levers 47 having hubs 48 are rotatably mounted on the sleeve 46 in stacked relationship, a cam lever 47 being provided for each of the cam tracks 40. The cam levers 47 are identical and each has a cam follower 50 on the end thereof. When the device is assembled, the alternate cam levers 47 are inverted so that the inverted levers extend on the opposite side of the axis of the cams and the followers 50 extend upwardly into the cam tracks 40 on the bottom face of the cams. Thus, during rotation of the cams, all the cam levers are oscillated in a manner dictated by the configuration of the associated cam track. For compactness, the levers 47 are offset as indicated at 49 so that the levers extending between a pair of cams on opposite sides of the axis thereof, lie substantially in the same plane.

In accordance with the invention, a selectively adjustable clutch is provided between the cam levers 47 and the sleeve 46 whereby a selected one of the levers may be drivingly connected to the sleeve for the oscillation thereof with the selected lever and whereby the remaining levers will, during operation of the attachment, merely oscillate freely relative to the sleeve. Specifically, the sleeve 46 is provided with a plurality of apertures 52 which are spaced angularly about and longitudinally of the axis of the sleeve with the apertures registering respectively with the hubs of the cam levers. In the specific embodiment, the apertures are angularly spaced apart

approximately 60°. Each of the hubs of the cam levers is provided with notches or recesses 53 with one of the notches of each hub being registrable with one of the apertures 52 of the sleeve. In the specific embodiment, each hub is provided with three notches spaced apart angularly approximately 120°. Therefore, with the cam levers arranged in alternately inverted relation, as shown in Figs. 4 and 5, one of the notches in each hub will be registrable with one of the apertures 52 in the sleeve.

A ball 54 is carried in each of the apertures 52 of the sleeve but the ball 54 may move in the aperture 52 radially of the sleeve. Inward radial movement of the balls is limited by engagement with the shaft 42. The balls form a plurality of driving members individually actuatable to connect the hub of a selected one of the cam levers to the sleeve. A cam bar 56 is carried in a slot in the shaft 42 and forms a radial shoulder extending from top to bottom of the shaft. A leaf spring 58 is disposed intermediate of the bar and the shaft to urge the bar radially outwardly of the shaft. As most clearly seen in Fig. 4, when the shaft 42 is rotatably adjusted relative to the sleeve 46, the bar 56 engages with a selected one of the balls 54 to urge the ball into engagement with the registrable cam lever notch 53.

Mounted on the lower end of the sleeve 46 and peened to the sleeve for rotation therewith is a drive lever 60 connected to a stud 61 received in an elongated slot in the base 23 of the frame and on which is mounted one end of the feed blade 12. The feed blade is pivoted intermediate its ends on the stroke adjustment lever 16 by means of an elongated slot 64 in the feed blade and a pin 66 on the lever. The stroke lever 16 is slidably mounted on the base 23 by means of pins 68 on the lever engaged with elongated slots 70 on the base, whereby the magnitude of movement of the feed blade may be selectively adjusted by moving the stroke lever 16 longitudinally of the frame.

In order to assist in locating the shaft 42 in the selected rotated position corresponding to the pattern desired and to yieldably latch the shaft in the selected position, a detent is provided between the shaft and drive lever 60 and comprises a plurality of apertures 72 in the drive lever disposed circularly about the axis of the lever and a spring pressed ball 74 carried by the shaft 42 for engagement in the apertures 72.

It is believed that the operation of the attachment will be apparent from the following explanation taken in connection with the above description. With the actuating lever 14 connected to a needle bar of the sewing machine as shown in Fig. 2, it can readily be seen that the vertical movement of the needle bar will, through the ratchet drive, rotate the cams 38 in unison in a step-wise manner. The actuation of the ratchet drive is timed with respect to the operation of the needle bar so that the cams are rotated during the latter portion of the vertical upward movement of the needle at which time the needle will be disengaged from the cloth and the machine feed dog will feed the cloth at right angles to the movement of the cloth by the attachment feed blade 12. As the cams are rotated, the cam levers 47 will also be simultaneously oscillated about the axis of the sleeve 46. In accordance with the rotated position of the selector dial 18, one of the levers 47 will be drivingly connected to the sleeve 46 for the oscillation of the sleeve therewith. The sleeve oscillation will be transmitted to the feed blade 12 by the drive lever 60 for the oscillation thereof. If, at any time, it is desired to change the pattern to be stitched, it is merely necessary to rotate the selector dial 18 to the desired setting preferably indicated by indicia on the selector dial registrable with an index marking on the housing of the attachment. The knob 20, which is used to set the cams at a predetermined starting point before commencing a sewing operation, is preferably set prior to adjustment of the selector dial. The throw of the feed blade 12 for any

selected cam track is adjustable by moving the selector lever 16.

