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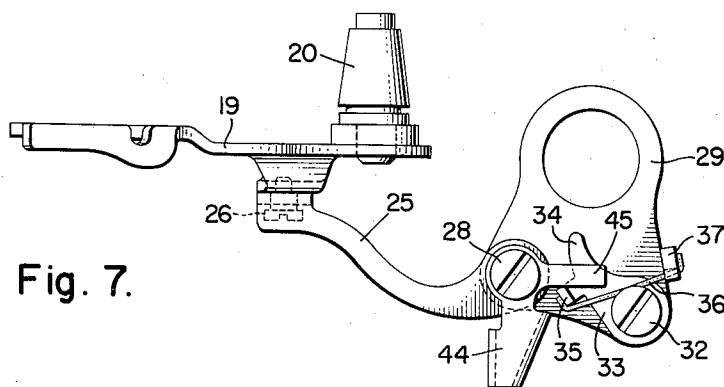
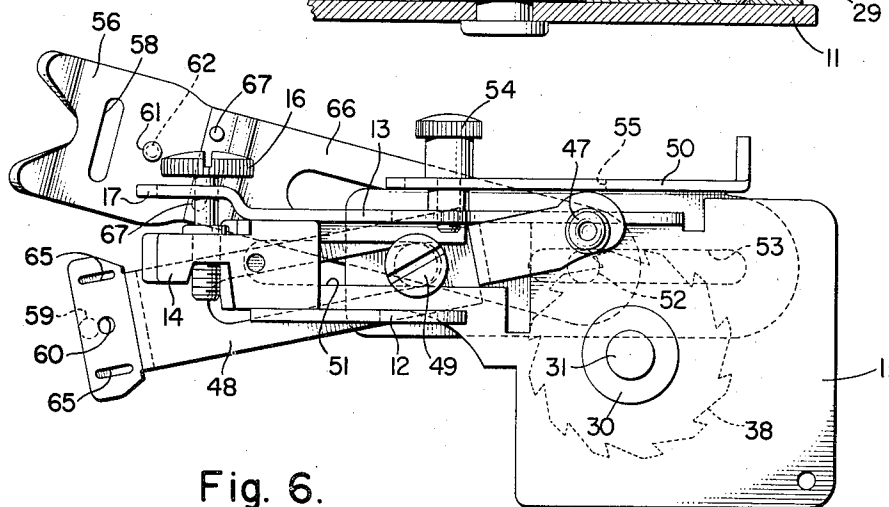
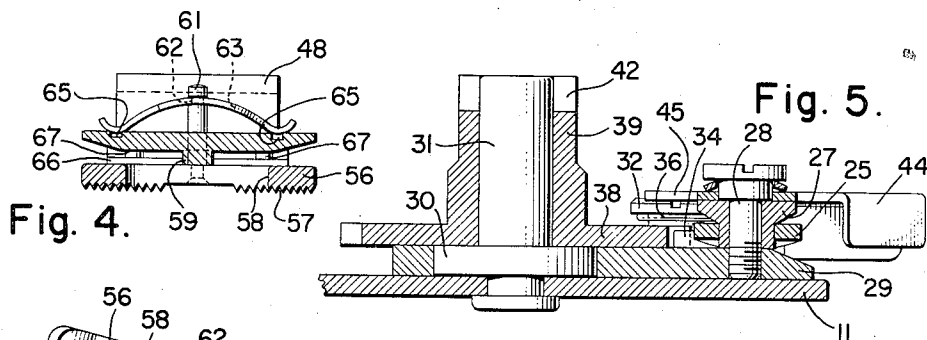
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ORNAMENTAL ZIGZAG STITCHING ATTACHMENTS

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WITNESS

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ORNAMENTAL ZIGZAG STITCHING ATTACHMENTS

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This invention relates to work jogging attachments for sewing machines and, more particularly, to an attachment adapted to operate in conjunction with the conventional drop feed mechanism of a sewing machine to jog the work fabrics transversely of the normal direction of the sewing machine feed.

