Nov. 29, 1960 D. J. LENNEY 2,962,082

METHOD AND MEANS FOR SEALING SEAMS

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Fig. 1.

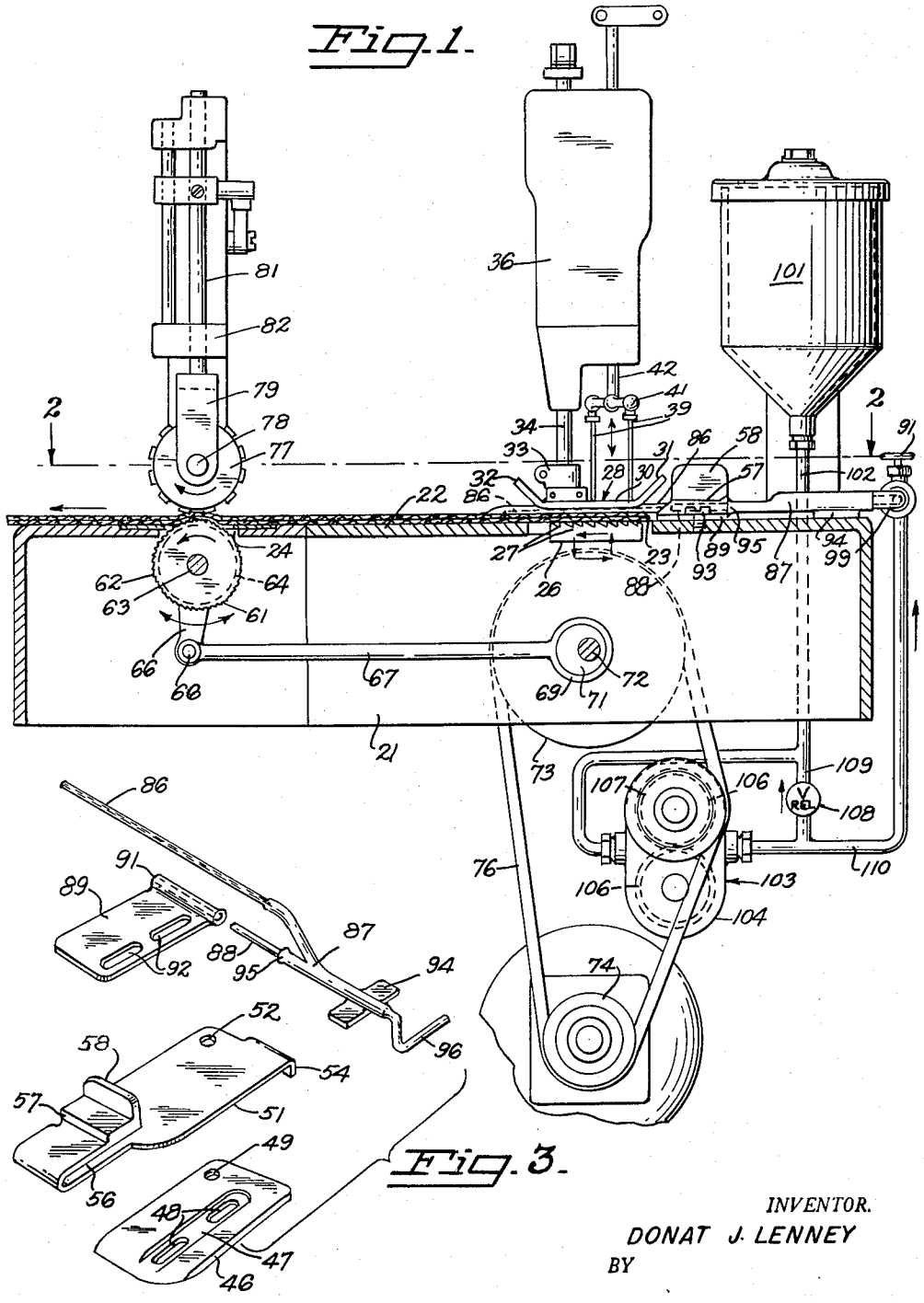


Fig. 3.

INVENTOR.
DONAT J. LENNEY
BY

Townsend, Townsend and Hoppe
ATTORNEYS

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Fig. 2.

