Jan. 13, 1953 J. HERMAN 2,625,126

APPARATUS FOR FORMING SEALED LAP SEAMS

Filed Nov. 12, 1948 2 SHEETS—SHEET 1

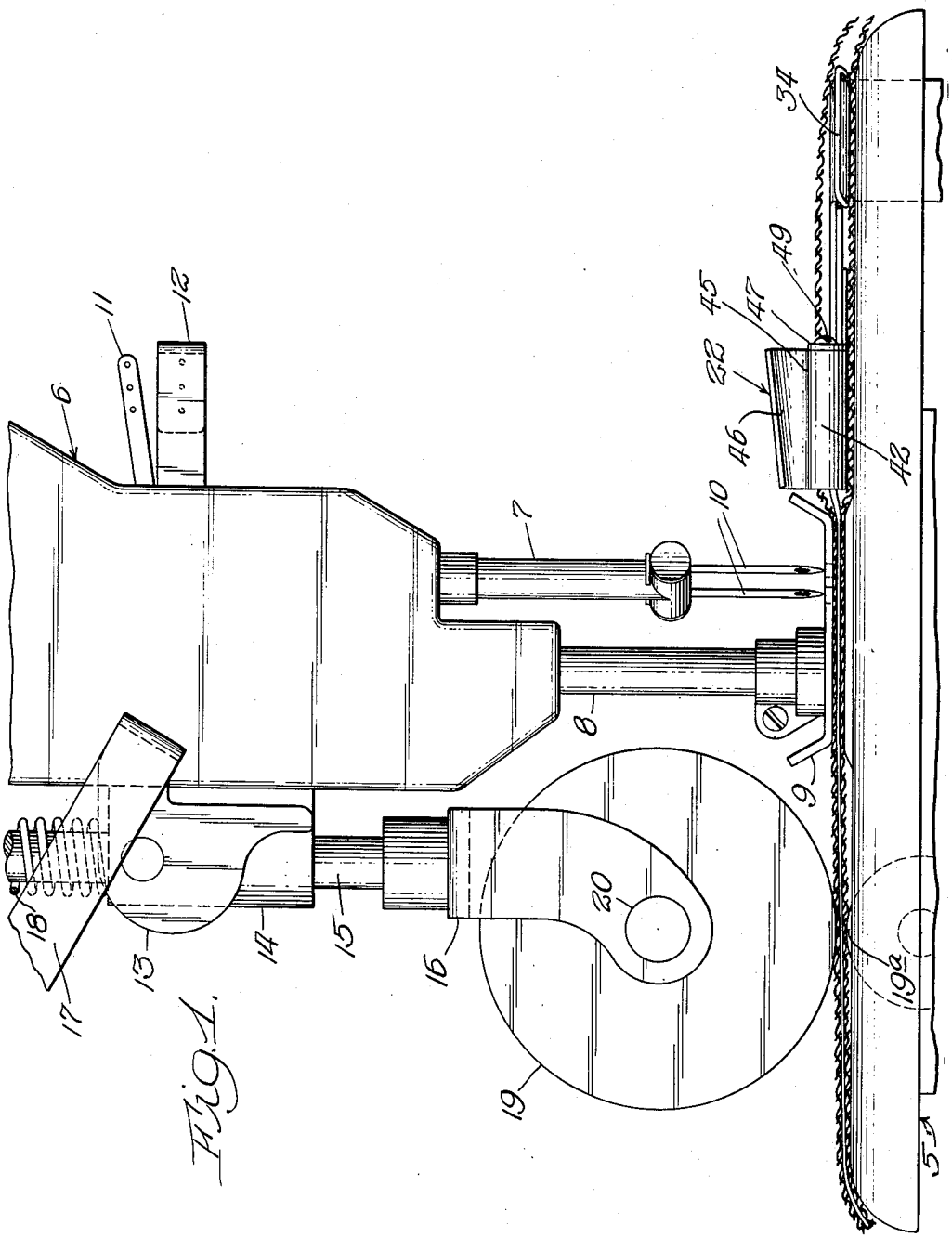


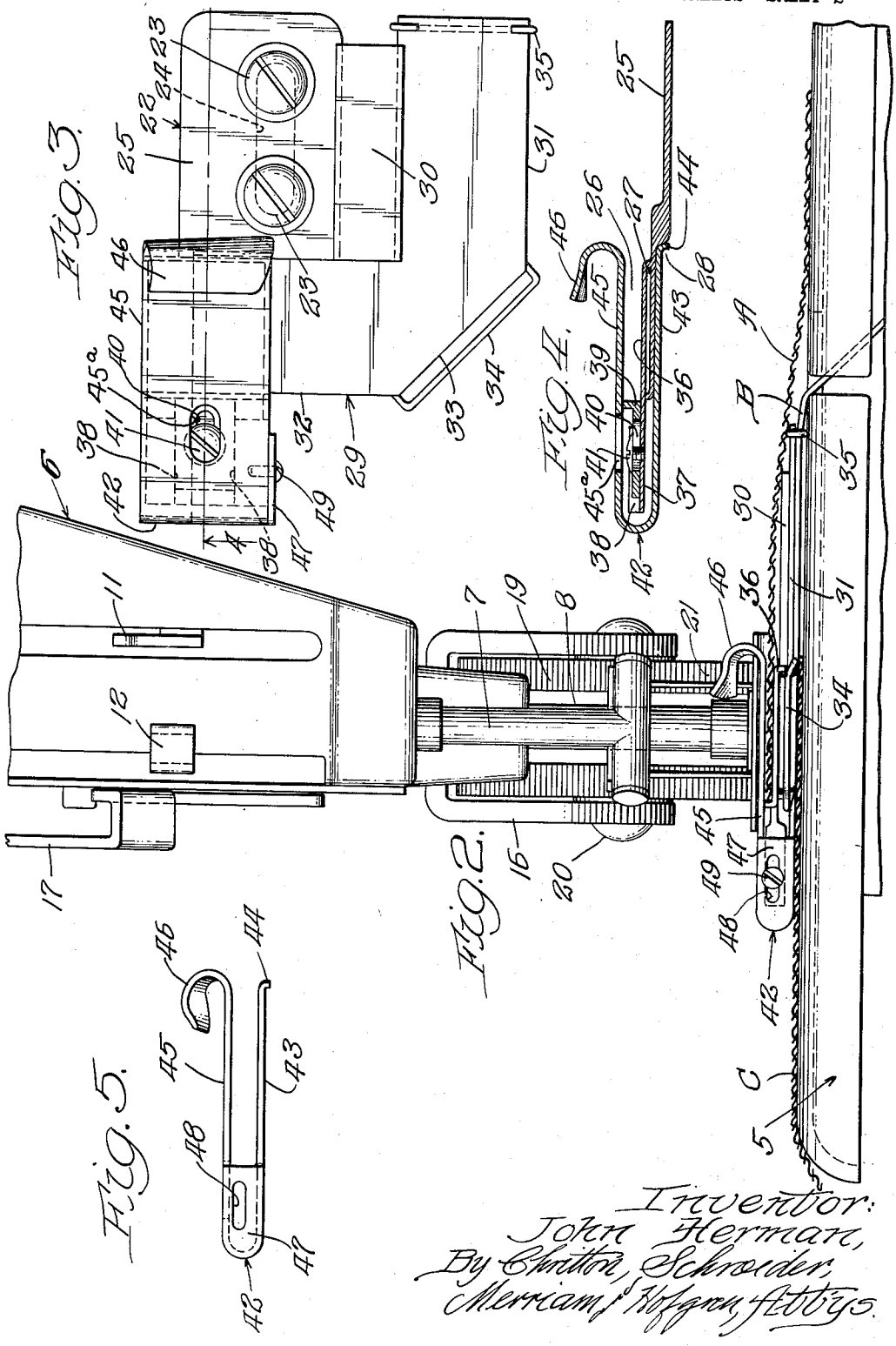
Fig. 1.

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APPARATUS FOR FORMING SEALED LAP SEAMS

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APPARATUS FOR FORMING SEALED LAP SEAMS

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11 Claims. (Cl. 112—147)

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This invention relates to apparatus for forming sealed lap seams in fabric objects, and in particular it relates to an attachment for heavy duty sewing machines by means of which a sealing strip formed of a flowable solid elastomer may be continuously laid between the overlapping adjacent layers of fabric in such a way as to seal the lines of stitching.

