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ALTERNATING PRESSER-DEVICES FOR SEWING MACHINES

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2 Sheets-Sheet 1

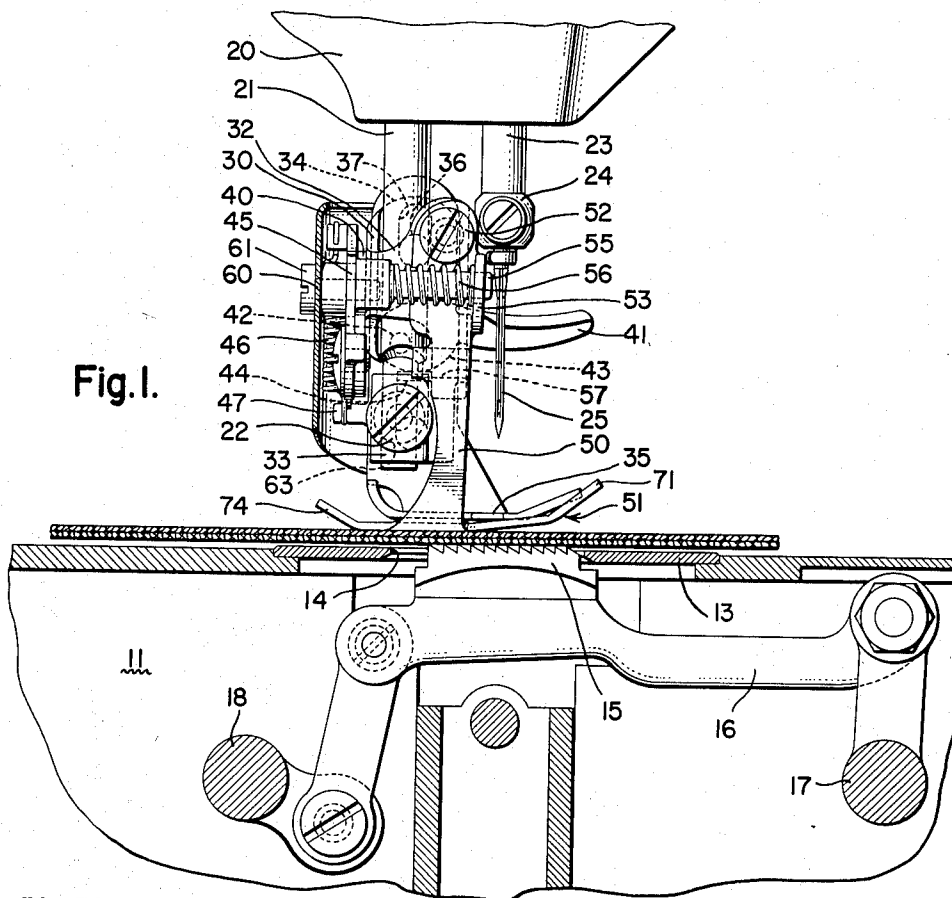


Fig. 1.

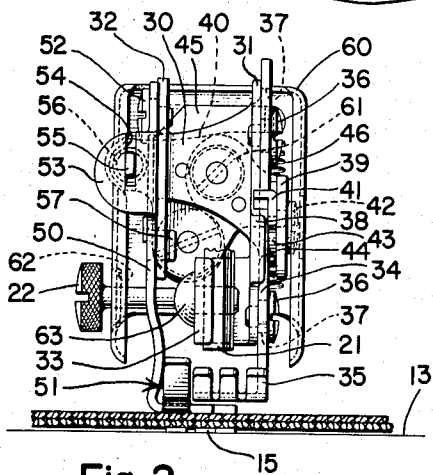


Fig. 2.

