Aug. 29, 1944. W. W. PRUE 2,356,883

WORK HOLDING AND MASKING DEVICE

Filed Aug. 17, 1942 2 Sheets-Sheet 1

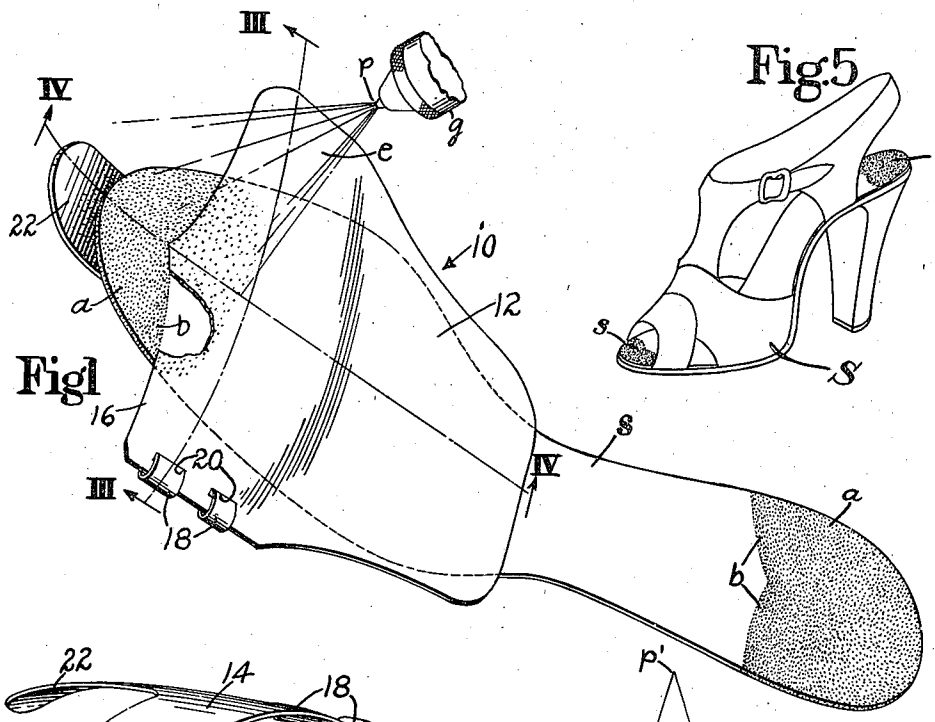


Fig1

Fig.5

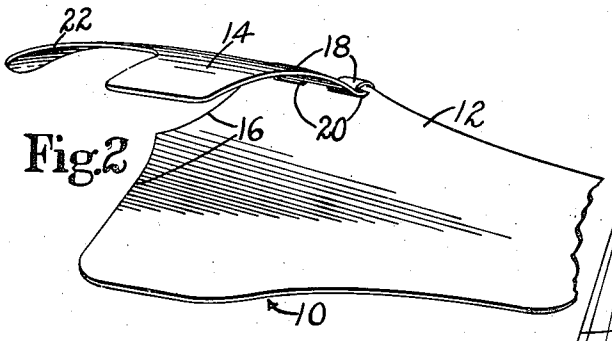


Fig.2

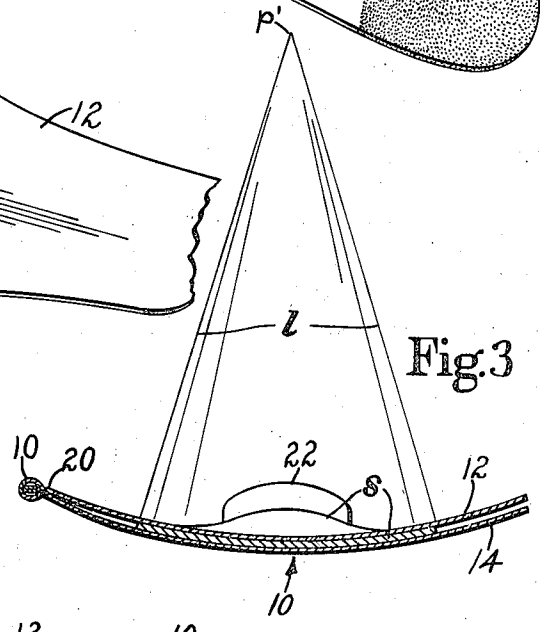


Fig.3

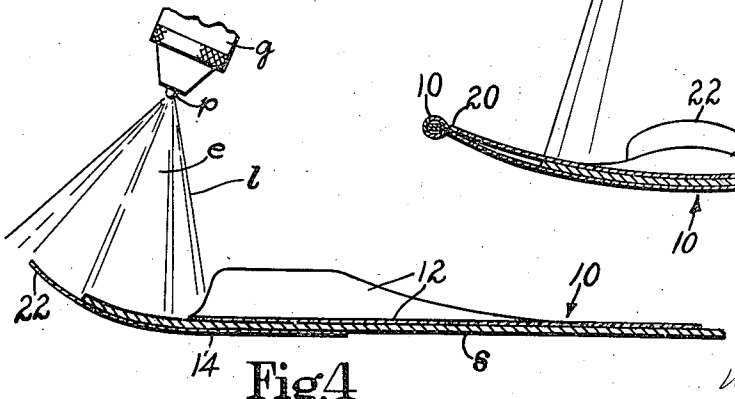


Fig.4

INVENTOR.
Walter W. Prue
By his attorney
Thomas J. Ryan

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WORK HOLDING AND MASKING DEVICE

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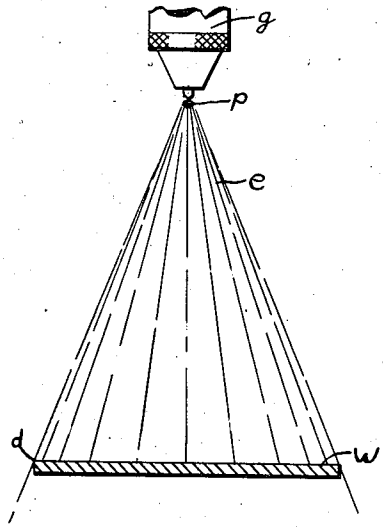


Fig.6

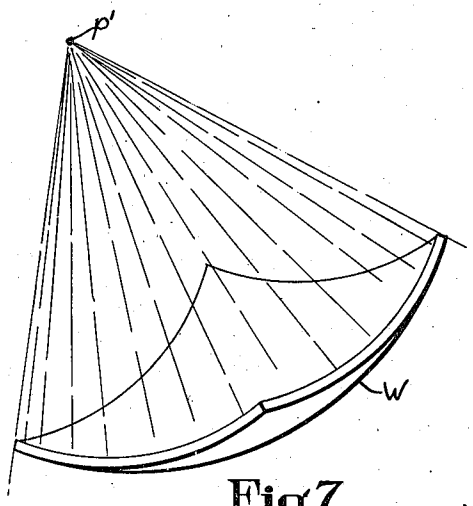


Fig.7

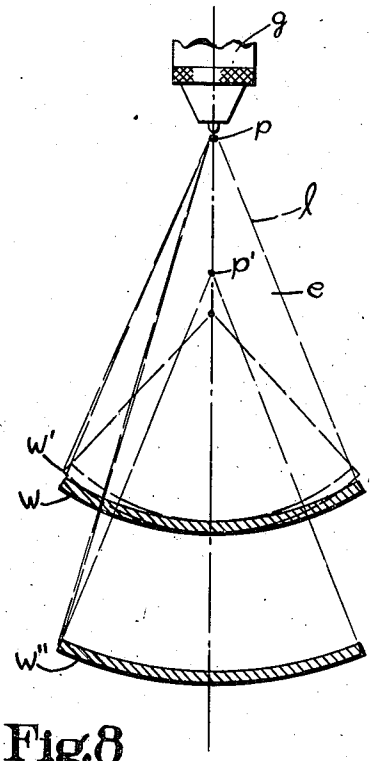


Fig.8

INVENTOR.
Walter W. Prue
By his attorney
Thomas J. Ryan

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UNITED STATES PATENT OFFICE

2,356,883

WORK HOLDING AND MASKING DEVICE

Walter W. Prue, Auburn, Maine, assignor to United Shoe Machinery Corporation, Flemington, N. J., a corporation of New Jersey

Application August 17, 1942, Serial No. 455,046

7 Claims. (Cl. 36—72)

This invention relates to devices for holding parts of shoes while being coated by a spraying operation, and more particularly is illustrated herein as embodied in a device for bending shoe parts in a predetermined shape to facilitate the simultaneous application of a coating to the surface and peripheral edge of these parts.

