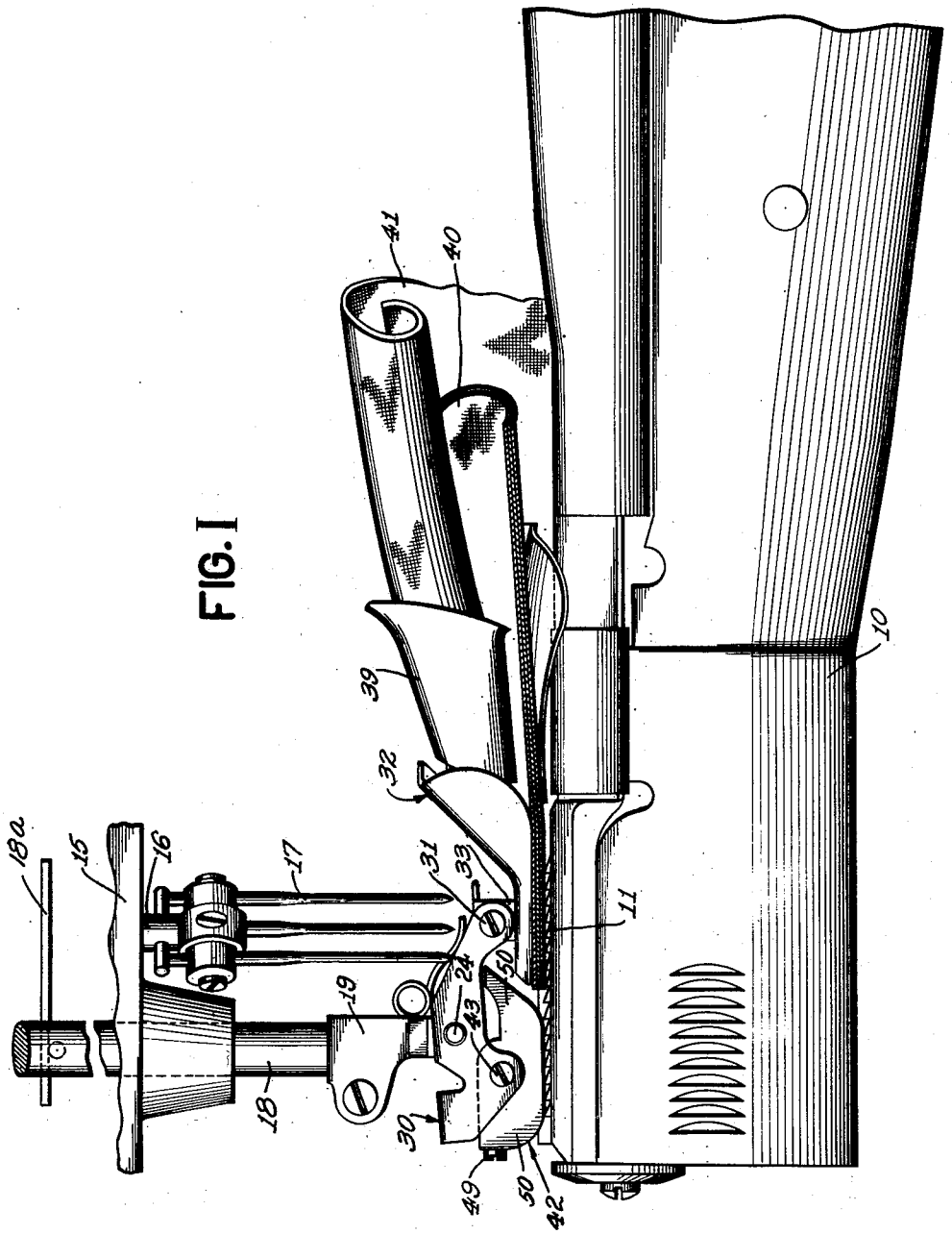
March 6, 1945. F. A. KUCERA 2,370,738

SEWING MACHINE

Filed April 17, 1941 4 Sheets-Sheet 1

FIG. 1



INVENTOR
FRANK A. KUCERA
BY
H. C. Clemens
ATTORNEY

March 6, 1945. F. A. KUCERA 2,370,738

SEWING MACHINE

Filed April 17, 1941 4 Sheets-Sheet 2

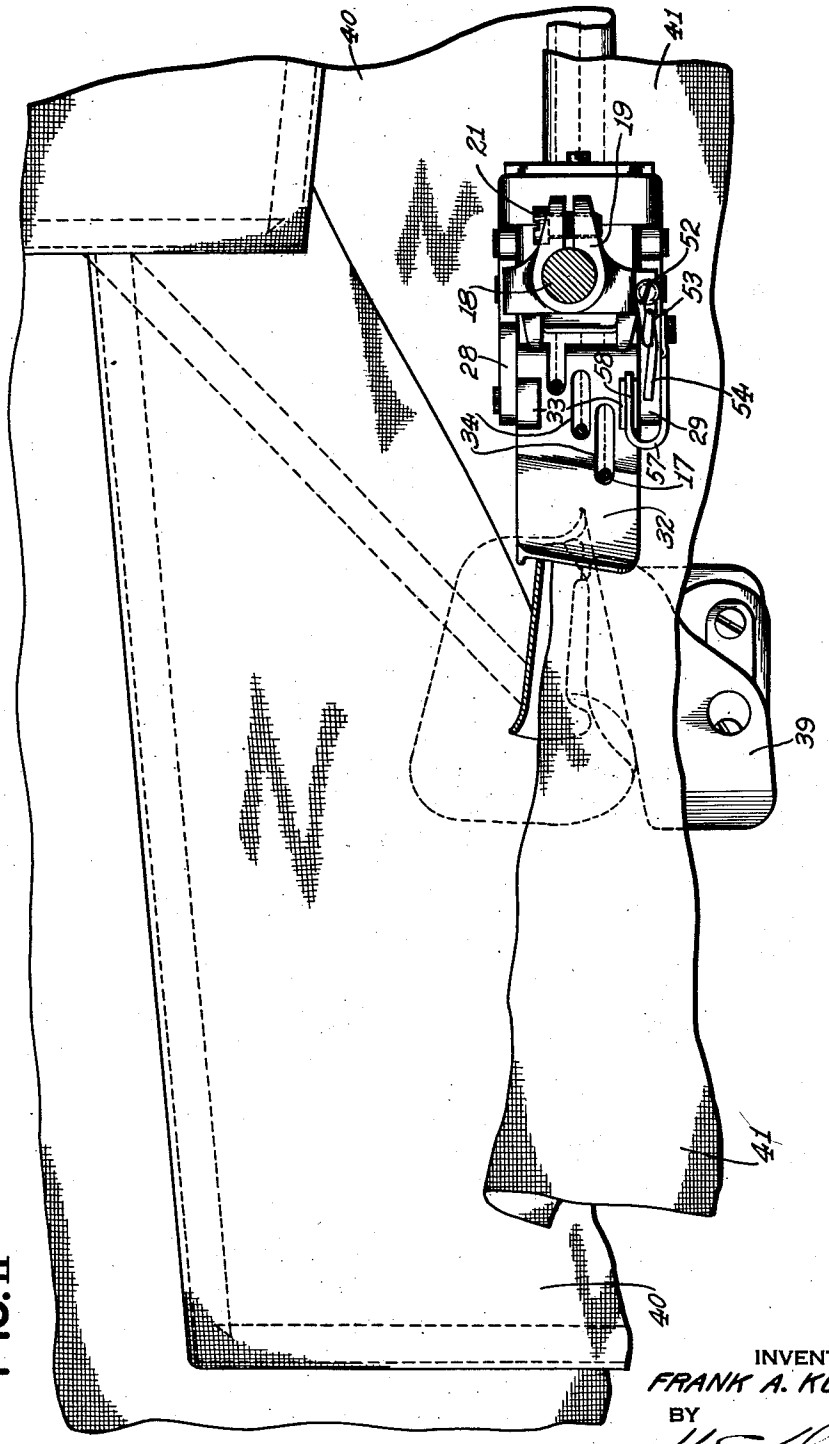


