March 4, 1958 L. G. FREEMAN, JR 2,825,366

LEATHER LACING MEANS AND METHOD

Filed Sept. 15, 1954 2 Sheets-Sheet 1

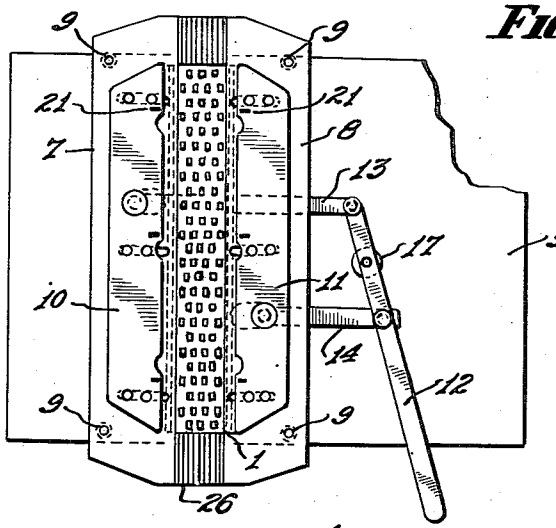


FIG. 2.

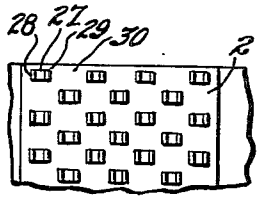
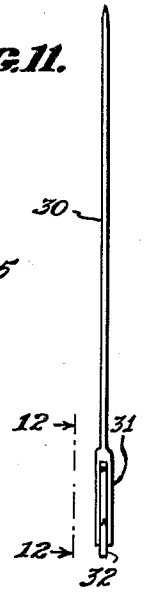


FIG. 6.

FIG. 11.



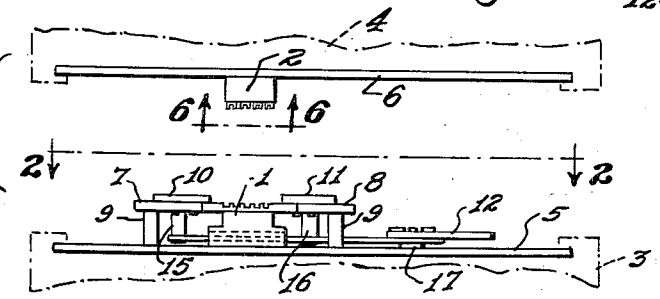


FIG. 1.

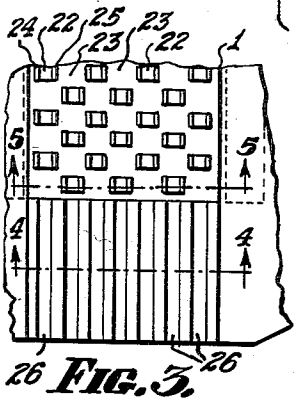


FIG. 3.

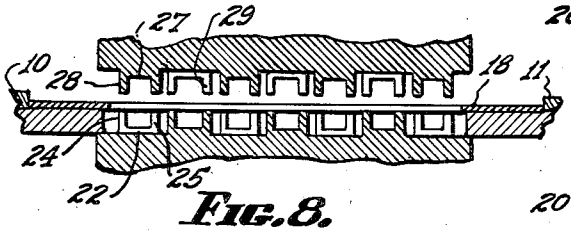


FIG. 8.

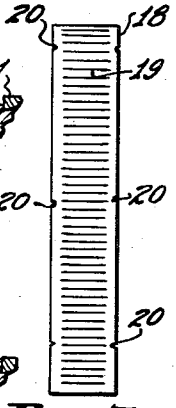


FIG. 7.

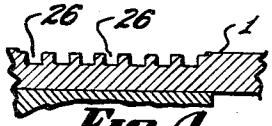


FIG. 4.

