Dec. 25, 1951 M. F. ASHLEY 2,579,896

MAGNETIC WELT HOLDDOWN

Original Filed Aug. 6, 1947 3 Sheets-Sheet 1

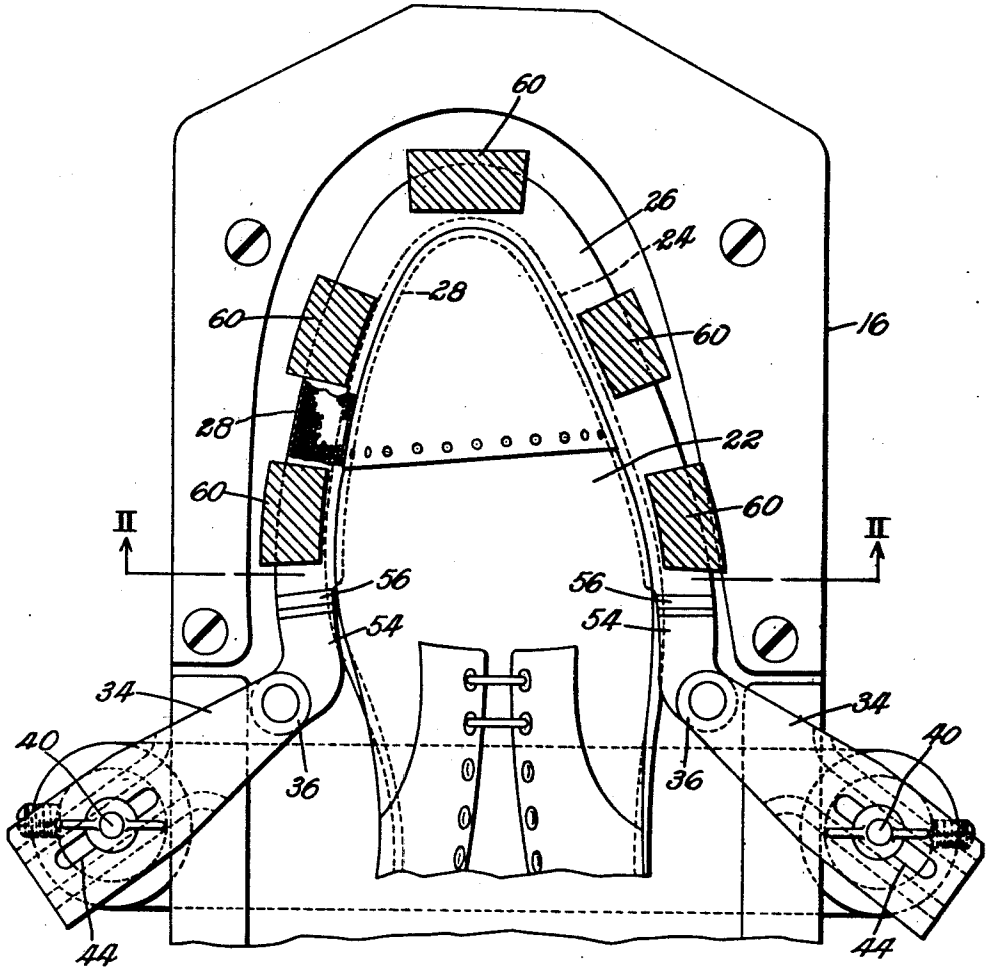

Fig.1

Inventor
Merwin F. Ashley
By his Attorney
Thomas J. Scott

Dec. 25, 1951 M. F. ASHLEY 2,579,896

MAGNETIC WELT HOLDDOWN

Original Filed Aug. 6, 1947 3 Sheets-Sheet 2

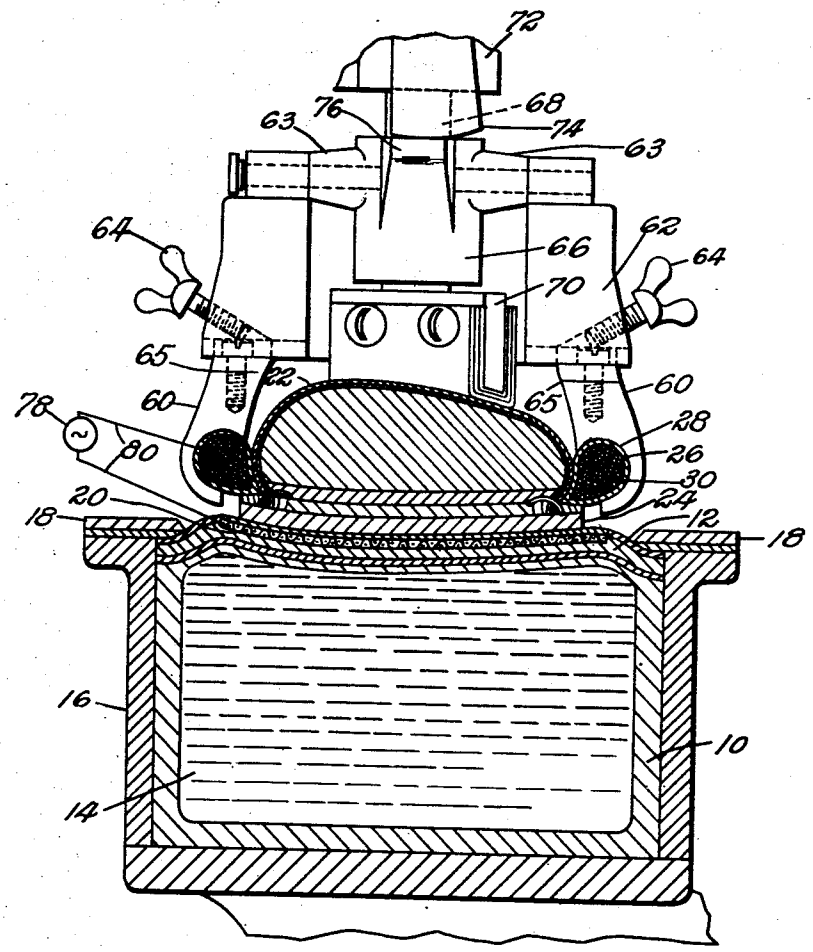

Fig. 2

Inventor
Merwin F. Ashley
By his Attorney
Thomas J. Ryan

Dec. 25, 1951 M. F. ASHLEY 2,579,896

MAGNETIC WELT HOLDDOWN

Original Filed Aug. 6, 1947 3 Sheets-Sheet 3

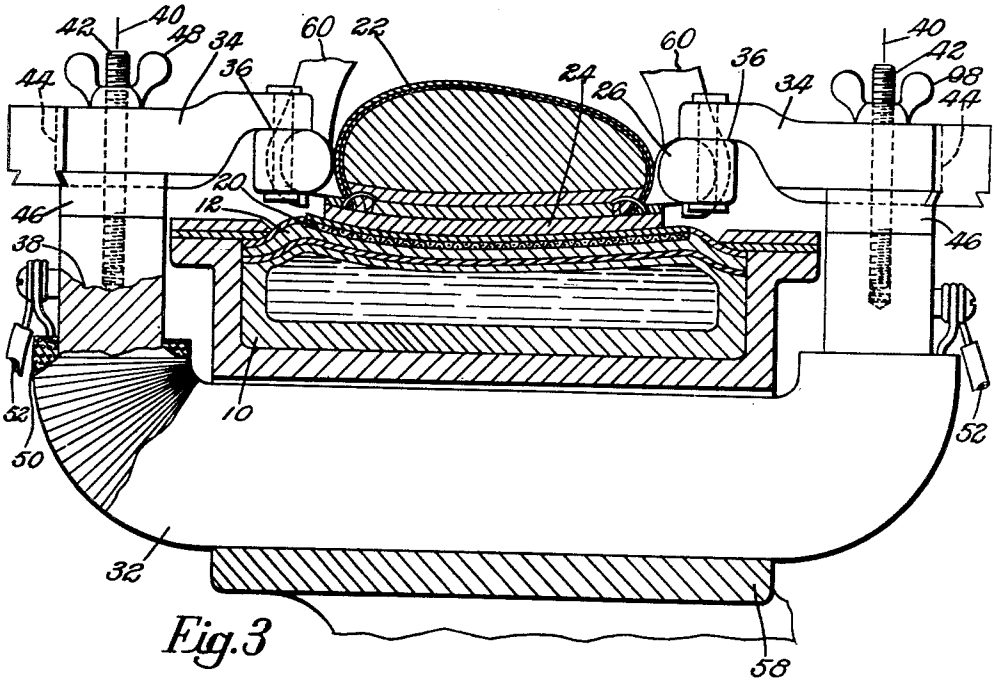

Fig. 3

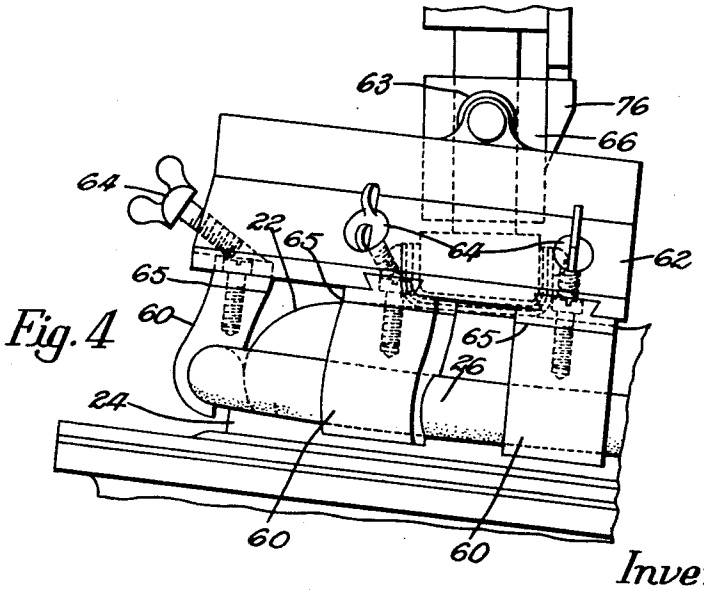

Fig. 4

Inventor
Merwin F. Ashley
By his Attorney
Thomas J. Ryan

Patented Dec. 25, 1951

2,579,896

UNITED STATES PATENT OFFICE

2,579,896

MAGNETIC WELT HOLDDOWN

Merwin F. Ashley, Arlington, Mass., assignor to United Shoe Machinery Corporation, Flemington, N. J., a corporation of New Jersey

Original application August 6, 1947, Serial No. 766,825. Divided and this application August 24, 1949, Serial No. 112,097

8 Claims. (Cl. 12—33)

1

This invention relates to high-frequency electrical heating apparatus of a type adapted for use in adhesively bonding together work parts, and more particularly to an improved flexible welt holddown and electrode member adapted for use in adhesively attaching soles to welt shoes.