FIG. II

INVENTOR
FRANK A. KUCERA
BY
H. C. Chesney
ATTORNEY

March 6, 1945. F. A. KUCERA 2,370,738

SEWING MACHINE

Filed April 17, 1941 4 Sheets-Sheet 3

FIG. III

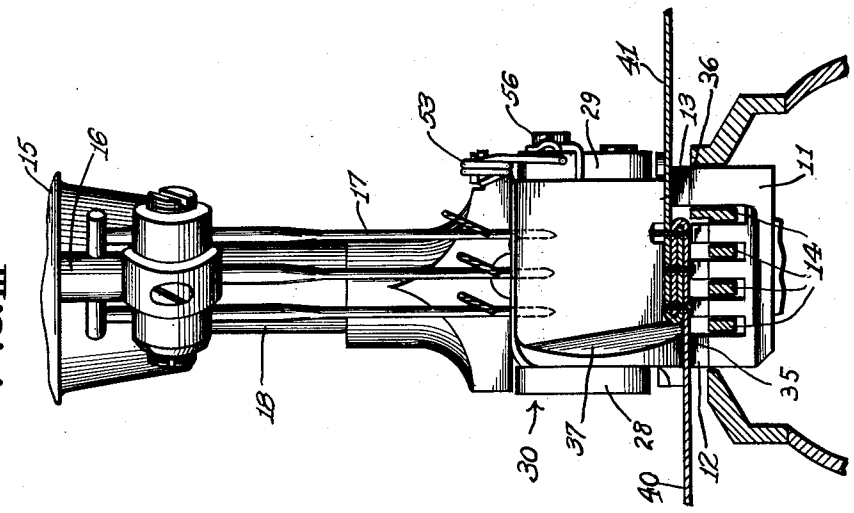


FIG. IV

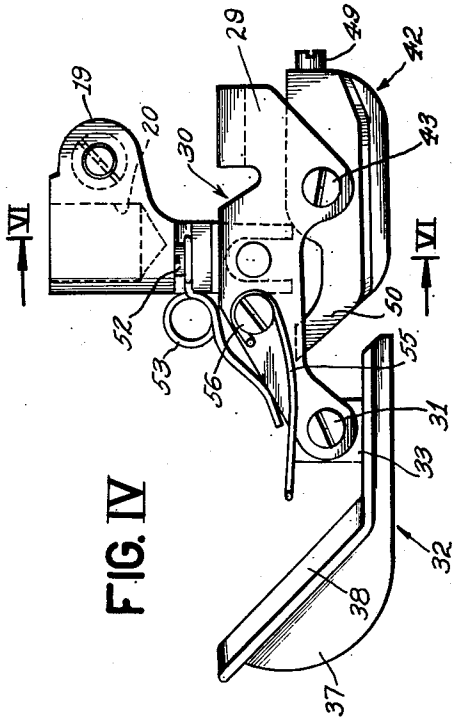
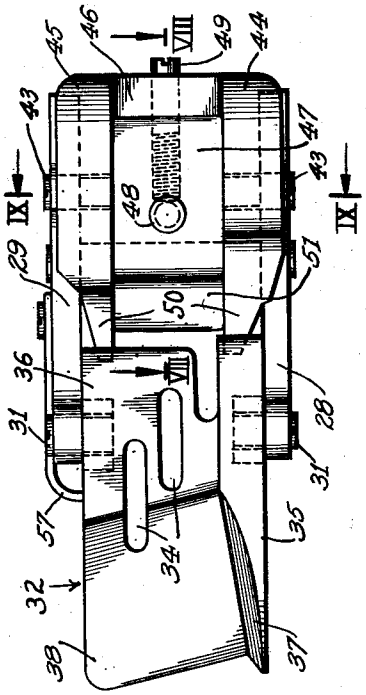