Women's novelty shoes are frequently provided with openings at the toe and heel; consequently, the sock lining is visible through these openings. For decorative purposes and to cover the exposed raw edge of the sock lining, it is desirable to coat the exposed parts with a color like or harmonizing with the adjacent sole edge.

Coating material projected from the nozzle of a spray gun having a circular opening takes a form which is substantially conical. When, therefore, the surface and peripheral edge face of a normally flat article, for example, a sock lining, are to be coated by spraying the coating material, it is obvious that substantially none of the projected coating material will be applied to the vertical peripheral edge face of the article, since the coating material strikes the corner of the edge face at an acute angle from a point source from above and inwardly of the edge face.

It is an object of the present invention, therefore, to provide a work-holding device which is simple and inexpensive in construction, which may readily be cleaned and which will hold the article in the best possible position to facilitate the application of a uniform coating to the entire surface to be coated and the peripheral edge face bounding the same.

As illustrated herein, invention resides in a device comprising a pair of members adapted to engage the opposite sides of a piece of work adjacent to the portion to be coated and to bend it both transversely and longitudinally.

The aforesaid device will now be described with reference to the accompanying drawings, in which

Fig. 1 shows an angular view of the device holding a shoe part for the application of a spray coating thereto;

Fig. 2 shows an angular view of the device from the rear or work-engaging side with the backing member tilted away from the mask;

Fig. 3 shows a transverse section on the line III—III of Fig. 1;

Fig. 4 shows a longitudinal section on the line IV—IV of Fig. 1;

Fig. 5 is a perspective view of an open-work shoe S through the openings of which the sock lining *s* may be seen;

Fig. 6 is a vertical section through a cone of spray projected at a flat article;

Fig. 7 is a perspective view of a flat article bent so that all the points on its surface are substantially equidistant from a given point; and

Fig. 8 is a vertical section through a cone of spray projected at a normally flat article bent transversely and longitudinally.

The apparatus to be described is to facilitate the uniform application of a coating to the surface and peripheral edge of a flexible, normally flat article *w* (Fig. 6), when the coating material is projected from a point source *p*, such as the nozzle of a spray gun *g*. As may be observed, the projection *e* of the coating material from the nozzle of the spray gun when the aperture is circular is substantially conical. Accordingly, when a normally flat article is held in the range of the projected coating material, the point or center of projection *p* lies inwardly of the edge of the article, so that the diverging streams of particles which make up the cone of projected coating strike the top corner *d* (Fig. 6) of the work, formed by the meeting of the top surface of the article and its peripheral edge face, at an acute angle. Thus, the peripheral edge face is substantially shielded from the coating material. While it is possible to move the spray gun or the work about to insure a uniform coating over the entire surface of the work and to tip the work edgewise to the spray gun, or to move the spray gun to a position in which it will be directed at the edge face of the work, this is undesirable because it is wasteful of time and material. According to the practice employed herein, the article *w* is bent both transversely and longitudinally, as illustrated in Figs. 7 and 8, so that its surface is substantially spherical, and in such a manner that all the parts on the surface of the article are substantially equidistant from a given point or center *p'* and the article, when so bent, is moved into such a position with respect to the spray gun that the given point *p'* and the center of projection *p* of the spray gun substantially coincide (Fig. 8.) When the article is bent in this manner, the peripheral edge face will be tipped toward the point of projection *p* so that lines *l* (Fig. 8) drawn through its surface at any point normal to the surface of the article will intersect substantially at the point of projection. It is evident that the diverging streams of particles which make up the cone of spray will be substantially parallel to the surface of the peripheral edge face of the article but enough of the particles will adhere to this edge face as the

streams move by to coat the same. In actual practice, it is expedient to bend the work both transversely and longitudinally to such a degree that the curvature of the surface thereof, shown at w' (Fig. 8), is slightly less than the radius of curvature of the wave front of the cone of spray, and while this is not enough to affect the uniformity of the surface coating to any appreciable degree, it tips the peripheral edge face a little more toward the center of projection and thus insures a better coating. A substantially similar result may be effected by moving the work away from the center of projection p along the axis of the cone of projection, as shown at w''.

