

May 23, 1961

R. REEBER ET AL

2,985,127

MEANS FOR MOUNTING THE PRESSER FOOT ON SEWING MACHINES

Filed Aug. 18, 1958

3 Sheets-Sheet 1

FIG. 1

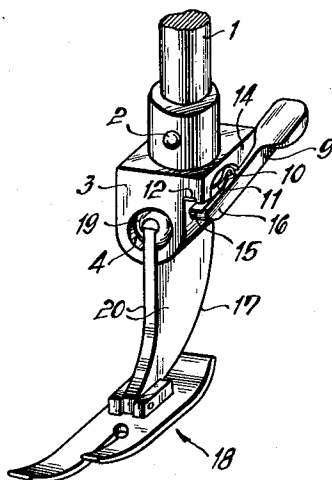
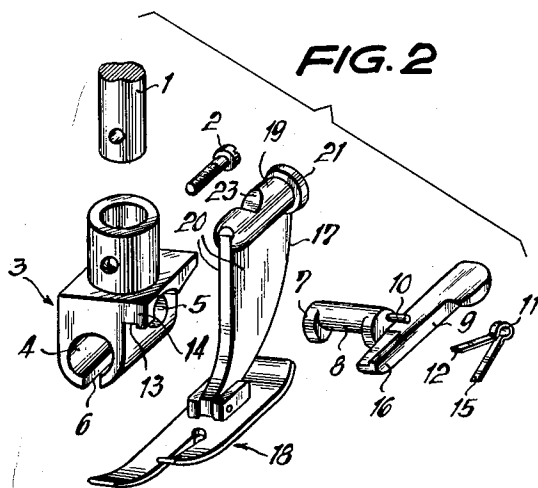


FIG. 2



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FIG. 3

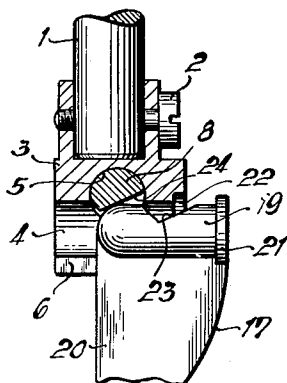


FIG. 4

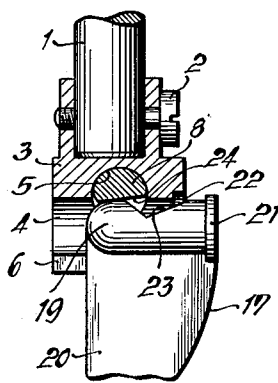


FIG. 5

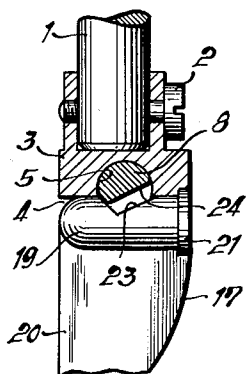
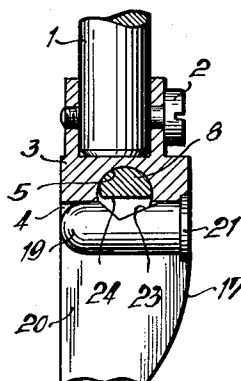