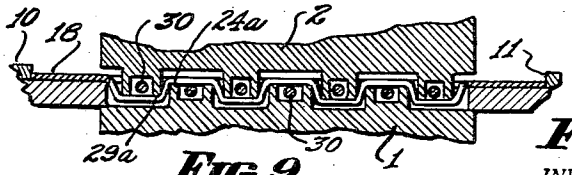


FIG. 9.

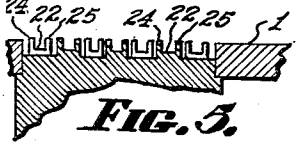


FIG. 5.

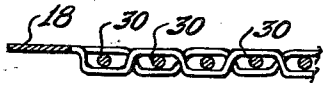


FIG. 10.

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LEATHER LACING MEANS AND METHOD

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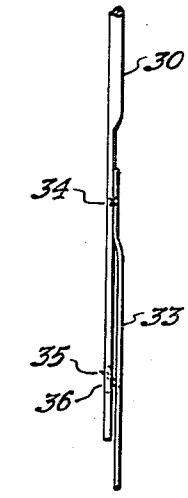


FIG. 12.

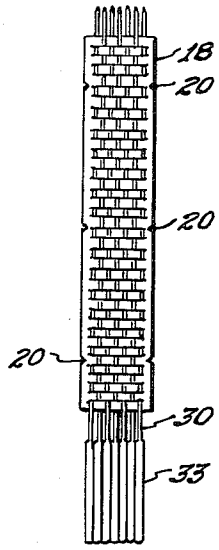


FIG. 13.

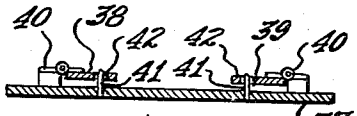


FIG. 15.

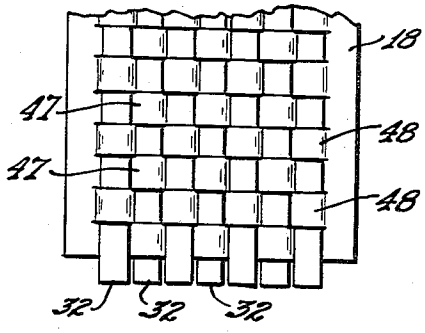


FIG. 16.

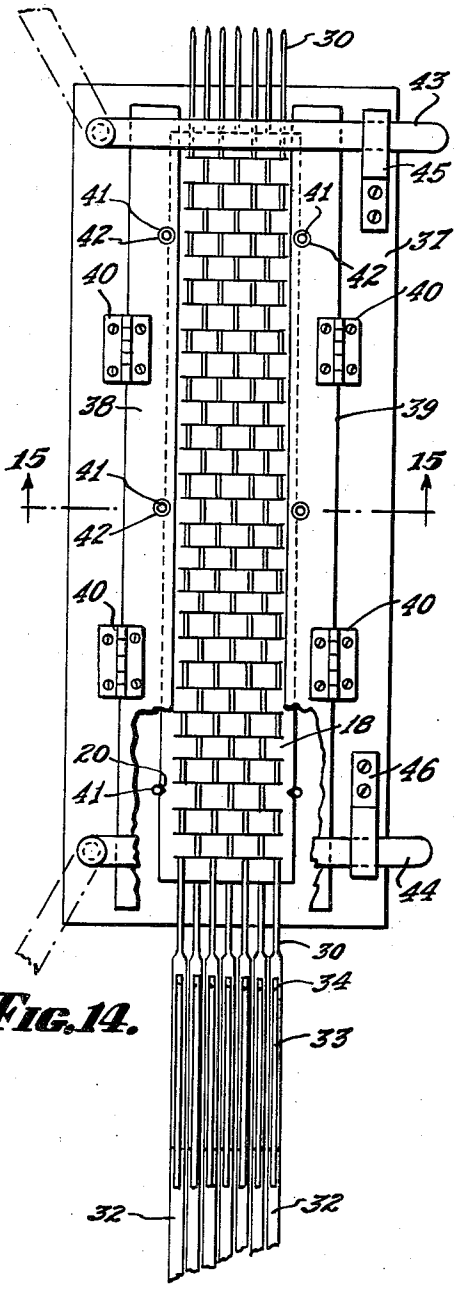


FIG. 14.