FIG. V



INVENTOR
FRANK A. KUCERA
BY
H. C. Kliesrisch
ATTORNEY

March 6, 1945. F. A. KUCERA 2,370,738

SEWING MACHINE

Filed April 17, 1941 4 Sheets-Sheet 4

FIG. IX

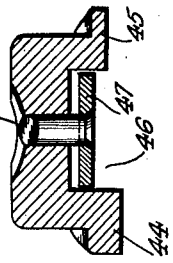


FIG. VIII

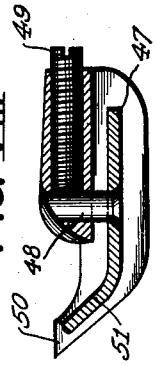


FIG. VII

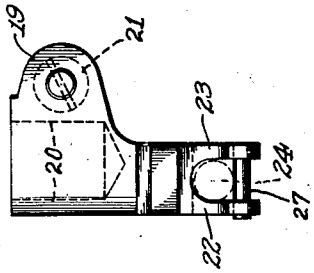


FIG. VI

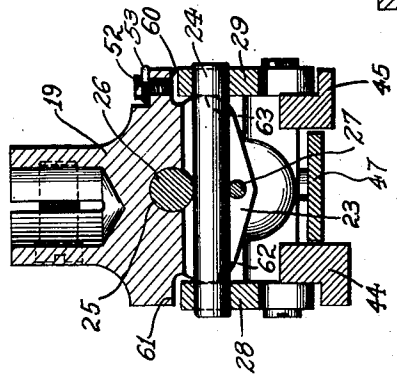


FIG. XII

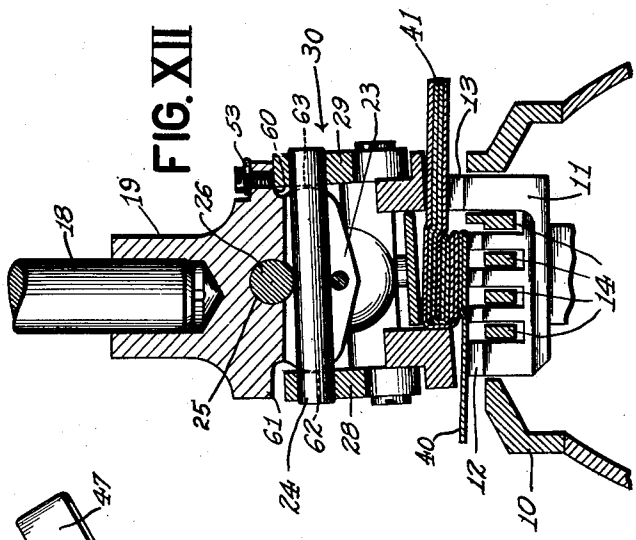


FIG. X

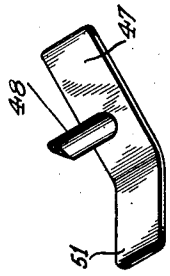
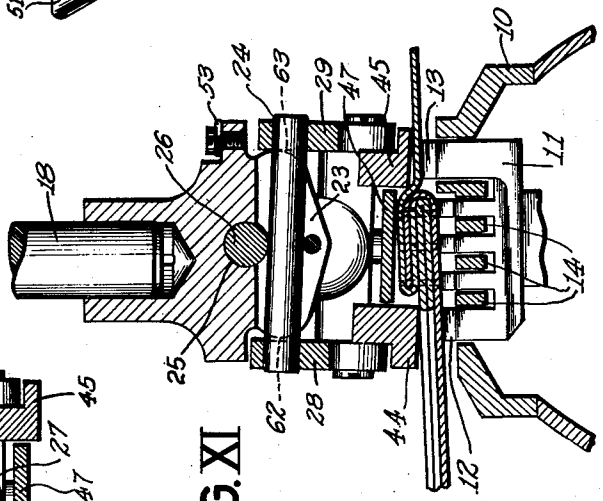


FIG. XI



INVENTOR
FRANK A. KUCERA
BY
H. C. Hieronymus
ATTORNEY

Patented Mar. 6, 1945 2,370,738

UNITED STATES PATENT OFFICE

2,370,738

SEWING MACHINE

Frank A. Kucera, Chicago, Ill., assignor to Union Special Machine Company, Chicago, Ill., a corporation of Illinois

Application April 17, 1941, Serial No. 388,924

16 Claims. (Cl. 112—235)

This invention relates to sewing machines and more particularly to the improved construction and mounting of the presser foot employed in such machines and its novel relation to the work-support and the work-feeding devices.

An object of the invention has been to provide a presser foot capable of effectively urging the work against the supporting and feeding means under a wide variety of conditions. In the sewing of garments of various sorts, and particularly those, such as overalls, formed of relatively heavy material, a problem is involved in insuring the regular and proper feeding of the material in relation to the needles and other stitch-forming devices. In forming seams, and particularly double-lap, felled seams, in various garments, such as overalls, in which the seams at points may cross other similar seams or special pocket formations or the like, a wide variation may be encountered in the number of layers of material to be dealt with by different portions of the feed dog, throat plate and presser foot. In machines specially designed for the production of double-lap, felled seams, such as those disclosed in the Thompson Patents Nos. 1,988,399 and 1,988,400, granted January 15, 1935, each side of the presser foot and the corresponding side of the feed dog will normally cooperate with only single layers of fabric while the intermediate portions of the presser foot and feed dog will be spaced sufficiently to allow the free passage of the four layers of material forming