It can thus be seen that there has been provided a novel embroidery attachment for a sewing machine providing a plurality of stitch patterns, any one of which may be selected for use merely by a simple manual adjustment of a selector dial and requiring a minimum of skill for the operation thereof.

I claim:

1. A cloth feeding attachment for sewing machines comprising a supporting member for attachment to a sewing machine, a plurality of rotatable cams mounted on the supporting member for rotation in unison, driving means adapted to be attached to the needle bar of a sewing machine for rotating the cams, a plurality of cam followers continuously engaged, respectively, with said cams and pivotally mounted on said supporting member whereby rotation of said cams causes each follower to oscillate in accordance with the shape of the cam associated therewith, a cloth feeding blade mounted for oscillating movement on the supporting member and adapted to engage a cloth being sewed, and means to connect the feed blade to one of said followers, said last named means including a manually operable clutch having a single rotatable selector knob operable to establish the desired connection.

2. A cloth feeding attachment for sewing machines comprising a supporting member for attachment to a sewing machine, a plurality of rotatable cams mounted on the supporting member for rotation in unison, driving means adapted to be attached to the needle bar of a sewing machine for rotating the cams, a plurality of cam followers continuously engaged, respectively, with said cams and mounted for pivotal movement on said supporting member whereby rotation of said cams causes oscillation of each follower in accordance with the shape of the cam associated therewith, a cloth feeding blade mounted for oscillating movement on the supporting member and adapted to engage a cloth being sewed, an actuating link pivotally connected to the feed blade, and manually operable clutch means to connect the actuating link to one of the cam followers, said clutch means including a single rotatable connector knob operable to establish the desired connection.

3. A cloth feeding attachment for sewing machines comprising a support for attachment to a sewing machine, a plurality of rotatable cams mounted coaxially in side by side relation on the support, means to drive the cams in unison from the needle bar of a sewing machine, a cloth feed blade mounted for oscillating movement on the support, a plurality of cam followers, one of said cam followers being continuously engaged with one of said cams, said cam followers being mounted in side by side relationship for continuous oscillation about a common pivot point by the cams, and means operable to connect the cloth feed blade to a selected one of the cam followers.

4. A cloth feeding attachment for sewing machines, comprising a support for attachment to a sewing machine, a plurality of rotatable cams mounted in stacked relation on the support, means to drive the stacked cams in unison and in timed relation to the operation of the needle of a sewing machine, a cloth feed blade mounted on the support for oscillatory movement, a plurality of levers mounted in stacked relationship on the support for oscillating movement, one said lever being continuously engaged, respectively, with each of said cams whereby rotation of the cams causes oscillation of the associated levers, an actuating link connected to the feed blade, and manually operable means to connect the link selectively to one of said levers for movement therewith.

5. A cloth feeding attachment for sewing machines comprising a support for attachment to a sewing machine, a rotatable shaft on the support, driving means for

turning the shaft, said driving means being adapted to be connected to the needle bar of a sewing machine, a plurality of cams secured to the shaft in side by side relationship for simultaneous rotation therewith, a plurality of cam followers, each cam follower being continuously engaged with one of said cams and mounted for oscillation about a common axis whereby rotation of said cams causes oscillation of the followers associated therewith, a cloth feed blade mounted for oscillating movement on the support, a driving member connected to the feed blade, a plurality of clutches, one of said clutches being operatively disposed between the driving member and each of the cam followers, and manually operable means to engage one of the clutches, said last-named means having a single selector knob rotatable to a plurality of positions in each of which one of said clutches is engaged to operatively connect the driving member to one of said cam followers.

6. A cloth feeding attachment for sewing machines comprising a frame for attachment to a sewing machine, a rotatable supporting member mounted on the frame, means for rotatably driving the supporting member, said means being adapted to be connected to the needle bar of a sewing machine, a plurality of cam discs secured to the rotatable supporting member in coaxial relationship, each of said cam discs having a continuous cam track in a side face thereof, a plurality of side by side cam followers, each having a roller continuously engaged in a cam track of one of the cam discs whereby rotation of a cam disc causes oscillation of its associated cam follower, a cloth feed blade mounted for oscillating movement on the frame, and manually adjustable means to connect the feed blade to one of the cam followers for movement therewith.