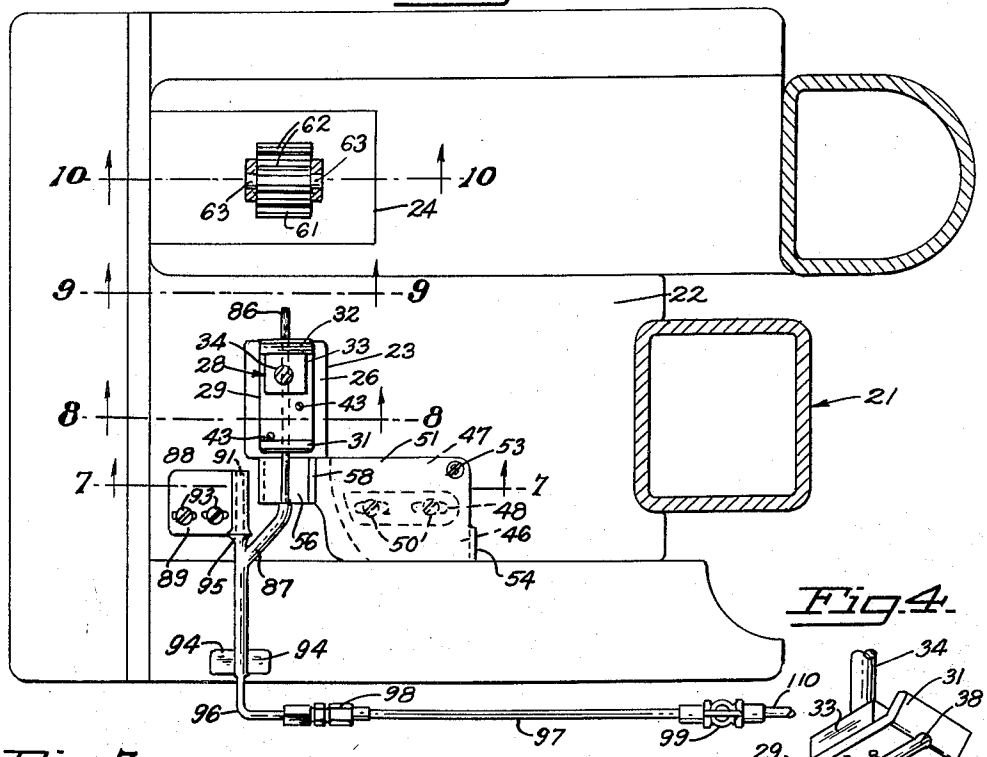


Fig. 4.

Fig. 7.

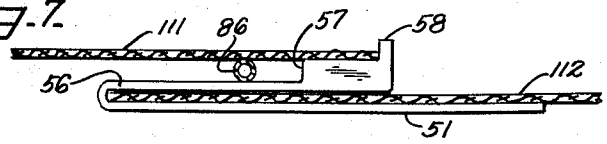


Fig. 5.

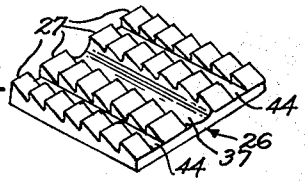


Fig. 8.

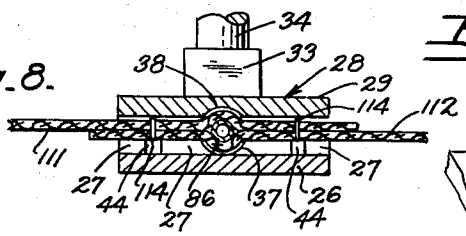
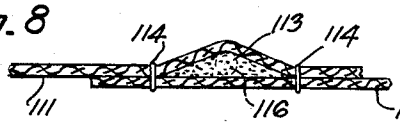


Fig. 8



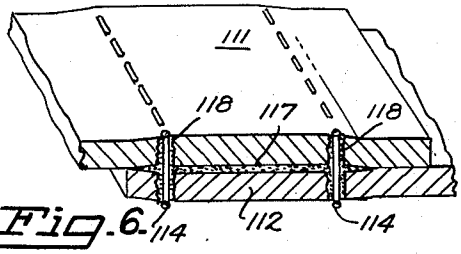
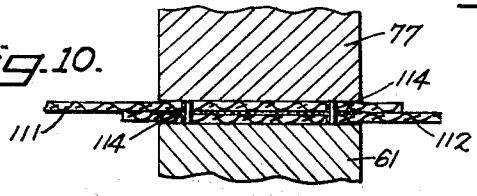


Fig. 6.