In the making of waterproof fabric objects, and in particular tarpaulins, it is customary to employ a plurality of pieces of heavy waterproofed material, such as canvas, and the seams of a tarpaulin are customarily simple lap seams with a double line of stitching securing the lapped edges together.

It is obvious that in stitching the seam, either by hand or with a sewing machine, the needle holes which are necessarily in register in the lapped layers of fabric leave numerous small holes through which water can pass, particularly where there is standing water on the surface of the tarpaulin.

I have discovered that the common lap seam in a tarpaulin may be rendered waterproof by placing a sealing strip composed of a flowable solid elastomer between the overlapping edge portions of the fabric and stitching through the elastomer. The elastomer may then be flowed close about the threads so as to seal the needle holes by applying pressure to the completed seam, as with a presser roll.

The improved waterproof fabric object and method of making it are described and claimed in my copending application, Serial No. 59,634, filed November 12, 1948.

In commercial operation it is necessary to employ heavy duty sewing machines of the double chain stitch or lock stitch type in order to stitch the adjacent pieces of waterproof fabric together. Such machines are usually furnished with a fabric guide ahead of the stitcher head by means of which two pieces of fabric may be guided to the stitcher head with their seam forming edges in overlapping relationship. The fabric is drawn through the stitcher head by means of a puller wheel unit immediately behind the stitcher head, the two puller wheels being provided with deep lateral cuts on their circumferential surfaces so as to make frictional engagement with the fabric. In the conventional commercial machine, the puller wheels are flat-toothed gear wheels.

My apparatus is provided with a fabric guide plate which is so arranged as to guide the continuous strip of elastomer to the stitcher head between the lapped edge portions of the fabric,

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In order to apply the necessary pressure to the completed seam so as to flow the elastomer close about the threads, I substitute for the conventional puller wheel unit a presser roll unit in which the rolls have lightly scored surfaces so as to exert substantially uniform pressure upon all parts of the seam.

The apparatus is illustrated in a preferred embodiment in the accompanying drawings in which:

Fig. 1 is a fragmentary and elevational view of a sewing machine provided with the special fabric guide and modified roller;

Fig. 2 is a fragmentary front elevation thereof;

Fig. 3 is a plan view of the fabric guide assembly;

Fig. 4 is a section taken as indicated at 4—4 of of Fig. 3; and

Fig. 5 is a front elevation of one element of the fabric guide assembly.

Referring to the drawings in greater detail, a work table, indicated generally at 5, has secured to its top a sewing machine of the type customarily used in making tarpaulins or other heavy waterproof fabric objects which is provided with an extremely long horizontal arm so as to accommodate wide pieces of fabric. A vertical housing indicated generally at 6 supports a reciprocating needle shaft 7 which is driven in the customary fashion, and a retractable presser foot rod 8 to which is secured a pressure foot 9. The entire needle shaft 7, which in this type machine carries two laterally spaced needles 10, may be raised from the work surface by means of a projecting lever 11; and the retractable presser foot may be raised by means of the lever 12. The combination of the presser foot 8 and needles 10 form a stitcher head through which fabric passes in the process of having a seam stitched therein.

A support arm 13 secured to the vertical housing 6 carries a vertical sleeve 14 in which a shaft 15 is slidably mounted. A fork 16 is secured to the lower end of the shaft, and the entire shaft assembly may be manually raised and lowered by means of a lever 17, the shaft normally being urged toward its lower position by a coil spring 18 which is coiled around the upper end of the shaft and confined between the top surface of the support arm 13 and an upper spring stop (not shown).

The assembly so far described is common to all heavy duty machines of the type employed in making tarpaulins.

Fabric is drawn through the stitcher head by

a presser roll unit which includes a driven roll 19a projecting through an aperture in the top of the work table top 5, and an idler roll 19 which is spindled in the fork 16, at 20, so as to be spaced slightly from the driven roll 19a and urged toward said roll by the spring 18. The drive mechanism for the roll 19a is conventional, and is not illustrated. As best seen in Fig. 2, the circumferential surface of the roll 19 is lightly scored, as at 21, so as to frictionally engage the surface of the fabric; and the circumferential surface of the driven roll 19a is also lightly scored.