As is well known in the art, sewing machines having drop feed mechanisms are provided with work supports including a throat plate in opposition to which work jogging attachments of the type to which the present invention relates are adapted to operate upon work fabrics. Throat plates, since they usually require hardening to withstand wear at the stitching point, are apt to be warped in varying degrees.

With prior work jogging attachments, erratic jogging movement of the work is commonly experienced when the throat plate is even slightly warped, since in these prior attachments the work engaging foot is fixed to or formed as an integral part of a rigid shank member and, therefore, cannot readily assume the varying inclinations of a warped throat plate.

It is an object of this invention to provide a self-leveling work-engaging foot for a work jogging attachment capable of effecting positive and consistent jogging movement of a work fabric even when arranged in opposition to a badly warped throat plate.

Another object of this invention is to provide a self-leveling work-engaging foot which may be assembled readily and conveniently in a work jogging attachment.

Still another object of this invention is to provide a self-leveling work-engaging foot for a work jogging attachment having a novel position of adjustment so as to accommodate insertion into the attachment of a novel subassembled actuating mechanism therefor.

With the above and other objects and advantages in view as will hereinafter appear, this invention comprises the devices, combinations, and arrangements of parts hereinafter described and illustrated in the accompanying drawings of a preferred embodiment in which:

Fig. 1 represents a top plan view of an attachment having my invention applied thereto and in which the pattern cam is removed and only the pattern cam outline is illustrated by a dotted line.

Fig. 2 represents a left hand side elevational view of the attachment of Fig. 1 including portions of a sewing machine presser bar and needle bar and in which the pattern cam is illustrated in cross section.

Fig. 3 represents a right hand side elevational view of the attachment shown in Fig. 1, with the pattern cam sectioned and in operative position.

Fig. 4 is an enlarged cross-sectional view of the work-engaging foot of the attachment taken substantially along line 4-4 of Fig. 2.

Fig. 5 is an enlarged cross-sectional view taken substantially along line 5-5 of Fig. 1.

Fig. 6 represents a top plan view of the base of the attachment with a portion of the actuating mechanism

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assembled thereon and positioned properly to receive the remaining subassembly of parts.

Fig. 7 represents a top plan view of the subassembly to be added to the attachment illustrated in Fig. 6.

Referring to the drawings, Figs. 1, 2 and 3 illustrate an assembled and operable work jogging attachment having my invention applied thereto, save that in Fig. 1 the pattern cam has been removed to illustrate more clearly the mechanism of the attachment. The attachment frame comprises a flat base plate 11 formed with spaced upstanding ears 12, 13 between which is secured a block 14 socketed to engage a sewing machine presser bar 15. As illustrated in Figs. 2 and 3, the attachment frame is adapted to be secured to the presser bar in place of the customary sewing machine presser foot by means of a fastening screw 16 which is held captive in a slotted projection 17 extending from the ear 13 of the attachment frame.

The work jogging motion of the attachment is derived from the endwise reciprocatory motion of a conventional sewing machine needle bar 18 by means of a forked actuating lever 19 which is secured to a stud shaft 20 journaled in the upstanding ears 12 and 13 of the attachment frame and held in place by a spring clip 21. The actuating lever 19 embraces a clamp device 22 by which a needle 23 is secured in the extremity of the needle bar and the lever is formed with a depending lever arm 24 to which a connecting link 25 is pivoted as by a shouldered screw 26. At its other extremity, as best illustrated in Fig. 5, the connecting link embraces a shouldered bushing 27 carried on a pivot screw 28 threaded into an oscillating pawl carrying plate 29 which is journaled for turning movement on an enlarged flange portion 30 of an upstanding stud shaft 31 fixed in the base plate 11 of the frame. Carried on a pivot screw 32 threaded into the pawl carrying plate is a pawl 33 formed with a ratchet engaging finger 34 and with an upstanding ear 35. A spring 36 coiled about the pivot screw 32 is disposed with one extremity engaging a notched lug 37 formed on the pawl carrying plate and with the other extremity hooked about the pawl ear 35 so as to bias the ratchet engaging finger of the pawl into operative engagement with the teeth of a ratchet wheel 38 freely journaled on the stud shaft 31.

