

April 23, 1940.

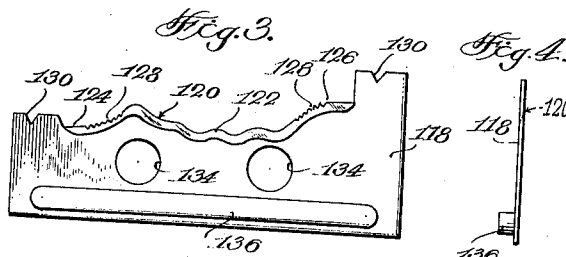
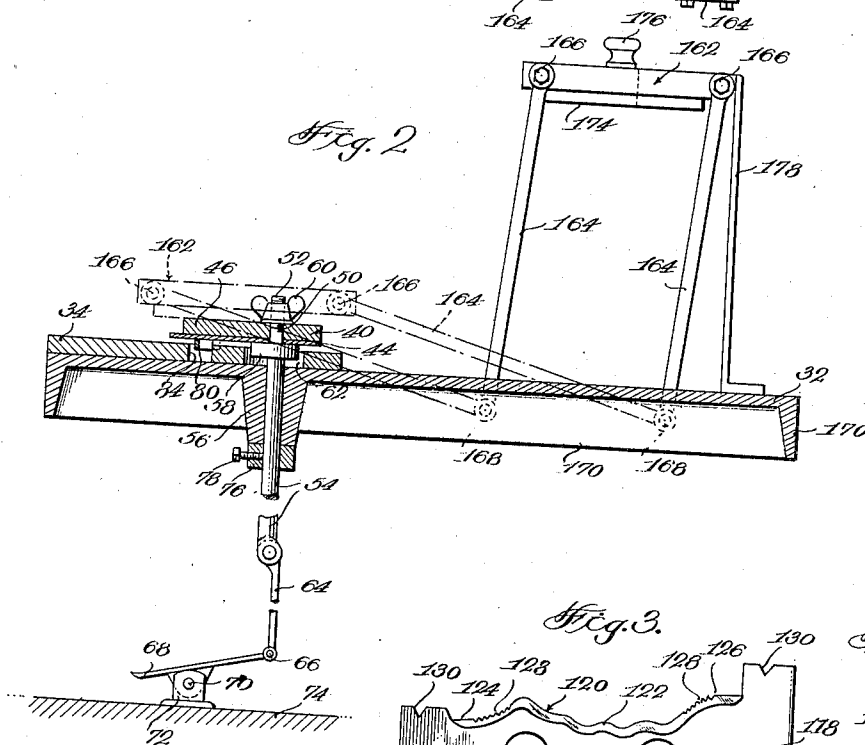
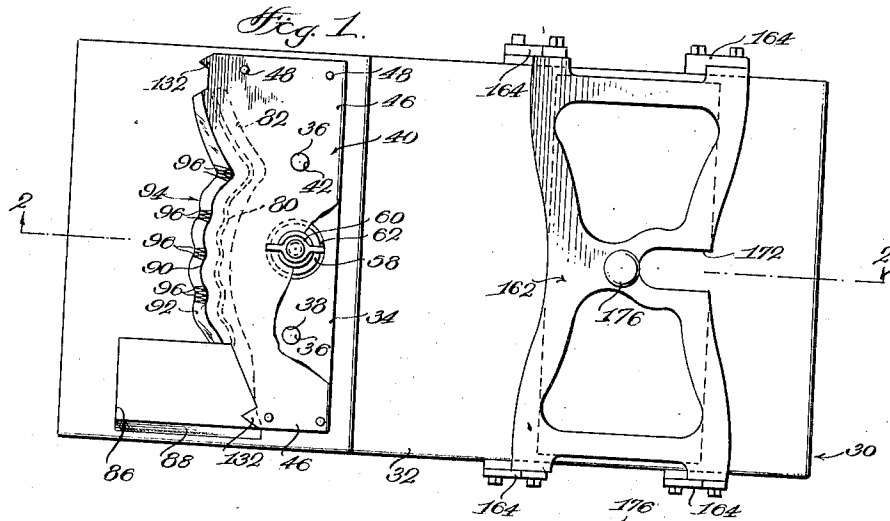
L. G. VACHON ET AL

2,198,140

METHOD OF AND MEANS FOR FOLDING SHOE UPPERS

Filed Sept. 12, 1938

3 Sheets-Sheet 1



Lionel G. Vachon &
Hubert A. Vachon
INVENTORS

BY Victor J. Evans & Co.
ATTORNEYS

April 23, 1940.

