Feb. 27, 1945. M. G. STRATTON 2,370,502

SHOE LAST

Filed Jan. 13, 1944

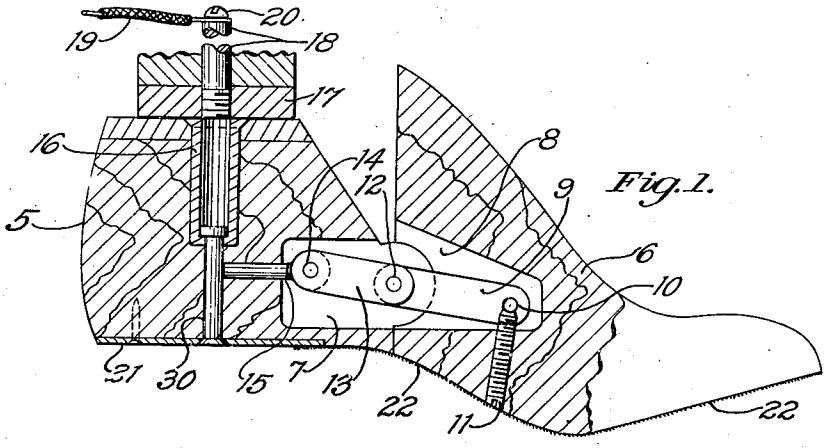


Fig. 1.

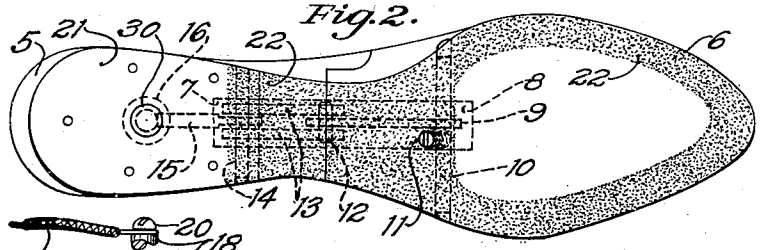


Fig. 2.

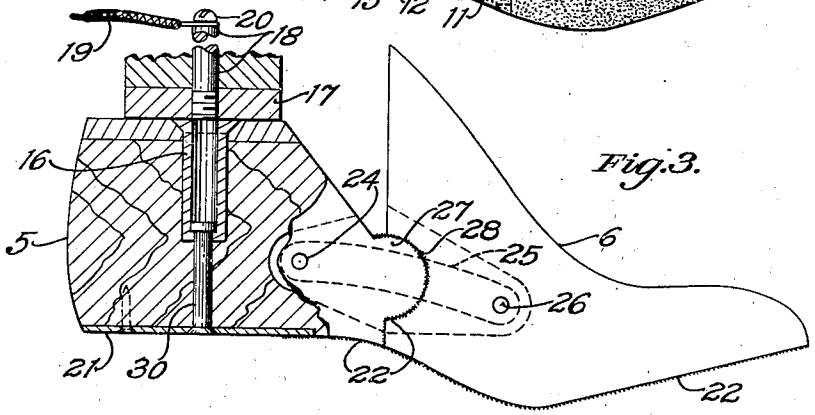


Fig. 3.

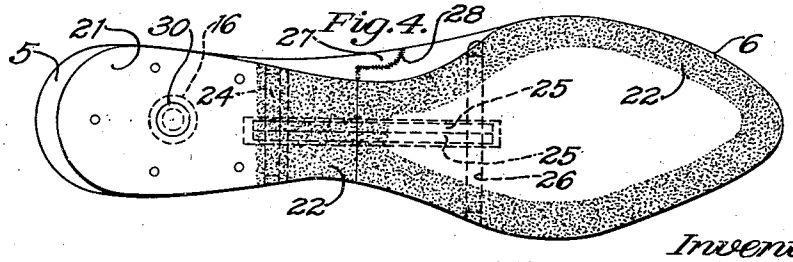


Fig. 4.

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SHOE LAST

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10 Claims. (Cl. 12—133)

This invention relates to the manufacture of footwear in which an adhesive is heated in an electrostatic field, and relates more particularly to lasts having incorporated therein, electrodes for use in establishing electrostatic fields.

The E. C. Pitman Reissue Patent No. 22,301 discloses processes for bonding shoe parts with thermoplastic adhesives heated by electrostatic fields. The J. F. Smith Patent No. 2,109,323 discloses apparatus for carrying out such processes in the manufacture of shoes. The J. F. Smith Patent No. 2,240,867 discloses a last having an electrode attached to its lower surface, which may be used in such apparatus.