The ratchet wheel is provided with a hub 39 upon which a bore 40 formed in a pattern cam 41 is adapted to seat. The ratchet wheel hub is notched, as at 42, to accommodate lugs 43 on the pattern cam such that the pattern cam will be locked for rotation with the ratchet wheel when the cam bore is fully seated upon the hub. During each cycle of needle reciprocation, therefore, the pawl finger 34 will be oscillated so as to play across one tooth of the ratchet wheel and to turn the ratchet wheel and the pattern cam by an amount equivalent to the angular displacement of the ratchet wheel teeth. A throw-out lever 44 for the pattern cam actuating mechanism is carried on the pivot screw 28 and is formed with an arm 45 extending opposite the upstanding ear 35 of the pawl. The throw-out lever may be turned clockwise, as viewed in Fig. 1, to shift and hold the pawl out of cooperation with the ratchet wheel.

Since the pattern cam is carried on the upstanding free extremity of the stud shaft 31 and the ratchet wheel hub 39, one cam may be substituted for another simply by lifting one cam off the ratchet wheel hub and dropping another in place. The bottom face of the pattern cam is formed with a sinuous annular cam groove 46 of which the particular configuration will determine the pattern of work jogging movements to be performed by the attachment. The cam groove 46 is tracked by a roller follower 47 carried on the rear extremity of a driving lever 48 which is offset so as to extend between the ratchet wheel 38 and the pattern cam 41. The lever

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48 is disposed generally lengthwise of the attachment and is slidably pivoted with respect to the attachment frame on a fulcrum pin 49 which is fixed on a bight adjusting slider 50. The slider 50 is confined for movement lengthwise of the attachment frame by means of the pin 49 which is slidable in a slot 51 formed lengthwise in the base plate 11 of the attachment frame as well as by a shouldered rivet 52 which is fixed in the base plate of the attachment frame and is slidably embraced by a slot 53 formed lengthwise in the slider 50. A clamp screw 54 threaded into the upstanding ear 13 of the attachment frame is disposed in the clearance slot 55 formed in the slider and serves to clamp the slider in any selected position of adjustment lengthwise of the attachment frame. By means of the slider 50 the position of the fulcrum pin 49 may be selectively adjusted toward or away from the roller follower on the lever 48, thus effectively varying the lever arms of the lever 48 so as to provide an adjustment of the bight or width of the work jogging motion imparted by any particular pattern cam.

The driving lever 48 at its forward extremity is pivoted resiliently to a work feeding foot 56 which is formed with a serrated work engaging sole plate 57 and with a transversely elongated needle accommodating aperture 58. Figs. 1, 2, 3 and 4 best illustrate the resilient pivotal connection between the lever 48 and the work feeding foot. The driving lever 48 has struck from its bottom face a button 59 adapted to bear against the work feeding foot and is also formed with a clearance aperture 60 adapted loosely to accommodate a pivot pin 61 extending upwardly from said feeding foot. At its upper extremity, the pin is formed with an annular groove 62 adapted to cooperate with a keyhole-shaped slot 63 of a leaf spring 64. The leaf spring extremities seat in shallow notches 65—65 formed in the lever 48.

The presser foot 56 is anchored to the attachment frame by means of a flat resilient shank or lever 66 preferably formed as a leaf spring and secured, as by rivets 67—67, to the presser foot and held in pivotal relation to the attachment frame on the rivet 52 by an enlarged head 68 thereof. The shank 66 with the presser foot 56 attached thereto is thus a work engaging member which is driven from side to side by the driving lever 48 which is disposed in substantially parallel relationship with said resilient shank 66.