FIG. 6



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FIG. 7

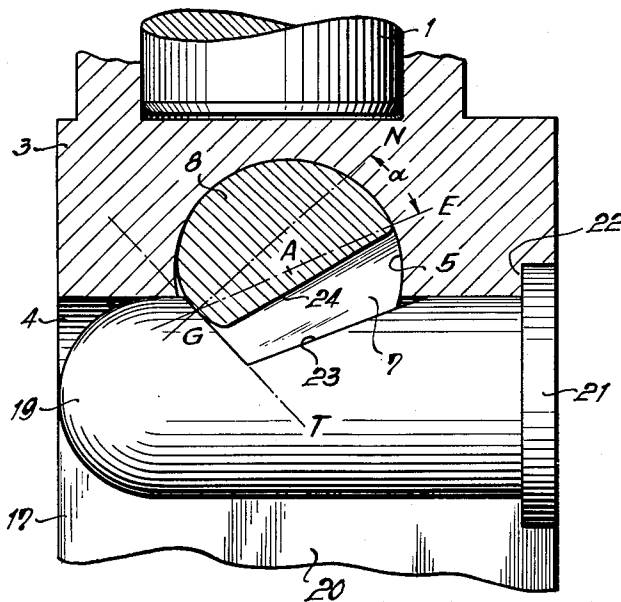


FIG. 8

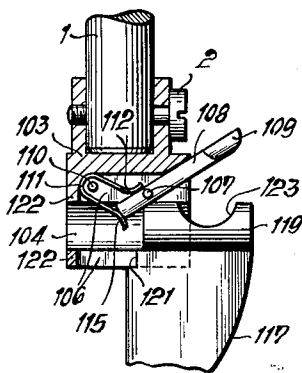
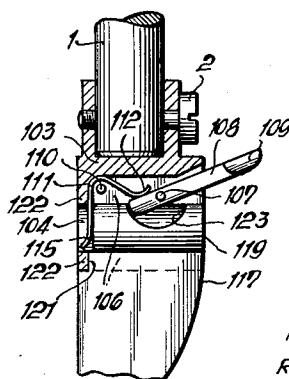


FIG. 9



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MEANS FOR MOUNTING THE PRESSER FOOT ON SEWING MACHINES

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7 Claims. (Cl. 112—240)

This invention relates to sewing machines and more particularly to means for mounting the presser foot upon the presser bar of a sewing machine.

In most sewing machines the presser foot is secured to the presser bar by means of a clamping connection. If a knurled clamping screw is used for this purpose the connection between the presser foot and the presser bar can be established and released without a screw driver being required. However, the strength of the fingers of the seamstress is not sufficient in all cases for securing the presser foot safely without the aid of a tool.

It is an object of the invention to provide means for mounting and dismounting the presser foot of a sewing machine conveniently and safely. It is a further object of the invention to provide a satisfactory connection between the mounting parts of a presser foot where the guiding surfaces are not too accurately machined.

The invention is based on known arrangements where the presser foot is secured to the presser bar by means of a special mounting which is readily releasable. In accordance with the invention the support member is provided with a rotation opposing cylindrical guide slot extending in the direction of sewing and spring biased latch means, which are self-locking by virtue of wedge action, for a guide member on the shank of the presser foot formed to correspond to and slidably received in the guide slot in its position which is determined by an abutment.

The expression "cylindrical guide slot" is intended to mean a guiding surface which comprises parallel lines. The latching means is considered to be "self-locking" by virtue of the fact that frictional forces are developed under a load which are greater than the load and oppose the same.

For such a mounting, it is advantageous for protecting the contact planes as well as to insure their reliable mutual engagement if as the invention furthermore provides, a rotatable latch is provided having its axis of rotation disposed perpendicularly to the axis of the guide means and the engagement planes of the rotary latch and of the guide member have as their generatrices lines which are parallel to the axis of rotation of the rotary latch so that they engage one another along lines or linearly.

If it is desired to construct the rotary latch particularly simply and economically, it is possible in accordance with a further object of the invention to provide the guide means with a partial cylindrical bore adapted to receive a rotatable cylinder having a part serving as rotary latch extending through the guide means and which is recessed in such a manner that in its operative position it wedges the guide member of the presser foot in place while in its inoperative position it frees the cross sectional area of the guide means.

In order to simplify the assembly of the device a two legged spring may be provided having one leg in a groove of a shoulder of the mounting and retaining the rotatable cylinder in its bearing by engaging the same with its side

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while its other leg applies pressure in the direction of locking upon one arm of a double armed release lever which is secured to the rotary cylinder and which by abutting the shoulder at the same time limits the angular displacement or rotation of the rotary cylinder in both directions. Thus the spring serves also simultaneously as the fastening element for the rotary latch.

