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[54] METHOD OF, AND APPARATUS FOR, STITCHING TOGETHER TWO LAYERS OF MATERIAL

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[52] **U.S. Cl.**.....**112/121.15,** 112/262
[51] **Int. Cl.**.....**D05b 21/00**
[58] **Field of Search**.....112/121.15, 121.12, 262; 223/1, 2, 3; 2/143

[56] **References Cited**

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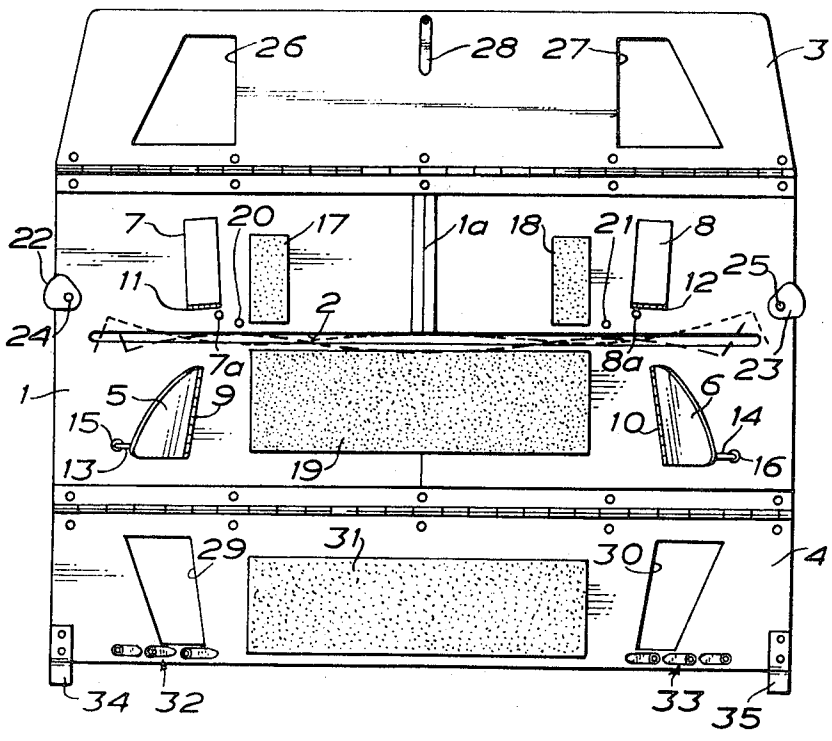
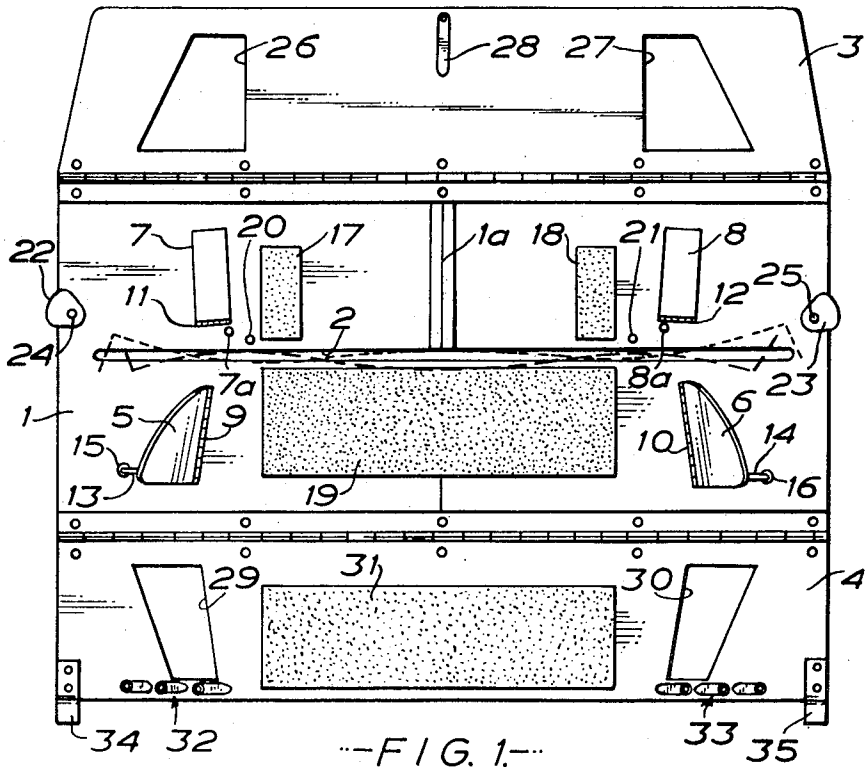
Attorney—Stevens, Davis, Miller & Mosher