The resiliency of the shank 66 provides a flexible support for the presser foot 56 which accommodates tilting of the foot in any direction so that the foot may follow automatically the possible changing contour of a throat plate which may be warped or not level. The universal connection between the presser foot 56 and the actuating lever 48 operated by the pattern cam provides a driving connection therebetween which is held tightly by the arched spring clip 64 so that the movements transmitted to the presser foot are consistent and without objectionable lost motion. The universal connection, however, is sufficiently flexible to permit yielding of the presser foot without impairing the satisfactory transmission of work jogging motion to the foot.

In addition to the advantages mentioned above, the presser foot construction of this invention provides for novel and efficient assembly of all of the actuating mechanism onto the attachment frame. The manner in which the present presser foot arrangement facilitates assembly of the actuating mechanism is indicated in Figs. 5, 6 and 7. Fig. 6 illustrates the attachment frame with only those parts assembled thereon which are secured by the fulcrum pin 49 and the rivet 52. These parts include the presser foot driving lever 48 fulcrumed on the pin 49, the resilient presser foot supporting lever 66 pivoted on the rivet 52 and the bight adjusting slider 50 which is slidably confined by both the pin 49 and the rivet 52. As illustrated in Fig. 6, when the leaf spring 64 is removed to free the driving lever 48 from the presser foot,

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the presser foot driving lever 48 may be swung to an extreme position clear of or completely beyond the axial projection of the pattern cam supporting member, which is the ratchet wheel 38. With the leaf spring removed and the parts positioned as illustrated in Fig. 6, the subassembly of actuating mechanism illustrated in Fig. 7 may be moved into proper place in the attachment frame as a unit. The subassembly including the attachment actuating lever 19, the stud shaft 20, the connecting link 25 and the pawl carrier 29 with the pawl 33 and the throw-out lever 44 mounted thereon may be incorporated into the attachment merely by inserting the stud shaft 20 into the aligned holes provided in the frame ears 12 and 13 and locking it therein by means of the spring clip 21 as illustrated in Fig. 1, and then positioning the pawl carrier 29 on the flange 30 of the stud shaft 31. As subsequent steps to complete assembly of the attachment, the ratchet wheel 38 is slipped upon the stud shaft 31, and the driving lever is returned to normal position and locked to the presser foot by the leaf spring 64. When locked to the presser foot, the driving lever will be maintained in a position, as illustrated in Fig. 1, overlying the ratchet wheel 38, that is, at the opposite side of both the ratchet wheel 38 and the oscillatory pawl carrier 29 so as to prevent inadvertent disassembly of these parts from the bearing provided by the stud shaft 20.

Insertion of the pattern cam 41 into the attachment is not considered to be part of the assembly operation since, as discussed in my prior U. S. patent application Serial No. 461,149, filed October 8, 1954, the attachment of this invention is of the type in which the pattern cam is arranged specifically for ready removal and replacement simply by lifting one cam out and dropping into place a selected replacement. The variety of stitch patterns of which the attachment is capable of producing is limited, therefore, only by the number of different pattern cam shapes which may be at hand.

Having thus described the nature of the invention, what I claim herein is:

1. In a work jogging attachment having a frame adapted to be secured to a sewing machine, a work engaging presser foot, a presser foot shank secured at one extremity to said presser foot, means at the other extremity of said presser foot shank defining a pivotal axis thereof with respect to said attachment frame, said presser foot shank being rigid for sidewise movement about said pivotal axis but having the capacity for turning movement one extremity with respect to the other about a longitudinal axis transverse to said pivotal axis, an operating lever for said presser foot, means pivoting said operating lever to said attachment frame, and a universal pivotal connection between said operating lever and said presser foot shank.