Further details and objects of the invention will become apparent from the following specification with reference to the accompanying drawings which show two embodiments of the invention and in which:

Fig. 1 is a perspective view of the presser foot secured to the presser bar,

Fig. 2 is an exploded view of the parts of the embodiment in accordance with Fig. 1,

Figs. 3 to 5 illustrate subsequent positions of the guide member while being inserted into the mounting which is illustrated in a cross section taken along the axis of the guiding means,

Fig. 6 is an illustration similar to Figs. 3 to 5 with the guide member unlatched,

Fig. 7 is a greatly enlarged view of a section of Fig. 5,

Fig. 8 illustrates a second embodiment of the mounting means partly in section along the axis of the guiding means with the guide member inserted half way, and

Fig. 9 is a view of the embodiment similar to Fig. 8 with the guide member in latched position.

In the embodiment in accordance with Figs. 1 to 7 a support member 3 is secured to the lower end of the presser bar 1 by means of a screw 2 the construction of which can best be seen in Fig. 2.

The support member 3 is provided with two cylindrical bores 4 and 5 which partly intersect one another. The bore 4 connects with a slot 6 defined by vertical planes and which is open at the bottom. The bore 5 is adapted to receive a rotatable cylinder 7 having a portion 8 which extends through the bore 4 and which is recessed as illustrated particularly in Figs. 2 and 7.

A double armed release lever 9 and a retaining pin 10 are securely fastened to the rotatable cylinder 7. The pin retains a two legged spring 11 one leg 12 of which rests in a groove 13 against a shoulder 14 of the support member 3. The other leg 15 presses against the arm 16 of the release lever 9 tending to rotate the same together with the rotary cylinder 7 in counter-clockwise direction. The angular movement of the rotatable cylinder 7 is limited in both directions by the release lever 9 abutting the shoulder 14. The spring 11 by laterally engaging rotatable cylinder 7 causes the same to be retained in the bore 5.

The cylindrical bore 4 and the slot 6 form in combination a cylindrical guide slot, which prevents rotation and extends in the direction of sewing, for a cylindrical guide member 19 provided on the shank 17 of the presser foot 18. This guide member 19 is slidably received from the rear in the bore 4 while the vertical side planes 20 of the shank 17 are guided by the walls of slot 6. A collar 21 which enters a recess 22 in the bore 4 constitutes an abutment limiting the inward movement of the guide member 19. The guide member is also provided with a notch 23 the surface of which is defined by straight lines extending parallel to and in the direction of the axis of the rotatable cylinder 7.

The mounting of the presser foot 18 is accomplished by first sliding the guide member 19 upon a plane 24 of portion 8 of the rotatable cylinder (Fig. 3) and rotating the same against the action of spring 11 (Fig. 4) until portion 8 engages the latching position of guide member 19 shown in Fig. 5.

To remove the presser foot 18 the release lever 9 is rotated clockwise so that the part 8 assumes the position

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shown in Fig. 6. The guide member 19 can now be readily withdrawn from the bore 4.

The latching position of the guide member 19 as shown in Fig. 5 is again illustrated in Fig. 7 where it is considerably enlarged. Here G designates the line of contact of member 8 with the guide member 19. Said straight line G extends in that location perpendicularly to the plane of Fig. 7 of the drawing. The contact plane is indicated at T and N is the vertical plane or normal for the contact plane T through the contact line designated G, while the axis of rotation of rotatable cylinder 7 is indicated at A, the plane passing through the contact line G and through axis of rotation A is designated E, while α represents the angle enclosed by the planes E and N. If the angle α is smaller than a predetermined limiting or critical angle, the self-locking becomes operative. The limiting angle is computed in a known manner in accordance with the equation $\tan \alpha = \mu$, where μ is the coefficient of friction of the contact surfaces at the location designated G in the drawing.