Fig. 10.



INVENTOR.
DONAT J. LENNEY
BY
Townsend, Townsend and Hoppe
ATTORNEYS

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METHOD AND MEANS FOR SEALING SEAMS

Donat J. Lenney, 1966 Illinois Ave., Santa Rosa, Calif.

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11 Claims. (Cl. 154—42)

This invention relates to a new and improved apparatus and method for sewing seams. Reference is made to my co-pending application Serial No. 466,031 filed November 1, 1954 now abandoned, of which the present application is a continuation-in-part.

The principal object of this invention is to provide a means and method of producing a double-stitched seam wherein a cement is injected into the seam interiorly thereof while sewing adjacent edges of sheet material together.

A principal object of the present invention is to improve the holding characteristics, waterproof and other desirable characteristics for joining sheet material such as canvas or the like and to provide a new method of joining sheet material and sealing the seams at the time of joinder. Heretofore when such materials have been sewed together, there has been a tendency for water to leak through the seam and particularly through the holes formed by needles. The present invention provides a waterproof sealing medium or cement which is injected into the seam after it is formed and seals the two layers of material together at the seam and likewise fills the needle holes and surrounds the thread.

Another object of the invention is to reduce thread wear from friction by surrounding the same with cement.

A further object of the invention is the elimination of the separate operation of applying sealer before or after formation of the seam as is the case with prior art practice. Here the application of sealer or cement is simultaneous, or practically so, with the seam formation and interiorly thereof. Additionally, by applying the sealer from the inside of the seam, while the seam is being formed, better results are obtained both as to the end product and from the standpoint of production economy and efficiency.

A further object of the invention is to apply sealing material under pressure into the seam so that all the needle holes are completely sealed interiorly of the seam, thereby producing a more waterproof and attractive product.

Still another object of the present invention is to provide means for applying the sealing material between two pieces of material as they are being sewn together.

Other objects of the present invention will become apparent from reading the following specification and referring to the accompanying drawings in which similar characters of reference represent corresponding parts in each of the several views.

In the drawings:

Fig. 1 is a schematic side elevation partly broken away in section and with certain parts removed showing a sewing machine in which the present invention is incorporated;

Fig. 2 is a schematic horizontal sectional view taken substantially along the line 2—2 of Fig. 1 with certain parts broken away and removed;

Fig. 3 is an exploded perspective view of certain portions of the invention;

Fig. 4 is a perspective view of a presser foot modified in accordance with this invention;

Fig. 5 is a perspective view (enlarged relative to Fig. 4) of a feed foot modified in accordance with this invention;

Fig. 6 is an enlarged fragmentary prespective view showing a portion of a seam formed in accordance with the present invention;

Fig. 7 is a transverse sectional view through certain portions of the sewing machine and material being sewn taken substantially along the line 7—7 of Fig. 2;

Fig. 8 is a view similar to Fig. 7 taken substantially along the line 8—8 of Fig. 2;

Fig. 9 is a view similar to Fig. 7 taken substantially along the line 9—9 of Fig. 2; and

Fig. 10 is a view similar to Fig. 7 taken substantially along the line 10—10 of Fig. 2.

The present invention may be incorporated in a standard commercial sewing machine, modified as hereinafter set forth, to accommodate the features of the present invention. Inasmuch as such commercial sewing machines are extremely complicated mechanisms, the necessary parts with which the present invention is associated are shown and simplified. Many of the additional parts of the sewing machine, but whereby the parts shown are supported, driven, and controlled, are eliminated in order to emphasize the principal features of the present invention.

Accordingly there is shown herein a sewing machine frame 21 having a substantially horizontal table 22. Table 22 is formed with at least two apertures 23 and 24 for projection therethrough of the feed foot 26 and the lower take-off roll 61, respectively. Feed foot 26 is formed with buttress-type serrations 27 in a manner well understood in this art. The means whereby the feed foot is actuated is conventional and forms no part of the present invention and accordingly has been omitted from the drawings and the present description. Immediately above the feed foot 26 is presser foot 28, which comprises a base 29 horizontally disposed immediately above the feed foot 26, the base being bent upwardly at an obtuse angle to form a front 31 and rear 32. On top of the base 29 is a boss 33 which receives vertical stem 34 which projects upwardly into the sewing machine head 36. The interior construction of the head 36 is conventional and forms no part of the present invention. Nevertheless, it may be stated that means is provided for raising and lowering the stem 34 to facilitate installing and removing the pieces of material to be sewn together. When the stem 34 is depressed, spring pressure is applied downwardly to cause firm engagement of the lower layer of cloth with the feed foot 26 so that it may be moved rearwardly in an intermittent motion as well understood in this art.

