

May 9, 1939.

J. P. WEIS

2,157,372

PRESSER FOOT DEVICE

Filed June 24, 1936

2 Sheets-Sheet 1

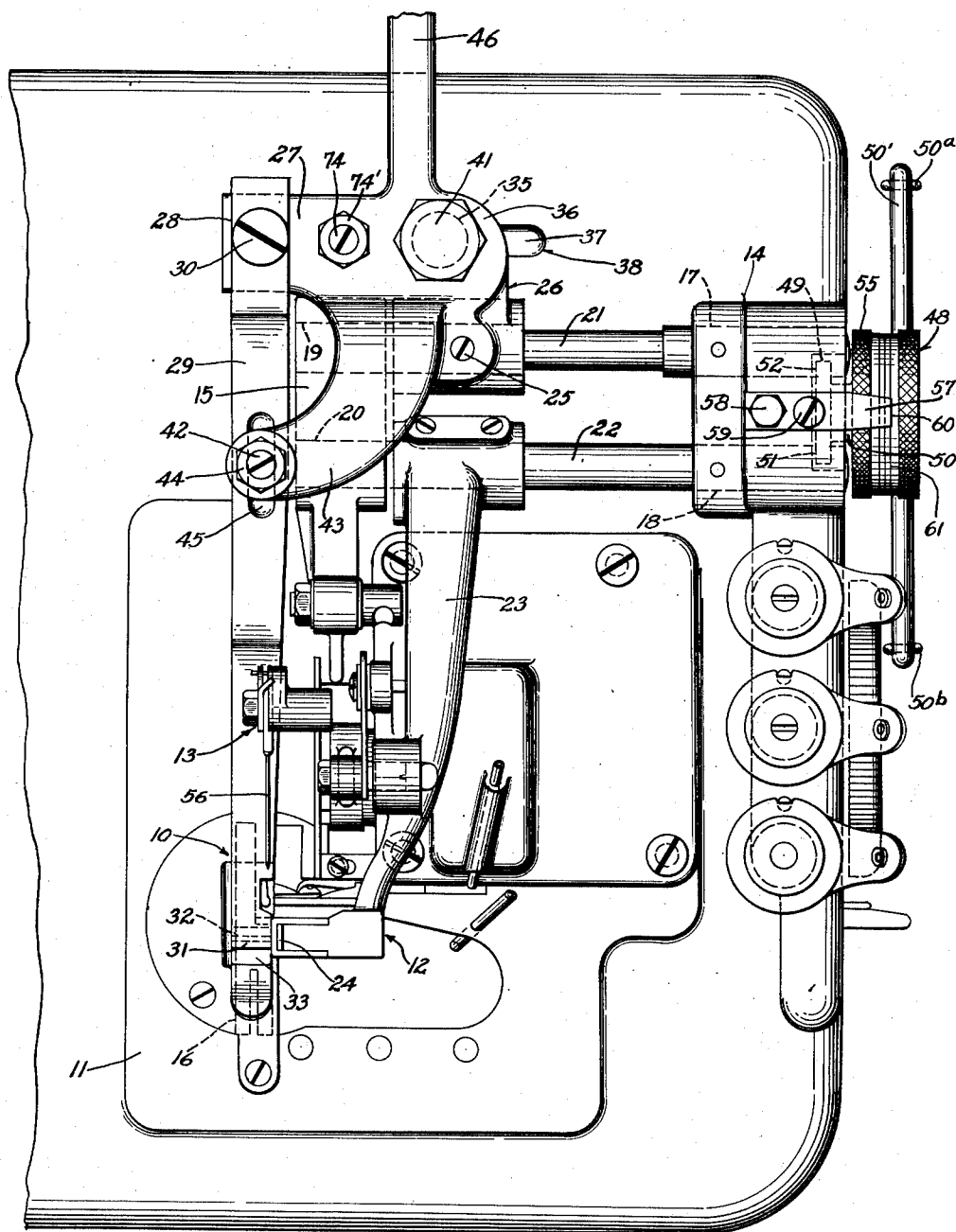


Fig. 1

BY

INVENTOR
JOHN P. WEIS
William Feyer
ATTORNEY

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J. P. WEIS

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2 Sheets-Sheet 2

Fig. 2

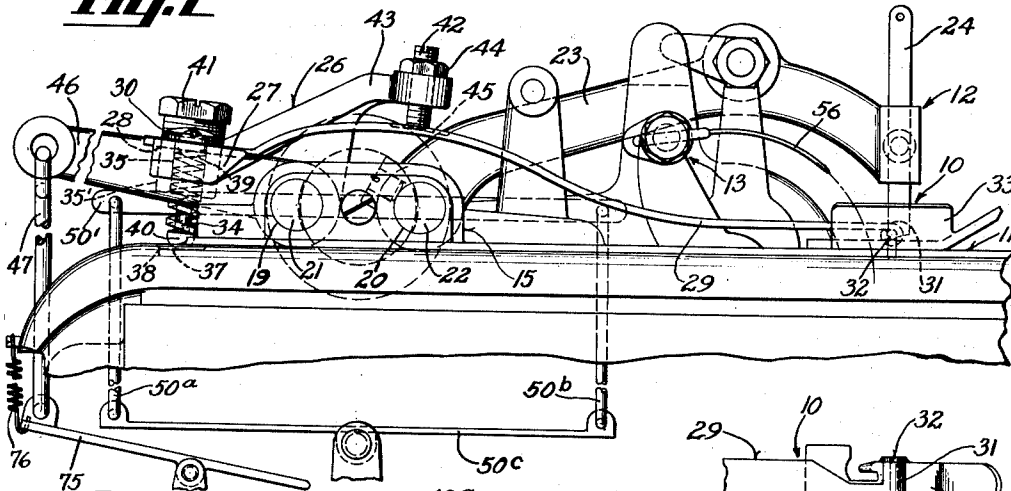


Fig. 3

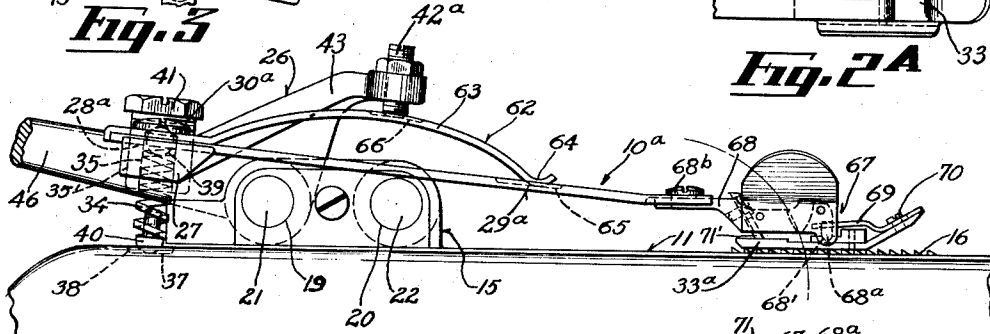


Fig. 2A

Fig. 3A

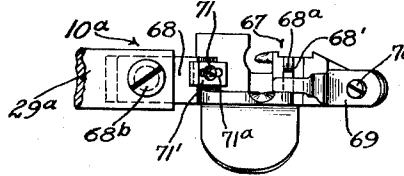


Fig. 4

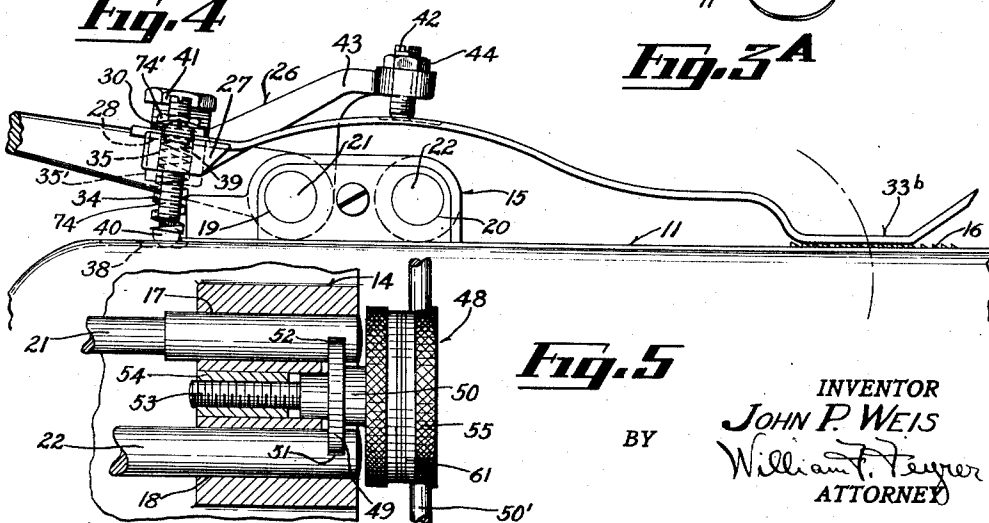


Fig. 5

BY

INVENTOR
JOHN P. WEIS
William F. Feyrer
ATTORNEY

UNITED STATES PATENT OFFICE

2,157,372

PRESSER FOOT DEVICE

John P. Wels, Nyack, N. Y., assignor to Willcox
& Gibbs Sewing Machine Company, New York,
N. Y., a corporation of New York

Application June 24, 1936, Serial No. 86,922

34 Claims. (Cl. 112—235)

My invention relates to an improved presser foot device for sewing machines, and the present application is a continuation in part of my co-
pending application Serial No. 27,773, filed June 21, 1935, and my related parent application Serial No. 11,488, filed March 16, 1935.

An important object of the invention is to provide a presser foot device which will advantageously operate with a feed dog to insure a positive movement of the materials being sewed even when the machine is operated at very high speeds.

A further object of the invention is to provide a presser foot device which will automatically and readily compensate for irregular seams in the material being stitched and fed, as well as for variations in the thickness of the material.

A still further object of the invention is the provision of a presser foot device for sewing machines which may be readily adjusted to vary the pressure with which the presser foot urges the material toward the feed dog.

The present invention may be particularly advantageously incorporated in sewing machines of the overedge stitching type, but it is to be understood that the applicability of the invention is not to be so limited. In sewing machines of the overedge stitching type it has heretofore been proposed to provide a relatively long presser foot carrier arm to the free end of which there has been attached a presser foot. In these heretofore developed devices, however, the long presser foot arm has been a casting or other long solid member, backed usually by a single spring. With such a structure there is very little yield for great thicknesses of material and to ride over seams or other inequalities in the thickness of the work. To obviate the above mentioned deficiencies in the heretofore developed presser foot devices and to achieve the objects set forth above there is provided as an important feature of the invention a presser foot mechanism which includes a presser foot carrier arm in the form of a spring strip upon which a presser-foot is provided adjacent its outer or free end.