[57] **ABSTRACT**

The specification discloses a method and apparatus for stitching together two or more pieces of material along desired stitching lines which follow different curves when the pieces of material are flat. The pieces of material are arranged over a base plate having a guide slot corresponding in contour to the required stitching line and one or more of said pieces of material is distorted out of its own plane in such a way that the stitching lines in all the pieces of material are located in substantially congruent relationship overlying said guide slot. The distorting means may be a plate hinged between the base plate and an upper plate and having an upward projection receivable in an opening in the upper plate. Alternatively the distorting means may be projections upstanding from said base plate and receivable in openings in one or more upper plates hinged to the base plate. The apparatus causing the required distortion is conveniently designed for use with a sewing machine so that it may be guided beneath the needle of the sewing machine by the guide slot and the pieces of material thus stitched together.

21 Claims, 4 Drawing Figures

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--FIG. 1.--

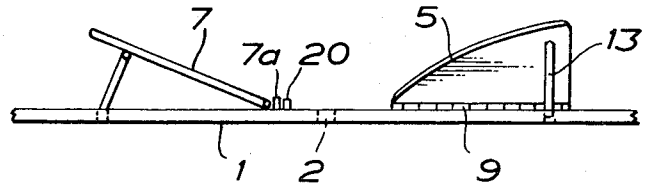


FIG. 2

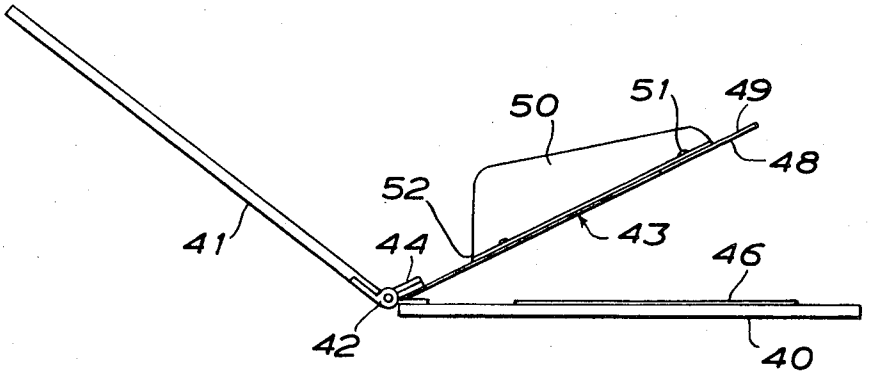
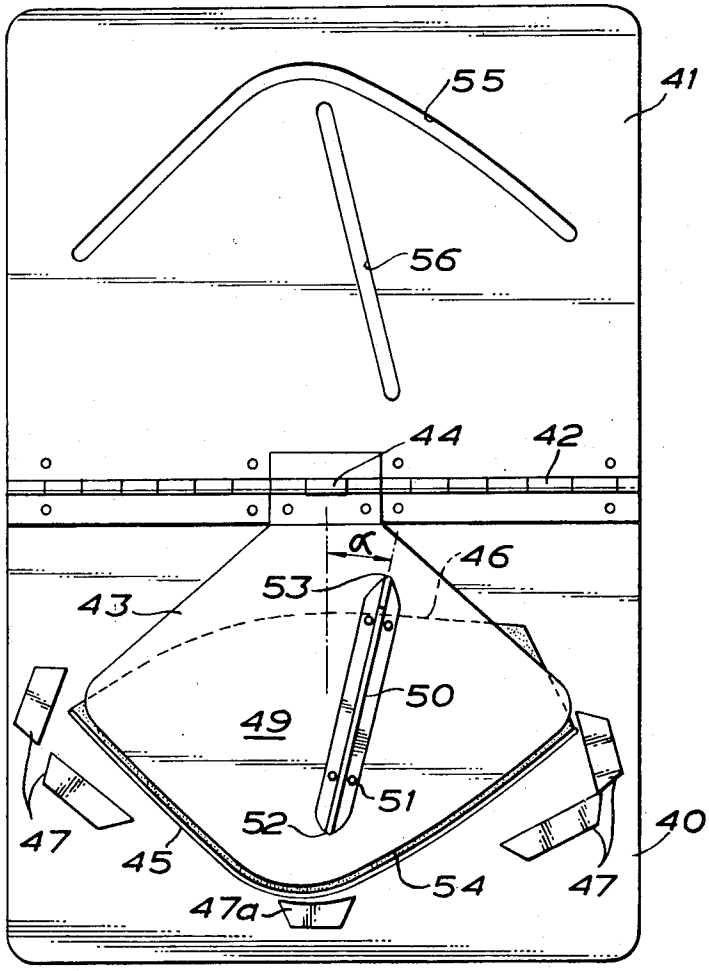