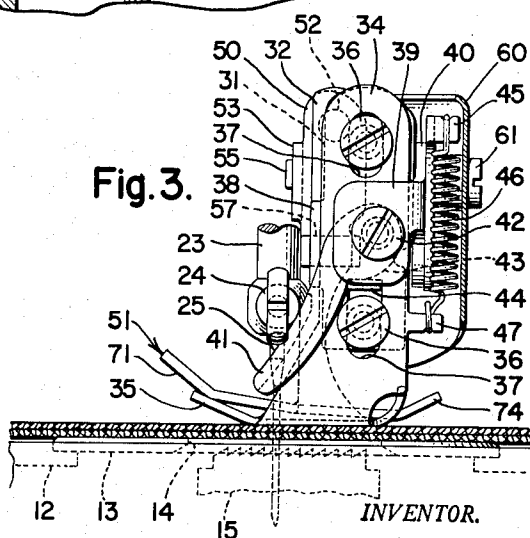


Fig. 3.

WITNESS

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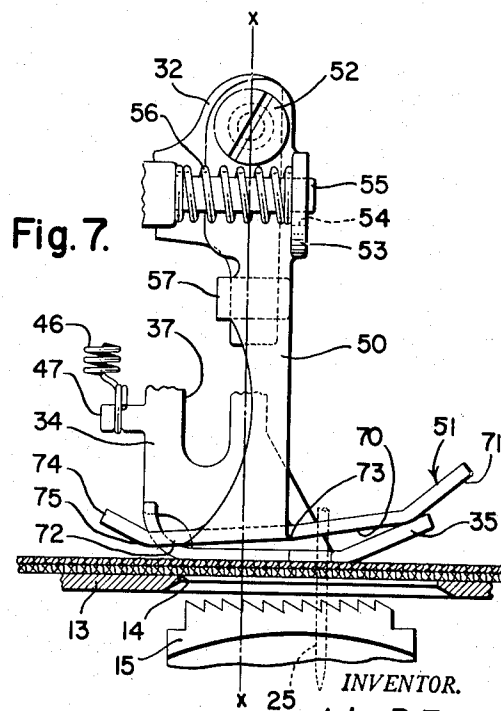
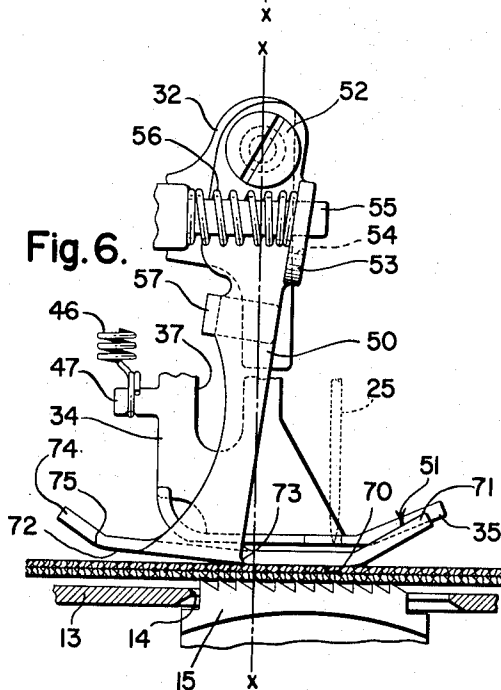
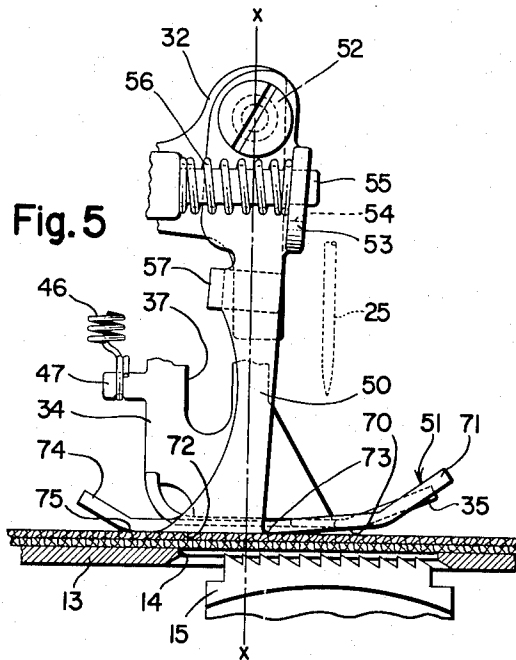
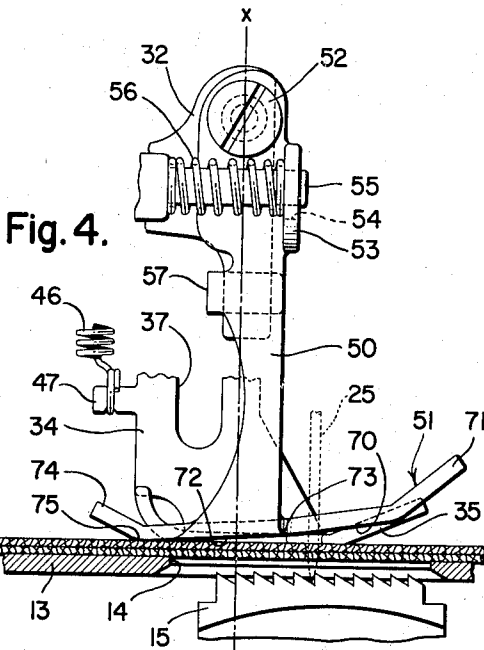
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ALTERNATING PRESSER-DEVICES FOR SEWING MACHINES