Formed in the top surface of the feed foot 26 is a groove 37 and formed in the lower surface of the presser foot 28 is a corresponding groove 38 immediately above the groove 37. The cross-sectional size and shape of the grooves 37 and 38 is sufficient to accommodate a cylindrical tube 86 hereinafter described.

The present machine employs at least two needles 39 which are generally vertically disposed and have their upper ends received in needle retainers 41 which are attached to needle actuating stem 42 which extends upwardly into the head 36 and is actuated to reciprocate the needles as understood in the art.

To provide passage for the needles 39, two holes 43 are formed in presser foot 28 and similarly two elongated slots 44 are formed in the feed foot 26 so that the feed foot may move while the needles are depressed.

Positioned in advance of the feet 26 and 28 and to one side thereof is guide mounting plates 46, which is

formed with a transverse groove 47 in its upper surface in which are formed a pair of transverse slots 48. Screws 50 extend through the slots 48, the heads thereof being received in the groove 47 so that they do not project above the surface of the plate 46. The location of the guide mounting plate 46 may thus be laterally adjusted.

The guide 51 which is mounted on plate 46 is formed with a hole 52 in one of its corners in alignment with tapped hole 49 in plate 46. Screw 53 extends through the hole 52 and is received in tapped hole 49. One corner 54 of the guide 51 is downwardly turned and the downwardly turned portion engages an edge of the plate 46. Accordingly, the guide 51 may be turned out of position when it is necessary to adjust the needles 39 or for other purposes, the screw 53 serving as a pivot for the turning movement.

The downturned corner 54 prevents the guide 51 from being turned toward the needles and hence prevents damage to the needles. Guide 51 extends horizontally inwardly over the guide mounting plate 46 and then is formed with a reverse bend 56, the bend serving to receive one edge of the lower piece of material being sewn. The upper surface of the reverse bend portion 56 is formed with a step 57 and the step 57 terminates in an upturned edge 58 which forms a guide for an edge of the other piece of material being sewn. The purpose of the step 57 is to provide room for the tube 86, as hereinafter described.

In accordance with conventional sewing machine construction and practice, two pieces of material, usually sheet material such as canvas or other fabric or synthetic substance, are properly located in overlapped relationship by means of the guide 51 and are then passed through the space between the feed foot 26 and presser foot 28. The feed foot 26 advances the material in proper timed relation while the needles 39 reciprocate and sew the seam. After the seam has been sewn, the material passes between lower takeoff roll 61 and upper takeoff roll 77 which are located rearwardly of the presser foot 28 and feed foot 26. Lower takeoff roll 61 is located below the table 22 and its periphery is formed with serrations 62. Shaft 63 provides a mounting for the roll 61 and is journaled in the frame 21 by means not illustrated. A conventional overriding clutch 64 on shaft 63 is actuated by arm 66 which is atached to connecting rod 67 by pivot joint 68. The opposite end of connecting rod 67 carries eccentric strap 69 which embraces eccentric 71 on shaft 72. Shaft 72 carries a pulley 73 which is driven from reduction motor 74 by means of belt 76. In accordance with conventional practice, the lower takeoff roll 61 is driven in timed relation to the shaft 72 which is connected to the means which drives the feed foot 26 and needles 39. By reason of the overriding clutch 64 the material is advanced only in such manner as not to damage the material or the needles as is conventional in sewing machines.

The upper takeoff roll 77 is ribbed and mounted by means of stub shaft 78 between the bifurcations of bracket 79 which is attached to the lower end of stem 81 received in takeoff head 82. The details of the construction of head 82 are not illustrated or described, but as well understood in this art, means is provided for raising and lowering upper takeoff roll 77 when the material must be installed and removed. Sufficient resilient pressure is applied to the upper takeoff roll 77 to grip the material sufficiently firmly to cause the same to advance as lower roll 61 is turned.