FIG. 4



--FIG. 3--

METHOD OF, AND APPARATUS FOR, STITCHING TOGETHER TWO LAYERS OF MATERIAL

This invention relates to a method of, and apparatus for, facilitating the stitching together of pieces of material by a sewing machine.

In the manufacture of some articles, particularly articles of clothing, it is necessary to stitch together two pieces of material along stitching lines which, when the two pieces of material are flat, do not follow the same shaped curves. The stitching lines in the two pieces of material are then said to be "unsympathetic," and the stitching operation has generally had to be carried out by hand with the operator manipulating the material to guide the stitching lines in both pieces of material below the needle of the sewing machine. Skilled operators are thus required, and the stitching can not be carried out very rapidly.

According to the present invention a method of arranging a plurality of pieces of material for stitching together along desired lines which are unsympathetic when the pieces of material are flat comprises arranging the pieces of material over a base plate having a guide slot corresponding in contour to the required stitching line, and distorting one or more of the pieces of material out of its own plane in such a way that the stitching lines in all the pieces of material are located in substantially congruent relationship overlying the guide slot.

Apparatus according to the invention comprises a base plate having a guide slot corresponding in contour to a required stitching line, means for locating a plurality of pieces of material relative to the plate, said pieces, when flat, having desired stitching lines which are unsympathetic, and means for distorting one or more of said plurality of pieces so that the desired stitching lines in all said pieces are located in substantially congruent relationship overlying the guide slot.

The invention enables the required stitching lines to be brought to a congruent relationship in a simple and reliable manner. The invention is capable of wide application. It may be used in work wherein single opposed edges of two pieces of material are required to be stitched together, and the distortion is then conveniently caused by parts projecting upwardly from the base plate, said parts being receivable in holes in an upper plate which may be laid over the base plate with the material to be distorted lying between the two plates. The shape of the upwardly projecting parts may be designed to cause all or substantially all of the required distortion of the material.

For some applications of the invention it may also be necessary to distort or move part of one or more of the pieces of material in its own plane. When an upper plate is used as aforesaid then this may conveniently be hinged to the base plate, and the lower face of the upper plate may be provided with members capable of engaging material placed over the base plate to distort or move this material in its own plane as the upper plate is lowered. These members may conveniently be fingers of springy material bent to project from the lower face of the upper plate in the direction in which distortion of the material is required. Differently oriented fingers may be used to cause distortion in different directions in different parts of the material.