Due to the wedge effect and as a result of the spring biasing of the latching, the contact location, even if there is some tolerance between the guide member 19 and the bore 4, i.e. with a loose fit, assumes the position of greatest distance from the axis of the rotary latch. As a result any load can only effect a shortening of the distance between the point of contact and the axis of rotation. As a result of the pressure thus caused at the contact location, the self-locking becomes effective, i.e., the parts no longer can slide one upon the other so that any shortening of the distance between the contact location and the axis of rotation is not possible. The load is absorbed by the bearing of the rotatable latch and the connection is completely rigid in spite of a freely sliding fit.

Figs. 8 and 9 illustrate a second embodiment of the invention.

In this embodiment a support member 103 is secured to the presser bar 1 by means of a screw 2. The support 103 is provided with a vertical slot 106 which is open at the bottom. The slot 106 extends to a position above a cylindrical bore 104 disposed in the direction of sewing and is located in a plane which passes through the axis of the bore 104. The part of slot 106 which is located below the bore 104 serves for guiding the shank 117 of the presser foot.

The slot 106 is provided at one end with a fixed abutment 122 which is engaged by an edge 121 of the shank 117 of the presser foot. The abutment 122 furthermore serves for the support of a two legged spring 111. The latter is accommodated in the portion of the slot 106 above the bore 104 and is secured in its position by a pin 110. In the upper part of slot 106 a double armed latch lever 108 is mounted for rotation about an axis 107. A cylindrical guide member 119 is provided on the shank 117 of the presser foot which member is provided with a cylindrical recess 123 extending transversely of its axis.

As the guide member 119 is inserted (Fig. 8) it engages a leg 115 of spring 111 and presses the same rearwardly. The spring 111 is thereby tensioned and in turn presses with its other leg 112 against the latch lever 108 which drops into the recess 103 when the presser foot is in position (Fig. 9).

The cylindrical axis of the recess 123 in this connection is disposed somewhat above the plane through the axis 107 and point of contact of the latch lever 108 and guide member 119 but still analogous to the conditions in accordance with Fig. 7 so that the device operates in a self-locking manner.

If the presser foot in accordance with Fig. 9 is mounted the leg 115 of spring 111 presses against the guide member 119 in the direction of disengagement. Pressing down on the rearward end 109 of the latch lever 108 causes the guide member 119 to be ejected.

As already mentioned in connection with the first embodiment the guiding arrangement can be very loosely

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fitted. The force of the spring is then readily sufficient to completely eject the presser foot.

Having now described our invention with reference to the embodiments illustrated in the drawings we do not wish to be limited thereto, but what we desire to protect by Letters Patent is set forth in the appended claims.

We claim:

1. Means for releasably securing a presser foot to the presser bar of a sewing machine, said means comprising, in combination, a support member adapted to be secured to the presser bar of the machine, and a shank supporting a presser foot at the lower end thereof and extending into said support member; said support member defining a generally horizontally disposed cylindrical bore and having a pair of jaws at its lower end defining a slot extending longitudinally of the cylindrical walls of said bore, and said shank having a guide member at its upper end adapted to be slidably received in said bore and having an abutment surface at one end for contacting said support member adjacent one end of said bore in the mounted position of said presser foot in locked condition, and said guide member having a recess extending substantially centrally and transversely thereof and presenting a latch surface, and self-locking latch means comprising a lever extending longitudinally of said support member and having a latch portion adapted to engage said recess and spring means extending endwise of said lever and biasing said lever and said latch portion into latched position, said lever being pivotally mounted and said latch portion engaging said latch surface along a line in a plane having a normal disposed at an angle with respect to the plane extending through the pivot axis of said latch portion and said line, the tangent of said angle being smaller than the coefficient of friction of the materials engaging in the area proximate said line.