Thus, a preferred manner of operation has been explained in its broadest aspect but is specifically illustrated herein with reference to the application of a coating to sock linings.

Referring to Fig. 5, S denotes a shoe having openings at the toe, shank and heel through which the grain surface and raw edges of a sock lining s may be seen. The portions of the sock lining to be coated will, of course, depend upon the size and number of openings. For the purposes of illustration, the sock lining treated herein, as shown in Fig. 1, is to be coated only at the tip and heel ends, illustrated by the stippled areas denoted a. It is to be observed that the dividing line b between the coated area and the uncoated area may be made in any contour that is desirable, the particular shape shown herein being for illustrative purposes only.

As illustrated, the sock lining is bent transversely (Fig. 3) and longitudinally (Fig. 4) to cause its peripheral edge face to be tipped so that it is exposed to the spray, that is, the peripheral edge face of the sock lining is tipped so that lines l drawn through the edge normal to the surface of the sock lining will intersect substantially at the point of projection p. In practice, the peripheral edge face is tipped to a slightly greater degree toward the point of projection, thus procuring a better application of the coating material without affecting to any serious degree the uniformity of the coating on the surface of the sock lining.

The specific means employed is for holding a sock lining in the condition prescribed and, as shown herein, constitutes not only means for holding the sock lining but also means for shielding a part of the sock lining so that the coating is applied to only such portions as will be exposed in the shoe. This means, denoted generally by the reference character **10** (Fig. 1), consists of a mask **12** and backing member **14** (Figs. 1 and 2) between which the sock lining s may be placed, the mask **12** being adapted to engage the side of the sock lining to which a coating is to be applied and to shield that side, and the backing member **14** being arranged to be brought into engagement with the opposite side of the sock lining to hold it against the curved mask, the members while so engaging the opposite sides of the work providing convenient means for holding it for the application of the sprayed material thereto by means of a spray gun g, as indicated in Fig. 1. The mask **12** is substantially shield shaped and has a surface area of such dimensions as to cover that portion of the sock lining adjacent to the portion to be coated, the work engaging surface of the mask being convex transversely of its width, as illustrated in Fig. 3. The upper edge **16** of the shield-shaped mask, as shown herein, has converging curved portions which meet approximately at the center and corresponds to b. The shape of the edge, however, is not important and may be changed to suit the desires of the particular manufacturer. The work engaging surface of the backing member **14** is also concave to conform to the convex work engaging surface of the mask **12** and is provided at one edge with a pair of tabs **18** which are passed through a pair of slots **20** formed in the corresponding edge of the mask **12**, the tabs being bent over to provide a hinge connection between the mask **12** and the backing member **14**. Projecting upwardly from the backing member **14** and beyond the upper edge **16** of the mask **12** is a longitudinal extension **22** which is arranged to engage the underside of the sock lining, as shown in Fig. 1, and to uphold the projecting end thereof during the application of the spray coating thereto.

The transverse concavity of the members **12** and **14** bends the sock lining transversely so that lines l (Fig. 3) normal to the surface of the sock lining along any given transverse line will intersect substantially at a given point p'. Thus, when the sock lining and spray gun are moved relative to each other to bring the given point of intersection p' into substantial coincidence with the point p of projection of the cone of the spray, all the points on a given line running transversely of the sock lining will be equidistant from the point of projection. It is to be observed that if the given point p' and the point p of projection are substantially coincident, the streams of sprayed particles which make up the cone of spray near the peripheral edge face of the sock lining will be substantially parallel thereto and that as these streams pass the edge of the sock lining enough particles of solid matter will deposit on the edge to impart a uniform coating thereto. The coating on the peripheral edge face may be made to build up at a faster rate by moving the work a short distance away from the center of projection p of the spray gun along the axis of the cone of spray or by bending the sock lining to a slightly greater degree. This changes the relation between the surface of the peripheral edge of the sock lining and the streams from parallel to angular and thereby causes the particles to be impelled against the peripheral edge face. In practice, if the separation of the work from the center of projection p or the change in curvature is small, the uniformity of the coating on the surface of the sock lining will not be appreciably affected. To insure the application of coating to the tip edge face as well as to the edge face along the sides of the sock lining which, as heretofore explained, were tipped toward the center of projection p by the transverse bending, longitudinal bending must also be provided. Accordingly, the longitudinal extension **22** of the backing member **14** is curved forwardly at its terminal portion, as shown particularly in Fig. 4, so that the sock lining is bent longitudinally to tip the surface and the peripheral edge face at the extreme end into a position in which lines drawn through it normal to the surface will intersect substantially at the center of projection p of the cone of the spray. The transverse and longitudinal bending of the sock lining at the portion to which the coating material is to be applied causes the entire peripheral edge face of the lining to be tipped toward the center of projection of the projected spray so that the operator, by holding the spray gun in one position, may uniformly coat the entire exposed face of the lining and the peripheral edge