This arrangement may, for example, be used in the manufacture of a sandwich collar.

The invention is also applicable to the stitching together of two overlying pieces of material, one of which requires a degree of fullness relative to the other, for example in the manufacture of brassiere cups.

In this case the method preferably comprises the steps of placing a lower layer of material on to the base plate, placing distorting means over the lower layer of material, placing an upper layer of material over the distorting means, and placing a second plate over the upper layer of material to cooperate with the distorting means to distort the upper layer of material out of its own plane to cause the stitching line of the upper layer to assume a substantially congruent relationship with the stitching line of the lower layer, said second plate being positioned so that a guide slot of predetermined contour therein is aligned with the guide slot in the base plate.

Apparatus according to this preferred form of the invention comprises a base plate on which the lower and upper layers of material may be placed, distorting means disposable between the material layers, a second plate which may be placed on to the upper layer of material and which cooperates with the distorting means to distort the upper layer of material out of its own plane to cause the stitching line of the upper layer to become substantially congruent with the stitching line of the lower layer, both the base and the second plates having aligned guide slots of predetermined contour for guiding a sewing machine needle along the required stitching lines through the material.

This embodiment is particularly applicable to material pieces wherein the pieces are pre-cut to shape, with the desired stitching lines following the shape of the curved edges of the material, the stitching lines and the edges thus being unsympathetic.

The distorting means is preferably a third plate hinged to the base plate, having a flat first surface for engaging the lower layer of material on the base plate, and having a second surface formed with one or more projections over which the upper layer of material may be placed. The second plate is then formed with openings for accommodating the projections from the third plate when the second plate is placed over the upper layer of material. The second plate is conveniently also hinged to the base plate.

It will be understood that the degree and shape of the fullness obtained will be dictated by the distorting means. Distorting means can be designed to give any particular desired fullness effect, and the shape of the curved edge of the upper layer of material can then be determined so that on distortion of the upper layer the curved edge thereof will take substantially the same shape and location as the curved edge of the lower layer.

Specific embodiments of the invention will now be described in more detail, by way of examples only, with reference to the accompanying drawings in which:

FIG. 1 shows a plan view of a stitching aid for forming a sandwich collar, the aid being in open condition;

FIG. 2 shows a partial side elevation of the aid of FIG. 1;

FIG. 3 shows a plan view of a stitching aid for forming a brassiere cup, the aid being in part-open condition; and

FIG. 4 shows a side elevation of the partly-opened aid of FIG. 3.

The sandwich collar stitching aid shown in FIGS. 1 and 2 comprises a base plate 1 formed with a central, longitudinally extending guide slot 2. Upper plates 3 and 4 are hinged one on each side of the base plate 1. The base plate carries four distorting members 5 to 8, each of these members being hinged to the base by hinges 9 to 12 respectively so that they may be raised above the base. Each member has a strut, such as the struts 13 and 14 on members 5 and 6, engageable in holes, such as 15 and 16, in the base plate. A plurality of spaced holes may be provided in association with each member so that the position of each distorting member may be adjusted. Each member is held in its set position by a spring urging the member towards the base plate so that the strut is held firmly in the selected hole. The base plate is also provided with a center line marker 1*a*, with studs 7*a* and 8*a*, with pads 17 to 19 of friction material such as emery paper or baize, and with pins 20 and 21. Catches 22 and 23 are rotatably mounted about pins 24 and 25 on the base plate.

The upper plate 3 is formed with two spaces 26 and 27 allowing the distorting means 7 and 8 to pass through the plate 3 when this is lowered on to the base plate. The upper plate 3 also carries a leaf spring 28 projecting away from the surface of the plate.

The upper plate 4 is formed with two spaces 29 and 30 allowing the distorting means 5 and 6 to pass through the plate 4 when this is lowered onto the base plate. The plate 4 also carries a pad 31 of friction material such as baize, and sets 32 and 33 of three leaf springs each projecting away from the surface of the plate and towards the lateral center line thereof. The plate 4 has locking tabs 34 and 35.