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2,825,366

LEATHER LACING MEANS AND METHOD

Louis G. Freeman, Jr., Cincinnati, Ohio, assignor to The Louis G. Freeman Company, Cincinnati, Ohio, a corporation of Ohio

Application September 15, 1954, Serial No. 456,248

6 Claims. (Cl. 139—28)

My invention has to do with the formation of laced leather pieces and finds particular utility in the formation of laced leather members for shoes, although the laced members may be used for any purpose for which laced leather is appropriate.

For the most part the lacing of leather pieces for shoes has been a hand operation, a common procedure being to attach a lacing needle to a support in upright position and then thread a leather piece on to the needle passing the needle alternately in opposite directions through adjacent slits in the leather. When the leather piece has been thus threaded onto the needle, a leather lacing thong is attached to the free end of the needle and the leather piece withdrawn. This results in the lacing thong occupying the position formerly occupied by the needle. The operation, of course, is repeated for each thong required for the particular lacing design. This type of operation is both time consuming and costly; and furthermore, numerous opportunities for error are inherent in the operation and incorrect positioning of the leather thongs often results. These factors make the hand lacing of leather pieces an extremely costly operation and the increased cost must either be borne by the manufacturer or passed on to the consumer in the form of more expensive shoes.

It has also been proposed to lace leather pieces by mechanical means acting to automatically position lacing needles with respect to the leather piece and to draw the lacing strips through the leather. While the automatic mechanical lacing of leather pieces has proved to be satisfactory for large scale production wherein the volume of work produced warrants the cost of the machine, the cost of such equipment is prohibitive for the small manufacturer who is desirous of producing only a small quantity of laced leather articles. Consequently the small producer is forced to go either to a costly hand operation or to use an expensive machine, neither of which is economically feasible for him.

It is, therefore, a principal object of my invention to provide inexpensive leather lacing means and a procedure for lacing which eliminates the inaccuracies inherent in a hand operation as well as the amount of time consumed in the lacing operation, and at the same time does not require the expensive equipment required for the fully automatic lacing of the pieces.

Yet a further object of my invention is the provision of means and a method by means of which laced leather pieces may be made at reduced cost and which employs inexpensive mechanism.

Yet a further object of my invention is the provision of means and a method for the production of laced structures in what may be termed a single operation, as distinct from a strip-by-strip operation.

These as well as other objects of my invention, which will be set forth or explained hereinafter or will be apparent to the skilled worker in the art upon reading these specifications, I accomplish by that procedure and mechanism of which I shall now describe an exemplary embodiment.

Reference is now made to the accompanying drawings, wherein:

Figure 1 is a somewhat diagrammatic representation of a deflecting assembly comprising upper and lower die members.

Figure 2 is a sectional view taken along the line 2—2 of Figure 1.

Figure 3 is an enlarged fragmentary plan view of the lower die element in accordance with my invention.

Figure 4 is a sectional view taken along the line 4—4 of Figure 3.

Figure 5 is a sectional view taken along the line 5—5 of Figure 3.

Figure 6 is an enlarged fragmentary plan view of the upper die element taken along the line 6—6 of Figure 1.

Figure 7 is a plan view of a leather piece adapted to be laced in accordance with my invention.

Figure 8 is an enlarged vertical sectional view of the deflecting elements and a workpiece just prior to the closing of the elements about the workpiece.

Figure 9 is a sectional view similar to Figure 8 and showing the deflecting element in closed position and illustrating the needles positioned in the channels defined by the deflecting element.

Figure 10 is a vertical sectional view illustrating the deflected workpiece with the needles in laced position.

Figure 11 is a plan view of a needle element for use with my invention.