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2 Sheets-Sheet 2



WITNESS

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ALTERNATING PRESSER-DEVICES FOR SEWING MACHINES

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5 Claims. (Cl. 112—235)

This invention relates to presser devices for sewing machines and, more particularly, to improvements in alternating presser devices.

In the sewing machine art, the term "alternating presser device" is used to describe a mechanism which includes a presser member free to move in the direction of feed of the work and which presser member is alternately raised and lowered in timed relation with the work-feeding instrumentalities. An advantage of an alternating presser device is that it reduces the frictional drag which is normally imposed on the work by the usual fixed presser foot, thereby encouraging even and accurate feeding of the work.

It is an object of this invention to provide an alternating presser device for a sewing machine which exerts a minimum of drag upon the work being stitched.

It is also an object to provide, in a device of the above character, an alternating presser member which is formed and arranged to utilize its alternating movement to assist in feeding of the work.

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 thereof, in which:

Fig. 1 is a fragmentary end elevational view of a sewing machine, partly in section, and having an embodiment of this invention applied thereto;

Fig. 2 represents a front view of the alternating presser device of Fig. 1;

Fig. 3 is an elevational view of the alternating presser device taken from the side opposite that of Fig. 1;

Figs. 4, 5, 6 and 7 are enlarged fragmentary elevational views showing four consecutive positions of the needle, the alternating presser device and the feed-dog during a typical stitch-forming cycle;

Fig. 4 illustrates the parts in a position in which the needle is ascending out of the work and the feeding foot of the alternating presser device is descending into initial contact with the work;

Fig. 5 illustrates the positions of the parts at the beginning of the feeding stroke of the feed-dog;

Fig. 6 illustrates the positions of the parts at the completion of the feeding stroke of the feed-dog; and

Fig. 7 illustrates the positions of the parts during the return movement of the feed-dog while the needle is in the work.

In its preferred embodiment, my invention is shown in the drawings as an alternating presser attachment of the type disclosed in the patent to Sailer No. 2,474,282, June 28, 1949. The attachment is adapted for use with sewing machines of usual construction and the sewing machine parts are, therefore, illustrated fragmentarily in the drawings. The illustrated parts and mechanisms of the sewing machine include a frame bed 11 having a work-supporting plate 12 which is apertured in the usual manner to receive a throat-plate 13 formed with slots 14 through which the feed-dog 15 operates. The work-feeding mechanism of

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the sewing machine is carried in the bed and includes a feed-bar 16 upon which a feed-dog 15 is secured. Feed-advance and -return movements are imparted to the feed-dog by means of suitable connections with a feed-advance rock-shaft 17 journaled in the bed, while the feed-dog is lifted and lowered by means of a feed-lift rock-shaft 18 also journaled in the bed. As the feed-advance and the feed-lift rock-shafts are simultaneously actuated by the driving mechanism (not shown) of the sewing machine, cyclic "four motion" feeding movements are imparted to the feed-dog in a manner which is well known in the art.