A sandwich collar is made by stitching together two pieces of material known respectively as the undercollar and the top collar. The undercollar is a two layer structure comprising one layer of canvas and one layer of cloth stitched together to leave along one longitudinal edge of the undercollar a margin wherein the two layers are unstitched. It is to this edge that a longitudinal edge of the top collar cloth must be stitched, with the top collar material received between and stitched to the canvas and cloth layers of the undercollar. The longitudinal edges of the two collar parts in their opposed stitching positions do, when the parts are flat, follow unsympathetic curves.

To prepare the collar pieces for stitching using the aid as described the undercollar is first placed on the base plate with the canvas layer in contact with the plate. The outline of the unsympathetic edge of the undercollar is shown in broken lines on the figure and it will be seen that this is placed so that at the deepest points of the concave parts of the edge the material lies about half way over the guide 2. The undercollar is located with respect to the center of the plate by aligning a notch in the center of the undercollar with the center line indicated by the marker 1*a*. The undercollar is pressed on to the pins 20 and 21 to hold it in position and the upper plate 3 is then closed over the base plate. As the upper plate closes the undercollar lying over the distorting members 7 and 8 is further distorted by the action of the edges of the spaces 26 and 27. Furthermore the center part of the undercollar is pulled slightly away from the guide 2 by the action of the leaf spring 28 engaging the undercollar as the upper plate 3 is lowered. The shapes of the distorting members 7 and 8 and the associated spaces 26 and 27 and the location of the leaf spring 28 are such that when the upper plate 3 has been closed the undercollar has been distorted so that the formerly curved unsympathetic edge follows what is substantially a straight line approximately down the center of the guide 2. When the upper plate 3 has been closed the catches 22 and 23 are rotated to engage the top edge of the plate 3 and hold this in its locked position.

The top collar is now loaded into the stitching aid. The top collar is also provided with a notch at its center point and this notch is placed in alignment with the notch in the bottom collar and the top collar positioned so that at this center point the unsympathetic edge of the top collar lies substantially across the full width of the guide 2. The outline of the top collar when correctly positioned is shown in dotted lines on the figure. It will be seen that the overall length of the unsympathetic edge of the top collar is slightly greater than the unsympathetic edge of the bottom collar. The upper plate 4 is then lowered on to the base plate. During such lowering that part of the top collar distorted by the member 9 and 10 is further distorted by the edges of the spaces 29 and 30 the operator making whatever manual adjustment is necessary to ensure a correct distortion of the top collar. The leaf springs 32 and 33 draw the ends of the unsympathetic edge in slightly towards the center and the net effect of the distortion results in the edge of the top collar extending along a substantially straight line adjacent to the remote edge of the groove 2 the line being of equal length to the distorted unsympathetic edge of the bottom collar. The catches 22 and 23 are then further rotated so that they engage the tabs 34 and 35 of the upper plate 4 to lock this in position.

Using a blunt edged tool the cloth layer of the bottom collar is now lifted and the edge of the top collar is displaced to lie between the cloth and canvas layers of the bottom collar. Care must be taken to ensure that the three fabric layers lie flat. The loaded stitching aid is now ready to be placed in the sewing machine and the machine has a throat plate specially modified for use with this aid. The modified throat plate has two studs projecting upwardly therefrom, the studs having a diameter equal to the width of the guide 2 and engageable therein. Extending between the studs is a raised bar intersecting the needle hole of the throat plate but broken in the region of the needle hole to allow free passage of the needle. With the guide 2 fixed over the studs on the throat plate the sewing machine is operated to stitch the two collar parts together. The bar gives sufficient support to the canvas of the undercollar to ensure that this does not get bent downwardly and so be missed by the needle. After stitching, the stitching aid is removed from the machine, the upper plates 3 and 4 are opened and the collar removed from the base plate. By turning the cloth of the top collar over the canvas of the undercollar the finished collar is obtained ready for assembly to the rest of the garment.