It is desirable in electrostatic heating to have an electrode on the bottom of a last, which extends along the entire length of the forepart portion of the last and along a portion of the adjoining heel portion of the last. Such electrodes have been satisfactorily provided on lasts which are not of the hinged type but have not been satisfactorily provided for hinged lasts. With hinged lasts, separate electrode portions have been provided on the bottoms of the heel and forepart portions of the last, which electrodes have not been in good electrical contact when the lasts were broken, even slightly, as often occurs due to the pressure and movement imparted to the lasted shoes by the sole pressing pads. Since the connection from the high frequency electrical source is usually completed to the electrode portion on the bottom of the forepart portion of the last, through a pin contacting the conventional metal liner in the usual jack-pin hole in the heel portion of the last, the relative movement of the forepart and heel portions of the last during the pressing operations has resulted in the circuit to the electrode on the bottom of the forepart portion of the last being poorly made or broken with the result that insufficient or no heat was generated in the adhesive in the forepart area of the shoe.

This invention provides for maintaining positive electrical connection between the electrode on the forepart portion of the bottom of a hinged last and an electrode in the heel portion thereof, which connection is maintained throughout the full range of movement of the said two portions of the last relative each other. This connection is maintained at the hinge of the last.

Two embodiments of the invention are disclosed herein. In both embodiments the electrode surfaces preferably are formed by sprayed metal particles and the metal liner in the conventional jack-pin hole in the heel portion of the last preferably is relied upon for establishing electrical contact between the electrode on the last bottom and the wiring to the usual high frequency electrical source which is provided for establishing the electrostatic field.

In one embodiment of the invention, a metal screw extends from the lower surface of the forepart of the last into the last interior and is electrically connected therein at the hinge of the last to the levers which attach the heel and forepart portions of the last together and which are pivoted thereto. The levers are electrically connected to the aforesaid metal liner. The spray which forms the electrode surface contacts the head of said screw.

In the other embodiment of the invention, the forepart and heel portions of the hinged last have complemental circular, hinge segments which contact each other throughout their range of movement and which are sprayed with the metallic spray so that electrical contact between them is maintained at all times. The bottom of the last is also sprayed with the metallic particles with the spray being continued in the areas between the bottoms of the forepart and heel portions of the last so as to contact the sprayed portions of the said segments, the spray also being continued so as to contact the convenitonal metal heel plate. The heel plate is electrically connected to the metal liner in the jack-pin hole, and the liner is connected to a terminal for connection to the high frequency electrical source.

An object of the invention is to maintain electrical contact between electrode surfaces in the bottom of a hinged shoe last throughout the range of movement relative each other, of the heel and forepart portions of the last.

The invention will now be described with reference to the drawing, of which:

Fig. 1 is a side elevation, partially in section, of a shoe last embodying this invention;

Fig. 2 is a plan view looking at the bottom of the last of Fig. 1;

Fig. 3 is a side elevation, partially in section, of another last embodying this invention, and

Fig. 4 is a plan view looking at the bottom of the last of Fig. 3.

Referring first to Figs. 1 and 2, the last illustrated may be a conventional hinged wooden last having the heel portion 5 and the fore portion 6 pivoted for movement relative each other.

The fore portion 6 of the last is hollowed out at 8 to receive the metal arm 9 which is pivoted at one end about the pivot pin 12 to the metal arms 13 and which is pivoted to the forepart portion of the last by the pin 10.

The screw 11 extends from the bottom of the fore portion 6 of the last into the opening 8 and contacts the pin 10 with its inner end. The head of the screw 11 is flush with and is made to conform with the contour of the last bottom at its location.

The heel portion of the last is hollowed out at 7 to receive the arms 13. The pivot pin 12 is attached to the arms 13 at one end thereof. The other ends of the arms 13 are pivoted to the heel portion 5 of the last by the pin 14 which in turn is attached to the inner end of the rod 15. The outer end of the rod 15 contacts the metal pin 30 which connects the metal liner 16 in the usual jack-pin hole to the heel plate 21 of the last. The arms 9 and 13 are the usual arms employed in the type of last illustrated by Figs. 1 and 2 for holding the heel and forepart portions of the last together at the hinge thereof. The screw 11 and the rod 15 are added for establishing the aforesaid electrical connections to the forepart portion of the last.