the seam. By the constructions disclosed in the Thompson patents, proper feeding of both of the felled and lapped pieces of material being stitched together is insured and in accordance with the second of these patents the main part of each section of fabric lies flat and is permitted to extend laterally without bending from the upper or lower surface of the seam. Similar provision is preferably made in accordance with the present invention.

However, in the prior constructions mentioned, difficulty is encountered if a greater number of layers or thicknesses of fabric is presented at one side of the presser foot than the other. In such a case the feeding action will take place at only one side of the seam and the desired uniform feeding of both sections of fabric will be interfered with.

An important feature of the present invention is the mounting of the presser foot upon the lower end of the presser bar in such a way that the presser foot is permitted to accommodate itself readily for effective cooperation with both sections of fabric being united along a seam, whether but a single layer or a plurality of two, three, four or more layers of material may be brought between the presser foot and the cooperating portion of the feed dog at either side of the seam. Toward this end, provision is made for the rocking of the presser foot freely in a direction transverse to the length of the seam being formed. Thus, either side of the presser foot may be raised or lowered in relation to the other side as different thicknesses of material are presented to the two sides. At the same time provision is made for the rocking of the presser foot in the direction of the length of the seam being formed so that it may accommodate itself readily to the different thicknesses of material encountered in crossing over transversely extending seams. To accomplish these results, the presser foot is so mounted on the head of the machine, and preferably at the lower end of a presser bar, as to be capable of universal movement or adjustment with respect to the latter.

A further feature of the invention is the formation of the presser foot in a plurality of sections arranged in tandem, all of the sections partaking of the universal adjustment motion mentioned and the sections themselves being independently adjustable in relation to each other.