The brassiere cup stitching aid shown in FIGS. 3 and 4 comprises a base plate 40, a second plate 41 hinged at 42 to the base plate and a third plate 43 hinged at 44 to the base plate. The base plate is formed with a guide slot 45 following the required stitching line, and has a

pad **46** of a high-friction material such as baize, and location markers **47** fixed to the upper surface thereof.

The third plate **43** has a flat first surface **48** which may rest on the upper surface of the base plate, and has a second surface **49** formed with an upstanding fin-shaped projection **50** secured by rivets **51** to the third plate. The fin is aligned with a first end **52** thereof lying on or close to the center line of the third plate lying normal to the hinge line, and a second end **53** thereof offset from said center line so that the fin lies at an angle α to the center line. A suitable value for the angle α is about 14°. The fin is covered by a high-friction material, such as baize. The third plate has a free edge **54** shaped similarly to the guide slot **45** so as not to obstruct any part of this slot when the third plate is in contact with the base plate.

The second plate is formed with a guide slot **55** of the same shape, but wider than, the guide slot **45**, and positioned to overlie guide slot **45** when the plates are closed. The second plate also has a further slot **56** for receiving the fin-shaped projection **50**.

The jig shown is designed to be used to stitch together two pre-cut pieces of material. In use, all three plates of the jig are opened and the lower layer of material placed over the base plate in correct position with its edge parallel to and covering the slot **45**. The baize pad **46** holds the piece of material in position until the third plate **43** is lowered on to the upper surface of the material. The second piece of material is then placed over the third plate and located relative to the markers **47** with its edge covering the guide slot **45**. A selected point on the edge of this piece is held by the operator adjacent to the marker **47***a* and the second plate is closed. The second piece of material is thus distorted, and its edge is pulled into substantial congruency with the edge of the lower piece of material.

The closed jig is then transferred to a sewing machine having a guide through which the needle passes. The guide is engaged in slot **55**, the stitching aid moved below the machine, and stitching takes place with the needle moving in slot **45**. The two unsympathetic pieces of material are thus stitched together along a common line, and one piece of material will have fullness relative to the other as dictated by the shape and location of the fin.

It will be evident that the invention may be applied to stitching aids for use in other fields, the distorting means being designed so as to give the required change in the configuration of the flat material layer when the aid is closed.

What we claim is:

1. A method of arranging a plurality of pieces of material for stitching together along desired lines which are unsympathetic when said pieces of material are flat, comprising arranging said pieces of material over a base plate having a guide slot corresponding in contour to the required stitching line, in such a way that in at least one of said pieces of material the desired stitching line does not, for the whole of its length, overlie said guide slot or extend substantially parallel to the center line of said guide slot, contacting said at least one piece of material with distorting means having an outline which does not extend parallel with the center line of said guide slot to induce distortion of said at least one piece of material out of its own plane, said distortion being such that the full length of the desired stitching line in said piece takes up a contour overlying said guide slot and extending substantially along the center line thereof.

2. A method as claimed in claim **1** wherein part of one or more of said pieces of material is distorted or moved in the plane of said material.

3. A method as claimed in claim **1** wherein two pieces of material lying side by side are to be stitched along adjacent edges of unsympathetic shape comprising placing a first one of said pieces of material on said base plate, distorting said first piece of material to cause said edge to lie along a given line overlying said guide slot and holding said first piece of material in its distorted condition, placing a second one of said pieces of material on said base plate, distorting said second piece of material to cause said edge to lie over said first piece of material overlying said guide slot and with said edge parallel to said edge of said first piece of material, so rendering stitching lines in said two pieces of material congruent and overlying said guide slot.

4. A method as claimed in claim **3** wherein said two pieces have differently curved edges both of which are distorted to be substantially straight, and said guide slot is straight.