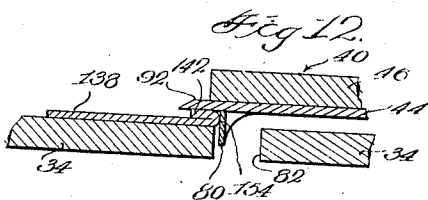
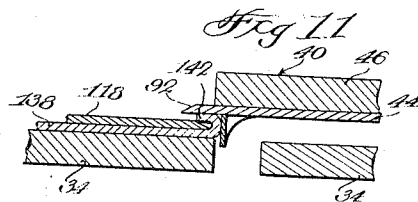
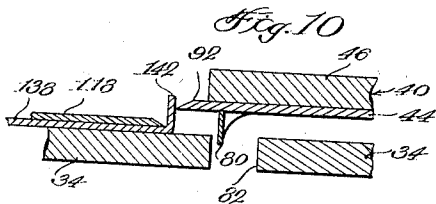
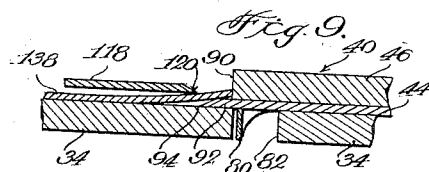
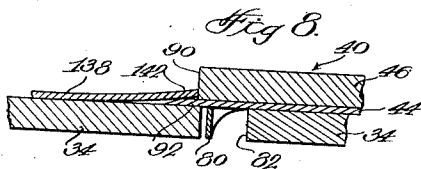
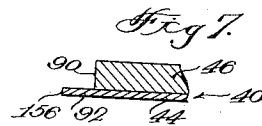
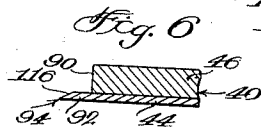
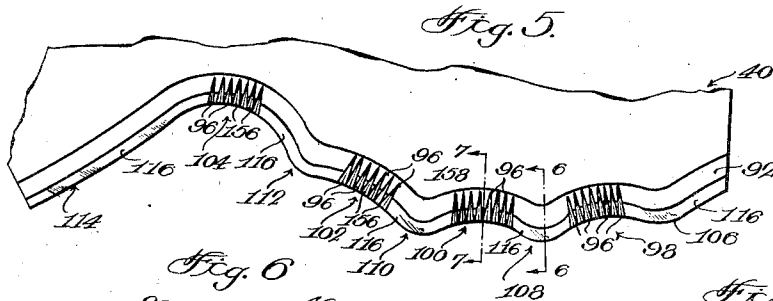
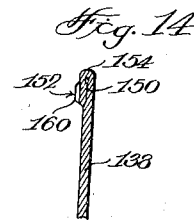
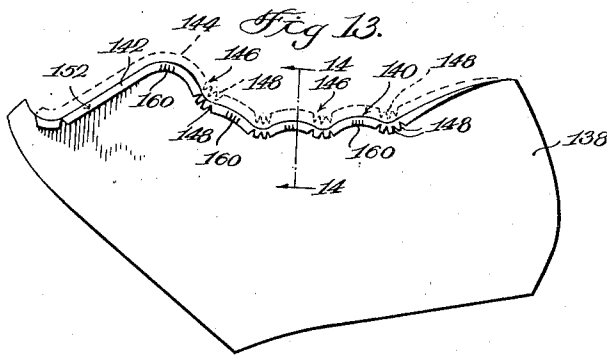
L. G. VACHON ET AL

2,198,140

METHOD OF AND MEANS FOR FOLDING SHOE UPPERS

Filed Sept. 12, 1938

3 Sheets-Sheet 2



Lionel G. Vachon &
Hubert A. Vachon
INVENTORS

BY Victor J. Enns & Co.
ATTORNEYS

April 23, 1940.