Still another feature of the invention is the provision in a presser foot, particularly of the type adapted for cooperation with a double-lap, felled seam, in the manner explained, of an adjustable element or member arranged to cooperate with the lapped seam. The adjustment of this member may be conveniently and quickly effected so that the member may be readily set in a selected position for proper cooperation with the seam, depending upon the character of the work being dealt with. Through the adjustment of this member, more effective action of the presser foot is insured under all conditions of operation. The member may, for example, be set in one position when materials of a certain thickness are being dealt with and it may be set in another position when either thicker or thinner materials are being handled.

A primary object of the invention has been to provide a presser foot having one or more of the features and advantages set forth above and which is both simple and sturdy, economical to construct, easy to assemble and apply or remove, and efficient and reliable in its operation. Other objects, features and advantages of the invention will appear from a detailed description of an illustrative form of the same which will now

be given in conjunction with the accompanying drawings, in which:

Fig. I is a side elevation of a portion of a sewing machine embodying the invention, a portion of the work being handled also being shown.

Fig. II is a top plan view of the improved presser foot shown in relation to a double-lap seam feller and a typical item of work, the presser bar to which the presser foot is attached being shown in section.

Fig. III is a view partly in end elevation and partly in section, the presser foot and associated mechanism being shown in elevation and the work support and the work being shown in section.

Fig. IV is a side elevation of the complete presser foot shown detached from the machine.

Fig. V is a bottom view of the presser foot.

Fig. VI is a transverse section through the presser foot taken along the line VI—VI of Fig. IV.

Fig. VII is a side elevation of the presser foot shank.

Fig. VIII is a longitudiual, sectional view through the second or rear section of the presser foot, taken along the line VIII—VIII of Fig. V.

Fig. IX is a transverse sectional view through said section of the presser foot, taken along the line IX—IX of Fig. V.

Fig. X is a perspective view of an adjustable member forming part of the rear section of the presser foot, and

Figs. XI and XII are transverse sectional views through the rear section of the presser foot, showing the presser foot in relation to the work feeding and supporting means when different portions of the work are brought into cooperation with these parts.

Referring now to the drawings, the invention has been illustrated in connection with a feed-off-the-arm type of machine but it will be understood that it is adapted for use in connection with flat-bed machines as well. The machine may, in general, be of any appropriate construction and may include, for example, a work support arm 10 having mounted therein, near its forward end, a suitable four-motion feed dog 11 adapted to receive its four-motion feed cycle in any suitable way, as by the means disclosed in the patent to N. V. Christensen et al., No. 1,741,095, granted December 24, 1929. As shown in Fig. III, the feed dog is preferably of the type having different portions of its work engaging teeth 12 and 13 at different elevations. This, as disclosed in the Thompson Patent No. 1,988,400, is for the purpose of normally enabling the two sections of fabric, joined by a double-lap, felled seam, to extend laterally from the top and bottom surfaces of the seam without a bend. The portion 13 of the teeth of the feed dog, provided along one side of the latter, extends upwardly above the main portion 12 of the teeth a distance substantially equal to the thickness of three layers of the material to be sewn together. As will be understood, the feed dog has its toothed portions projecting upwardly through openings or slots provided in a throat plate 14, which permits the desired vertical and horizontal movements of the feed dog.

Above the work supporting arm 10 there is provided a head 15 in which there is slidably mounted, adjacent its forward end, a needle bar 16 adapted to carry and reciprocate one or more needles 17 (three being shown). Any suitable means may be provided for reciprocating the needle bar, such as that disclosed in said Christensen et al. patent. It will be understood that one or more loopers will be provided in the work support arm 10 to complete the stitch-forming mechanism. These loopers (not shown) may be constructed and operated in the manner disclosed in said Christensen et al. patent.

Also mounted in the head 15, for vertical reciprocation therein, is a presser bar 18 which is normally urged downwardly toward the work supporting arm 10 by means of a spring shown conventionally at 18a. Suitable manual means (not shown) may also be provided for lifting the presser bar, whenever desired, in a manner well known. At the lower end of the presser bar, there is secured a shank 19 having a socket 20 to receive the end of the presser bar. The shank is preferably of split construction and adapted to be clamped to the lower end of the presser bar by tightening a screw 21. The lower end of the shank is forked to provide a pair of spaced walls 22 and 23 adapted to receive between them a long pin 24. Above the pin 24 and substantially midway between the ends thereof the yoke is provided with a cylindrical opening 25, at right angles to the pin 24 and partially intersecting the passage formed between the walls 22 and 23. In the opening 25 is inserted a pin 26 which is adapted to bear upon the upper surface of the pin 24. Directly beneath the pin 24 and in vertical alignment with the pin 26 is a smaller retaining pin 27 carried by the walls 22 and 23. This construction is such that the pin 24 may rock freely in a vertical plane passing through its axis, this being in a plane transverse to the direction of feed of the work.

