

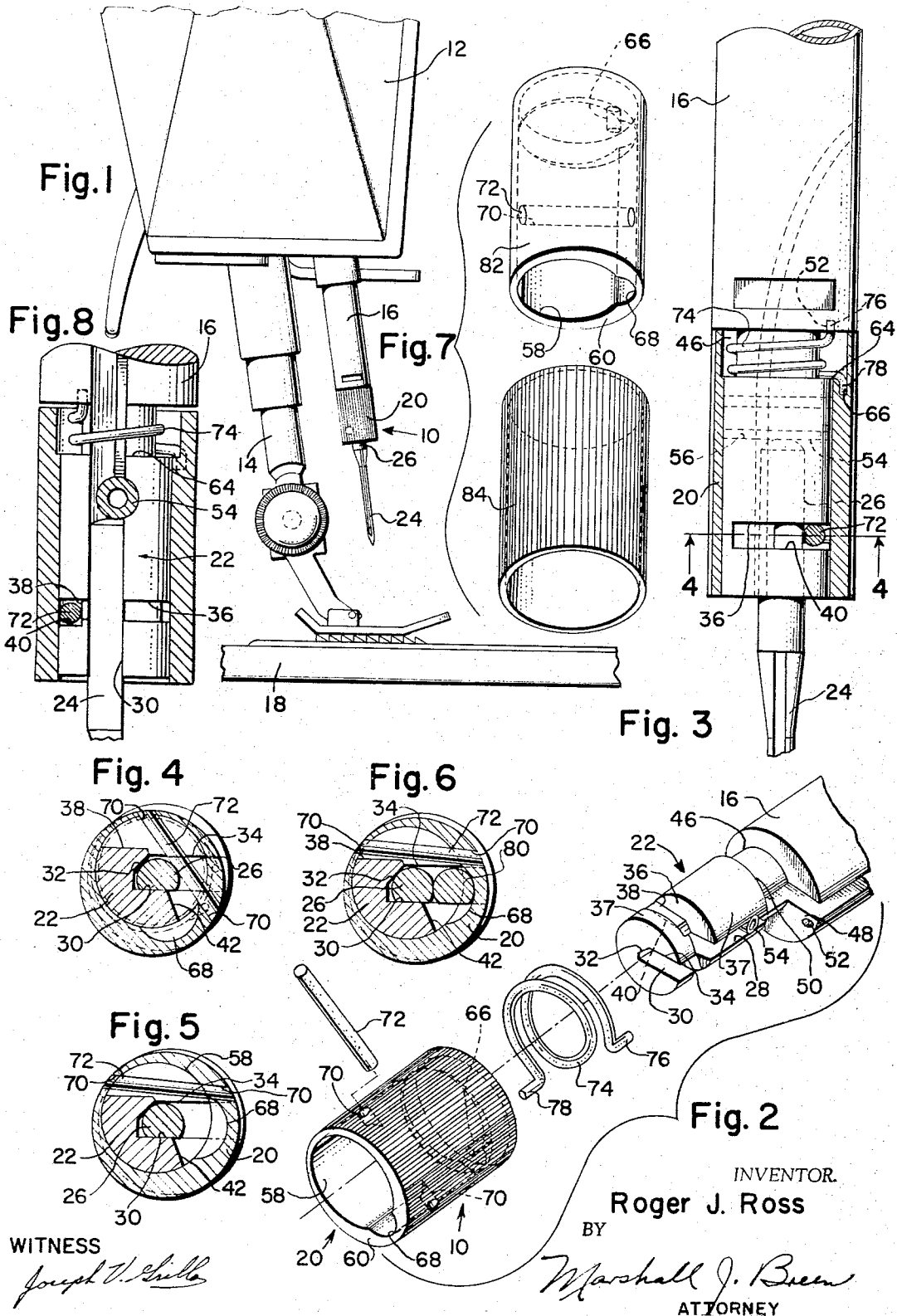
Oct. 3, 1967

R. J. ROSS

3,344,761

SCREWLESS NEEDLE-CLAMPS

Filed Sept. 10, 1964



1

3,344,761

SCREWLESS NEEDLE-CLAMPS

Roger J. Ross, Dover, N.J., assignor to The Singer Company, New York, N.Y., a corporation of New Jersey
Filed Sept. 10, 1964, Ser. No. 395,380
12 Claims. (Cl. 112-226)

The present invention relates to a needle-clamp and more particularly to a quick-release needle-clamp in which the usual needle-clamping screw is not employed. It is the main object of the present invention to provide an improved needle-clamp.