face bounding that area without manipulation of the spray gun or the work, and therefore with a maximum of efficiency.

The device 10 may be made of sheet metal or any similar sheet material and its surface is polished so that coating material applied thereto during the spraying operation may readily be wiped off with a cloth or washed off with the aid of a solvent.

In using the device, the operator tilts the backing member 14 away from the mask 12 and places the sock lining in position against the rear or convex side of the mask 12 with the tip or the heel end thereof in a position to expose the desired portion of the sock lining above the upper edge 16 of the mask 12. He then brings the concave side of the backing member 14 into engagement with the convex side of the lining and, while holding the mask and backing member in engagement, brings the device into the range of a spray gun, or moves a spray gun into a position to project coating material on the work. The shield protects the major portion of the sock lining from the application of the sprayed material and also holds the sock lining in a position to insure a uniform coating to the surface and peripheral edge face.

Having described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. Work holding means comprising a pair of members adapted to engage the opposite sides of a shoe part, the work engaging surface of one of said members being transversely convex and the other of the members having a work engaging surface a portion of which mates with the convex work engaging surface of the one member and another portion of which is longitudinally concave, said members being adapted when brought into engagement with the shoe part to bend the same both transversely and longitudinally.

2. A device to hold a shoe part for the application of a coating to a portion of the surface thereof and the peripheral edge bounding that portion, comprising a mask adapted to overlie one side of the shoe part adjacent to the portion to be coated, said mask having a transversely convex surface, backing means arranged to engage the other side of the shoe part to hold it in engagement with the convex surface of the mask thereby to bend the shoe part transversely, and means associated with said backing means to bend the shoe part longitudinally.

3. A device to hold a shoe part for the application of a coating to a portion of the surface and the peripheral edge bounding that portion, comprising a mask adapted to overlie one side of the shoe part adjacent to the portion to be coated, said mask having a transversely convex surface, and backing means movably secured to the mask, said backing means being co-operable with the convex surface of the mask to grip and hold the opposite sides of a shoe part and to bend the shoe part both transversely and longitudinally.

4. A device to hold a shoe part for the application of a coating to a portion of the surface and the peripheral edge bounding that portion, comprising a mask and backing means arranged to engage the opposite sides of the shoe part adjacent to the portion to be coated, and an extension on said backing means arranged to engage the back side of the portion to be coated, said extension having a curved terminal portion.

5. A device to hold a shoe part for the application of a coating to a portion of the surface and the peripheral edge bounding that portion, comprising a mask and backing means arranged to engage the opposite sides of the shoe part adjacent to the portion to be coated, and a longitudinal extension on said backing means arranged to engage the back side of the portion to be coated, said extension having a concavo-convex terminal portion arranged to bend the portion to be coated longitudinally adjacent to its end.

6. A device to hold a shoe part for the application of a coating to a portion of the surface and the peripheral edge bounding that portion, comprising a mask and backing means having co-operating convex and concave surfaces arranged to engage the opposite sides of a shoe part placed between them adjacent to the portion to be coated, and a longitudinally extending projection on the backing means arranged to engage the back side of the portion to be coated, said extension having a curved terminal portion.

7. A device to hold a shoe part for the application of a coating to a portion of the surface and the peripheral edge bounding that portion, comprising a pair of concavo-convex plates hinged together and arranged to engage the opposite sides of a shoe part placed between them adjacent to the portion to be coated, and a longitudinally extending projection on one of said plates having a forwardly inclined concavo-convex terminal portion arranged to engage and bend the portion to be coated longitudinally.

WALTER W. PRUE.