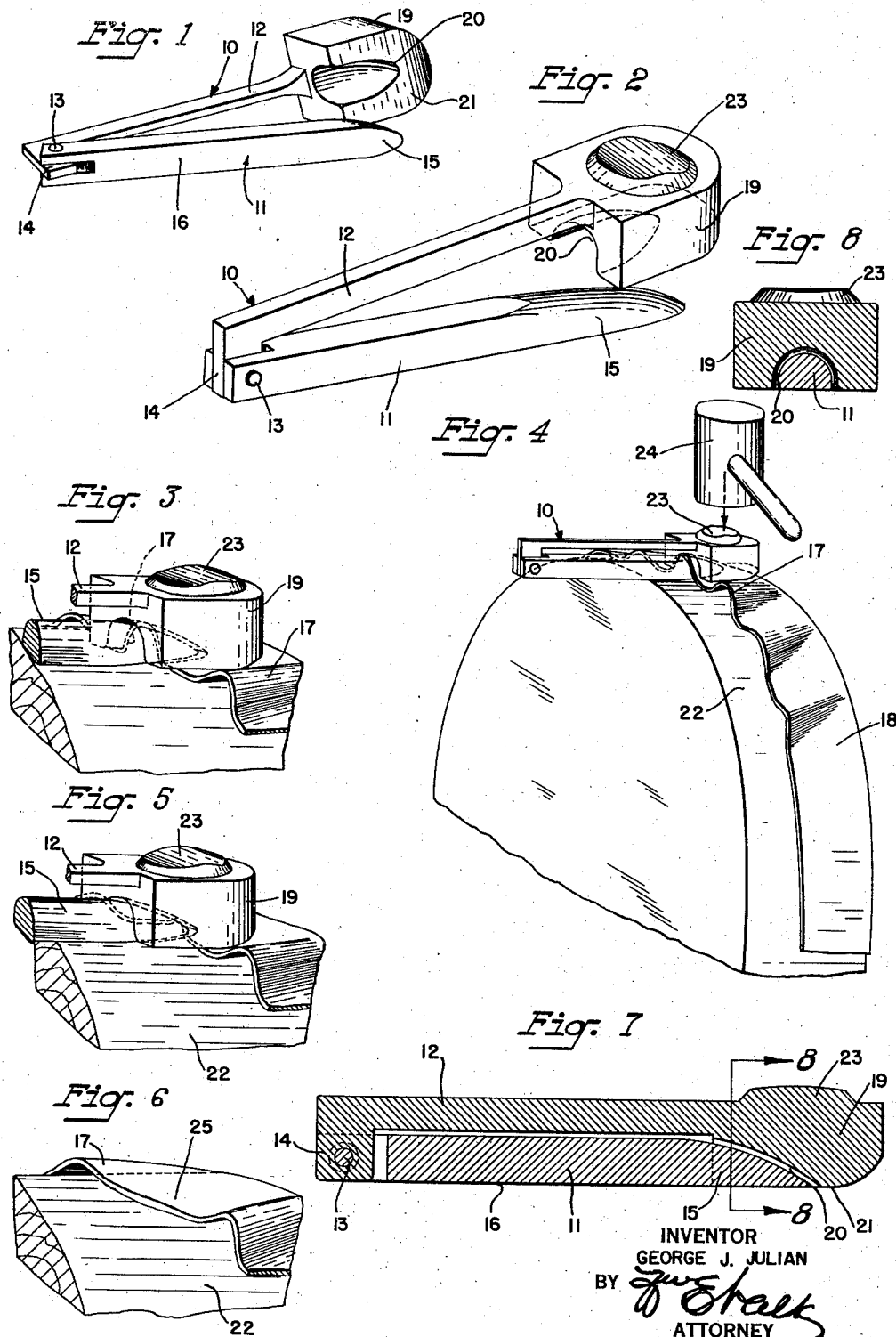


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WRINKLE REMOVING DEVICE  
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## UNITED STATES PATENT OFFICE

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## WRINKLE REMOVING DEVICE

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This invention relates to a shrinking device for removing wrinkles from the edge portions of sheet material.