It is another object of this invention to provide a quick-release screwless type of needle-clamp.

It is a further object of the present invention to provide a quick-release needle-clamp economical of manufacture and convenient to operate.

Having in mind the above and other objects that will be evident from an understanding of this disclosure, the invention comprises the devices, combination and arrangements of parts as illustrated in the presently preferred embodiments of the invention which is hereinafter set forth in such detail as to enable those skilled in the art readily to understand the function, operation, construction and advantages of it when read in conjunction with the accompanying drawings, in which:

FIG. 1 is an elevational side view of a typical sewing machine head including a needle-bar equipped with the quick-release needle-clamp of the present invention,

FIG. 2 is an exploded perspective view of one form of the needle-clamp of the present invention,

FIG. 3 is an enlarged view, partially in section, of the needle-clamp and a portion of the needle-bar shown in FIG. 1,

FIG. 4 is a sectional view taken substantially along line 4-4 of FIG. 3, showing the needle secured in the needle-clamp;

FIG. 5 is a view similar to FIG. 4 but showing the needle clamping sleeve in its needle-released position;

FIG. 6 is a view similar to FIG. 5 but depicting two needles secured in the needle clamp;

FIG. 7 is an exploded perspective view of another embodiment of the clamping means disclosed in FIGS. 1-6, and

FIG. 8 is a view similar to FIG. 7 but with the needle-clamp and needle-bar rotated 90°.

Referring now to the drawings wherein similar reference numerals identify corresponding parts throughout the several views, 10 represents a quick-release screwless needle-clamp assembly.

As viewed in FIG. 1 a typical sewing machine head 12 has journaled therein a presser-foot bar 14 and a needle-bar 16, positioned above a work supporting surface 18. A knurled clamping sleeve 20 is mounted for turning movement on a lower reduced section 22 of needle-bar 16 and a conventional sewing needle 24 having a shank portion 26 is held by screwless needle-clamp assembly 10. The lower reduced section 22 is integrally formed with the needle-bar 16 and is disposed eccentrically to the longitudinal axis of needle-bar.

Needle-bar 16 including the lower reduced section 22 is formed with a needle-shank receiving slot, designated generally by the numeral 28, extending along the longitudinal axis of section 22 to a point in the needle-bar a short distance above the reduced section 22. Slot 28 includes a needle-shank receiving seat which is formed in part at least by a pair of substantially intersecting angularly disposed flat walls 30 and 32, with wall 34 extending parallel to wall 30 and in opposing relationship thereto. A needle-clamping-pin clearance slot, designated generally by the numeral 36, intersects slot 28 at right angles

2

thereto and breaks through the wall 37 of the lower reduced section 22 of the needle-bar on both sides of the intersected slot. Clearance slot 36 is formed in part by a first floor 38 which extends from the wall 37 of reduced section 22 to slot 28 substantially parallel with wall 34 of the slot. Within the needle-clamping-pin clearance slot 36 there is also disclosed a clamping pin rest ledge 40 which extends parallel with and adjacent to, but slightly above floor 38, as seen more clearly in FIGS. 2, 5 and 6. Ledge 40 is approximately twice as long as floor 38 but is less than the diameter of the lower reduced section 22. The needle-clamping-pin clearance slot 36 further includes a second floor 42 which extends from slot 28 to the wall 37 of the lower reduced section 22 on the other side of slot 28 from that of the first floor 38, but angularly disposed from the first floor.

A biasing sleeve spring groove 46 is cut into and extends completely around the periphery of the needle-bar 16 and is formed by wall 48 of the needle-bar and wall 50 of lower reduced section 22. Wall 48 includes a first sleeve spring locking hole 52. Disposed within the needle-shank receiving bore 28, intermediate slot 36 and groove 46 is a needle stop pin 54 which is press fit within an aperture 56 in the lower reduced section 22 and extends substantially the diametrical dimension of lower reduced section. It is noted that the needle stop pin 54 is of a diameter sufficient to block the upward thrust of the shank portion 26 of the sewing needle 24 when such needle is inserted into the slot 28. Thus, sewing needles of the same length will extend downwardly the same predetermined distance when fully inserted into slot 28, thereby to provide the proper cooperation between the needle and the other standard stitch forming instrumentalities (not shown) of the sewing machine.