The metal plate 17 forming a portion of the heel post of a shoe press contacts the upper end of the liner 16 as illustrated and is tapped to receive the threaded terminal post 18 to which the lead 19 to a suitable high frequency electrical source, is connected by the screw 20.

The bottom of the last between the heel plate 21 and the toe end of the last is roughed as by the application of a conventional shoe roughing tool, around the marginal edges of the forepart and in the shank area, and a metallic layer 22 is formed on the roughened areas as illustrated by Fig. 2 by metal particles sprayed from a conventional spray gun. The sprayed coating is continued over the inner portion of the heel plate 21 for establishing electrical contact therewith. This metallic area contacts the head of the screw 11, and an electrical connection to the terminal screw 20 from the metallic layer 22 is established through the screw 11, the pin 10, the arm 9, the pin 12, the arms 13, the pin 14, the rod 15, the rod 30, the liner 16 and the post 18. This connection is maintained when the last is broken and during any lesser movement of the heel and forepart portions of the last relative each other.

In the embodiment of the invention illustrated by Figs. 3 and 4, the heel portion 5 of the last has the pivot pin 24 extending crosswise therethrough and to which are rotatably attached the arms 25 at one end thereof. The fore portion 6 of the last has the pivot pin 26 extending crosswise therethrough and the other ends of the arms 25 are rotatably attached thereto. The arms 25 are the usual type employed in the form of last illustrated by Figs. 3 and 4 for holding the heel and forepart portions of the last together at its hinge.

The hinge of the last has the rounded male portion 27 at the inner end of the heel portion 5 thereof, formed as a segment of a cylinder and has the corresponding female portion 28 formed complemental thereto on the forepart portion of the last. The arms 25 and the pivot pins 24 and 26 hold the heel and fore portions of the last together when they are moved with respect to each other, with the hinge portions 27 and 28 in contact.

For applying the electrode surfaces the heel and fore portions of the last are disassembled by removal of the pivot pin 26. The bottom of the forepart portion is then sprayed with metal particles and the spray is continued around the female portion 28 of the hinge and in the area between same and the bottom.

Likewise the inner portion of the bottom of the heel portion 5 of the last is sprayed with the spray continued on the surface of the male portion 27 of the hinge on the heel portion and in the area between same and the bottom thereof. The spray is also continued over the inner portion of the heel plate 21 for establishing electrical contact therewith.

The metal pin 30 extends in contact with the metal liner 16 and with the heel plate 21 of the last of Figs. 3 and 4. The electrical circuit from one side of the high frequency electrical source to the sprayed layer 22 on the last bottom extends through the wire 19, the terminal screw 20, the terminal post 18, the metal plate 17, the liner 16, the pin 30, and the heel plate 21. This circuit is maintained regardless of the movement of the fore portion of the last relative the heel portion since the sprayed layers on the male portion 27 of the hinge of the last and on the female portion 28 thereof remain in contact during such movement.

For applying the sprayed electrode, molten zinc particles have been sprayed upon the last bottom with a conventional air type spray gun. Other metals could be used. By thus spraying the electrode surfaces, an electrode is not only provided at low cost but the electrode surfaces conform readily to the curved surface of the last bottom and do not add appreciable depth to a last so that the conventional wooden last not having a metal bottom may be easily and cheaply provided with an electrode surface and still be used with the shoe for which it was originally designed.

While embodiments of the invention have been disclosed for the purpose of illustration, it should be understood that the invention is not limited to the exact apparatus and arrangement of apparatus illustrated, as modifications thereof may be suggested by those skilled in the art without departure from the essence of the invention.

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

1. A non-metallic shoe last for use in the electrostatic heating of adhesive between shoe parts and having hinged heel and forepart portions, comprising means forming metal surfaces attached to the bottoms of said portions, means including means extending within the heel portion of said last for electrically connecting one of said surfaces to a high frequency electric source, and means including means at the hinge of said last for electrically interconnecting said surfaces whereby electrical connection between same is maintained when said last is unbroken and is broken.

2. A non-metallic shoe last for use in the electrostatic heating of adhesive between shoe parts and having hinged heel and forepart portions, comprising means forming a metal surface attached to the bottom of the forepart portion of said last, means including means forming an electrical connection extending within the heel portion of said last for establishing an electrical circuit to a high frequency electrical source, and means including means at the hinge of said last for connecting said surface and said connection whereby an electrical circuit is maintained from said connection to said surface when said last is unbroken and is broken.