A fabric guide assembly, indicated generally at 22, is secured to the work table 5 immediately forward of the stitcher head by means of a pair of screws 23 extending through a slot 24 in a support element 25 thereof.

The guide assembly comprises three superposed guide slots 26, 27 and 28, the lower slot 28 preferably having its bottom face formed by the top of the work table 5. The superposed guide slots 26, 27 and 28 receive, respectively, the upper piece of fabric A, the sealing strip, or tape B, and the lower piece of fabric C. The physical elements of the guide assembly, which form the slots 26, 27 and 28, will now be described in detail.

As best seen in Figs. 3 and 4, a main plate, indicated generally at 29, includes a connector portion 30, and an L-shaped separator plate having a first arm 31 at right angles to the path of travel of the fabric through the slots and a second arm 32 forming the lower surface of the center slot 27 which is a tape take-off slot. The arms 31 and 32 are of suitable width to accommodate the sealing tape B, and the outer corner of the L is mitered, at 33, and provided with a spaced guide bar 34; while a flat guide loop 35 is spaced from the lower surface of the arm 31.

Thus, the supply roll (not shown) of tape B may be hung below the table 5, forwardly and to one side of the stitcher head, and the tape may be guided through the loop 35 which holds it close against the underside of the arm 31, between the mitered surface 33 and the guide bar 34, and along the upper side of arm 32 into the take-off slot 27. Therefore, as best seen in Fig. 2, the tape B is separated by the arm 31 from the immediately adjacent, overlying piece of fabric A while it is moving across the line of travel thereof.

A spacer plate 36 forms the top surface of the take-off slot 27, and has an extending portion 37 provided with a pair of parallel upstanding lugs 38 which form a guideway for a slidable side-guide member 39. The member 39 is slotted at 40 to receive a retaining screw 41 by which it may be adjustably secured to the extending portion 37 of the spacer plate 36. The side guide member 39 forms the vertical guide surface of the upper fabric slot 26, and the adjustment of it permits variation in the overlap between the sealing tape B and the upper fabric piece A.

As best seen in Figs. 4 and 5, a serpentine plate 42 has a lower element 43 which serves as the top surface of the lower guide slot 28, and a downwardly directed edge portion 44 of the serpentine plate forms the vertical guide surface of said slot. The serpentine plate curves outside the extension portion 37 of the spacer plate 36, and its upper element 45 rests upon the side-guide member 39 to form the top surface of the upper slot 26. The extreme end portion of the serpentine plate 42 is reversely curved, as seen at 46, to form

a handle and finger rest. An aperture 45a in the upper element 45 gives access to the screw 41 to permit adjustment of the side guide member 39.

The forward side of the principal convolution of the serpentine plate 42 closed by an integral face plate 47 which is slotted at 48 to receive a screw 49 by which the plate is secured to the extension portion 37 of the spacer plate 36. Thus, the serpentine plate is laterally adjustable with respect to the main plate 29, and the adjustment permits variation in the overlap of the sealing tape B and lower fabric piece C.

In operation, the loose end of a roll of sealing tape is introduced between the first arm 31 of the separator plate and the guide loop 35, the tape is fed between the mitered edge 33 and guide bar 34 and thence into the take-off slot 27. The piece of fabric A is placed in the upper guide slot 26 with its edge riding against the side-guide member 39, and the piece of fabric C is introduced into the guide slot 28 with its edge riding against the vertical guide surface 44. The fabric pieces A and C are thus guided to the stitcher head with their seam forming edge portions in over-lapping relationship and with the sealing strip B interposed therebetween. The elements A, B and C may be hand fed through the stitcher head until engaged by the driven presser roll unit, after which the rolls draw the material through the stitcher head.

The sealing strip B is formed of a flowable solid elastomer having an unsized fabric strengthening member, such as cheese cloth, bonded to one of its faces. In forming the seam, the needles pierce the elastomer and leave holes of considerable size around the threads, but these holes are sealed by the pressing action of the roll unit which flows the elastomer around the threads so as to complete the sealing of the seam.