The present invention employs a tube 86 which is of sufficient length to extend from a position in advance of the feed foot 26 and presser foot 28 to a position rearwardly thereof. The forward end of the tube 86 is attached to a generally Y-shaped connection, the opposite branch of which is provided with a pin 88 which is detachably received in tube guide 89. Tube guide 89 comprises a cylindrical socket 91 which engages frictionally the pin 88. It is further formed with a pair of transversely extending elongated slots 92 through which extend screws 93 which are tapped into the table 22. By reason of the slots 92, the lateral position of the guide 89 and hence of the tube 86 may be adjusted. Feet 94 on the Y-shaped fitting 87 engage the top surface of the table 22 and prevent dislocation of the tube 86. An enlarged shoulder 95 at the base of pin 88 forms an abutment limiting inward movement of the tube 86.

Bend 96 is formed on the forward end of the Y-shaped fitting 86 and is connected to a flexible tube 97 so that when the pin 88 is disengaged from the socket 91, the tube 86 may be moved out of position. A conventional joint 98 is employed to connect the bent tube 96 to the flexible tube 97. The oposite end of flexible tube 97 is connected to a shut-off valve 99 which may be used to adjust the rate of fluid sealer, adhesive or cement through the tube 86. A reservoir 101 for a sealing or adhesive compound discharges into pipe 102 which is connected to the intake of gear pump 103. The body 104 of pump 103 encloses gears 106 as well understood in the pump art. Pulley 107 which is driven by belt 76 turns the pump 103. A pressure relief valve 108 is employed immediately behind the pump 103 to divert fluid through by-pass line 109 when the valve 99 is closed or not sufficiently open to permit full discharge of the pump 103. Pipe 110 delivers the fluid from the pump 103 to the regulating valve 99.

The present invention may be employed, as illustrated in Fig. 7 and following figures, to form a seam to join sheets of overlapping sheet material designated as a top layer of cloth 111 and bottom layer 112. The lefthand edge of bottom piece 112 is disposed in the reverse bend 56 of the guide 51. The righthand edge of the upper piece 111 is positioned against the upturned edge 58. Step 57 holds the two layers apart and provides room for the tube 86 which extends from the tube guide 89 rearwardly between the two layers of cloth. The layers of material are positioned between the feed foot 26 and the presser foot 29 and also between the rolls 61 and 77. As the feed foot 26 advances the cloth, the needles 39 form seams of thread 114 in two parallel lines. The action of the tube 86 and the grooves 37 and 38 in the feet 26 and 28, respectively, causes a pucker 113 to form at the seam between the threads 114 and this pucker 113 is filled with cement 116 which flows out of the end of the tube 86 after the seam has been formed and after the material has been released from gripping action between the feet 26 and 28. After the discharge of the cement 116, the material passes between the takeoff rolls 61 and 77 which flatten the pucker 113 and cause the cement to flow into the holes for the thread 114 forming a cement seal 118 around the thread 114 and adhesively secure pieces 111 and 112 as shown in Fig. 6.

As shown in Fig. 6, the cement 116 between the layers of material forms a secure sewed and sealed sheet joinder and the seal 118 around the thread 114 seals the holes formed by the needle and also protects the thread 114 against friction wear.

The pump 103 is driven in synchronism with the sewing machine and the cement is continuously discharged into the seam after it has been sewn and before the pucker 113 has been flattened.

The expressions "double seam" or "double stitched seam" or like expression as used herein are intended to mean a plurality of rows of stitches substantially parallel to form material sheets or the like, and between which rows of stitching the cement may be injected according to this invention.

The essence of this invention resides in the simplicity of sheet material joinder by means of suitable cement and stitching. The cement is injected into the seam, interiorly, at the time of seam formation. The fluid cement is trapped in the continuously forming seam and subsequently subjected to pressure, which distributes the fluid

material most efficaciously around and about the needle holes, thread and, of course, the overlapping portions of the sheets to be joined. A more secure joinder is thus obtained in a most efficient fashion without exterior defacement.

Although the foregoing invention has been described in some detail by way of illustration and example for purposes of clarity of understanding, it is understood that certain changes and modifications may be practiced within the spirit of the invention and scope of the appended claims.