2. In a work jogging attachment having a frame adapted to be secured to a sewing machine, a work engaging presser foot, a flat leaf spring pivoted to said attachment frame and secured to said presser foot, a substantially rigid sewing machine actuated presser foot driving lever pivotally secured to said attachment frame, and a universal pivotal connection between said presser foot and said driving lever.

3. In a work jogging attachment having a frame adapted to be secured to a sewing machine, a work engaging presser foot, a flat leaf spring pivoted to said attachment frame and secured to said presser foot, a substantially rigid sewing machine actuated presser foot driving lever pivotally secured to said attachment frame, and disposed to overlie said presser foot, a pivot pin operatively connecting said driving lever with said presser foot, and spring means urging said presser foot and said driving lever into engagement.

4. In a work jogging attachment having a frame adapted to be secured to a sewing machine, a work engaging presser foot, a flat leaf spring pivoted to said attachment

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frame and secured to said presser foot, a substantially rigid sewing machine actuated presser foot driving lever pivotally secured to said attachment frame, and disposed in substantial parallel relationship with said presser foot, a button formed on said driving lever and disposed to bear against said presser foot, and a universal pivotal joint connecting said presser foot with a point on said driving lever between said button and the pivotal connection of said driving lever with said attachment frame.

5. In a work jogging attachment for a sewing machine, an attachment frame, a work engaging lever pivoted to said attachment frame, a driving lever adapted for jogging said work engaging lever, a readily separable pivotal connection between said levers, a pattern cam adapted to control the motion of said driving lever, a rotatable pattern cam supporting member, bearing means carried by said attachment frame and engageable with said pattern cam supporting member to define an axis of rotation therefor, means carried by said attachment frame and adapted to be driven by said sewing machine for imparting step-by-step rotary motion to said pattern cam supporting member in one direction of rotation, said pattern cam supporting member being disposed to extend between said driving lever and said attachment frame when said driving lever is arranged in pivotally connected relation with said work engaging lever, and a slidably pivotal connection between the driving lever and said attachment frame, said slidably pivotal connection being formed so as to permit movement of said driving lever into a position completely beyond the axial projection of said pattern cam supporting member upon separation of the pivotal connection between said levers.

6. In a work jogging attachment for a sewing machine, an attachment frame, a work engaging lever pivoted to said attachment frame, a driving lever adapted for jogging said work engaging lever, a readily separable pivotal connection between said levers, a pattern cam adapted to control the motion of said driving lever, a pattern cam supporting ratchet wheel, bearing means carried by said attachment frame and engageable with said ratchet wheel to define an axis of rotation therefor, means including a pawl carried by said attachment frame and adapted to be driven by said sewing machine for imparting step-by-step rotary motion to said ratchet wheel in one direction of rotation, said ratchet wheel being disposed to extend between said driving lever and said attachment frame when said driving lever is arranged in pivotally connected relation with said work engaging lever, and a slidably pivotal connection between the driving lever and said attachment frame, said slidably pivotal connection being formed so as to permit movement of said driving lever into a position completely beyond the axial projection of said ratchet wheel upon separation of the pivotal connection between said levers.

7. In a work jogging attachment for a sewing machine, an attachment frame, a work engaging lever pivoted to said attachment frame, a driving lever adapted for jogging said work engaging lever, a readily separable pivotal connection between said levers, said pivotal connection including a pivot pin carried by one of said levers and adapted to project through an aperture formed in the other of said levers and a spring clip detachably secured on the free extremity of said pivot pin, a pattern cam adapted to control the motion of said driving lever, a rotatable pattern cam supporting member, bearing means carried by said attachment frame and engageable with said pattern cam supporting member to define an axis of rotation therefor, means carried by said attachment frame and adapted to be driven by said sewing machine for imparting step-by-step rotary motion to said pattern cam supporting member in one direction of rotation, said pattern cam supporting member being disposed to extend between said driving lever and said attachment frame when said driving lever is arranged in pivotally connected relation with said work engaging lever, and a slidably pivotal connection

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between the driving lever and said attachment frame, said slidably pivotal connection being formed so as to permit movement of said driving lever into a position completely beyond the axial projection of said pattern cam supporting member upon separation of the pivotal connection between said levers.