An object of the invention is the provision of a flexible welt holddown member adapted for use in sole attaching with shoes of different shapes and sizes, and, when so used, adapted to be applied conformably to the welt crease around a shoe forepart and thereafter to be rigidified for the transmission of bonding pressure uniformly to the welt strip of the shoe. In this connection, a further object of the invention is the provision of a holddown member of the foregoing type which will additionally serve as an electrode useful in uniformly activating a sole-attaching adhesive positioned between the welt and the outsole of a shoe.

By employing particles of ferromagnetic material, the electrode, after it has been conformed to the object, may be made rigid by passing a strong magnetic field through the particles as a body, in accordance with a feature of the invention, and, when thus rigidified, may be employed as a welt holddown member in sole attaching. Such a conformable member may comprise an elongated, flexible, dielectric tubing of a wedge-shaped cross-section thereby facilitating its insertion into the welt crease of a shoe. Thereafter, with the shoe positioned on a sole attaching pad, and with the holddown member magnetized, pressure may be applied through holddown feet to such member at spaced points along its length for transmission uniformly to the welt strip of the shoe. With the shoe sole and welt thus clamped together, and utilizing the welt holddown as one electrode, cooperating, for example, with another electrode in the pad cover, a high-frequency electric field may be passed directly through a layer of thermoactive adhesive positioned marginally between the shoe parts, for the activation of such adhesive.

These and other features and advantages of the invention, including various details of construction of the apparatus, will now be more specifically described by reference to the accompanying drawings, in which

Fig. 1 is a view taken in horizontal section through the holddown feet of a sole attaching machine employing a welt holddown electrode member of a type contemplated by the invention;

Fig. 2 is a vertical section through the same

2

machine and a shoe in position therein, taken along the line II—II in Fig. 1;

Fig. 3 is a broken sectional view looking at the front of the same machine, and showing the manner of utilizing an electro-magnet for rigidifying the welt holddown member; and

Fig. 4 is a partial side elevation of the same machine showing the forepart of the holddown mechanism in operative engagement with a shoe.