Also illustrated fragmentarily in the drawings is a bracket-arm 20 of the sewing machine frame supported from the bed 11 in a position over the work-supporting plate 12 and the throat-plate 13. Journaled vertically in the bracket-arm is a presser-bar 21 which is spring biased downwardly toward the work support in the usual manner (not shown) and which is drilled and tapped transversely at its lower extremity to accommodate an attachment fastening screw 22. Journaled for vertical reciprocation in the bracket-arm 20 adjacent the presser-bar is a needle-bar 23 provided at its lower extremity with a needle-clamp 24 in which is fixed a needle 25.

Referring more particularly to Figs. 1, 2 and 3, the alternating presser attachment of this invention comprises a frame member 30 having spaced forwardly extending arms 31 and 32. The arm 31 of the frame member is formed with an L-shaped extension 33 which is apertured to accommodate the attachment fastening screw 22 and is adapted to embrace the lower extremity of the presser-bar.

Slidably secured for vertical reciprocation on the arm 31 of the frame member 30 is a shank portion 34 of a presser-foot 35. The shank 34 is secured to the arm 31 by means of shouldered screws 36—36 which pass through vertically aligned slots 37—37 in the presser-foot shank and are threaded into the arm 31 of the frame. The presser-foot shank is also guided in its vertical sliding movement by means of an inturned lip 38 formed on the arm 31, and by one forwardly extending arm 39 of a U-shaped bracket 40 which is secured to the frame member 30. The arm 39 of the bracket 40, however, serves primarily to support an actuating lever 41 which, as best illustrated in Fig. 3, is pivoted to the arm 39 by a screw 42. The lever 41 is disposed in the path of the needle-clamp 24 for actuation thereby, and is formed with a cam surface 43 which bears against an outturned follower lug 44 formed on the presser-foot shank 34 so as to cam the presser-foot 35 downwardly at each down stroke of the needle-bar. Secured to the bracket 40 at the rear of the attachment is an anchor member 45 which supports one end of a coil spring 46, of which the other end is secured to a finger 47 extending rearwardly from the presser-foot shank 34, thereby to bias the presser-foot shank yieldingly upwardly and to maintain the follower lug 44 in constant engagement with cam surface 43.

The forwardly extending arm 32 of the attachment frame 30 serves to support a shank portion 50 of a feeding foot indicated generally as 51. The shank portion 50 is pivoted to the arm 32 by means of a shouldered screw 52 so that the foot 51 may oscillate in the direction of feed of the feed-dog 15. An outturned finger 53 on the shank portion 50 is slotted as at 54 to accommodate a forwardly extending arm 55 of the bracket 40. A coil spring 56 is seated about the arm 55 and bears against the outturned finger 53 so as to bias the feeding foot forwardly. In order to limit the forward movement of the feeding foot, the shank portion 50 is formed with a forwardly extending stop lug 57 which is inturned to embrace the arm 32 of the attachment frame 30.

As best shown in Figs. 1, 2 and 3, a sheet metal attachment cover 60 is secured to the attachment frame 30 by

a screw 61. The cover 60 is apertured at 62 to accommodate the attachment fastening screw 22, the screw 22 being formed with a conical enlargement 63 of larger diameter than aperture 62 so as to prevent complete removal and possible loss of the attachment fastening screw.

From the above description, it will be apparent that as the needle-bar 23 reciprocates, the presser-foot 35 will be cammed downwardly by the cam surface 43 into engagement with the work and the feeding foot 51 will, consequently, be lifted on the downstroke of the needle. Moreover, the spring 26 is disposed to urge the feeding foot 51 into extreme forward position whenever the feeding foot is lifted from the work. On the upstroke of the needle, the coil spring 46 will lift the presser-foot 35 and thus allow the main presser spring (not shown) of the sewing machine to force the feeding foot 51 downwardly into work-engaging position. In these respects, the present attachment operates in a manner similar to that described in the above noted Sailer Patent No. 2,474,282, to which reference may be had for a more detailed description of the alternating operation of the presser-foot and feeding foot.