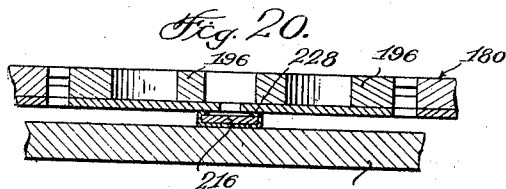
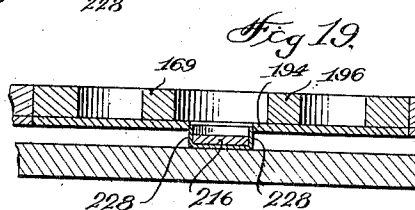
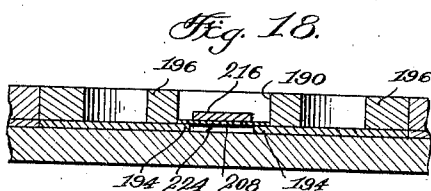
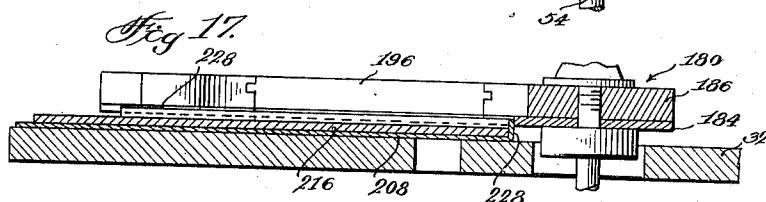
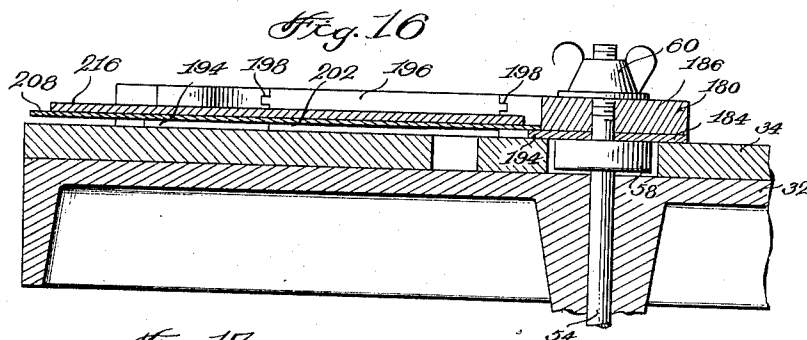
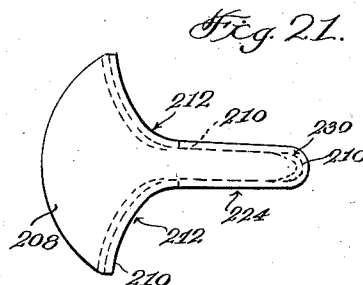
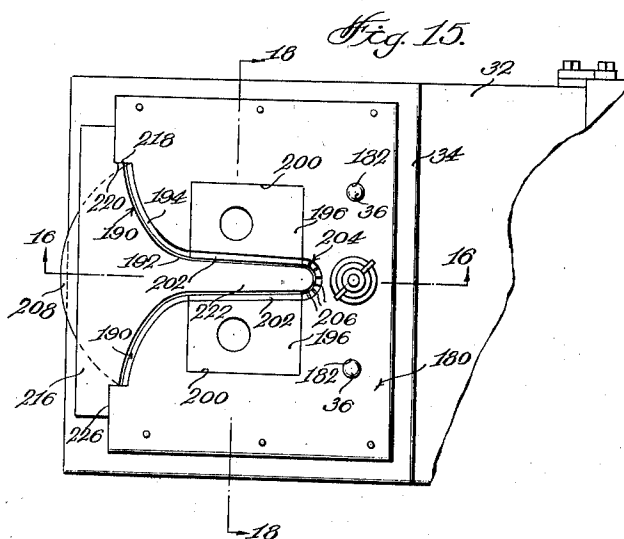
L. G. VACHON ET AL

2,198,140

METHOD OF AND MEANS FOR FOLDING SHOE UPPERS

Filed Sept. 12, 1938

3 Sheets-Sheet 3



Lionel G. Vachon +
Hubert A. Vachon

INVENTORS

BY Victor J. Evans & Co.

ATTORNEYS

UNITED STATES PATENT OFFICE

2,198,140

METHOD OF AND MEANS FOR FOLDING
SHOE UPPERS

Lionel G. Vachon and Hubert A. Vachon, Haverhill, Mass., assignors to Stampress Folding System, Inc., Haverhill, Mass., a corporation of Massachusetts

Application September 12, 1938, Serial No. 229,598

17 Claims. (Cl. 12-55)

Our invention relates to the art of manufacturing shoes and has among its objects and advantages the provision of an improved method of and means for folding shoe uppers and the like.

In the manufacture of shoe uppers having a finished edge in the nature of a sinuous contour, considerable difficulty has been experienced in folding the material of the upper back upon itself to provide a sinusoidal configuration. Heretofore the folding of the material to provide such a configuration has been performed by hand, and no satisfactory machine has been devised to perform such work. Accordingly, an object of our invention is to provide a novel method of and means for folding a considerable margin of the shoe upper and the like along a sinusoidal line, wherein such work may be performed in an efficient manner through mechanical means so designed as to execute a well performed and neat appearing job.