The pin 24 is carried by the side members or arms 28 and 29 of a yoke designated generally by the character 30 in Figs. I and IV. Any suitable means may be provided for retaining the pin in the yoke arms. A tight fit creating sufficient friction for the purpose may be relied upon, if desired. The arms of the yoke extend in the direction of feed and, due to the freedom of the pin to turn upon its axis within the socket provided between the walls 22 and 23, these arms are adapted to rock in substantially vertical planes. As will be seen, the yoke 30 is thus permitted to partake of a universal movement with relation to the presser bar 18 and shank 19. It may rock longitudinally about the axis of the pin 24 and the latter, in turn, may rock in a transverse direction about the pin 26.

Pivotally mounted upon a pair of studs or screws 31, extending through and threaded in the sides 28 and 29 of the yoke 30, is an advance or forward section 32 of the presser foot. Upstanding ears 33 on this section are provided with openings into which the screws 31 extend. Elongated apertures 34 are provided through the section 32 to permit the passage of the needles 17 into cooperation with the work and the looper means. On its under side, as best shown in Fig. V, section 32 is provided with two longitudinally extending work-engaging portions 35 and 36, the portion 35 at the left (Fig. III) having its work-engaging surface below that of the portion 36 at the right. The construction is such that normally portion 35 urges the work at the left side of the presser foot against the lower toothed portion 12 of the feed dog while portion 36 of the presser foot extends across the lapped seam and urges the upper of the two layers of fabric being united against the higher toothed portion

13 of the feed dog. Forwardly extending portions 37 and 38 of section 32 are angled upwardly in relation to the portions 35 and 36, respectively, and are formed to provide an angled guide channel serving to direct the work properly in double-lap relation to the point where it is pressed by the section 32 against the feed dog 11 and throat plate 14. The work may be felled and lapped and directed into the angled guide channel of the presser foot by means of any appropriate form of feller 39. This may, for example, be of the type disclosed in the patent to Kucera No. 1,926,950. As best shown in Figs. I and II, this feller is adapted to receive the edges of the two pieces of work 40 and 41 and directs them into the channel of the presser foot section 32 in the manner explained.

Arranged in tandem or in line with the section 32 is a second or rear presser foot section 42. This is also pivotally mounted on the yoke 30 by means of a pair of screws 43 extending through the sides 28 and 29 of the yoke member and into suitable openings in the sides of the section 42. In its preferred form the section 42 is provided with two side portions 44 and 45 adapted to engage the work at opposite sides of the lapped seam. Portion 44, which is in line with portion 35 of the forward presser foot section, extends to a point somewhat lower than the portion 45, whose under surface is substantially in the plane of the portion 36 of the forward section. The under surface of portion 44 cooperates with a part of the toothed portion 12 of the feed dog while the under surface of portion 45 cooperates with the rear part of the teeth 13 of the feed dog. Intermediate the portions 44 and 45 there is formed a recess or channel 46 extending the full length of the under side of the section 42. In this channel there is provided a plate 47 having rigidly secured thereto an upwardly extending pin 48 received by a vertically disposed opening in the section 42. A set-screw 49 may be tightened against the pin 48 to retain the plate 47 in any desired position within the channel. By proper adjustment of the plate, in accordance with the thickness of the material being handled, it will cooperate properly with the top of the lapped seam under all conditions to be encountered in the formation of a seam. This will appear more clearly from the description of the operation of the presser foot, to be given hereinafter. The forward end 50 of the section 42, i. e., of the portions 44 and 45 thereof, is inclined upwardly, as best shown in Fig. VIII, and extends slightly over the rear portion of the forward section 32. So also, the forward end 51 of the plate 47 is inclined upwardly, this arrangement being such as to facilitate the proper feeding of the work into the grip of the rear section of the presser foot under all conditions and to enable the desired freedom of relative movement between the two sections of the presser foot.

Attached to a laterally extending shoulder of the shank 19, by means of a screw 52, is a spring 53, preferably of loop construction, having its free end 54 extending over and bearing down upon the top of the side member 29 of the yoke 30. Spring 53 thus tends to rock the yoke in a counterclockwise direction (Fig. IV) and urges the forward section 32 of the presser foot into engagement with the work. It will be understood, of course, that the spring 18a acting upon the presser bar 18 will urge the presser foot as a whole, and particularly the rear section, against the work as it passes over the throat plate and is engaged by the feed dog. Another spring 55 has one end secured by a screw 56 to the side of the yoke 30. This spring is looped or bent at 57 through an arc of 180° to provide an end 58 arranged to extend over the top of the rear 33 of section 32 which is adjacent the side member 29 of the yoke. The portion 58 of the spring is normally horizontal and cooperates with a flat, horizontal surface at the top of the ear 33 or may fit in a small depression in this surface. Accordingly, the spring tends to hold the forward section 32 of the presser foot in a centralized position in relation to the yoke 30. If the front end of this section is tilted upwardly by the work, the forward edge of the ear 33 is elevated slightly to further tension the spring 55. So also, if the rear end of the section 32 is tilted upwardly, the spring will be temporarily tensioned further by the lifting of the rear edge of ear 33 and it will tend to restore the section to its normal position when the seam, or the like, which has caused the tilting has passed from beneath the presser foot section.