A further feature of the invention resides in providing a sewing machine presser foot mechanism having a pivotally supported carrier to which there is secured a presser foot carrier arm in the form of a spring strip, and having a secondary spring overlying the carrier arm with a portion engaging the latter intermediate its length, the secondary spring and the carrier arm constituting in effect a double leaf spring which facilitates the yielding of the presser foot for cross seams, additional thicknesses of material,

and the like. Also, this structure provides a presser foot mechanism exceptionally responsive to high speeds.

Still another feature of the invention resides in the provision of a sewing machine mechanism which includes a presser foot carrier arm in the form of a spring strip, and which is shiftable transversely relative to the line of feed.

Yet another feature of the invention consists in the provision of a sewing machine presser foot mechanism including a presser foot carrier arm in the form of a spring strip in which the pressure with which the presser foot is urged toward the feed dog may be regulated.

A further feature is the provision in one form of a carrier arm with an integral presser foot, and in another form a carrier arm upon which variously shaped presser feet may be easily and quickly interchanged.

In high speed sewing machines it is particularly important that the presser foot be fully and quickly responsive to the high speed action of the feed dog. If such is not the case there results a failure of the presser foot to hold the material down onto the feed dog and consequently a failure to feed the work properly, in which event stitches are irregularly spaced or may pile upon each other.

In sewing machines of the conventional overhanging arm type the presser foot is carried by a reciprocating bar positioned directly over the feed dog. With this construction the action of the presser foot is usually made responsive to the movements of the feed dog by the provision of a coil spring associated with the presser foot bar. In machines of the overedge stitching type, the bar or arm carrying the presser foot is usually supported and oscillated on a pivot positioned remote from the feed dog. As pointed out above the presser foot carrier member has heretofore been of a nonyielding or rigid construction, the rigid arm being backed by a spring remote from the presser foot to urge it toward the feed dog and intended to be responsive to the movements thereof. While this latter construction has proved to be partially satisfactory, because of the solid lever between the pivot and the presser foot and the remotely located spring, the responsiveness of the presser foot to the movements of the feed dog has not been sensitive enough to achieve complete satisfaction, especially in machines operated at very high speeds.

To the end of providing a presser foot mechanism which is particularly satisfactory for use with a sewing machine of the overedge stitching

type, the presser foot mechanism forming the subject matter of the present invention is constructed with a presser foot carrier arm which is pivotally supported at a point remote from the feed dog and which, because of the novel yielding construction throughout its length, is highly responsive to the movements of the feed dog even when the machine is operated at very high speeds.

In actual tests the novel feeding mechanism of the present invention has worked satisfactorily at speeds of 7000 stitches per minute without variations in the spacing of stitches. Also it has proven capable of feeding all kinds of fabrics, especially delicate rayon and similar fabrics, some of which are not more than .005 thick, without upturning the fabric. These advantageous factors are accomplished by the highly responsive and yielding mechanism provided by the present invention.

The conventional type of presser foot mechanism, with the foot attached to the bottom end of a vertical shaft or bar, operating in spaced vertical bearings, obtains pressure by a spring made of wire surrounding the bar or placed in the bar, or a flat spring giving pressure to the bar and foot, has proven inefficient to meet the requirements at these high speeds. Excessive pressures, as high as 16 lbs. have been used to cause such a presser foot mechanism to respond to the rapid movements of the feed and even under such conditions, variations in the spacing of stitches occur. The stitches become shorter and shorter as the speed is increased, due to the inability of the presser foot mechanism to keep step with the movements of the feed to accurately feed the work. Then too, these high pressures cannot be used because the feed teeth rupture the delicate fabrics, causing small cuts which damage the fabric and make the garments unsalable.

The pivotal or hinge action of the presser foot of the present invention is nearly in line with the lengthwise movement of the feed dog, thus avoiding any cramping action, and reducing to a minimum the friction of the pivotal action caused by the thrust of the feed dog.

The presser foot and the spring type of presser foot carrier arm to which it is attached, or of which it may be an integral part, have their weight reduced to a minimum to avoid bounding or bouncing action. These parts, while being made very light, are yet strong, and quite rigid laterally, but flexible vertically.

The average lift of a feed dog above the throat plate is equal to the depth of the feed teeth, approximately $\frac{1}{8}$ ". It therefore follows that the presser foot is lifted from the throat plate, $\frac{1}{8}$ " at each feed stroke. This necessitates the flexing of the presser foot carrier or spring. The spring is made long to meet this requirement, and to increase its rapidity and accuracy of movement, an auxiliary spring is employed at the opposite side of the pivotal mounting for the presser foot. This spring is arranged with a screw for independent adjustment so that the tension of the spring may be varied. The tension of this spring acts with the tension of the presser foot carrier spring. Adjustment is also provided to regulate and create independent pressure on the presser foot carrier spring. These two springs and presser foot, associated with the carrier secured to the pivotal shaft, enable the presser foot to follow the feed at the highest speeds at which it is safe to sew. Moreover, it accommodates itself to varying thicknesses of

goods, feeding over seams, feeding on and off of the goods with ease.

By reason of my improvements, the pressure required on the presser foot to accurately feed the goods, is reduced from 16 lbs., to 8 and not more than 12 lbs. for practical stitching operations.

By the use of the two springs, arranged as shown, with independent adjustments, the load on the machine's operating mechanism is greatly reduced, for it is well known by those skilled in the art that the load of the presser foot mechanism on the average sewing machine imposes higher duties on the mechanism of the machine from the source of power delivered to the machine by the drive belt through the main shaft, and all operating mechanism up to the feed surface which acts against the presser foot.