Whenever a flange is formed by bending a sheet along a curved line, wrinkles are formed as a result of the excess material present in the outer portions of the flange, the wrinkles in general increasing progressively in depth and width in the direction of the marginal edge of the flange and in number and depth depending, among other factors, upon the angle of the flange with respect to the body portion of the sheet. Such wrinkles are usually worked out of the flange with a mallet. This method of removing the wrinkles, however, is slow and arduous and has the further objection that the surfaces of the areas in which the wrinkles are located are marred by the mallet.

The principal object of the present invention, therefore, is to overcome the above objections, this object contemplating a device which is adapted to transmit the blows of a mallet to a wrinkle in such a manner that the latter may be readily flattened with a minimum of effort and without objectionably marking the area originally containing the wrinkle.

A further object is to provide a shrinking device which is so designed that the shrinking of the areas containing the wrinkles may be effected with a minimum displacement of the excess material causing the wrinkles and in such a manner that any tendency for the latter to travel with respect to their original locations is avoided.

The device is characterized by pivotally connected parts which are adapted to engage conformably the opposite sides of a wrinkle. When so applied to a wrinkle and while supported upon a forming block, the device is struck repeatedly by a mallet. At the same time the device is gradually drawn across the forming block in a direction to disengage the wrinkle. Thereby the blows which are applied to the device are transmitted to the wrinkle in such a manner that the walls thereof are caused to shrink to a degree which will take up the excess material causing the wrinkle and in so doing enable the latter to be flattened.

The invention is illustrated in the accompanying drawing, in which:

Figures 1 and 2 are different perspective views, to slightly different scales, of a device embodying the features of the invention.

Figures 3 and 5 are fragmentary perspective views showing the device occupying different op-

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erative positions corresponding to different stages in the removal of a wrinkle from a flange.

Figure 4 is a perspective view of the tool showing it in an operative position preparatory to the application of the blows which are to effect the removal of the wrinkle.

Figure 6 is a fragmentary view of a flange from which a wrinkle has been removed by the device.

Figure 7 is a longitudinal section through the device, the parts thereof being shown closed.

Figure 8 is a transverse section taken along line 8—8 of Figure 7.

The device, indicated generally at 10, includes an anvil 11 and a co-operating blow-transmitting part 12. The anvil and blow-transmitting part have shank portions which are pivotally connected by a hinge pin 13, the shank portion of the blow-transmitting part being formed with an angular projection 14 which is located between fork extensions on the shank portion of the anvil. The anvil 11 is of a finger shape, having a half-round end portion 15 which tapers to a rounded tip and which in the direction of the tip decreases progressively in thickness. A flat face 16 on the under side of the anvil is adapted to rest upon a supporting surface. The rounded end of the anvil conforms generally to the curvature of the walls of the concavities formed by the wrinkles which are to be removed. The latter, which are indicated at 17, are wrinkles of the kind which are produced as an incident to the formation of an annular flange 18 on a stamping, it being understood, of course, that the device may be availed of to remove various kinds of wrinkles without regard to the manner in which they are formed.

The blow-transmitting part 12 includes a head 19. A cavity 20, which is formed in the under side of the latter, is adapted to receive the wrinkle 17 which is occupied by the rounded end of the anvil 11, the said cavity conforming in shape to the anvil so that when a wrinkle is engaged between the cooperating parts of the device, the convex surfaces of the wrinkle will be engaged by the walls of the cavity 20 while the concave surfaces will be engaged by the walls of the anvil 11. When a wrinkle area is gripped in the manner described, the said area and the rounded portion of the anvil are located wholly within the cavity 20 of the head 19 while a face 21 on the latter engages the area of the flange surrounding the wrinkle.

A forming block 22 is employed in connection with the device, the flange 18 being arranged over the latter in the manner illustrated so that the

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area of the flange around the wrinkle which is to be removed will rest upon the forming block. The latter also provides the supporting surface for the anvil 11. The shank portions of the companion parts of the device form a handle which preferably overhangs the forming block and which may be grasped in one hand to manipulate the device while a mallet 24 may be grasped in the other hand and used to strike a projection 23 on the head 19.