2. Means for releasably securing a presser foot to the presser bar of a sewing machine, said means comprising, in combination, a support member adapted to be secured to the presser bar of the machine, and a shank supporting a presser foot at the lower end thereof and extending into said support member; said support member defining a generally horizontally disposed cylindrical bore and having a pair of jaws at its lower end defining a slot extending longitudinally of the cylindrical walls of said bore, and said shank having a guide member at its upper end adapted to be slidably received in said bore and having an abutment surface at one end for contacting said support member adjacent one end of said bore in the mounted position of said presser foot in locked condition, and said guide member having a recess extending substantially centrally and transversely thereof and presenting a latch surface, and self-locking latch means comprising a lever extending longitudinally of said support member and having a latch portion adapted to engage said recess and spring means extending endwise of said lever and biasing said lever and said latch portion into latched position, said lever being pivotally mounted and said latch portion engaging said latch surface along a line in a plane having a normal disposed at an angle with respect to the plane extending through the pivot axis of said latch portion and said line, the tangent of said angle being smaller than the coefficient of friction of the materials engaging in the area proximate said line and the pivot axis of said latch portion extending transversely of the axis of said guide member.

3. Means for releasably securing a presser foot to the presser bar of a sewing machine, said means comprising, in combination, a support member adapted to be secured to the presser bar of the machine, and a shank supporting a presser foot at the lower end thereof and extending into said support member; said support member defining a generally horizontally disposed cylindrical bore and having a pair of jaws at its lower end defining a slot extending longitudinally of the cylindrical walls of said bore, and said shank having a guide member at its upper end

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adapted to be slidably received in said bore and having an abutment surface at one end for contacting said support member adjacent one end of said bore in the mounted position of said presser foot in locked condition, and said guide member having a recess extending substantially centrally and transversely thereof and presenting a latch surface, and self-locking latch means comprising a lever extending longitudinally of said support member and having a latch portion adapted to engage said recess and spring means extending endwise of said lever and biasing said lever and said latch portion into latched position, said lever being pivotally mounted and said latch portion engaging said latch surface along a line in a plane having a normal disposed at an angle with respect to the plane extending through the pivot axis of said latch portion and said line, the tangent of said angle being smaller than the coefficient of friction of the materials engaging in the area proximate said line, and the areas of said latch surface and of said latch portion along the line of contact being contact planes having the same angle of inclination.

4. Means for releasably securing a presser foot to the presser bar of a sewing machine, said means comprising, in combination, a support member adapted to be secured to the presser bar of the machine, and a shank supporting a presser foot at the lower end thereof and extending into said support member; said support member defining a generally horizontally disposed cylindrical bore and having a pair of jaws at its lower end defining a slot extending longitudinally of the cylindrical walls of said bore, and said shank having a guide member at its upper end adapted to be slidably received in said bore and having an abutment surface at one end for contacting said support member adjacent one end of said bore in the mounted position of said presser foot in locked condition, and said guide member having a recess extending substantially centrally and transversely thereof and presenting a latch surface, and self-locking latch means comprising a lever extending longitudinally of said support member and having a latch portion adapted to engage said recess and spring means extending endwise of said lever and biasing said lever and said latch portion into latched position, said lever being pivotally mounted and said latch portion engaging said latch surface along a line in a plane having a normal disposed at an angle with respect to the plane extending through the pivot axis of said latch portion and said line, the tangent of said angle being smaller than the coefficient of friction of the materials engaging in the area proximate said line, said support member having a transverse bore intersecting a portion of said slot and said latch portion defining a substantially cylindrical latch member in said bore having an outwardly extending end portion secured to said lever and a pin supporting said spring means and said spring means having one leg in engagement with said lever and another leg biased against said support member.