What is claimed is:

1. A method of forming a seam comprising overlapping two pieces of material, stitching thread through the overlap in at least two lines of sewing, injecting cement generally longitudinally between the two lines and pieces and interiorly of the seam between said lines after said lines have been sewn, and squeezing the overlap together to cement the overlap and to force said cement into the stitches formed by said stitching.

2. In a method of forming a seam through overlapping pieces of material, stitching thread through the overlap in at least two substantially parallel lines of sewing, and injecting cement between the stitched lines interiorly between said overlapping pieces after the two lines have been sewn so as to introduce cement interiorly of said formed seam and around the thread in the stitches.

3. In a method of forming a seam through overlapping pieces of material, guiding overlapping portions of said pieces of material in generally parallel spaced relation and in parallel with a cement feed line between said spaced overlapping portions of said pieces of material, stitching thread through the overlap in at least two substantial parallel lines of sewing straddling said cement feed line, and injecting cement from said feed line between the stitched lines interiorly in said overlap after said stitching so as to introduce cement around the thread in the stitches.

4. The invention claimed in claim 3 and squeezing the overlap together after said cement feeding for spreading said cement.

5. In an apparatus for forming a cemented seam through superimposed pieces of material, the combination with a presser foot and a feed foot of a sewing machine, means for actuating said feet to advance superimposed pieces of material to be sewn together; of a cement feed tube, means to locate said tube between and beyond said presser foot and feed foot whereby said tube is positioned along and between said superimposed pieces of material, a pair of needles spaced transversely with respect to said feet and being reciprocable to and through said feet so as to straddle said cement feed tube and being actuated to form generally parallel rows of stitches through said superimposed pieces of material, the outlet of said cement feed tube being beyond said needles and between said rows of stitches, and means to feed cement through said tube.

6. The apparatus for injecting material into a seam defined in claim 5 and at least one of said feet having groove therein to accommodate said tube between the superimposed portions of said material.

7. The apparatus for injecting material into a seam defined in claim 5 and means to guide said pieces of material in superimposed spaced relation respectively above and below said tube to said feet.

8. In a sewing machine the combination with a presser foot, a feed foot beneath said presser foot, means for actuating said feed foot to advance material to be sewn, a pair of needles spaced transversely with respect to said feet and being reciprocable to and through said feet, means for actuating said needles in timed relation to actuation of said feed feet, of the improvements comprising a guide positioned in advance of said feet to guide two pieces of material in spaced superimposed relation, and a cement feed tube extending from a position in advance of said guide, through said guide, between said presser foot and feed foot and between said superimposed pieces of material so as to be straddled by said needles and to a position beyond said needles, and means for supplying cement under pressure to said tube.

9. In a sewing machine the combination with a presser foot, a feed foot beneath said presser foot, means for actuating said feed foot to advance material to be sewn, a pair of needles spaced transversely with respect to said feet and being reciprocable to and through said feet, means for actuating said needles in timed relation to actuation of said feed foot, of the improvements comprising a pair of material take-off rolls behind said feet, means for driving at least one of said rolls in timed relation to actuation of said feed foot, a cement feed tube extending from a position in advance of said needles, between said feet so as to be straddled by said needles, and terminating beyond said needles, and means for supplying cement under pressure to said tube.

10. In a sewing machine the combination with a presser foot, a feed foot beneath said presser foot, means for actuating said feed foot to advance material to be sewn, a pair of needles spaced transversely with respect to said feet and being reciprocable to and through said feet, means for actuating said needles in timed relation to actuation of said feed foot, of the improvements comprising a cement feed tube extending from a position in advance of said needles, between said presser foot and feed foot so as to be straddled by said needles, to a position beyond said needles, a tube guide, a tube locating pin connected to said tube, said tube guide being formed to detachably receive said pin to hold said tube in position, and means for supplying cement under pressure to said tube.

11. In a sewing machine the combination with a presser foot, a feed foot beneath said presser foot, means for actuating said feed foot to advance material to be sewn, a pair of needles spaced transversely with respect to said feet and being reciprocable to and through said feet, means for actuating said needles in timed relation to actuation of said feed foot, of the improvements comprising a cement feed tube extending from a position in advance of said needles, between said presser foot and feed foot so as to be straddled by said needles, to a position beyond said needles, a tube guide located in advance of and to one side of said feet, a tube locating pin connected to said tube, said tube guide being formed to detachably receive said pin to hold said tube in position, and means for supplying cement under pressure to said tube.

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