3. A non-metallic shoe last for use in the electrostatic heating of adhesive between shoe parts and having hinged heel and forepart portions

with pivoted metal arms interconnecting said portions at the hinge thereof, comprising means forming a metal surface attached to the bottom of the forepart portion of said last, means including means extending within the heel portion of said last forming an electrical connection for establishing an electric circuit to a high frequency electrical source, and means including said arms for connecting said surface and said connection whereby an electrical circuit is maintained from said connection to said surface when said last is unbroken and is broken.

4. A non-metallic shoe last for use in the electrostatic heating of adhesive between shoe parts and having hinged heel and forepart portions with pivoted metal arms interconnecting same at the hinge thereof, said heel portion having a metal liner in the jack-pin hole thereof, comprising means forming a metal surface attached to the bottom of the forepart portion of said last, means including said liner for establishing electrical connection to a high frequency electrical source, and means including said arms for electrically connecting said surface to said liner whereby an electrical circuit from said liner to said surface is maintained when said last is unbroken and is broken.

5. A non-metallic shoe last for use in the electrostatic heating of adhesive between shoe parts and having hinged heel and forepart portions with pivoted metal arms interconnecting same at the hinge thereof, said heel portion having a metal liner in the jack-pin hole thereof, comprising means forming a metal surface attached to the bottom of the forepart portion of said last, means including said liner for establishing electrical connection to a high frequency electrical source, and means including said arms and including electrical conducting means in contact with said surface and extending within said forepart portion and contacting one of said arms for electrically connecting said surface to said liner whereby an electrical circuit from said liner to said surface is maintained when said last is unbroken and is broken.

6. A non-metallic shoe last for use in the electrostatic heating of adhesive between shoe parts and having hinged heel and forepart portions with pivoted metal arms interconnecting same at the hinge thereof, said heel portion having a metal liner in the jack-pin hole thereof, comprising means forming a metal surface attached to the bottom of the forepart portion of said last, means including said liner for establishing electrical connection to a high frequency electrical source, and means including said arms and including a metal screw having its head end flush with and contacting said surface for electrically connecting said surface to said liner whereby an electrical circuit from said liner to said surface is maintained when said last is unbroken and is broken.

7. A non-metallic shoe last for use in the electrostatic heating of adhesive between shoe parts and having hinged heel and forepart portions, said portions having complemental, curved hinge portions with surfaces which are in contact when said last is unbroken and is broken, means forming metal surfaces attached to said surfaces of said portions, means forming metal surfaces attached to the bottoms of said heel and forepart portions of said last, means electrically connecting the said metal surface on said curved portion of said heel portion of said last with the said metal surface on the bottom thereof, and means electrically connecting the said metal surface on said curved portion of said forepart portion thereof, with the said metal surface on the bottom thereof.

8. A non-metallic shoe last for use in the electrostatic heating of adhesive between shoe parts and having hinged heel and forepart portions, said portions having complemental, curved hinge portions with surfaces which are in contact when said last is unbroken and is broken, means forming a metal surface attached to the bottom of said heel portion which continues on the surface of said curved hinge portion thereof, and means forming a metal surface attached to the bottom of said forepart portion which continues on the surface of said curved hinge portion thereof.

9. A non-metallic shoe last for use in the electrostatic heating of adhesive between shoe parts and having hinged heel and forepart portions, said portions having complemental, curved hinge portions with surfaces which are in contact when said last is unbroken and is broken, means forming metal surfaces attached to said surfaces of said portions, means forming metal surfaces attached to the bottoms of said heel and forepart portions of said last, means electrically connecting the said metal surface on said curved portion of said heel portion of said last with the said metal surface on the bottom thereof, means electrically connecting the said metal surface on said curved portion of said forepart portion of said last with the said metal surface on the bottom thereof, and means including means extending within said heel portion and electrically contacting said metal surface on the bottom thereof for establishing an electrical connection to a high frequency electrical source.

10. A non-metallic shoe last for use in the electrostatic heating of adhesive between shoe parts and having hinged heel and forepart portions, said portions having complemental, curved hinge portions with surfaces which are in contact when said last is unbroken and is broken, means forming a metal surface attached to the bottom of said heel portion which continues on the surface of said curved hinge portion thereof, means forming a metal surface attached to the bottom of said forepart portion which continues on the surface of said curved hinge portion thereof, and means including means extending within said heel portion and electrically contacting said metal surface on the bottom thereof for establishing an electrical connection to a high frequency electrical source.

MICHAEL G. STRATTON.