In our invention, the shoe upper blank is cut to provide an edge in the shape of a sinusoidal line. The margin along this edge is skived, and the margin is bent back upon itself along a sinusoidal line, with the overlapping parts adhesively secured into a unitary structure. The margin folded back upon the upper proper is snapped at suitable intervals at substantially right angles to the concavities of the sinusoidal edge prior to folding thereof, while the convexities along the edge are crimped during the folding operation. The crimping is performed by novel mechanical means, while the margin is simultaneously folded along a sinusoidal line throughout its entire length, after which the overlapping parts are pressed into adhesive relation.

A further object is to provide a novel top folding plate operatively related to a base folding plate for pressing purposes, wherein a novel free member folding plate is peculiarly related to the top folding plate for folding the margin along a sinusoidal line. The top folding plate is characterized by a grooved formation which cooperates in a novel manner with the free member folding plate for crimping the margin bent back upon the piece proper along the convexities of the margin, so that a neatly formed bend may be made.

A further object is to provide a folding machine of the type described in which novel folding mechanism is incorporated and in which novel pressing means are embodied.

In the accompanying drawings:

Figure 1 is a top plan view of a machine embodying our invention;

Figure 2 is a sectional view along the line 2-2 of Figure 1;

Figure 3 is a plan view of the free member folding plate;

Figure 4 is an end view of the structure of Figure 3;

Figure 5 is a fragmentary view of the top folding plate;

Figure 6 is a sectional view along the line 6-6 of Figure 5;

Figure 7 is a sectional view along the line 7-7 of Figure 5;

Figure 8 is a sectional view of the base folding plate and the top folding plate illustrating a shoe upper placed in position preparatory to folding the same;

Figure 9 is a similar view illustrating the free member folding plate applied to the upper;

Figure 10 is a similar view illustrating one step in the folding operation;

Figure 11 is a similar view illustrating a second step in the folding operation;

Figure 12 is a similar view illustrating the fold pressing operation;

Figure 13 is a view of a shoe upper folded in accordance with our invention;

Figure 14 is a sectional view along the line 14-14 of Figure 13;

Figure 15 is a top plan view of the machine illustrated in Figure 1, but with other folding mechanism associated therewith for executing differently shaped folds;

Figure 16 is a sectional view along the line 16-16 of Figure 15;

Figure 17 is a view similar to Figure 16 illustrating one step in the folding operation;

Figure 18 is a sectional view along the line 18-18 of Figure 15;

Figure 19 is a view illustrating a second step in the folding operation;

Figure 20 is a view illustrating a third step in the folding operation; and

Figure 21 is a plan view of a toe blank which may be folded in accordance with our invention.

Referring to Figures 1 and 2, the machine includes a bed 32 which may be mounted on legs or other suitable structure (not shown). Upon the bed 32 we mount a base folding plate 34, which plate is restrained from lateral shifting on the bed 32 by reason of pins 35 which are anchored to the bed and extend through openings 38 in the plate, one of which openings is illustrated in Figure 1. A top folding plate 40 is

positioned above the base folding plate 34 and includes openings 42 for slidably receiving the pins 36. One of the openings 42 is illustrated in Figure 1. Top folding plate 40 comprises a

5 metallic plate 44 and a body plate 46 which are connected as a unit through the medium of rivets 48.

Top folding plate 40 is provided with a bore 50 for the reception of a shank 52 formed on the shaft 54 slidable in the guide 56 formed integrally with the bed 32. Shaft 54 includes a collar 58 constituting a bed for the plate 40, while the shank 52 is threaded for the reception of a nut 60 which clamps the plate to the collar 58 for connecting the plate and the shaft as a unit. We provide the base folding plate 34 with a bore 62 of sufficient diameter to freely receive the collar 58. Plate 40 is movable toward and away from the base plate 34 and is restrained from

20 relative rotary motion because of the guide pins 36.

To the lower end of the shaft 54 we pivot one end of a link 64, the other end of which is pivotally connected at 66 with a foot pedal 68. Pedal 68 is pivotally connected at 70 with a bracket 72 anchored to the floor 74. Shaft 54 may be reciprocated through the medium of the foot pedal 68 for raising and lowering the top folding plate 40 with respect to the base folding plate 34. Upon the shaft 54 we mount a collar 76 which may be adjusted therealong and secured in fixed relation thereto by a set screw 78. Collar 76 is arranged in the path of the guide 56 for abutting the same to limit the rise of the top folding

35 plate 40. To the lower face of the top folding plate 40 we connect a limit gauge and former 80 which is in the nature of a right-angular flange having a sinusoidal configuration, as illustrated in Figure 1. The configuration of the limit gauge and former 80 will, of course, depend upon the configuration of the line of fold to be formed on the shoe upper. Base folding plate 34 is provided with a slot 82 for accommodating the limit gauge and former 80. Slot 82 takes the general configuration of the limit gauge and former 80, while the latter barely clears the wall 84 of the slot. One end of the slot 82 opens into an opening 86 in the base folding plate 34, which opening provides accommodation for the back seam of connected shoe uppers. The wall 88 defining one side of the opening is beveled, as illustrated in Figure 1.