Knurled clamping sleeve 20 extends the length of the lower reduced section 22 when secured thereto, and includes an inner cylindrical surface 58 defining a needle-bar accepting bore disposed eccentrically to the longitudinal axis of the sleeve, which inner cylindrical surface 58 is adapted slidably to engage the surface of the cylindrical wall 37 of the lower reduced section 22. The inner cylindrical surface 58 begins at the end face 60 of the clamping sleeve but terminates at a ledge 64 intermediate the length of sleeve 20. Ledge 64 includes a second sleeve spring locking hole 66 bored therein parallel with the longitudinal axis of both sleeve 20 and the first sleeve spring locking hole 52 but spaced from the latter. Inner cylindrical surface 58 includes a double needle groove 68 which extends the length of the inner cylindrical surface. Knurled clamping sleeve 20 includes a pair of pin receiving apertures 70 in alignment, but angled to allow the insertion therein of a needle-shank engaging pin 72 which when inserted within apertures 70 extends transversely of the sleeve 20.

A coil spring 74 includes ends 76 and 78, the spring cooperating to bias knurled clamping sleeve 20 in a clockwise direction, as viewed from below the needle-bar, about the lower reduced section 22. To assemble the screwless needle-clamp 10 the coil spring 74 must be slipped over lower reduced section 22 and into the spring groove 46 with the end 76 being mated with hole 52 in wall 48 of the needle-bar. The next step in the assembly process requires slipping the knurled clamping sleeve 20 onto the lower reduced section in an orientation that will allow end 78 of the coil spring 74 to engage second sleeve spring locking hole 66. Simultaneously sleeve 20 is forced over the coil spring 74 and up against the wall 48, thereby aligning apertures 70 with the needle-clamping-pin slot 36. At this point, needle-shank engaging pin 72 is pressed into apertures 70, the pin of necessity entering clearance slot 36 and being

captured by the walls of the slot, thereby locking the sleeve onto the lower reduced section 22.

With quick-release screwless needle-lamp 10 assembled as shown in FIGS. 1 and 3, the operator may insert either one or two sewing needles, as desired. To insert a sewing needle into its operating position on the needle-bar, the operator need only grasp the knurled clamping sleeve 20 and twist it in a counter-clockwise direction, as viewed from below, thereby clearing pin 72 from the path of the needle-shank 26 and allowing the insertion of the needle-shank in its properly oriented position, flush up against the needle stop pin 54, as illustrated in FIGS. 3 and 5. Next, the operator has only to release his grip on the knurled clamping sleeve 20 to allow the bias of spring 74 to exert its force on the sleeve, thereby turning the sleeve and the clamping pin a clockwise direction. The clockwise movement of the clamping pin 72 serves to clamp the needle-shank 26 and force it into engagement with the walls 30 and 32 of slot 28 (FIG. 4). As shown in FIG. 6 needle groove 68 is designed to accommodate a second sewing needle-shank 80 positioned side by side with the first sewing needle-shank 26, the loading operation being similar to that followed for a single needle insertion.

Clamping pin rest ledge 40 is designed to further facilitate the insertion or removal of the sewing needles. Thus, when the knurled clamping sleeve 20 is rotated in a counterclockwise direction on the needle-bar, pin 72 is rotated until it is parallel with the ledge 40. Since spring 74 is coiled and is connected between the fixed needle-bar and the movable knurled sleeve a pressure is exerted by the spring against knurled sleeve 20 in a direction along the longitudinal axis of the needle-bar, in addition to the hereinbefore mentioned bias exerted by the spring urging the sleeve in a clockwise movement on the needle-bar. Thus, the bias exerted by the spring along the longitudinal axis of the needle-bar tends to urge the sleeve pin 72 in the direction of rest ledge 40. The bias of the spring is sufficient to move pin 72 up and onto ledge 40 and hold it there after the clamping sleeve 20 is released thereby to hold the sleeve in the open position. To release the sleeve from its open position after the needle or needles have been inserted, the operator need only exert a slight upward pressure on knurled clamping sleeve 20 sufficient to overcome the bias of the spring and move pin 72 off ledge 40. Sleeve 20 is then free to rotate in a clockwise direction and pin 72 moves into clamping engagement with the shank of the needle, thereby securing the needle in its operative position.