Figure 12 is an enlarged sectional view taken along the line 12—12 of Figure 11.

Figure 13 is a plan view of the leather piece with all of the needles laced in position.

Figure 14 is a plan view with parts broken away of a jig for supporting the workpiece for the actual lacing operation.

Figure 15 is a sectional view taken along the line 15—15 of Figure 14.

Figure 16 is an enlarged fragmentary plan view of the completed workpiece.

Briefly, in the practice of my invention, I provide deflecting elements acting to deflect portions of the workpiece to either side of a median plane, the deflecting elements serving to define channels through which needle elements are adapted to be inserted. The lower deflecting element is provided with adjustable guide means serving to position the workpiece with respect to the deflecting die; and the upper deflecting element is adapted to mate with the lower element. These elements may be mounted in a simple press or, if such is available, they may be conveniently mounted in a slitting press of the type taught in United States Letters Patent No. 2,526,868. It will be understood that the closing of the deflecting elements will serve to deflect the workpiece and define channels for the insertion of the needles.

Upon insertion of the needles through the deflected workpiece, the entire workpiece and needle assembly is removed from the deflecting element and placed in a jig acting to firmly support the workpiece, whereupon lacing strips are connected to the ends of the needles and the needles then drawn from the workpiece so as to position the lacing strips in the position formerly occupied by the needles. The arrangement is such that one operator may insert the needles and then pass the assembly to a second operator who will fit it into the jig and insert the lacing strips, whereupon the needles may be returned to the first operator for reuse.

For a clearer understanding of my invention, reference is now made to Figures 1 and 2 of the drawings wherein I have illustrated a lower deflecting element 1 and an upper deflecting element 2 arranged to be brought to-

gether by any suitable press means, the jaws of which are diagrammatically illustrated at 3 and 4.

In the embodiment illustrated the deflecting elements are mounted on base plates 5 and 6 of the kind suitable for convenient attachment to the jaws of the press. The lower deflecting element 1 includes laterally extending portions 7 and 8 which defines in effect a platform supported above the base plate 5 by means of studs 9. Side guides numbered 10 and 11 are slidably supported on the lateral extensions 7 and 8, and arranged to jointly move laterally with respect to the deflecting elements, the movement of the side guides being controlled by means of a lever arm 12 having pivoted the extensions 13 and 14 connected respectively to the side guides by means of studs 15 and 16. The lever arm itself is pivoted on a stud 17 intermediate the extensions 13 and 14, and the arrangement is such that movement of the lever arm in a clockwise direction will result in moving the side guides toward one another; whereas movement of the lever arm in the opposite direction will result in the joint movement of the side guides away from each other.

In Figure 7, I have illustrated a workpiece 18 of a size to be handled by the deflecting elements illustrated in Figure 1. The workpiece 18 is provided with a plurality of aligned slits 19; and it will be understood that the deflection elements in their coaction serve to depress or deflect portions of the workpiece lying between the slits in such fashion that the leather portions, beneath which a lacing strip is to be positioned, are brought into substantially a single plane, while the leather portions above which the strip is to be positioned are brought into substantially a single plane so spaced from the first mentioned plane that a lacing means or needle may be thrust between the dies and between the deflected portions of the workpiece. Preferably the workpiece will be provided with one or more sets of notches or nicks 20 adapted to be aligned with notches 21 in the side guides, thereby assuring proper registry of the workpiece with the deflecting elements.

It will be understood that there are various types and styles of lacing and sizes and shapes of the workpiece, and the illustrative use herein of an elongated laced strip is not to be taken as a limitation of the invention to the particular style shown. The slits may, for example, be of various shapes and sizes, may be spaced in various ways and at varying distances, and may be slanted at various angles to the axis of the workpiece or parallel or perpendicular with the axis, as may be required for a given style of lacing. In addition, the term "slit" as used herein is employed in a nonlimiting sense. In many forms of laced structures the workpiece is merely provided with linear cuts which form the slits; but I use the term broadly enough to encompass two-dimensional perforations, slots, holes, or any other apertures through which lacing strips or thongs may be drawn in lacing the structure. Similarly, it will be understood that the configuration of the side guides 10 and 11 may be altered as required to accommodate workpieces of varying shapes and sizes.