7. A cloth feeding attachment as defined in claim 6 wherein the cam discs have a cam track on each face thereof and wherein a pair of cam followers are provided for each cam and extend on opposite sides thereof.

8. A cloth feeding attachment for a sewing machine comprising a support for attachment to a sewing machine, a plurality of rotatable cams mounted coaxially on the support, driving means for rotating the cams in unison, said driving means being adapted to be attached to the needle bar of a sewing machine, a driven member mounted on the support for oscillating movement, a plurality of cam followers rotatably supported on the driven member in stacked relationship, each said cam follower being continuously engaged with one of said cams so as to be oscillatable thereby, a detent for operatively connecting each of the followers to the driven member for simultaneous movement, manually operable means for engaging a detent between one said follower and the driven member, a cloth feed blade mounted for oscillating movement on the support, and means interconnecting the driven member and feed blade to operate the feed blade in accordance with the oscillatory movement of the driven member.

9. A cloth feeding attachment for a sewing machine comprising a frame for attachment to the presser foot bar of a sewing machine, a rotatable first shaft on the frame, driving means adapted to be connected to the needle bar of a sewing machine for intermittently turning the first shaft, a plurality of cam discs fixed to the first shaft for rotation therewith, each of said cam discs having a continuous cam track in a side face thereof, a second shaft mounted parallel to the first shaft, a sleeve mounted for oscillation on the second shaft, a plurality of cam followers having hubs mounted coaxially of the sleeve for oscillating movement, said cam followers being engaged respectively in the cam tracks of the cam discs for oscillation thereby, individually engageable connectors between the sleeve and the hubs of the cam followers for engaging the sleeve with a selected cam follower, means on the second shaft for engaging a selected connector, a cloth feed blade mounted on the frame for oscillating move-

ment, and means interconnecting said sleeve and feed blade to operate said feed blade in accordance with sleeve oscillation.

10. A cloth feeding attachment for a sewing machine comprising a support for attachment to a sewing machine, a rotatable shaft on the support, driving means adapted to be connected to the needle bar of a sewing machine for intermittently turning the shaft, a plurality of cams fixed to the shaft for rotation therewith, a sleeve mounted for oscillation on an axis parallel to said shaft, a plurality of cam followers having hubs supported on the sleeve for oscillating movement, said cam followers being engaged respectively with the cam discs for oscillation thereby, said sleeve and hubs of the cam followers having registering apertures, connectors in the sleeve apertures adapted to move radially outwardly to a driving position to interconnect the sleeve and hub or to move radially inwardly to free the hub, manually operable means for camming one of the connectors into driving position to connect the sleeve of the hub of a selected cam follower, a cloth feed blade mounted on the frame for oscillating movement, and means interconnecting said sleeve and feed blade to oscillate said feed blade in accordance with sleeve oscillation.

11. A cloth feeding attachment for a sewing machine comprising a frame for attachment to the presser foot bar of a sewing machine, rotatable first shaft on the frame, driving means adapted to be connected to the needle bar of a sewing machine for intermittently turning the first shaft, a plurality of cam discs fixed to the first shaft for rotation therewith, each of said cam discs having a continuous cam track in a side face thereof, a sleeve parallel to the first shaft mounted on the frame for oscillating movement, a plurality of cam followers having hubs supported on the sleeve for oscillating movement, said cam followers being engaged respectively in the cam tracks of the cam discs for oscillation thereby, said sleeve and hubs of the cam followers having registering apertures, ball connectors in the sleeve apertures adapted to move radially outwardly to a driving position to interconnect the sleeve and hub or to move radially inwardly to free the hub, manually operable cam means for selectively camming one of the balls into driving position, a cloth feed blade mounted on the frame for oscillating movement, and means interconnecting said sleeve and feed blade to oscillate said feed blade in accordance with sleeve oscillation.