A machine operating at 6000 R. P. M., lifting a presser foot $\frac{1}{8}$ " at this speed, with an average pressure of 10 lbs., equals a lift of 31.25 feet per minute, or 312.5 foot pounds. From this, we obtain an appreciation of the importance of the improvements through the high duties imposed upon such a mechanism when operating at such high speeds. Even the slightest reduction in weight of the parts enables a reduction in the tension on the springs, and also an immediate reduction in noise, wear and tear on the mechanism and pounding action on the materials being stitched, and as a result of such improved construction, delicate fabrics may be stitched at higher speeds than heretofore possible.

Some additional features and advantages resulting from the attainment of these objects include: a presser device which may be lifted and/or shifted laterally by other than hand manipulation; a presser device wherein pressure on the spring which urges the presser foot toward the feed dog is entirely relieved when moved to the inoperative position rather than increased as in the usual presser devices; stops to regulate the lift and angle of the presser foot relative to the feed dog; and, the ready accessibility and detachability of the simplified parts enables the operator to change presser feet or flexible supports without difficulty.

Other and more specific objects and features residing in advantageous forms, combinations and relations of parts will hereinafter appear.

In the drawings:

Figure 1 is a top view of a sewing machine provided with one form of the presser foot mechanism constituting the subject matter of the present invention, certain of the operating parts of the sewing machine being omitted in order to more clearly illustrate the invention.

Fig. 2 is a side view of the presser foot mechanism shown in Fig. 1.

Fig. 2A is a fragmentary top view of that form of presser foot mechanism shown in Fig. 2.

Fig. 3 is a side view of a modified form of the presser foot mechanism.

Fig. 3A is a fragmentary top view of the mechanism shown in Fig. 3.

Fig. 4 is a side view of yet another modified form of the presser foot mechanism.

Fig. 5 is a detail view showing the mechanism for shifting the presser foot transversely relative to the line along which the material is being fed.

Referring to the drawings, and first to Figs. 1 and 2 there is disclosed a presser foot mechanism embodying the present invention in operative association with an overedge stitching machine disclosed and described fully in my copending

application Serial No. 27,773. It is to be understood that the presser foot mechanism is capable of use with other types of overedge stitching machines and also with various other types of sewing machines, the particular machine disclosed being utilized for the purpose of illustration only.

The sewing machine, which is described in detail in my copending application above referred to, includes a work plate 11 on which there is positioned in addition to the presser foot mechanism, a trimming mechanism 12, a stitching mechanism 13, and various thread guiding and tensioning devices. On the upper face of the work plate there are provided a pair of upstanding lugs 14 and 15 spaced from each other transverse of the line along which material is fed by the co-operation of a feed dog 16 and the presser foot mechanism.

Carried in and rotatably and slidably associated with bearings 17 and 18 in the upstanding lug 14 and bearings 19 and 20 in the upstanding lug 15 are a pair of rods 21 and 22 respectively. Secured to the rod 22 is a cutter carrying arm 23 with which there is associated a trimmer or cutter 24. Secured to the rod 21 by means of a screw 25 is a carrier 26 which forms a part of the presser foot mechanism constituting the subject matter of the present invention.

The carrier 26 is provided with a finger 27 having formed therein a channel 28 adapted to receive a presser foot carrier arm 29 preferably in the form of a spring strip and in the present disclosure in the form of a relatively long flat spring. The channel 28 holds the carrier arm 29 against lateral displacement, while a screw 30 holds it against vertical displacement relative to the carrier.

It is to be observed that the rod 21, which serves as the pivotal axis of the carrier 26, is located remote from the feed dog 16. Secured to the outer or free end 31 of the spring carrier arm 29 by means of a pin connection 32 is a presser foot 33 which may be of any desired construction. Because of the pin connection disclosed it is possible to associate presser feet of various shapes and types with the carrier arm depending upon the particular requirements of the work being done.

The presser foot carrier arm 29, being in the form of a spring strip enables the presser foot 33 to exert substantial pressure on the materials in their relation with the feed dog 16 which may be given a four-way or like movement by any of the now well-known feeding mechanisms, yet enables the presser foot to yield for coarse seams, supplementary thicknesses, and the like, in the work as it is fed rearwardly through the machine.

Furthermore, because of the provision of the presser foot carrier arm 29 in the form of a long flat spring the presser foot 33 is made very responsive to the movements of the feed dog 16 thus insuring a uniform feed of the material relative to the stitching mechanism even though the machine be operated at very high speeds. Failure to provide a presser foot mechanism which is particularly sensitive and responsive to the movements of the feed dog results in an entire or a partial lack of feeding which causes an uneven and improper stitch formation.

The main pressure of the presser foot 33 toward the work plate 11 and the feed dog 16 is accomplished by means of a coil spring 34 positioned in a suitable bore 35 of a hollow screw

stud 41 adjustable in a threaded hole 35' in a portion 36 of the carrier 26 which extends from the pivotal axis thereof on the side opposite the feed dog. The spring 34 is supported on a flat sliding surface 37 which constitutes the bottom of a recess 38 formed in the work plate and extending parallel to the rotatable and axially slidable shaft 21 which forms the pivotal support for the carrier 26. Preferably the coil spring 34 is provided at its upper and lower ends with balls 39 and 40. The lower ball enables a more ready sliding of the spring relative to the sliding surface 37 when the carrier is shifted transverse the line of feed. The ball 39 at the upper end of the spring engages the upper end of the bore 35 in the hollow screw stud 41 by means of which it is possible to regulate the pressure on the spring and in turn the pressure with which the presser foot 33 is urged toward the feed dog 16. The use of one or both of these balls is not absolutely necessary but does tend to make the presser foot device more efficient.