5. A method as claimed in claim **3** wherein said material is distorted by projections upstanding from said base plate, and said distortion is controlled and said material held by closing an upper plate over said base plate with said projections being received through openings in said upper plate.

6. A method as claimed in claim **1** comprising placing a lower layer of material over said base plate with the required stitching line in said lower layer extending substantially along the center line of said guide slot in said base plate, placing said distorting means over said lower layer of material, placing an upper layer of material over said distorting means, said upper layer having a desired stitching line which does not, for the whole of its length, overlie said guide slot or extend substantially parallel to the center line of said guide slot, and placing a second plate over said upper layer of material to cooperate with said distorting means to distort said upper layer of material out of its own plane to cause said required stitching line of said upper layer to assume a substantially congruent relationship with said required stitching line of said lower layer substantially along the center line of said guide slot, said second plate being positioned so that a guide slot of predetermined contour therein is aligned with said guide slot in said base plate.

7. Apparatus for arranging a plurality of pieces of material for stitching together along desired lines which are unsympathetic when the material is flat, comprising a base plate having a guide slot corresponding in contour to a desired stitching line, means for locating said plurality of pieces of material relative to said plate so that in at least one of said pieces the desired stitching line does not, for the whole of its length, overlie said guide slot or extend substantially parallel to the center line of said guide slot, and means for distorting said at least one of said pieces so that the full length of the desired stitching line in said piece takes up a contour overlying said guide slot and extending substantially along the center line thereof.

8. Apparatus as claimed in claim 7 wherein said distorting means comprises parts projecting upwardly from said base plate and receivable in holes in an upper plate which may be laid over said base plate.

9. Apparatus as claimed in claim 8 wherein said parts are adjustable relative to said base plate.

10. Apparatus according to claim 9 and further comprising a hinge member hinging each of said parts to said base plate and a support member for securing each of said parts at any one of a number of required angles relative to said base plate.

11. Apparatus as claimed in claim 8 wherein said upper plate is hinged to said base plate.

12. Apparatus as claimed in claim 11 wherein the lower face of said upper plate is provided with members capable of engaging material placed over said base plate to distort or move said material in its own plane as said upper plate is lowered.

13. Apparatus as claimed in claim 12 in which said members are fingers of springy material bent to project from said lower face of said upper plate in the direction in which distortion of said material is required.

14. Apparatus as claimed in claim 11 wherein said guide slot is located substantially centrally of said base plate, distorting means are provided to each side of said guide slot, and two upper plates are hinged one to each side of said base plate and have free edges lying parallel to and spaced from said guide slot when said upper plates are lowered onto said base plate.

15. Apparatus as claimed in claim 7 comprising a base plate on which said lower and upper layers of material may be placed, distorting means disposable between said material layers, a second plate which may be placed on to said upper layer of material and which cooperates with said distorting means to distort said upper layer of material out of its own plane to cause the stitching line of said upper layer to become substantially congruent with the stitching line of said lower layer, both said base and said second plates having aligned guide slots of predetermined contour for guiding a sewing machine needle along the required stitching lines through said material.

16. Apparatus as claimed in claim 15 wherein said distorting means is a third plate hinged to said base plate, said third plate having a flat first surface for engaging said lower layer of material on said base plate and a second surface formed with one or more projections for distorting said upper layer of material when placed thereover, said second plate being formed with openings for accommodating said projections when said second plate is placed over said upper layer of material.

17. Apparatus as claimed in claim 16 wherein said second plate is hinged to said base plate.

18. Apparatus as claimed in claim 16 wherein said third plate has a single fin-shaped projection.

19. Apparatus as claimed in claim 18 wherein said projection extends at an angle to the center line of said third plate lying normal to the hinge line.

20. Apparatus as claimed in claim 19 wherein said angle is substantially 14°.

21. Apparatus as claimed in claim 16 wherein said distorting means and said guide slot are positioned and shaped so that the distances between spaced closest points of said distorting means and said guide slot are unequal.

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