Referring now to Figs. III, XI and XII, the operation of the presser foot under different conditions will be seen. Under normal conditions, when the portions of the two work sections to be united that are under the presser foot are single, flat pieces of material without seams, the presser foot will remain in its normal position as indicated in Fig. III. There will be no transverse tilting of the yoke 30. If a transversely extending seam is carried beneath either section of the presser foot, this section will simply tilt in a longitudinal direction as the seam passes but there will still be no transverse tilting of the yoke. On the other hand, when a seam is encountered which extends in whole or in part longitudinally of the double-lap seam being formed on the operation in question, or when some special formation, such as a pocket, places more layers of fabric at one side of the seam than at the other, it will be necessary for the yoke 30 to tilt transversely in one direction or the other, depending upon the nature and position of the particular formation. Thus, at some point there may be encountered a previously formed seam in the under member 40 of the two work pieces being united by a double-lap seam. This will present three layers of the material between the portion 44 of the rear presser foot section, for example, and the teeth 12 of the feed dog while only one layer of fabric will be presented between the portion 45 of the presser foot section and the teeth 13 of the feed dog. This will cause transverse tilting of the yoke into the position indicated in Fig. XI. It is important at this time that the plate 47 be positioned sufficiently high in the channel of the presser foot section to enable parts of the portions 44 and 45 to engage the work sections and urge the latter against the teeth of the feed dog.

Referring to Fig. XII, there is indicated a condition encountered in the formation of another seam in a pair of overalls. At the top of this seam there may be encountered four layers of fabric on the upper work section 41, turned under to form eight thicknesses of material, while only a single layer of fabric, turned under to form two thicknesses, may be presented by the lower work section 40. In forming this portion of the new seam, it will be necessary to tilt the yoke 30 transversely in a counter-clockwise direction (Fig. XII). While at this time it is not possible to provide engagement between the por-

tion 44 of the presser foot and the teeth 12 of the feed dog, nevertheless a satisfactory feeding action takes place because of the transverse tilting of the presser foot. It is to be noted that at this time a limit is provided to the transverse tilting of the yoke 30 by a shoulder 60 on the shank 19 cooperating with the upper edge of the member 28 of the yoke. A similar shoulder 61 is provided at the opposite side of the shank for limiting the transverse tilting of the yoke in the opposite direction by cooperation with the top of the member 28.

To facilitate the rocking of the yoke 30 in the manner indicated while maintaining its correct transverse position, the end surfaces 62 and 63 of the downwardly extending portions 22 and 23 of the shank 19 are curved, preferably along an arc having its center at the midpoint of the pin 24.

While the construction and operation of the improved presser foot have been described in considerable detail, it will be understood that various changes may be made without departing from the general principles and scope of the invention. The terms and expressions used herein have been used as terms of description and not of limitation.

I claim:

1. A presser foot for a sewing machine having a presser bar urged toward the work by a spring which comprises a member adapted for connection with the presser bar of the machine, means carried by said member and mounted for universal rocking movement in relation thereto, and work engaging means pivotally mounted on said first mentioned means and arranged to be held against the work by said spring.

2. A presser foot for a sewing machine having a presser bar urged toward the work by a spring which comprises a member adapted for connection with the presser bar of the machine, means carried by said member and mounted for universal rocking movement in relation thereto, and a plurality of separate work engaging means each pivotally mounted on said first mentioned means and arranged to be held against the work by said spring.

3. A presser foot for a sewing machine having a presser bar urged toward the work by a spring which comprises a supporting member, means for removably attaching the same to the presser bar of the machine, multi-sectional work engaging means, and means for attaching the sections of said work engaging means to said member, said last recited means comprising a frame member, means pivotally connecting the sections of said work engaging means with said frame member, and a pin for connecting said frame member with said first mentioned member, said pin being arranged for rotation about its longitudinal axis relative to one of said members and being rockable about a transversely extending axis relative to one of said members.

4. A presser foot for a sewing machine having a presser bar which comprises a supporting member, means for removably attaching the same to the presser bar of the machine, multi-sectional work engaging means, and means for attaching the sections of said work engaging means to said member, said last recited means comprising a frame, means pivotally connecting the sections of said work engaging means with said frame, and a pair of pins carried by said member and frame respectively, said pins having coacting curved surfaces and having their axes disposed at an angle with relation to each other to provide universal adjustment between said member and frame.

5. A presser foot for a sewing machine having a presser bar which comprises a supporting member, a frame member, a pin carried by said frame member, said pin and said supporting member being provided with coacting convex surfaces for relative universal rocking movement, and work engaging means movably attached to said frame member.