An auxiliary or secondary means for regulating the pressure with which the presser foot 33 is urged toward the feed dog 16 comprises a regulating screw 42 carried by a finger portion 43 of the carrier 26. This regulating screw is positioned to overlie and to engage a portion of the spring carrier arm 29 intermediate its free end and the portion which is secured to the carrier in the channel 28. A lock nut 44 may be advantageously used to maintain the screw in any desired adjusted position.

Preferably, and as shown the portion of the carrier arm 29 which is engaged by the screw 42 is formed with a recess or channel 45. This recess in addition to serving as a means for centering the carrier arm relative to the carrier 26 also serves to prevent an adverse shifting of the presser foot 33 relative to the needle 56. A further advantage flowing from the use of the secondary adjusting mechanism disclosed is that it serves the advantageous purpose of preventing adverse strains on the screw 30 which might be applied thereto because of the substantial length between the screw 30 and the presser foot 33 and makes possible the use of lighter and more responsive mechanism for high speed operation.

As a means for lifting the presser foot 33 into an inoperative position relative to the work plate 11 and the feed dog 16 there is provided an arm 46 which extends rearwardly of the carrier 26. Preferably, adjacent the outer end thereof this rearwardly extending arm is connected by a linkage 47 to any usual type of foot treadle knee or hand operating connection.

In order that the presser foot mechanism 10 may be shifted transversely relative to the line of feed there is provided and shown one form of shifting mechanism 48. Normally, shifting mechanisms for this purpose include cams which are adapted to move the presser foot mechanism positively in one direction and depend upon springs to shift it in the opposite direction. The present invention provides direct mechanical connections dispensing with all springs for this purpose so that the presser device is positively moved both in right and left hand directions relative to the line of feed and stitching.

As disclosed, the shifting mechanism 48 is adapted not only to shift the presser foot device in the manner above indicated, but to coordinately shift the trimming mechanism 12 in a similar manner.

The shifting of the trimming mechanism 12

and also of the presser foot mechanism 10 is accomplished through the provision of a flange 49 on a stud 50 adapted to enter a slot 51 in the rod 22 carrying the trimming mechanism and a slot 52 in the rod 21 which pivotally supports the carrier 26 of the presser foot mechanism. A screw thread 53 on the stud 50 has a connection with a threaded sleeve 54 adapted to be secured in the upstanding lug 14 in any suitable manner.

A large knurled head or knob 55 is provided on the stud 50 to facilitate a manual rotation of the stud. If preferred the knob may be provided with a lever 56' connected as by wires 56a and 56b to any usual knee or foot treadle 56c. When the stud or lever 56' is turned in a right hand or clockwise direction the rods 22 and 21 through the flange 49 are moved in a left hand direction to move the trimming mechanism 12 and the presser foot mechanism relatively closer to: the needle 56, the line of stitching and the line of feeding. When the stud 50 or lever 56' is turned in a left-hand direction the flange moves the shafts in the opposite direction.

A finger 57 suitably secured to the top of the upstanding lug 14, as by screws 58 and 59, is provided with an end 60 adapted to cooperate with peripheral groove graduations 61 on the knob 55 to indicate the extent of lateral shifting of the presser foot mechanism 10 and the trimming mechanism 12 when the knurled knob 55 is rotated.

A modified form of presser foot mechanism 10a disclosed in Figs. 3 and 3A differs from the form disclosed in Figs. 1, 2 and 2A primarily in that the presser foot carrier arm 29a, preferably of lighter material than the arm 29, is made up somewhat like a double leaf spring construction to facilitate the yielding of the presser foot for cross seams, additional thicknesses of material, and the like. In the modified form the carrier arm 29a is in the form of a spring strip clamped in the channel 28a with the screw 30a in the same manner as the carrier arm 29 disclosed in Figs. 1 and 2. In this modified form, however, there is provided an auxiliary or secondary spring 62 in order to obtain the desirable action of a leaf spring effect between the carrier 26 and the presser foot 33a. This secondary spring 62 is preferably provided with a central bowed portion 63 and is, as shown, connected to the carrier arm 29a in the channel 28a with the screw 30a, and has an end portion 64 which is engageable with the carrier arm 29a preferably in a recess 65 intermediate its length.

The main pressure control for regulating the pressure with which the presser foot 33a is urged toward the feed dog 16 is provided, as in the case of the presser foot mechanism first described, by means of the coil spring 34 and adjusting stud 41. However, because this is remote from the presser foot and feed dog there is a considerable lag or delayed responsiveness which is overcome in a marked manner by the carrier arm in the form of a spring strip as provided by the present invention.

An auxiliary or secondary pressure control is provided in the modified form including an adjusting screw 42a carried by the finger portion 43 of the carrier 26 and positioned above and engageable with the central bowed section 63 of the auxiliary spring 62 preferably in a recess 66 formed therein. With this modified construction it is possible to utilize a much lighter weight material in the spring carrier arm 29a and to there-

by obtain more responsive action in the presser device.