An important feature of the present invention resides in the form and arrangement of the work-feeding foot. As described above and as best illustrated in Figs. 4 to 7, the feeding foot 51 and the shank portion 50 are provided as a rigid unit, preferably formed integrally from a single sheet metal stamping. The bottom or sole-plate of the feeding foot 51 is formed with two substantially flat work-engaging surfaces, i. e., a toe portion 70 which extends rearwardly from an upturned front extremity 71, and a heel portion 72 which adjoins the toe portion 70 at vertex 73 and which extends rearwardly to a juncture 75 with an upturned rear extremity 74. The upturned front and rear extremities 71 and 74 respectively do not normally engage the work but are provided to prevent the work from catching on the feeding foot.

In each of the Figs. 4 through 7, the line X—X denotes the trace of a plane which is perpendicular to the work-supporting surface (i. e. either the work-support 12 or the throat-plate 13) and which plane contains the pivotal axis of the feeding foot 51 as determined by the pivot screw 52. When the feeding foot is raised as in Fig. 7, or when it is descending into contact with the work as in Fig. 4 so that the shank 50 is biased by the spring 56 to the forward limit as determined by the stop-lug 57, the heel portion 72 of the sole-plate occupies an inclined position with respect to the work-supporting surface, the inclination being downwardly in the direction of feed of the feed-dog 15. In this position, the heel portion 72 extends on both sides of the plane X—X and the lowermost part of the feeding foot sole-plate, at 75, first contacts the work at a point rearwardly of plane X—X in the direction of feed as shown in Fig. 4. The downward force exerted by the descending feeding foot 51 to the work fabrics is thus applied at a rearward inclination to the work-support, and continued downward movement of feeding foot 51, therefore, gives rise to a force component in the direction of feed which causes the foot and the work to shift in the direction of feed to the position as shown in Fig. 5, in which the foot 51 has turned sufficiently so that heel portion 72 is substantially parallel with the work-support 13. This work-feeding action is the result of the inclination and arrangement of the sole-plate of the feeding foot and is not dependent upon the motion of the feed-dog 15. By this construction, the descending motion of the feeding foot is utilized to augment the action of the feed-dog in advancing the work. Moreover, when the feed-dog 15 is raised into contact with the work, as shown in Fig. 5, the feeding foot 51 has already begun its movement in the direction of feed. A smoother feeding action is thus obtained since the feeding foot overcomes its own inertia.

As the advance stroke of the feed-dog 15 continues, the feeding foot 51 is carried rearwardly with the work as shown in Fig. 6 and the toe portion 70 of the sole-

plate moves into contact with the work. Since the toe portion 70 is inclined with respect to the heel portion 72, the toe portion moves into a position substantially parallel with the work-support 13 at the completion of the feeding cycle. The proper inclination of the toe portion prevents the forward end of the feeding foot from becoming the only part of the feeding foot in engagement with the work at the end of the feed-dog stroke which would be disadvantageous in that it would tend to return the feeding foot in a direction opposite that of the feed of the work.

It has been found that when used with a sewing machine having a maximum stitch length of 6 stitches per inch, optimum results are obtained with an angle of 6 degrees between the toe portion 70 and the heel portion 72 of the sole plate, and with the heel portion 72 formed such that when in the position determined by the stop-lug 57, the portion 72 forms an angle of 1.5° to 3° with the throat-plate 13. The above-mentioned values are descriptive of the preferred embodiment and are not intended as limitations.

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

1. An alternating presser device for a sewing machine having a frame including a work support and a bracket-arm overhanging said work support, said device comprising a member slidably supported in said bracket-arm for movement toward and away from said work support, means actuated by said sewing machine for alternately raising and lowering said member, a work-feeding member including a foot portion and a shank portion rigidly secured to said foot portion, means pivoting said shank portion to said slidably supported member for oscillation in a plane, said work-engaging foot being formed with adjoining heel and toe portions arranged in tandem in said plane of oscillation, said heel and toe portions each having a substantially planar work-engaging sole-plate surface associated therewith, said surfaces being inclined with respect to each other at an angle of less than 180° and means effective when said slidably supported member is raised for urging said work feeding member to a position in which the work engaging foot will extend on both sides of a line perpendicular to said work support and intersecting the pivotal axis defined by the means pivoting said shank portion to said slidably supported member.