6. A presser foot for a sewing machine having a presser bar which comprises a supporting member, a frame member, a pin carried by said frame member, said pin and said supporting member being provided with coacting convex surfaces for relative universal rocking movement, means on said support for retaining said pin in cooperative relation to said surface of the support, and work engaging means movably attached to said frame member.

7. A presser foot for a sewing machine having a presser bar which comprises a supporting member, a frame member, a pin carried by said frame member, said pin and said supporting member being provided with coacting convex surfaces for relative universal rocking movement, coacting guide surfaces on said members for limiting the relative bodily movement thereof, and work engaging means movably attached to said frame member.

8. A presser foot for a sewing machine having a presser bar which comprises a supporting member, a frame member, a cylindrical pin carried by said frame member, means on said supporting member for receiving said pin in a manner to permit turning thereof and limited relative rocking thereof about a line transverse to the axis of the pin, said supporting member having a convex surface for coaction with the surface of said pin, and work engaging means pivotally attached to said frame member.

9. A presser foot for a sewing machine having a presser bar which comprises a supporting member, a frame member, a cylindrical pin carried by said frame member, said supporting member having a socket arranged to receive said pin and having a convex surface within said socket for coaction with the surface of said pin, said pin and socket being constructed and arranged to enable relative universal movement between said frame member and said supporting member and work engaging means pivotally attached to said frame member.

10. A presser foot for a sewing machine having a presser bar which comprises a supporting member, a frame member, a cylindrical pin carried by said frame member, said supporting member having a socket arranged to receive said pin and having a convex surface within said socket for coaction with the surface of said pin, said pin and socket being constructed and arranged to enable relative universal movement between said frame member and said supporting member, guide surfaces at the ends of said socket for limiting the relative bodily movement of said frame member and supporting member, and work engaging means pivotally attached to said frame member.

11. A presser foot for a sewing machine having a presser bar which comprises a supporting member, means for attaching said member to the presser bar, a yoke member, means for connecting said yoke member with said supporting member including a pin tiltable in a plane through its axis with respect to one of said mem-

bers and rotatable about its axis with respect to one of said members, said pin being held against lengthwise movement with respect to one of said members, means for limiting relative bodily movement of said members, and work engaging means movably carried by said yoke member.

12. A presser foot for a sewing machine having a presser bar which comprises a supporting member, means for attaching said member to the presser bar, a yoke member, means for connecting said yoke member with said supporting member including a pin tiltable in a plane through its axis with respect to one of said members and rotatable about its axis with respect to one of said members, means for limiting said tiltability of said pin, said pin being held against lengthwise movement with respect to one of said members, means for limiting relative bodily movement of said members in the direction of the axis of said pin, and work engaging means movably carried by said yoke member.

13. A presser foot for a sewing machine having a presser bar which comprises a supporting member, means for attaching said member to the presser bar, a yoke member, means for connecting said yoke member with said supporting member including a pin tiltable in a plane through its axis with respect to one of said members and rotatable about its axis with respect to one of said members, said pin being held against lengthwise movement with respect to one of said members, means for limiting relative bodily movement of said members, a work engaging member rockably mounted on said yoke beneath said supporting member, and a second work engaging member rockably mounted on said yoke in line with and in advance of said first mentioned work engaging member.

14. A presser foot for a sewing machine having a presser bar which comprises a supporting member, means for attaching said member to the presser bar, a yoke member, means for connecting said yoke member with said supporting member including a pin tiltable in a plane through its axis with respect to one of said members and rotatable about its axis with respect to one of said members, said pin being held against lengthwise movement with respect to one of said members, means for limiting relative bodily movement of said members, a work engaging member rockably mounted on said yoke beneath said supporting member, a second work engaging member rockably mounted on said yoke in line with and in advance of said first mentioned work engaging member, and spring means normally urging said yoke member in a direction to force said second work engaging member against the work.

15. A presser foot for a sewing machine having a presser bar which comprises a supporting member, means for attaching said member to the presser bar, a yoke member, means for connecting said yoke member with said supporting member including a pin tiltable in the direction of its axis with respect to one of said members and rotatable about its axis with respect to one of said members, said pin being held against lengthwise movement with respect to one of said members, means for limiting relative bodily movement of said members, a work engaging member rockably mounted on said yoke beneath said supporting member, a second work engaging member rockably mounted on said yoke in line with and in advance of said first mentioned work engaging member, spring means normally urging said yoke member in a direction to force said second work engaging member against the work, and means for urging said second work engaging member into a centralized position with relation to said yoke member.

16. In a sewing machine a work support, a feed dog in said support, a head extending over said work support, a presser bar in said head, a spring for urging said bar downwardly and a presser foot carried by said bar arranged to hold the work against said feed dog, said presser foot including a support member attached to said presser bar, a frame mounted on said support member for both longitudinal and transverse rocking movement, and a plurality of work engaging members rockably mounted on said frame and arranged to be held against the work by said spring.

FRANK A. KUCERA.