If desired, the presser foot may be connected to the carrier arm 29a in the manner disclosed in Fig. 3 rather than in the manner disclosed and described in Figs. 1 and 2. In the construction shown in Fig. 3 there is provided between the presser foot 33a and the carrier arm a connection 67 comprising an interponent 68 having a transverse lug 68a entering a transverse slot 68' in the presser foot at the top thereof. Thus, the presser foot is pivotally connected directly to the interponent and connected indirectly to the carrier arm 29a by means of the connection 67, and is normally maintained thereon by means of a spring 69 which at one end overlies the interponent and at its opposite end is secured to the presser foot by a screw 70 whereby it is possible to merely snap divers presser feet onto the interponent.

An adjustable stop including a screw 71 and plate 71' with an elongated slot 71a in the latter limits movement of the presser foot relative to the interponent 68. The adjustable stop 71' for regulating the tilt or angle of the foot attached to the flexible member is of importance. With it, pressure can be brought to bear on the heel of the foot to prevent clatter and rattle when the machine is chaining out at high speed, making stitches when there is no work under the foot. This adjustment permits rocking of the foot to accommodate different sizes of seams, different thicknesses of work, and at other times, it may be adjusted to limit the rocking action. In other cases, it may be adjusted to tilt the toe of the foot slightly upward, leaving an opening between the presser foot bottom and the surface of the throat plate to more readily receive the work from the hands of the operator. The accessibility and the detachability of the simplified parts of this construction enable one to interchange presser feet or flexible supports without difficulty. In fact, the detachability of the foot bottom from one design to another, is reduced to a most simple operation that can be cared for by any operator.

A screw 69b serves to secure the interponent to the carrier arm; but, if preferred and as will be readily appreciated the interponent 68 and carrier arm 29a may be made in one piece similar to the carrier arm 29.

The modified form of presser foot mechanism disclosed in Fig. 4 differs from the one disclosed in Figs. 1 and 2 only in the fact that instead of providing a presser foot separate from the presser foot carrier arm, a presser foot 33b is formed integral therewith. Presser feet made integral with the flexible arm member are found very useful on machines for serging operations on clothing and other kinds of work where no hinge action is necessary.

As shown in Figs. 1 and 2, the carrier 26 may be pivotally moved on the rod 21 to lift the presser foot clear of the feed dog 16 without using one's hands by merely pulling down on the rod 47, which is connected to the carrier 26, until the stop screw 74 engages the plate 11 as by a suitably located knee or foot treadle 75 connected thereto. A nut 74' serves to lock the stop screw in any desired station. The stop screw prevents lifting the presser foot too high, which may cause damage to the loop spreader, which moves over the presser foot in the formation of stitches. If preferred a spring 76 connected to the rod 47 or treadle 75 at one end and to the plate 11 as shown, or bench supporting the machine may be pro-

vided to offset the weight of the rod 47 and the treadle 75. Similarly the treadle 50c and rods 50a and 50b hereinbefore described enable the operator to shift the presser device transversely relative to the line of feed during operation of the machine and without use of hands.

The flexible member supporting the presser foot is relieved of its pressure and tension when the presser foot is lifted. Thus, the major portion of the tension of the presser foot is relieved when the presser foot is lifted. The reverse of this is what takes place in all the machines usually because the compression of the spring and its tension is downward, directly in line with the pressure of the presser foot, and to lift the presser foot, the spring and tension of the springs are increased. This imposes extra effort on the part of the operator each time the presser foot is lifted, either by hand or by foot.

It is the opposed spring members, such as the coiled spring 34 and flat spring 29 of the first form of the invention, for example, which assist greatly in keeping the presser foot in engagement with the work or material gently and firmly at all times.

Preferably the spring strips forming the carrier arms of the present invention are made of hardened and tempered spring steel. However, phosphor bronze and other yielding or spring materials may be used. Also the spring strips may be in a round form of some shape other than the flat shape shown, for economy or efficiency, but are preferably flat in order to facilitate connection thereof to the carrier 26 and adjustment by the screw 42.

Variations and modifications may be made within the scope of this invention and portions of the improvements may be used without others.

Having thus described the invention what is claimed as new is:

1. A sewing machine presser foot mechanism cooperable with a feed dog, including in combination a pivotally supported carrier; a carrier arm in the form of a spring strip secured to and movable with said carrier and having a free end; a presser foot on said carrier arm; and spring means associated with said pivotally supported carrier to urge the latter and the presser foot toward the feed dog.

2. A sewing machine presser foot mechanism cooperable with a feed dog, including in combination a pivotally supported carrier; a carrier arm in the form of a flat spring secured to said pivoted carrier and having a free end; a presser foot on said carrier arm; and spring means associated with said pivotally supported carrier and spaced from the pivotal axis thereof on the side opposite the presser foot.

3. A presser foot mechanism for sewing machines including in combination a carrier; a carrier arm in the form of a long spring strip, extending to one side of said carrier, having a portion supported by and secured thereto, and having a free end; and a presser foot pivotally supported by said carrier arm on the free end, remote from said supported portion.

4. A presser foot mechanism for sewing machines including in combination a pivotally supported carrier; a carrier arm secured to and movable with said carrier; a presser foot on said carrier arm at one side of and spaced from the pivotal axis of said carrier; and yielding means associated with said carrier, spaced from the pivotal axis thereof on the side opposite said presser foot.

5. A sewing machine presser foot mechanism

cooperable with a feed dog, including in combination a carrier arm in the form of a flat spring, having a free end and a supported end; a presser foot on the free end; and means engaging said carrier arm between said supported and free ends for regulating the pressure of the presser foot upon the feed dog.