Figure 3 illustrates in detail the construction of the lower deflecting element. It comprises staggered rows of upwardly extending projections 22 having spaces 23 therebetween. The projections 22 are U-shaped in cross section having upwardly extending sides 24 and 25 which may be characterized as being elongated in one direction and narrow in the opposite direction. The U-shaped projections thus define longitudinally extending channels through which the needle elements are passed. At its ends, the lower deflecting element is provided with elongated channels 26 which are in alignment with the projections and serve as guideways for the needles to assure their proper passage through the channels defined by the projections.

Figure 6 illustrates the upper deflecting element 2; and it too is provided with U-shaped projection 27 having downwardly projecting sides 28 and 29. The projections 27 are also arranged in staggered rows with spaces 30 therebetween; and it will be understood that when the deflecting elements are fitted together the projections 22 of the lower deflecting element will fit into the spaces 30 in the upper deflecting element and similarly the projection 27 will fit into the spaces 23, thereby providing substantially continuous channels for the passage of the needles.

Figure 8 illustrates the positioning of the workpiece 18 on the lower deflecting element where it is centered between the side guides 10 and 11; and the upper deflecting element is shown just prior to its contact with the workpiece to deflect portions thereof lying between the slits 19. From this illustration it will be apparent that the sides 24, 25 of the projections 22 are in alignment with the sides 28 and 29 of the projections 27.

Figure 9 illustrates the deflecting elements in closed position and the deflected path of a single strip of the workpiece will be apparent. The figure also illustrates needles 30 in position in the channels defined by the projections 22 and 27. Adjacent needles lying alternately above and below the deflected portion of the workpiece. To this end it will be noted that the sides of adjacent projections, such as the side 24*a* of the lower projection and side 29*a* of the upper projection, are spaced apart by a distance sufficient to permit the workpiece to pass therebetween.

It will be understood that the needles are inserted after the deflecting elements have been closed, a needle 30 being provided for each of the elongated channels 26. A needle suitable for this purpose is illustrated in Figure 11 wherein the needle 30 is provided at one end with a bifurcated head 31 adapted to receive a lacing element 32. The needles will each be of a length to extend from one end of the lower deflecting element to the other so as to assure passage of the needle through all of the slits in the workpiece.

In Figure 12, I have illustrated a preferred form of needle wherein the bifurcated end includes a spring metal strip 33 braised or welded to the body of the needle, as at 34. The strip 33 projects beyond the body of the needle and it may be pointed or rounded, in either event providing a convenient tip which may be grasped by the operator to thread the strip. The strip is also preferably provided with a detent 35 adapted to be received in a depression or perforation 36 in the body portion of the needle. A piece of lacing leather may be engaged with such a needle by separating the spring strip 33 from the end of the needle and placing the end of a leather strip therebetween, whereupon it will be held in place by the coaction of the detent 35 and depression or perforation 36. If desired, the ends of the leather strip may be perforated to receive the detent, but this is not necessary.

Figure 13 illustrates the workpiece with the needles in position subsequent to its removal from the lower deflecting element and prior to its securement in the lacing jig. The lacing jig is illustrated in Figures 14 and 15, and comprises a base 37 on which are mounted clamping plates 38 and 39, the clamping plates being hinged to the base by means of hinges 40. Upstanding pins 41 serve as positioning means for the workpiece, the notches 20 in the workpiece coinciding with the pins; and preferably the clamping plates 38 and 39 will be provided with perforations 42 to receive the free ends of the pins. The clamping plates are of a size to overlie marginal edge portions of the workpiece, in the manner illustrated in Figure 14, and the plates are clamped against the workpiece by means of pivoted arms 43 and 44 adapted to be secured beneath the latch tongues 45 and 46.