In the use of the device, assuming the flange 18 containing the wrinkles to be removed has been arranged upon the forming block and the device to be held temporarily partially open, the anvil 11 is inserted in a wrinkle between the forming block and the flange and the head 19 closed upon the wrinkle. While the wrinkle area is gripped between the parts of the device, the head 19 is struck repeatedly by the mallet 24. At the same time the device is gradually drawn outwardly in a direction to disengage the device from the flange. Such movement of the device may, if desired, be effected, or facilitated, by properly controlling the direction of the blows of the mallet 24. Thereby wider and deeper portions of the wrinkle are caused progressively to enter narrower and more shallow portions of the cavity 20 in the head 19. The sides of the wrinkle at the opposite sides of the crest are thus caused to shrink, being simultaneously forced toward and finally engaging the forming block. The shrinking of the wrinkle area and the accompanying movement of the sides of the wrinkle toward the forming block progresses in the direction of the marginal edge of the flange as the device is drawn in the direction described. During such movement of the device, the anvil and force-transmitting part support the wrinkle in such a manner that the sides thereof may be shrunk by compression forces without collapsing the wrinkle before the required shrinkage has been effected, the said parts permitting the necessary lateral flow of the material of the wrinkle between them. The face 21 on the head 19 acts upon the wrinkle area to further flatten and smooth the latter, it being noted in this connection that the backing block 22 provides a support on which the device is rested while a portion of the surface of the said block provides a form with which the face 21 on the head 19 cooperates directly. As the flattening action is completed the flange is released. Thereupon the device may be again manipulated in the manner described to effect the removal of another wrinkle.

It will be noted that in the removal of a wrinkle with the device, the excess material which is the cause of the wrinkle is, as indicated at 25 in Figure 6, concentrated in what originally was the crest portion of the wrinkle. As the excess material increases progressively in the direction of the marginal edge of the flange, the thickness of the area in which the excess material is concentrated likewise increases progressively in the same direction. The device, therefore, has the advantage that each wrinkle is wholly removed while the excess material in the wrinkle is concentrated in the mid-section of the area originally containing the wrinkle, there being no tendency for a wrinkle being acted upon by the device to travel around the flange away from the device. A further advantage obtained is that the removal of the wrinkles may be effected rapidly, with a minimum of effort and without undue marring of the surface of the flange. If desired to further guard against marring of the flange, Cellophane

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or a similar material may be employed to cover the surface of the flange and the force of the blows of the mallet transmitted to the wrinkle through such protective covering.

I claim as my invention:

1. A device adapted for use with a backing surface and hammer means for flattening a wrinkled area in an edge portion of a sheet of deformable material, comprising a first member having a substantially flat base surface with a recess for receiving the outer surface of a sheet wrinkle with one end of the recess adjacent to the end of the wrinkle most remote from the sheet edge, said recess being of arched transverse section of progressively reduced width and height toward said one end thereof, and the surface of said recess at its lateral edges and at its reduced end terminating in the plane of the base surface, a second member having a convex upper surface substantially similar in contour to the surface of the recess for engaging the inner surface of such sheet wrinkle, the second member having the base surface thereof substantially flush with the base surface of the first member when said members are closed in nested relation to provide therebetween a restricting channel for the material of the sheet wrinkle, and means for pivotally connecting said members, said members with such sheet wrinkle therebetween being adapted to be moved outwardly relative to the sheet edge as the first member is hammered upon the second member and a backing surface to progressively reduce the size of the sheet wrinkle in said restricting channel and to flatten it between the base surface and such backing surface.

2. A device adapted for use with a backing surface and hammer means for flattening a wrinkled area in an edge portion of a sheet of deformable material, comprising a first member having a substantially flat base surface with a recess for receiving the outer surface of a sheet wrinkle with one end of the recess adjacent to the end of the wrinkle most remote from the sheet edge, said recess being of arched transverse section and of curved longitudinal section so that the width and height thereof is progressively reduced toward said one end, with the surface of the recess at its lateral edges and at its reduced end terminating in the plane of the base surface, and a second member having a convex upper surface substantially similar in contour to the surface of the recess for engaging the inner surface of such sheet wrinkle, the second member having the base surface thereof substantially flush with the base surface of the first member when said members are closed in nested relation to provide therebetween a restricting channel for the material of the sheet wrinkle, said members with such sheet wrinkle therebetween being adapted to be moved outwardly relative to the sheet edge as the first member is hammered upon the second member and a backing surface to progressively reduce the size of the sheet wrinkle in said restricting channel and to flatten it between the base surface and such backing surface.