2. An alternating presser device for a sewing machine of the type having a work support, work-feeding mechanism carried beneath said work support and effective to feed the work in one predetermined direction with respect to said work support, and a presser-bar disposed above said work support, a frame member adapted to be secured to said presser-bar, means actuated by said sewing machine for alternately raising and lowering said frame member, an integral, rigid work-feeding foot pivoted directly to said frame member to swing in the direction of feed of said sewing machine, spring means effective to bias said feeding foot about its pivot in a direction opposite the work feed when said frame member is raised, stop means arranged between said feeding foot and said frame member to limit movement of said feeding foot in response to said spring means, said feeding foot having angularly arranged heel and toe portions, each of said portions being formed with a work-engaging sole-plate surface, said surfaces being arranged in tandem in the direction of feed of said work-feeding mechanism, said stop means arranged to position said feeding foot when the frame member is raised so that said heel portion is inclined upwardly in the direction opposite that of the work feed of the sewing machine and disposed such that a line which is perpendicular to the work support and which intersects the pivotal axis of said feeding foot will pass through the heel portion of said feeding foot.

3. An alternating presser attachment for a sewing machine having a work support, work-feeding mechanism carried beneath said work support, and a presser-bar dis-

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posed about said work support, an attachment frame adapted to be secured to said presser-bar, means actuated by said sewing machine for alternately raising and lowering said attachment frame, a work-feeding foot pivoted to said attachment frame to swing in the direction of feed of said sewing machine, spring means effective to bias said feeding foot about its pivot in a direction opposite the work feed when said attachment frame is raised, stop means arranged between said feeding foot and said attachment frame to limit movement of said feeding foot in response to said spring means, said feeding foot having an angular sole-plate formed of two work-engaging surfaces arranged in tandem in the direction of feed of said work-feeding mechanism, said surfaces formed such that when said feeding foot is biased against said stop means that one of said work engaging surfaces which extends forwardly in the direction of feed forms an angle of 1.5° to 3° with said work support and intersects a line which is perpendicular to the work support and which passes through the pivotal axis of said feeding foot.

4. In a sewing machine having a flat work support, and a feed-dog operating through said work support to transport work fabrics from the front and toward the rear of the sewing machine, a feeding foot opposed to said feed-dog and pivotally mounted for work-feeding movements with said feed-dog, means for raising and lowering said feeding foot, said feeding foot having front and rear substantially flat work-engaging surfaces relatively inclined to each other in tandem in the direction of feed, and spring means effective when said feeding foot is raised for urging said feeding foot into a position in which each work engaging surface is upwardly inclined toward the front of the sewing machine and in which a line perpendicular to said work support and intersecting the pivotal axis of said feeding foot will pass through said rear work engaging surface.

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5. An alternating presser device for a sewing machine having a work support, work-feeding mechanism carried beneath said work support, and a presser-bar disposed above said work support, comprising a frame member adapted to be secured to said presser-bar, means actuated by said sewing machine for alternately raising and lowering said frame member, an integral, rigid work-feeding foot pivoted directly to said frame member to swing in the direction of feed of said sewing machine, spring means effective to bias said feeding foot about its pivot in a direction opposite the work feed when said frame member is raised, stop means arranged between said feeding foot and said frame member to limit movement of said feeding foot in response to said spring means, said feeding foot being formed with a substantially planar work-engaging sole-plate surface which is so arranged on said foot as to occupy a position downwardly inclined in the direction of feed of said work-feeding mechanism when said feeding foot is biased against said stop means, said inclined sole plate surface being so arranged on said foot that when said feeding foot is biased against said stop means said surface extends on both sides of a plane which contains the pivotal axis of said feeding foot and which is parallel to the direction of the raising and lowering movement of said frame member.

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