12. A cloth feeding attachment for a sewing machine comprising a support for attachment to a sewing machine, a rotatable first shaft on the support, driving means adapted to be connected to the needle bar of a sewing machine for intermittently turning the first shaft, a plurality of cam discs fixed to the first shaft for rotation therewith, a second shaft mounted parallel to the first shaft, a sleeve mounted for oscillation on the second shaft but spaced therefrom to form an annular space therebetween, a plurality of cam followers having hubs supported on the sleeve for oscillating movement, said cam followers being engaged respectively with the cam discs for oscillation thereby, said sleeve and hubs of the cam followers having registering apertures, ball connectors in the sleeve apertures adapted to move radially outwardly to a driving position to interconnect the sleeve and hub or to move radially inwardly to free the hub, a cam on the second shaft for camming one of the balls into driving position, a cloth feed blade mounted on the frame for oscillating movement, and means interconnecting the sleeve and feed blade to oscillate said feed blade in accordance with sleeve oscillation.

13. A cloth feeding attachment for a sewing machine comprising a frame for attachment to the presser foot bar of a sewing machine, rotatable first shaft on the frame, driving means adapted to be connected to the needle bar of a sewing machine for intermittently turning the first shaft, a plurality of cam discs fixed to the first shaft for rotation therewith, each of said cam discs having a

continuous cam track in a side face thereof, a second shaft mounted parallel to the first shaft, a sleeve mounted for oscillation on the second shaft but spaced therefrom to form an annular space therebetween, a plurality of cam followers having hubs supported on the sleeve for oscillating movement, said cam followers being engaged respectively in the cam tracks of the cam discs for oscillation thereby, said sleeve and hubs of the cam followers having registering apertures, ball connectors in the sleeve apertures adapted to move radially outwardly to a driving position to interconnect the sleeve and hub or to move radially inwardly to free the hub, a cam on the second shaft for camming one of the balls into driving position, manually operable means to move the second shaft to a selected position to connect the sleeve to the hub of a selected cam follower, a cloth feed blade mounted on the frame for oscillating movement, and means interconnecting the sleeve and feed blade to oscillate the feed blade in accordance with sleeve oscillation.

14. A cloth feeding attachment for a sewing machine comprising a frame for attachment to the presser foot bar of a sewing machine, a vertically mounted rotatable first shaft on the frame, driving means adapted to be connected to the needle bar of a sewing machine for intermittently turning the first shaft, manually operable means for turning the first shaft to an initial starting position, a plurality of cam discs fixed to the first shaft for rotation therewith, each of said cam discs having a continuous cam track in each side face thereof, a second shaft mounted parallel to the first shaft, a sleeve mounted for oscillation on the second shaft but spaced therefrom to form an annular space therebetween, a plurality of cam followers having hubs supported on the sleeve for oscillating movement, said cam followers being engaged respectively in the cam tracks of the cam discs for oscillation thereby, said sleeve and hubs of the cam followers having registering apertures spaced longitudinally and circumferentially of the sleeve, ball connectors in the sleeve apertures adapted to move radially outwardly to a driving position to interconnect the sleeve and hub or to move radially inwardly to free the hub, a cam on the second shaft for camming one of the balls into driving position, manually operable means to turn the second shaft to selected rotated position to connect the sleeve to the hub of a selected cam follower, a cloth feed blade mounted on the frame for oscillating movement, and means interconnecting the sleeve and feed blade to oscillate the feed blade in accordance with sleeve oscillation.

15. A cloth feeding attachment for a sewing machine comprising a frame for attachment to the presser foot bar of a sewing machine, a vertically mounted rotatable first shaft on the frame, driving means adapted to be connected to the needle bar of a sewing machine for intermittently turning the first shaft, manually operable means for turning the first shaft to an initial starting position, a plurality of cam discs fixed to the first shaft for rotation therewith, each of said cam discs having a continuous cam track in each side face thereof, a second shaft mounted parallel to the first shaft, a sleeve mounted for oscillation on the second shaft but spaced therefrom to form an annular space therebetween, a plurality of cam followers having hubs supported on the sleeve for oscillating movement, said cam followers being engaged respectively in the cam tracks of the cam discs for oscillation thereby, said sleeve and hubs of the cam followers having registering apertures spaced longitudinally and circumferentially of the sleeve, ball connectors in the sleeve apertures adapted to move radially outwardly to a driving position to interconnect the sleeve and hub or to move radially inwardly to free the hub, a cam bar resiliently mounted on the second shaft longitudinally thereof for camming one of the balls into driving position, manually operable means to turn the second shaft to selected rotated position to connect the sleeve to the hub of a selected cam follower, a cloth feed blade mounted on a pivot for oscillating movement, means interconnecting said sleeve and said feed blade to pivot said feed blade in accordance with sleeve oscillation, and means for varying the position of the feed blade pivot to vary the throw of the blade.

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