Referring to Figures 1 and 5, the front edge 90 of the body plate 46 includes a configuration 55 simulating the contour of the limit gauge and former 80. Metallic plate 44 is extended beyond the edge 90, as at 92, and the edge 94 is of the same contour as the edge 90. In Figure 5, we illustrate the extension 92 as being grooved at 96 inwardly of the edge 94. The grooves 96 are localized in groups limited to the concaved runs 98, 100, 102 and 104 of the edge 94, and the grooves are arranged substantially at right angles to these runs. The convex runs 106, 108, 110, 112 and 114 are beveled to a knife edge, as at 116.

Figures 3 and 4 illustrate the free member folding plate or hold-down 118. This hold-down includes an edge 120 of the same configuration as the limit gauge and former 80, and is beveled to a knife edge, as indicated at 122. The sweeps 124 and 126 along the edge 120 are provided with saw teeth 128. Hold-down 118 is notched at 130 for the reception of alignment projections 132

75 formed on the top folding plate 40. Two finger

holes 134 are formed in the hold-down 118, and a handle 136 is attached to the hold-down.

Figure 13 illustrates a shoe upper at 138. Upper 138 includes an edge 140 of sinusoidal configuration, which edge constitutes the bight of the fold. The margin folded back upon the upper proper is illustrated at 142, which margin is adhesively secured to the upper. The margin 142, before being bent back upon the upper, is illustrated in dotted lines at 144. In blanking the upper 138 we snip the margin in the zones of the concavities 146 as indicated at 148. Figure 14 illustrates the upper 138 as being skived at 150 throughout the area of the overlap 152.

From the foregoing description of the various parts of our invention, the operation thereof will be readily understood. The upper blank 138 is laid on the base plate 34, with the margin 142 lying upon the extension 92 of the top folding plate 40 (see Fig. 8). The edge of the margin lies in abutting relation with the edge 90 of the body plate 46. At this time the metallic plate 44 rests on the base plate 40. The hold-down 118 is then laid upon the upper blank 138, as in Figure 9. Alignment projections 132 will then lie in the notches 130 for properly aligning the edge 120 of the hold-down 118 with respect to the edge 94 of the extension 92.

Hold-down 118 is held down manually against the upper blank 138, and the top folding plate 40 is elevated through the medium of the pedal 68 to the position of Figure 10. Such elevation of the top folding plate 40 bends the margin 142 upwardly into a position substantially at right angles to the upper proper along the edge 120 of the hold-down 118. At the same time, elevation of the top folding plate 40 brings the alignment extensions 132 above the hold-down 118 so as to permit forward shifting of the same upon the base folding plate 34. With the parts positioned according to Figure 10, the hold-down 118 is advanced forwardly for bending the margin 142 back upon the hold-down and underneath the extension 92, as illustrated in Figure 11. The hold-down 118 is advanced sufficiently far to bring the bight 154 of the fold into pressure relation with the limit gauge and former 80. Saw teeth 128 grips the leather so as to positively shift the same.

After pushing the shoe upper blank 138 home to the position of Figure 11, the hold-down 118 is withdrawn and the top folding plate 40 is lowered for pressing the margin 142 against the blank proper, as illustrated in Figure 12. Pedal 68 is pivoted intermediate its ends so as to be susceptible of foot manipulation for raising and lowering purposes. The concaved runs 98, 100, 102 and 104 are flat, as at 156 in Figure 7. As the margin 142 is being bent in the stages of Figures 11 and 12, particularly Figure 12, the margin will buckle into the grooves 96, which causes the convexities of the margin to be crimped, as illustrated at 160, thus taking up slack in the margin in such manner as to permit an effective adhesive connection between the margin and the blank proper. The snipped runs of the margin permit effective bending about the concavities of the bight, while the crimping action on the margin tends to contract the margin as it is being crowded into a more limited space.