Upon positioning of the workpiece in the jig and the closing of the arms 43, 44 to firmly secure it in place, the thongs or lacing strips are secured to the bifurcated ends of the needles, whereupon the needles are drawn through the workpiece so as to position the lacing elements.

A segment of the completed workpiece is shown in Figure 16 wherein it will be apparent that the lacing elements have been laced through the strips 47, 48 of the workpiece, the lacing elements passing alternately above and below the strips. It will be understood that subsequent to the lacing of the workpiece, the needles will be removed and the workpiece discharged from the jig.

By means of the procedure and apparatus just described, even a small producer may economically and profitably produce laced structures. It will be understood that while my invention has been described in connection with the lacing of leather pieces, it will find utility in the lacing of diverse materials other than leather. Modifications may, of course, be made in my invention without departing from the spirit of it.

Having, however, described my invention in an exemplary embodiment, what I desire to secure and protect by Letters Patent is:

1. In apparatus for lacing a workpiece, a base plate, a deflecting element supported on said base plate, said deflecting element including laterally extending planar surfaces projecting outwardly from opposite sides thereof, side guides slidably supported on said laterally extending surfaces for positioning a workpiece placed on said deflecting element, adjustment means for jointly moving said side guides toward and away from each other, and a second base plate and deflecting element adapted to be juxtaposed to said first named deflecting element with the workpiece positioned therebetween, said deflecting elements each comprising a plurality of fixedly secured generally U-shaped projections aligned in one direction and spaced in a transverse direction to provide channels for the passage of needle elements, the projections of the respective deflecting elements being adapted to fit together in interdigitating relation so as to deflect portions of the workpiece to either side of a median plane.

2. The apparatus claimed in claim 1 wherein said adjustment means comprises a lever arm pivoted to said base plate intermediate its ends, wherein an extension connects each of said side guides to said lever arm, there being an extension for each of said side guides, and wherein said extensions are pivotally connected to said lever arm on the opposite side of its pivotal connection to said base plate.

3. In apparatus for lacing a workpiece, a pair of deflecting elements adapted to be mounted in a press and having interdigitating projections for deflecting portions of a workpiece placed therebetween, said projections being generally U-shaped and aligned in one direction of the deflecting elements and spaced in a transverse direction to provide channels for the passage of needle elements between the deflected portions of said workpiece, whereby a plurality of needle elements may be inserted in the channels so as to lie between the deflected portions of the workpiece in laced relationship therewith, in combination with a jig for receiving the workpiece and needle assembly upon removal from between said deflecting elements, said jig including clamping means for securing said workpiece thereto so that upon subsequent attachment of lacing elements to said needles, said needles may be withdrawn from said workpiece and replaced by the lacing elements attached thereto.

4. The combination claimed in claim 3 wherein said jig comprises a base, clamping plates hingedly secured to said base and adapted to engage opposed marginal edge portions of the workpiece, and locking means for securing the said clamping plates in the closed position.

5. The apparatus claimed in claim 4 wherein said base includes upstanding guide pins for aligning said workpiece, said clamping plates having perforations therein in alignment with said guide pins, whereby said clamping plates may be closed over said guide pins.

6. A process for producing a laced structure which comprises providing a pair of deflecting elements adapted to be brought together with a piece of work therebetween to deflect aligned portions of the workpiece alternately to either side of a median plane, aligning a piece of work on one of said deflecting elements, bringing the said deflecting elements together so as to deflect the workpiece, and while the deflecting elements are in engagement, passing along the said median plane a plurality of lacing elements so that alternately deflected portions of the workpiece lie to either side of the lacing elements, removing the workpiece from between said deflecting elements and securing it to a supporting means, engaging strips of lacing material with the end of said lacing elements, withdrawing the lacing elements so as to position the lacing strips between the alternately deflected portions of said workpiece, and thereafter releasing said workpiece from said supporting means.

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