6. A presser foot mechanism for sewing machines, cooperable with a feed dog, including in combination a carrier arm in the form of a flat spring, having a free end and a supported end; a presser foot on the carrier arm; and a secondary spring, overlying said carrier arm and having a portion engaging the latter intermediate the free and supported ends.

7. A sewing machine presser foot mechanism cooperable with a feed dog, including in combination a carrier arm in the form of a flat spring, having a free end and a supported end; a presser foot on said carrier arm; a secondary spring having a central bowed section, overlying said carrier arm and having a portion engaging the latter intermediate the free and supported ends; and means for pressing on the bowed section of said secondary spring for regulating the pressure of the presser foot toward the feed dog.

8. A sewing machine presser foot mechanism cooperable with a feed dog, including in combination a carrier; a carrier arm in the form of a flat spring, connected to said carrier and having a free end; a presser foot on the free end; and a secondary spring, having a central bowed portion, connected to said carrier and having a portion engaging the carrier arm intermediate the free and supported ends.

9. A sewing machine presser foot mechanism cooperable with a feed dog, including in combination a pivotally supported carrier shiftable transversely relative to the line of feed; means for transversely shifting said carrier; a carrier arm in the form of a flat spring, connected to said carrier and having a free end; and a presser foot on the free end.

10. A sewing machine presser foot mechanism cooperable with a feed dog, including in combination a pivotally supported carrier; means for shifting said carrier transversely relative to the line of feed; a carrier arm in the form of a flat spring, secured to and movable with said carrier and having a free end; a presser foot on the free end; spring means associated with said carrier to urge the latter toward the feed dog; and an arm on said carrier for moving the latter away from the feed dog.

11. A sewing machine presser foot mechanism cooperable with a feed dog, including in combination a pivotally supported carrier, having a bore at one side of the pivotal axis; a carrier arm on said carrier, having a free end; a presser foot on the free end; a plate; a coil spring in said bore and supported on said plate; and means movable in said bore for varying the pressure on said coil spring, whereby the pressure with which the presser foot is urged toward the feed dog may be regulated.

12. A sewing machine presser foot mechanism cooperable with a feed dog, including in combination a pivotally supported carrier, having a bore; means for shifting the carrier transversely relative to the line of feed; a carrier arm on said carrier, having a free end; a presser foot on the free end; a sliding surface; a coil spring in said bore and supported on said sliding surface; and means movable in said bore for varying the pressure on said spring, whereby the pressure with

which the presser foot is urged toward the feed dog may be regulated.

13. A sewing machine presser foot mechanism cooperable with a feed dog, including in combination a pivotally supported carrier, having a bore; a carrier arm in the form of a spring strip having a portion secured to said carrier and having a free end; a presser foot on the free end; a supporting plate; a coil spring in said bore and supported on said plate; means movable in said bore for varying the pressure on said spring; and a secondary adjusting means engageable with said carrier arm intermediate the secured portion and free end for regulating the pressure with which the presser foot is urged toward said feed dog.

14. A sewing machine presser foot mechanism cooperable with a feed dog, including in combination a carrier; a carrier arm in the form of a spring strip, having a free end and a supported end; a presser foot on the free end; a portion of said carrier arm intermediate the free and supported ends thereof, having a recess therein; and means on said carrier above said carrier arm and engageable therewith in said recess, for regulating the pressure with which the presser foot is urged toward the feed dog and to prevent adverse shifting thereof.

15. A sewing machine presser foot mechanism cooperable with a feed dog, including in combination a pivotally supported carrier shiftable transversely relative to the line of feed; means for shifting the carrier; a carrier arm in the form of a yielding spring strip, having a portion secured to said carrier and having a free end; a presser foot on the free end; a secondary spring connected to said carrier at one end and engageable with said carrier arm intermediate the free and secured ends; spring means associated with said carrier on the side opposite the presser foot; and means engageable with the secondary spring for regulating the pressure with which the presser foot is urged toward the feed dog.

16. A sewing machine presser foot mechanism cooperable with a feed dog, including in combination a pivotally supported carrier; a carrier arm including a spring strip, secured to said carrier and having a free end; and means on the free end for interchangeably supporting variously shaped presser feet.

17. In a sewing machine the combination of a feed dog; a carrier on the sewing machine shiftable transversely relative to the line of feed and located remotely relative to the feed dog; a carrier arm including a spring strip extending from said carrier to a point above the feed dog; a presser foot, having a transverse channel; and a lug on said carrier arm engaging said channel to locate the presser foot relative to the feed dog.

18. In a presser mechanism, for sewing machines having a feed dog, the combination of a carrier; a presser foot; and means including opposed spring members associated with said carrier and the presser foot for yieldingly urging the presser foot toward the feed dog.

19. In a presser mechanism, for sewing machines having a feed dog, the combination of a carrier; a presser foot; means including opposed spring members associated with said carrier and the presser foot for yieldingly urging the presser foot toward the feed dog; and means for moving the presser foot entirely free from the feed dog.

20. In a presser mechanism, for sewing machines having a feed dog, the combination of a carrier; a presser foot; means including opposed spring members associated with said carrier and

presser foot for yieldingly urging the presser foot toward the feed dog; and means for varying the pressure of the presser foot toward the feed dog.

21. A presser foot mechanism for sewing machines, including in combination a pivotally supported carrier; a carrier arm in the form of a spring strip, having a portion connected to said carrier and having a free end; a presser foot on the free end; and a secondary spring connected to said carrier, overlying said carrier arm and cooperable with the latter intermediate the connected portion and the free end thereof.