After the margin 142 has been pressed home, according to Figure 12, the margin is additionally pressed and secured through the medium of a pressure frame 162. Frame 162 parallels the bed 32 and is swingably connected therewith

through the medium of parallel arms 164. Two arms 164 are pivotally connected at 166 with each end of the frame 162 and at 168 with the flange 170 depending from the bed 32. Frame 162 includes a recess 172 of sufficient proportions to accommodate the nut 60 as the pressure body 174 is brought into pressure relation with the top folding plate 40. A handle 176 is connected with the frame 162 to facilitate shifting of the frame from the full to the dotted line positions of Figure 2. Frame 162 maintains parallel relation with the bed 32 in all positions of the former so as to have uniform pressure on the top folding plate 40. When the frame 162 is swung upwardly and backwardly, the frame moves sufficiently far to pivot the arms 164 beyond the vertical so that the frame will rest against the bracket 178 to be supported in the clear of the folding facilities of the machine.

Obviously, the folding mechanism so far described may be made up in units for folding material along lines of different configuration than that illustrated. The sinusoidal line of bend may include more or less alternately related convexities and concavities. The adhesive employed for securing the margin 142 to the upper proper is well-known in the art and need not, therefore, be described.

In Figures 15 to 21, inclusive, we illustrate the manner in which a differently shaped shoe part may be folded in accordance with the invention. Upon the base folding plate 34 we mount a top folding plate 180 having openings 182 for the reception of the pins 36. Plate 180 is clamped to the shaft 54 in the same manner as the top folding plate 40. Plate 180 includes a metallic plate 184 riveted to the body plate 180. We provide the top folding plate 180 with a U-shaped slot 188 which flares outwardly, as indicated at 190 in Figure 15. Plate 184 is provided with a U-shaped slot 192 which is slightly smaller than the slot 188 to provide a ledge 194 extending into the slot 188. Folding blocks 196 are slidably keyed at 198 within recesses 200 in the top folding plate 180. Blocks 196 carry flanges 202 which represent continuations of the ledge 194. The bight 204 of the ledge 194 is grooved at 206 in the same manner as the concaved runs of the extension 32 of Figure 5.

Figure 21 illustrates a toe piece 208 which is to be folded back upon itself along the line 210. Toe piece 208 is shaped to lie upon the ledge 194. The margin to be folded back upon the piece 208 is substantially coextensive in area and contour with the ledge 194. In folding, the piece 208 is placed upon the ledge 194 after which a free member folding plate 216 is placed upon the toe piece 208. Plate 216 is provided with aligning edges 218 having guiding relation with the walls 220 of the plate 184 centering the extension 222 of the plate 216 centrally of the extension 224 of the toe piece 208. Plate 216 also has abutting relation at 226 with the plate 180 for limiting inward movement of the plate 216 while the plate 180 lies on the base folding plate 34. Figure 16 illustrates the piece 208 positioned on the ledge 194 and the free member folding plate 216 placed in position.

In Figure 17, we illustrate the top folding plate 180 elevated for bending the margin 228 upwardly. With the plate 180 positioned according to Figure 17, the plate 216 is in the clear of the plate 180 and may be advanced forwardly. As the plate 216 is advanced, margin 228 is folded back upon the piece 208 along the concavities

212, while the margin along the run 230 is also folded back upon the piece. At this time the folding blocks 196 are moved toward each other, as illustrated in Fig. 20, for bending the straight runs of the margin 228 back upon piece 208. The plate 216 is now withdrawn and the plate 180 lowered in the same manner as the plate 40 for pressing the margin against the piece 208 proper. The grooved curvature 204 performs a crimping action on the run 230 of the margin in the same manner as the grooved concavities of the extension 32.

Without further elaboration, the foregoing will so fully illustrate my invention that others may, by applying current knowledge, readily adapt the same for use under various conditions of service.

We claim:

1. A machine of the type described, comprising: means for supporting a shoe part having a margin of straight and curved configuration to be folded back upon the part proper; means for partly folding the curved margin back upon the part proper; and means for folding the straight margin back upon the part proper.

2. A machine of the type described, comprising: means for supporting a shoe part having a margin of straight and curved configuration to be folded back upon the part proper; means for partly folding the curved margin back upon the part proper; means for folding the straight margin back upon the part proper; and means for crimping the margin bent back upon the shoe part along convex lines.

3. A machine of the type described, comprising: a work support; a manually actuated hold-down for holding the work against the support and having a bend forming edge; a work folding means having a companion bend forming edge and means for moving the work folding means toward and away from the work support; said work folding means cooperating with said hold-down for bending a margin of the work across said bend forming edges; said hold-down being adapted to advance the work on the work support for crowding the margin between the hold-down and said work folding means when the latter is spaced a predetermined distance from the work support; and crimping formations on said work folding means for crimping the margin bent about a convex line on the work; said work folding means being arranged to press the margin against the work after withdrawal of the hold-down.