8. In a work jogging attachment for a sewing machine, an attachment frame, a work engaging lever pivoted to said attachment frame, a driving lever adapted for jogging said work engaging lever, a readily separable pivotal connection between said levers, a pattern cam adapted to control the motion of said driving lever, a bearing means carried by said attachment frame, a pattern cam supporting ratchet wheel journaled on said bearing means, an oscillatory pawl carrier journaled on said bearing means between said ratchet wheel and said attachment frame, a pawl on said pawl carrier adapted to impart step-by-step rotary motion to said ratchet wheel in one direction of rotation, said ratchet wheel being disposed to extend between said driving lever and said attachment frame when said driving lever is arranged in pivotally connected relation with said work engaging lever, and a slidably pivotal connection between the driving lever and said attachment frame, said slidably pivotal connection being formed so as to permit movement of said driving lever into a position completely beyond the axial projection of said ratchet wheel upon separation of the pivotal connection of said levers so as to free both said ratchet wheel and said pawl carrier for removal or reassembly on said bearing means.

9. In a work jogging attachment for a sewing machine, an attachment frame including a base plate and a pair of spaced ears projecting from said base plate, bearing means carried by said base plate, a pattern cam supporting ratchet wheel freely engageable axially on said bearing means, an actuating linkage defining a subassembly readily detachable from said attachment frame and adapted to be driven by said sewing machine for imparting step-by-step rotary motion to said ratchet wheel in one direction of rotation, said linkage including an attachment actuating lever adapted for operative engagement with said sewing machine, a pivot pin carried by said actuating lever, an oscillatory pawl carrier, and a link pivotally connected to said actuating lever and to said pawl carrier, the spaced ears of said attachment frame being apertured to accommodate said actuating lever pivot pin, a detachable spring clip adapted to engage and lock said actuating lever pivot pin rotatably in said spaced attachment frame ears, means formed on said oscillatory pawl carrier and freely engageable axially on the bearing means on said attachment frame base plate to define a pivotal axis for said pawl carrier, and means maintaining said ratchet wheel and said pawl carrier in operable engagement with said bearing means, said means including a driving lever slidably pivoted to said frame base plate, a work engaging lever secured on a fixed pivotal axis to said attachment frame, and a readily separable pivotal connection between said driving and work engaging levers, said readily separable pivotal connection serving to maintain said driving lever in position at the opposite side of said ratchet wheel and said pawl carrier from said attachment frame base plate.

10. In a work jogging attachment for a sewing machine, an attachment frame, a work engaging lever pivoted to said attachment frame, a driving lever adapted for jogging said work engaging lever, a readily separable universal connection between said levers, said universal connection including a lug projecting from said driving lever for engagement with said work engaging lever, a pivot pin carried by said work engaging lever and having a free extremity adapted to pass through an aperture formed in said driving lever adjacent said lug, and a spring detachably secured between its ends to the free extremity of said pivot pin, said spring being adapted to engage said driving lever on opposite sides of the pivot

pin aperture formed therein, a pattern cam adapted to control the motion of said driving lever, a rotatable pattern cam supporting member, bearing means carried by said attachment frame and engageable with said pattern cam supporting member to define an axis of rotation therefor, means carried by said attachment frame and adapted to be driven by said sewing machine for imparting step-by-step rotary motion to said pattern cam supporting member in one direction of rotation, said pattern cam supporting member being disposed to extend between said driving lever and said attachment frame when said driving lever is arranged in pivotally connected relation with said work engaging lever, and a slidably pivotal connection between the driving lever and said attachment frame, said slidably pivotal connection being formed so as to permit movement of said driving lever

into a position completely beyond the axial projection of said pattern cam supporting member upon separation of the pivotal connection between said levers.

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