It has been found that the needles 10 customarily used in tarpaulin stitching are of such a large diameter that the presser roll unit cannot seal the needle holes without exerting an impractically large pressure upon the sealing strip. Accordingly, it is advisable to substitute relatively fine needles for those ordinarily used in tarpaulin manufacture. In order to avoid breakage of the fine needles, they must be relatively short, and the needle shaft 7 must be adjusted downwardly from its customary position.

The foregoing detailed description is given for clearness of understanding only, and no unnecessary limitations should be understood therefrom, for some modifications will be obvious to those skilled in the art.

I claim:

1. A fabric guide assembly adapted to be mounted immediately forward of the stitcher head of a sewing machine, comprising: a horizontal L-shaped main plate, the outer corner of said L being mitered; guide means to retain a moving tape close adjacent one surface of said plate on the first arm of the L; a guide bar spanning said mitered corner whereby said moving tape may be guided around said corner to the second arm of the L adjacent the opposite surface of said plate; a spacer plate spanning said second arm of the L to form a tape take-off guide slot therewith; and guide means having upper and lower horizontal U-shaped fabric guide slots formed therein, one having its inner surface beneath the second arm of the L and the other having its inner surface formed by said spacer plate, and said fabric guide slots having their

open sides oppositely disposed so that two pieces of fabric may be guided to the stitcher head with their seam forming edge portions in overlapping relationship and the tape therebetween.

2. A fabric guide assembly adapted to be mounted immediately forward of the stitcher head of a sewing machine, comprising: an L-shaped separator plate, said plate having its outer corner mitered and being provided with guide elements arranged to guide tape along a first arm of said L adjacent a face of said plate, around said mitered corner and to the second arm of the L adjacent the opposite face of the plate; an integral spacer member spanning the second arm and forming a tape take-off guide therewith, said spacer member having a lateral extension portion; a side guide member slidably secured to said lateral extension portion, for lateral adjustment with respect to said spacer member, said spacer member having a perpendicular face above one side of the take-off guide; a serpentine plate having an arm with a downturned edge portion extending beneath the take-off slot and a second arm overlying the side-guide member to form an upper fabric slot with the spacer member; and means on said serpentine plate whereby said serpentine plate is laterally adjustable with respect to the take-off slot.

3. Apparatus for forming a sealed lap seam comprising: a sewing machine having a stitcher head; a fabric guide assembly immediately forward of the stitcher head comprising, guide means having three superposed guide slots formed therein, the center slot being a tape slot closed on both sides and the upper and lower slots being flat U-shaped slots with their open sides oppositely disposed, a tape lead-in guide including an L-shaped horizontal plate with the outer corner of the L mitered, a first arm of said plate forming one face of said center slot a flat guide loop extending across a second arm of said plate to guide a tape adjacent a surface of said arm, a second flat guide element at said mitered corner to guide tape around said corner and onto the opposite surface of said first arm of said plate into said center slot; and a presser roll unit behind the stitcher head adapted to draw the fabric frictionally through the stitcher head and exert substantially uniform pressure upon all parts of a finished seam.

4. Apparatus for forming a sealed lap seam comprising: a sewing machine having a stitcher head; a fabric guide assembly immediately forward of the stitcher head comprising, a horizontal L-shaped main plate, the outer corner of said L being mitered, guide means to retain a moving tape close adjacent one surface of said plate on the first arm of the L, a guide bar spanning said mitered corner whereby said moving tape may be guided around said corner to the second arm of the L adjacent the opposite surface of said plate, a spacer plate spanning said second arm of the L to form a tape take-off guide slot therewith, and guide means having upper and lower horizontal U-shaped fabric guide slots formed therein, one having its inner surface beneath the second arm of the L and the other having its inner surface formed by said spacer plate, and said fabric guide slots having their open sides oppositely disposed so that two pieces of fabric may be guided to the stitcher head with their seam forming edge portions in overlapping relationship and the tape therebetween; and a presser roll unit behind the stitcher head including a driven roll and an idler roll spaced therefrom, one of said rolls having its circumferential surface lightly scored to draw the fabric frictionally through the stitcher head and exert substantially uniform pressure upon all parts of the finished seam.