3. A device adapted for use with hammer means for flattening a wrinkled area in an edge portion of a sheet of deformable material, comprising a first member having a substantially flat base surface with a recess for receiving the outer surface of a sheet wrinkle with one end of the recess adjacent to the end of the wrinkle most remote from the sheet edge, said recess being of arched transverse section of progressively reduced width and height toward said one end

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thereof with the surface of said recess at its lateral edges and at its reduced end terminating in the plane of the base surface, a second member having a convex upper surface substantially similar in contour to the surface of the recess for engaging the inner surface of such sheet wrinkle, said members when closed in nested relation providing therebetween a restricting channel for the material of the sheet wrinkle, said members with such sheet wrinkle therebetween being adapted to be moved outwardly relative to the sheet edge as the first member is hammered upon the second member to progressively reduce the size of the sheet wrinkle in said restricting channel, said members having parts extending outwardly beyond the sheet engaging portions thereof, and means associated with said parts for guiding the members into said nested relationship.

4. A device adapted for use with hammer means for flattening a wrinkled area in an edge portion of a sheet of deformable material, comprising a first member having a substantially flat base surface with a recess for receiving the outer surface of a sheet wrinkle with one end of the recess adjacent to the end of the wrinkle most remote from the sheet edge, said recess being of arched transverse section and of curved longitudinal section so that the width and height thereof is progressively reduced toward said one end, with the surface of the recess at its lateral edges and at its reduced end terminating in the plane of the base surface, a second member having a convex upper surface substantially similar in contour to the surface of the recess for engaging the inner surface of such sheet wrinkle, said members when closed in nested relation providing therebetween a restricting channel for the material of the sheet wrinkle, said members with such sheet wrinkle therebetween being adapted to be moved outwardly relative to the sheet edge as the first member is hammered upon the second member to progressively reduce the size of the sheet wrinkle in said restricting channel, said members having parts extending outwardly beyond the said engaging portions thereof, and means associated with said parts for guiding the members into said nested relationship.

5. A device adapted for use with a backing surface and hammer means for flattening a wrinkled area in an edge portion of a sheet of deformable material, comprising a first member having a substantially flat base surface with a recess for receiving the outer surface of a sheet wrinkle with one end of the recess adjacent to the end of the wrinkle most remote from the sheet edge, said recess being of arched transverse section of progressively reduced width and height toward said one end thereof with the surface of said recess at its lateral edges and at its reduced end terminating in the plane of the base surface, a second member having a convex upper surface substantially similar in contour to the surface of the recess for engaging the inner

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surface of such sheet wrinkle, the second member having the base surface thereof substantially flush with the base surface of the first member when said members are closed in nested relation to provide therebetween a restricting channel for the material of the sheet wrinkle, said members with such sheet wrinkle therebetween being adapted to be moved outwardly relative to the sheet edge as the first member is hammered upon the second member and a backing surface to progressively reduce the size of the sheet wrinkle in said restricting channel, and to flatten it between the base surface and such backing surface, said members having parts extending outwardly beyond sheet engaging portion thereof, and means pivotally connecting said parts whereby the members may be opened to receive a sheet wrinkle and may be closed upon such sheet wrinkle in said nested relationship.

6. A device adapted for use with hammer means for flattening a wrinkled area in an edge portion of a sheet of deformable material, comprising a first member having a substantially flat base surface with a recess for receiving the outer surface of a sheet wrinkle with one end of the recess adjacent to the end of the wrinkle most remote from the sheet edge, said recess being of arched transverse section and of curved longitudinal section so that the width and height thereof is progressively reduced toward said one end, with the surface of the recess at its lateral edges and at its reduced end terminating in the plane of the base surface, a second member having a convex upper surface substantially similar in contour to the surface of the recess for engaging the inner surface of such sheet wrinkle, said members when closed in nested relation providing therebetween a restricting channel for the material of the sheet wrinkle, said members with such sheet wrinkle therebetween being adapted to be moved outwardly relative to the sheet edge as the first member is hammered upon the second member to progressively reduce the size of the sheet wrinkle in said restricting channel, said members having parts extending outwardly beyond the sheet engaging portion thereof, and means pivotally connecting said parts whereby the members may be opened to receive a sheet wrinkle and may be closed upon such sheet wrinkle in said nested relationship.

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