4. A machine of the type described, comprising: a work support; a manually actuated hold-down for holding the work against the support and having a bend forming edge; a work folding means having a companion bend forming edge and means for moving the work folding means toward and away from the work support; said work folding means cooperating with said hold-down for bending a margin of the work across said bend forming edges; said hold-down being adapted to advance the work on the work support for crowding the margin between the hold-down and said work folding means when the latter is spaced a predetermined distance from the work support; and a crimping formation on said work folding means for crimping the margin bent about a convex line on the work; said work folding means being arranged to press the margin against the work after withdrawal of the hold-down; said crimping formation comprising a slotted run underneath said work folding means.

5. A machine of the type described, comprising: a work support; a manually actuated hold-down for holding the work against the support and having a bend forming edge; a work folding means having a companion bend forming edge and means for moving the work folding means toward and away from the work support; said work folding means cooperating with said hold-down for bending a margin of the work across said bend forming edges; said hold-down being adapted to advance the work on the work support for crowding the margin between the hold-down and said work folding means when the latter is spaced a predetermined distance from the work support; and crimping formations on said work folding means for crimping the margin bent about a convex line on the work; said work folding means being arranged to press the margin against the work after withdrawal of the hold-down; said crimping formations comprising a group of grooves underneath said work folding means.
6. A machine of the type described, comprising: a work support; a manually actuated hold-down for holding the work against the support and having a bend forming edge; a work folding means having a companion bend forming edge and means for moving the work folding means toward and away from the work support; said work folding means cooperating with said hold-down for bending a margin of the work across said bend forming edges; said hold-down being adapted to advance the work on the work support for crowding the margin between the hold-down and said work folding means when the latter is spaced a predetermined distance from the work support; and crimping formations on said work folding means for crimping the margin bent about convex lines on the work; said work folding means being arranged to press the margin against the work after withdrawal of the hold-down; said crimping formations comprising a series of groups of grooves underneath said work folding means.
7. A machine of the type described, comprising: a work support; a manually actuated hold-down for holding the work against the work support and having a bend forming edge; a work folding means having a companion bend forming edge and means for moving the work folding means toward and away from the work support; said hold-down and said work folding means being provided with cooperating aligning means for precisely positioning the hold-down relatively to the work folding means; said work folding means cooperating with said hold-down for bending a margin of the work across said bend forming edges; said hold-down being adapted to advance the work on the work support for crowding the margin between the hold-down and said work folding means when the latter is spaced a predetermined distance from the work support for bringing said cooperating aligning means out of engagement; and a crimping formation on said work folding means for crimping the margin bent about a convex line on the work; said crimping formation comprising grooves underneath the work folding means and intersecting the bend forming edge thereof; said work folding means being arranged to press the margin against the work after withdrawal of the hold-down.
8. A machine of the type described, comprising: a work support; a manually actuated hold-down for holding the work against the work support and having a bend forming edge; a work folding means having a companion bend forming edge and means for moving the work folding means toward and away from the work support; said hold-down and said work folding means being provided with cooperating aligning means for precisely positioning the hold-down relatively to the work folding means; said work folding means cooperating with said hold-down for bending a margin of the work across said bend forming edges; said hold-down being adapted to advance the work on the work support for crowding the margin between the hold-down and said work folding means when the latter is spaced a predetermined distance from the work support for bringing said cooperating aligning means out of engagement; and crimping formations on said work folding means for crimping the margin bent about a convex line on the work; said crimping formations comprising a series of grooves underneath said work folding means; and manually actuated auxiliary pressure means arranged to be moved down on said work folding means for additionally pressing the margin against the work.
9. A machine of the type described, comprising: a work support; a manually actuated hold-down for holding the work against the support and having a bend forming edge; a work folding means having a companion bend forming edge and means for moving the work folding means toward and away from the work support; said work folding means cooperating with said hold-down for bending a margin of the work across said bend forming edges; said hold-down being adapted to advance the work on the work support for crowding the margin between the hold-down and said work folding means when the latter is spaced a predetermined distance from the work support; a crimping formation on said work folding means for crimping the margin bent about a convex line on the work; said work folding means being arranged to press the margin against the work after withdrawal of the hold-down; and manually actuated auxiliary pressure means arranged to be moved down on said work folding means for additionally pressing the margin against the work.
10. A machine of the type described, comprising: a work support; a manually actuated hold-down for holding the work against the support and having a bend forming edge; a work folding means having a companion bend forming edge and means for moving the work folding means toward and away from the work support; said work folding means cooperating with said hold-down for bending a margin of the work across said bend forming edges; said hold-down being adapted to advance the work on the work support for crowding the margin between the hold-down and said work folding means when the latter is spaced a predetermined distance from the work support; crimping formations on said work folding means for crimping the margin bent about a convex line on the work; said work folding means being arranged to press the margin against the work after withdrawal of the hold-down; said crimping formations comprising a group of grooves underneath said work folding means; and manually actuated auxiliary pressure means arranged to be moved down on said work folding means for additionally pressing the margin against the work.
11. A machine of the type described, comprising: a work support; a manually actuated hold-down for holding the work against the support