Reference to FIG. 7 discloses a modification of the clamping sleeve of the present invention. In this embodiment, a clamping sleeve 82 is formed in a shape similar to knurled clamping sleeve 20 except that it does not contain a knurled surface, rather a separate knurled sleeve 84 is utilized. Needle-shank engaging pin 72 and coil spring 74 may be inserted and the needle-clamp unit, knurled sleeve 84, assembled prior to the installation of the needle-bar in sewing machine head 12. The diameter of clamping sleeve 82 is the same as the diameter of needle-bar 16, thus, the entire assembly may be passed through the standard needle-bar bearing bushings (not shown) for mounting in head 12. After the needle-bar and the needle-clamping unit, less knurled sleeve 84, has been installed in head 12, knurled sleeve 84 may be press fit onto clamping sleeve 82 thereby locking the pin 72 in position and affording a suitable gripping surface for the operator.

Numerous alterations of the structure herein disclosed will suggest themselves to those skilled in the art. However, it is to be understood that the present disclosure relates to preferred embodiments of my invention which is for the purpose of illustration and not to be construed as a limitation of the invention. All such modifications which do not depart from the spirit of the invention are

intended to be included within the scope of the appended claims.

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

1. A needle-clamping device for a sewing machine including a cylindrical needle-bar formed with a needle-shank receiving slot, comprising a cylindrically shaped sleeve having an inner and outer surface and adapted for mounting on the needle-bar, said inner surface defining a needle-bar accepting bore disposed eccentrically to the longitudinal axis of said cylindrically shaped sleeve, said needle-bar being slidably received within the bore, and means acting between said sleeve and needle-bar for biasing the cylindrically shaped sleeve continuously to urge said sleeve to turn on the needle-bar in a direction toward needle clamping relationship with said needle-bar, and a needle-shank engaging pin secured to the cylindrically shaped sleeve and extending through a portion of the needle-bar accepting bore, whereby said pin is utilized to clamp the needle-shank within the needle-shank receiving slot as said sleeve is urged to turn in the needle clamping direction by said bias means shank.
2. A needle-clamping device for a sewing machine including a cylindrical needle-bar formed with a needle-shank receiving slot, comprising a cylindrically shaped sleeve having an inner and outer surface, means for mounting the sleeve on the needle-bar, said inner surface defining a needle-bar accepting bore, said needle-bar being slidably received within the bore, means acting between said sleeve and needle-bar for biasing said cylindrically shaped sleeve continuously to urge said sleeve to turn on the needle-bar in a needle clamping direction and a needle-shank engaging pin mounted in the cylindrically shaped sleeve and extending through a portion of the needle-bar accepting bore, whereby as said sleeve is urged to turn in the needle clamping direction said pin engages the needle-shank thereby to clamp the needle-shank within the needle-shank receiving slot.
3. A needle-clamping device for a sewing machine including a cylindrical needle-bar formed with a needle-shank receiving slot, comprising a first cylindrically shaped sleeve having an inner and outer surface, means for mounting the sleeve on the needle-bar, said inner surface defining a needle-bar accepting bore disposed eccentrically to the longitudinal axis of said first cylindrically shaped sleeve, said needle-bar being slidably received by the bore, a needle-shank engaging pin secured to said cylindrically shaped sleeve, a second cylindrically shaped sleeve having a knurled outer surface and fixedly mounted on the outer surface of said first cylindrically shaped sleeve and means acting between said first sleeve and needle-bar for biasing said first and second sleeves continuously to urge said sleeves to turn on the needle-bar in a direction toward needle clamping relationship with said needle-bar, whereby as said sleeves are urged to turn in the needle clamping direction said pin engages the needle-shank thereby to clamp the needle-shank within the needle-shank receiving slot.
4. A needle clamping device for a sewing machine including a cylindrical needle-bar formed with a needle-shank receiving slot, comprising a cylindrically shaped sleeve having an inner and outer surface, means for mounting the sleeve on the needle-bar, said inner surface defining a needle-bar accepting bore disposed eccentrically to the longitudinal axis of said cylindrically shaped sleeve, said needle-bar being slidably received within the bore, means acting between said sleeve and needle-bar for biasing the cylindrically shaped sleeve continuously to urge said sleeve to turn on the needle-bar in a direction toward needle clamping relationship with said needle-bar and means for clamping a sewing needle within said cylindrically shaped sleeve.
5. A needle-clamping device for a sewing machine including a cylindrical needle-bar formed with a needle-shank receiving slot, comprising a cylindrically shaped

5

sleeve having an inner and outer surface, means for mounting the cylindrically shaped sleeve on the needle-bar, said inner surface defining a needle-bar accepting bore, said needle-bar being slidably received within the bore, means acting between said sleeve and needle-bar for biasing said cylindrically shaped sleeve continuously to urge said sleeve to turn on the needle-bar in a needle clamping direction and means for clamping a sewing needle within said cylindrically shaped sleeve.