22. A sewing machine presser foot mechanism cooperable with a feed dog, including in combination a pivotally supported carrier; a carrier arm in the form of a spring strip, having a portion connected to said carrier and having a free end; a presser foot on the free end; spring means associated with said pivotally supported carrier to urge the latter and the presser foot toward the feed dog; and a secondary spring connected to said carrier, overlying said carrier arm and cooperable with the latter intermediate the connected portion and the free end thereof.

23. A sewing machine presser foot mechanism cooperable with a feed dog, including in combination a pivotally supported carrier; a carrier arm in the form of a spring strip, having a portion connected to said carrier and having a free end; a presser foot on the free end; spring means associated with said pivotally supported carrier to urge the latter and the presser foot toward the feed dog; and means engaging said carrier arm between the connected portion and the free end for regulating the pressure of the presser foot upon the feed dog.

24. A sewing machine presser foot mechanism cooperable with a feed dog, including in combination a pivotally supported carrier; a carrier arm in the form of a yielding spring strip, having a portion secured to said carrier and having a free end; a presser foot on the free end; a secondary spring connected to said carrier at one end and engageable with said carrier arm intermediate the free and secured ends; spring means associated with said carrier on the side opposite the presser foot; and means engageable with the secondary spring for regulating the pressure with which the presser foot is urged toward the feed dog.

25. A sewing machine presser foot mechanism for cooperation with a feed dog, including a carrier; a carrier arm in the form of a long spring strip, having a portion connected to said carrier and having a free end; a presser foot, having a transverse channel; a lug on said carrier arm, adjacent the free end thereof, engaging said channel to locate the presser foot; and means for maintaining the lug in the channel to pivotally associate said presser foot and said carrier arm.

26. A presser foot mechanism for sewing machines, including in combination a carrier; a flexible carrier arm extending to one side of said carrier, having a portion connected thereto and having a free end; a presser foot pivotally supported by said carrier arm adjacent the free end thereof, remote from said connected portion; and means for regulating the angle of said pivotally supported presser foot relative to said carrier arm.

27. A presser foot mechanism for sewing machines, including in combination a pivotally supported carrier; a flexible carrier arm extending to one side of said carrier, having a portion con-

connected thereto and having a free end; a presser foot on said carrier arm adjacent the free end thereof, remote from said connected portion; and means for moving said pivotally supported carrier to raise said carrier arm and presser foot.

28. A presser foot mechanism for sewing machines, including in combination a pivotally supported carrier; a flexible carrier arm extending to one side of said carrier, having a portion connected thereto and having a free end; a presser foot on said carrier arm adjacent the free end thereof, remote from said connected portion; and a lifting arm extending from said carrier in a direction opposite to said carrier arm, for moving said pivotally supported carrier to raise said carrier arm and presser foot.

29. A presser foot mechanism for sewing machines, including in combination a pivotally supported carrier; a flexible carrier arm extending to one side of said carrier, having a portion connected thereto and having a free end; a presser foot on said carrier arm adjacent the free end thereof, remote from said connected portion; means for moving said pivotally supported carrier to raise said carrier arm and presser foot; and stop means for limiting the pivotal movement of said carrier.

30. In a sewing machine having a work plate and a feed dog, a presser foot mechanism including a carrier; means for pivotally supporting said carrier relative to said work plate; a long flexible carrier arm supported by said carrier and extending therefrom substantially in line with the direction of the feed dog material advancing movement, said long flexible carrier arm extending over said work plate and terminating in a free end remote from said carrier; and a presser foot on said carrier arm adjacent the free end thereof, adapted to cooperate with said feed dog.

31. A presser foot mechanism having a work plate and a feed dog, including in combination a carrier arm in the form of a flat spring, having a supported end and a long portion extending therefrom, said long extending portion being adapted to extend over said work plate substantially in line with the direction of the feed dog material advancing movement and terminating in a free end remote from said supported end; a

presser foot on said free end, adapted to cooperate with said feed dog; and means engageable with said carrier arm intermediate said supported end and said presser foot for maintaining the carrier arm against shifting transverse the longitudinal axis thereof.

32. A presser foot mechanism for association with a sewing machine having a work plate and a feed dog, including in combination a carrier; a carrier arm in the form of a spring strip, supported only by said carrier and having a long portion extending therefrom substantially in line with the direction of the feed dog material advancing movement, said long extending portion being adapted to extend over said work plate and terminating in a free end remote from said carrier; a presser foot on said free end, adapted to cooperate with said feed dog; and means on said carrier above said carrier arm and engageable with the latter intermediate the presser foot and the carrier for maintaining the carrier arm in alignment with the feed dog and against adverse shifting transverse the longitudinal axis thereof.

33. In a sewing machine having a work plate and a feed dog, a presser foot mechanism comprising a carrier; a carrier arm in the form of a long spring strip, supported only by said carrier and extending therefrom substantially in line with the direction of the feed dog material advancing movement, said long spring strip extending over said work plate and terminating in a free end remote from said carrier; and a presser foot on said free end, adapted to cooperate with said feed dog.

34. In a sewing machine having a work plate and a feed dog, a presser foot mechanism comprising a carrier; a carrier arm in the form of a long spring strip, supported only by said carrier and extending therefrom substantially in line with the direction of the feed dog material advancing movement, said long spring strip extending over said work plate and terminating in a free end remote from said carrier; and a presser foot formed integral with said long spring strip at the free end thereof, adapted to cooperate with said feed dog.

JOHN P. WEIS.