and having a bend forming edge; a work folding means having a companion bend forming edge and means for moving the work folding means toward and away from the work support; said work folding means cooperating with said hold-down for bending a margin of the work across said bend forming edges; said hold-down being adapted to advance the work on the work support for crowding the margin between the hold-down and said work folding means when the latter is spaced a predetermined distance from the work support; a crimping formation on said work folding means for crimping the margin bent about a convex line on the work; said work folding means being arranged to press the margin against the work after withdrawal of the hold-down; a manually actuated pressure frame; and a parallelogram linkage swingably connecting the pressure frame with said work support, to bring the pressure frame down on said work folding means for additionally pressing the margin against the work.

12. A machine of the type described, comprising: a work support; a manually actuated hold-down for holding the work against the work support and having a bend forming edge; a work folding means having a companion bend forming edge and means for moving the work folding means toward and away from the work support; said hold-down and said work folding means being provided with cooperating aligning means for precisely positioning the hold-down relatively to the work folding means; said work folding means cooperating with said hold-down for bending a margin of the work across said bend forming edges; said hold-down being adapted to advance the work on the work support for crowding the margin between the hold-down and said work folding means when the latter is spaced a predetermined distance from the work support for bringing said cooperating aligning means out of engagement; a crimping formation on said work folding means for crimping the margin bent about a convex line on the work; said crimping formation comprising grooves underneath the work folding means and intersecting the bend forming edge thereof; said work folding means being arranged to press the margin against the work after withdrawal of the hold-down; and manually actuated auxiliary pressure means arranged to be moved down on said work folding means for additionally pressing the margin to the work.

13. A machine for folding shoe uppers and the like along a sinusoidal line, comprising: a work support, a manually actuated hold-down for holding the work on the support and having a bend forming edge; work folding means having a companion bend forming edge and means for moving the work folding means relatively to the work support; said work folding means cooperating with said hold-down for bending a margin of the work across said bend forming edges; said hold-down being adapted to advance the work on the work support for crowding the margin between the hold-down and said work folding

means when the latter is spaced a predetermined distance from the work support; and means associated with said work folding means for providing a predetermined crimp in the margin folded about a convex line on the work; said work folding means being arranged to press the margin against the work after withdrawal of the hold-down.

14. A machine for folding shoe uppers and the like along a sinusoidal line, comprising: a work support, a manually actuated hold-down for holding the work on the support and having a bend forming edge; work folding means having a companion bend forming edge and means for moving the work folding means relatively to the work support; said work folding means cooperating with said hold-down for bending a margin of the work across said bend forming edges; said hold-down being adapted to advance the work on the work support for crowding the margin between the hold-down and said work folding means when the latter is spaced a predetermined distance from the work support; and means associated with the work folding means for providing a predetermined crimp in the margin bent about convex lines on the work; said work folding means being arranged to press the margin against the work after withdrawal of the hold-down.

15. A machine of the type described, comprising: a work support; a manually actuated hold-down for holding the work against the support and having a bend forming edge; a work folding means having a companion bend forming edge and means for moving the work folding means toward and away from the work support; said work folding means cooperating with said hold-down for bending a margin of the work across said bend forming edges; said hold-down being adapted to advance the work on the work support for crowding the margin between the hold-down and said work folding means when the latter is spaced a predetermined distance from the work support; gauge means on said work folding means for engaging the bight of the bend, to limit the inward thrust of said hold-down; and means associated with the work folding means for providing predetermined crimps in the margin bent about convex lines on the work; said work folding means being arranged to press the margin against the work after withdrawal of the hold-down.

16. The herein described method of folding margins on shoe uppers or the like along a sinusoidal line, which consists in simultaneously folding the margin throughout its entire length, and providing a predetermined crimp in the margin bent about a convex line on the work.

17. The herein described method of folding margins on shoe uppers or the like along a sinusoidal line, which consists in simultaneously folding the margin throughout its entire length, and producing predetermined crimps in the margin bent about convex lines on the work.

HUBERT A. VACHON.
LIONEL G. VACHON.