5. Means for releasably securing a presser foot to the presser bar of a sewing machine, said means comprising, in combination, a support member adapted to be secured to the presser bar of the machine, and a shank supporting a presser foot at the lower end thereof and extending into said support member; said support member defining a generally horizontally disposed cylindrical bore and having a pair of jaws at its lower end defining a slot extending longitudinally of the cylindrical walls of said bore, and said shank having a guide member at its upper end adapted to be slidably received in said bore and having an abutment surface at one end for contacting said support member adjacent one end of said bore in the mounted position of said presser foot in locked condition, and said guide member having a recess extending substantially centrally and transversely thereof and presenting a latch surface, and self-locking latch means comprising a lever extending longitudinally of said support member and having a latch portion adapted to engage said recess and spring means extending endwise of said

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lever and biasing said lever and said latch portion into latched position, said lever being pivotally mounted and said latch portion engaging said latch surface along a line in a plane having a normal disposed at an angle with respect to the plane extending through the pivot axis of said latch portion and said line, the tangent of said angle being smaller than the coefficient of friction of the materials engaging in the area proximate said line, said bore and said slot being defined partly by a circular cylinder and partly by even planes on said jaws extending outwardly of said cylinder and said guide member having a cylindrical portion adapted to enter said bore and comprising vertical side planes on said shank adapted to engage said even planes of said guide slot.

6. Means for releasably securing a presser foot to the presser bar of a sewing machine, said means comprising, in combination, a support member adapted to be secured to the presser bar of the machine, and a shank supporting a presser foot at the lower end thereof and extending into said support member; said support member defining a generally horizontally disposed cylindrical bore and having a pair of jaws at its lower end defining a slot extending longitudinally of the cylindrical walls of said bore, and said shank having a guide member at its upper end adapted to be slidably received in said bore and having an abutment surface at one end for contacting said support member adjacent one end of said bore in the mounted position of said presser foot in locked condition, and said guide member having a recess extending substantially centrally and transversely thereof and presenting a latch surface, and self-locking latch means comprising a lever extending longitudinally of said support member and having a latch portion adapted to engage said recess and spring means extending endwise of said lever and biasing said lever and said latch portion into latched position, said lever being pivotally mounted and said latch portion engaging said latch surface along a line in a plane having a normal disposed at an angle with respect to the plane extending through the pivot axis of said latch portion and said line, the tangent of said angle being smaller than the coefficient of friction of the materials engaging in the area proximate said line, said support member having a transverse bore intersecting a portion of said slot and said latch portion defining a substantially cylindrical latch member in said bore having an outwardly extending end portion secured to said lever and a pin supporting said spring means, and said spring means having one leg in engagement with said lever and another leg biased against said support member, and said spring being adapted to eject said guide member from said slot upon release of said guide member by said latch portion and outward movement of said guide member by engagement of said latch portion with the forward end of said guide member.

7. Means for releasably securing a presser foot to the presser bar of a sewing machine, said means comprising, in combination, a support member adapted to be secured to the presser bar of the machine, and a shank supporting a presser foot at the lower end thereof and extending into said support member; said support member defining a generally horizontally disposed cylindrical bore and having a pair of jaws at its lower end defining a slot extending longitudinally of the cylindrical walls of said bore, and said shank having a guide member at its upper end adapted to be slidably received in said bore and having an abutment surface at one end for contacting said support member adjacent one end of said bore in the mounted position of said presser foot in locked condition, and said guide member having a recess extending substantially centrally and transversely thereof and presenting a latch surface, and self-locking latch means comprising a lever extending longitudinally of said support member and having a latch portion adapted to engage said recess and spring means extending endwise of said lever and biasing said lever and said latch portion into latched position, said lever being pivotally mounted

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and said latch portion engaging said latch surface along a line in a plane having a normal disposed at an angle with respect to the plane extending through the pivot axis of said latch portion and said line, the tangent of said angle being smaller than the coefficient of friction of the materials engaging in the area proximate said line, said resilient means comprising a spring having a pair of legs biased toward each other and said bore connecting with an upwardly extending groove having parallel sides adapted to receive said lever and one leg of said spring, said one leg of said spring being in engagement with one end of said lever defining said latch portion and said latch portion being in engagement with said latch surface, and the other leg of said spring being disposed

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endwise of said guide member for the latched condition of said latch portion and adapted to eject said guide member and said shank upon movement of said lever and of said latch portion in the direction of the unlatched horizontal position.

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