5. A fabric guide assembly adapted to be mounted immediately forward of the stitcher head of a sewing machine comprising: guide means providing a pair of vertically spaced guide slots with oppositely facing open sides for guiding two pieces of fabric to the stitcher head with only their adjacent edge portions in overlapping relationship and providing a flat tape slot to receive thick tape in a planar position sandwiched between said guide slots; and a horizontal separator plate extending forwardly from said tape slot, said separator plate being provided with guide means whereby tape may be continuously fed to the tape slot and maintained out of contact with fabric entering either of said superposed slots until it is aligned with the tape slot.

6. Apparatus for forming a sealed lap seam comprising: a sewing machine having a stitcher head; a fabric guide assembly immediately forward of the stitcher head comprising guide means providing a pair of vertically spaced guide slots with oppositely facing open sides for guiding two pieces of fabric to the stitcher head with only their adjacent edge portions in overlapping relationship and providing a flat tape slot to receive thick tape in a planar position sandwiched between said guide slots, and a horizontal separator plate extending forwardly from said tape slot, said separator plate being provided with guide means whereby tape may be continuously fed to the tape slot and maintained out of contact with fabric entering either of said superposed slots until it is aligned with the tape slot; and means behind the stitcher head constructed and arranged to exert substantially uniform pressure upon all parts of a finished seam.

7. A fabric guide assembly adapted to be mounted immediately forward of the stitcher head of a sewing machine, comprising: guide means having vertically spaced guide slots formed therein with oppositely facing open sides for guiding two pieces of fabric to the stitcher head with only their adjacent edge portions in overlapping relationship; a guide member having a flat tape slot formed therein to receive thick tape in a planar position sandwiched between said guide slots; a forwardly extending horizontal separator plate having a first arm leading to said tape slot and a second arm disposed at an angle to the line of travel through said slots; and guide means on said separator plate positioned and arranged to guide a tape continuously from a tape supply located forwardly and to one side of said guide slots while keeping said tape out of contact with either piece of fabric until it is alined with the tape slot.

8. A fabric guide assembly adapted to be mounted immediately forward of the stitcher head of a sewing machine, comprising: guide means having three superposed guide slots formed therein, the center slot being a flat tape slot to receive thick tape in a planar position, said slot being closed on both sides and the upper and lower slots being flat U-shaped slots with their open sides oppositely disposed; a tape lead-in guide comprising an L-shaped horizontal plate with the outer corner of the L mitered, a first arm of said plate forming one face of said center slot; flat guide elements extending across a second arm of said plate to guide a tape adjacent a sur-

face of said arm; and a second flat guide element at said mitered corner to guide tape around said corner and onto the opposite surface of said first arm of said plate into said center slot.

9. Apparatus for forming a sealed lap seam comprising: a sewing machine having a stitcher head; a fabric guide assembly immediately forward of the stitcher head comprising, guide means having vertically spaced guide slots formed therein with oppositely facing open sides for guiding two pieces of fabric to the stitcher head with only their adjacent edge portions in overlapping relationship, a guide member having a flat tape slot formed therein to receive a thick tape in planar position sandwiched between said guide slots, a forwardly extending horizontal separator plate having a first arm leading to said guide slot and a second arm disposed at an angle to the line of travel through said slots; and guide means on said separator plate positioned and arranged to guide a tape continuously to the tape slot from a tape supply located forwardly and to one side of said guide slots while keeping the tape out of contact with either piece of fabric until it is alined with the tape slot; and a presser unit behind the stitcher head adapted to exert substantially uniform pressure upon all parts of a finished seam.

10. The fabric guide assembly of claim 7 in which the guide means and the guide member

are slidably connected for limited relative lateral movement, and fastening means are provided to secure said guide means and said guide member firmly in any predetermined adjusted positions to adjust the relative positions of the closed side of one of the slots in the guide means and the tape slot.

11. The fabric guide assembly of claim 10 in which the guide means includes an independently mounted portion having a vertical face which forms the side wall of one of the guide slots, said portion being mounted for lateral sliding movement with respect to the remainder of the guide means and the tape slot.

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