6. In combination, a needle-bar having a lower cylindrically shaped end section, said end section including a needle-shank receiving slot, a clamping sleeve mounted for turning movement on the end section, means connected to said sleeve for clamping a needle within the needle-shank receiving slot and means acting between said sleeve and needle-bar for biasing said clamping sleeve continuously to urge said sleeve to turn on the needle-bar in a direction toward needle clamping relationship with said needle-bar.

7. In combination, a needle-bar having a lower end section reduced in diameter, the end section including a needle-shank receiving slot, a cylindrically shaped clamping sleeve mounted for turning movement on the end section, means acting between said needle-bar and sleeve for biasing the clamping sleeve continuously to urge said sleeve to turn on the needle-bar in a direction toward needle clamping relationship with said needle-bar and means, connected to the clamping sleeve, for clamping a sewing needle within the needle-shank receiving slot.

8. In combination, a needle-bar having a lower end section reduced in diameter, the lower end section including a needle-shank receiving slot, a cylindrically shaped clamping sleeve mounted for turning movement on the lower end section, means connected to said sleeve for clamping a sewing needle within the needle-shank receiving slot, means for biasing the clamping sleeve for turning movement on the lower end section in a direction toward needle clamping relationship with said needle-bar and for movement along the longitudinal axis of the lower end section and holding means mounted on said lower section cooperating with the longitudinal bias exerted by said biasing means on said sleeve for holding said clamping means and said sleeve against said turning movement.

9. In combination, a needle-bar having a lower end section reduced in diameter, the lower end section including a needle-shank receiving slot, a cylindrically shaped clamping sleeve mounted for turning movement on the lower end section, means for biasing the clamping sleeve continuously to urge said sleeve to turn on the needle-bar section in a direction toward needle clamping relationship with said needle-bar, means connected to said sleeve for clamping a sewing needle within the needle-shank re-

6

ceiving slot and means for holding said sleeve away from needle clamping relationship with said needle-bar.

10. In combination, a needle-bar having a lower end section reduced in diameter, the end section including a needle-shank receiving slot, a first cylindrically shaped sleeve mounted for turning movement on the end section, a second cylindrically shaped sleeve fixedly mounted on said first cylindrically shaped sleeve, said second cylindrically shaped sleeve including an outer knurled surface, means acting between said needle-bar and said first sleeve for biasing said first and second cylindrically shaped sleeves for turning movement in a direction toward needle clamping relationship with said needle-bar and means connected to said first sleeve for clamping a sewing needle within the needle-shank receiving slot.

11. In combination, a needle-bar having a lower end section, the end section including a needle-shank receiving slot, a cylindrically shaped clamping sleeve mounted for turning movement on the end section, said cylindrically shaped clamping sleeve having an inner and outer surface, said inner surface including a groove extending along the longitudinal axis of the inner surface adapted to be vertically aligned with the needle-shank receiving slot and to provide for an additional needle-shank in the needle-shank receiving slot, means for biasing the clamping sleeve for turning movement in a direction toward needle clamping relationship with said needle-bar and means connected to said sleeve for clamping sewing needles within the needle-shank receiving slot.

12. In combination, a needle-bar having a lower end section, the end section including a needle-shank receiving slot and a clearance slot formed to intersect the needle-shank receiving slot, a cylindrically shaped clamping sleeve adapted for mounting on the lower end section, means acting between said needle-bar and sleeve for biasing said cylindrically shaped sleeve in a direction toward needle clamping relationship with said lower end section and a needle-shank engaging pin secured to the cylindrically shaped sleeve, said pin being adapted to fit within the clearance slot, whereby when said sleeve is biased said pin engages the needle-shank.

References Cited

FOREIGN PATENTS

183,981 8/1936 Switzerland.
325,055 12/1957 Switzerland.

JORDAN FRANKLIN, *Primary Examiner*.

50 RICHARD J. SCANLAN, JR., PATRICK D. LAWSON,
Examiners.