Referring now to the drawings, a flexible welt holddown electrode member 26 is shown engaging the welt strip of a shoe 22 placed on a fluid-pad 10 having a flexible cover 12. The use of a fluid-pad of this type is well known in the industry and serves the purpose of imparting evenly distributed pressure to the shoe bottom including outsole 24 during a sole attaching operation. Thus, the pad 10 may be filled with a suitable fluid 14 and retained within a pad box 16 having a suitable flange cover 18 for holding the pad and pad cover in position. The pad cover will usually be of a flexible rubber-like material of considerable strength and resilience and in the present application the pad cover embodies a flexible electrode sheet 20 adapted for cooperation with the welt holddown electrode 26. The flexible electrode 20 may comprise a sheet of braided or woven flexible wire which is of sufficient area to underlie the largest shoe to be treated in the apparatus.

By virtue of the inherent characteristics of the holddown electrode member 26, the process of conforming it manually to the welt crease around the forepart of the shoe is a relatively simple matter and may be carried out in a moment by the operator. The novel points of construction contributing to this advantage and to other inherent advantages thereof relate to the use of a flexible, elastic, dielectric-containing-medium such as a tubular rubber casing 28 containing metallic particles 30 in packed relation, in this illustration the particles comprising small ferromagnetic balls substantially filling the casing 28. Normally, these metallic balls will be substantially unmagnetized and will distribute themselves readily by the application of pressure applied manually by the operator in conforming the holddown electrode to the contour of the welt crease, but once the holddown has been laid against the welt crease the balls may be magnetized to convert the holddown into a rigid body, thus adapting it for the transmission of pressure uniformly to the welt strip of the shoe. Preferably, therefore, for the desired magnetization characteristics, the metallic balls may be formed

of a ferromagnetic material of high magnetic permeability but of low magnetic retentivity.

In magnetizing the holddown, as in the illustrated apparatus, an electromagnet 32 (Fig. 3) is utilized, having pole pieces 34 cooperating with the end pieces 54 of the holddown member 26 through pivotal joints 36, the purpose of the pivotal joints 36 being to permit lateral expansion and contraction of the holddown member for the insertion and removal of shoes in the apparatus and for the handling of shoes of different sizes. In this connection the magnet pole pieces 34 are pivotally mounted on the respective upstanding ends 38 of the main body portion of the magnet, for rotation about vertical axes 40. The ends of the body portion 38 of the magnet are provided with axially positioned upstanding threaded studs 42 which pass slidably through longitudinal slots 44 (Fig. 1) formed in the pole pieces 34, and the pole pieces are dovetailed (Fig. 3) into collars 46 which are free to rotate about the studs 42. As a result, the pole pieces may be turned about axes 40 respectively and may be slid inwardly and outwardly relative to a shoe to accommodate the different sizes of shoes which may be brought under treatment. When the pole pieces have been positioned properly by the act of the operator in conforming the holddown member 26 to a shoe they may be locked in position by tightening wing nuts 48. Thereafter, the operator may energize the magnet by passing current through leads 52 to a magnet field winding 50 from any suitable direct current source (not shown). As shown, the end pieces 54 are ferromagnetic and the ends of the casing 28 are secured to them by means of encircling metallic bands 56. The ferromagnetic particles filling the casing 28 will thereby be retained by the inner faces of the end pieces 54, thus forming a continuous magnetic path around the holddown and through the magnet. Conveniently and as shown, the magnet may be mounted in a recess provided at the bottom of the pad box, supported on a plate 58, and secured in this position in any suitable manner.

For the purpose of bringing compacting pressure to bear against the holddown electrode member 26 for transmission to the welt and sole of the shoe there are various suitable mechanical devices available, among which the illustrated device is considered to be particularly suited for the purpose. Such a device comprises a plurality of spaced holddown feet 60, in this case two such feet positioned on either side of the shoe and one at the tip, engaging the holddown 26 at spaced points along its length. In accordance with the illustrated construction of the holddown feet, the holddown electrode member 26 is retained within a semi-cylindrical recess formed near the base of each foot, thereby lending certain assistance, if it be desired, in maintaining the cross-sectional shape of the holddown electrode member 26 when downward pressure is applied by the feet. In setting up the apparatus for use, the holddown feet 60 may be brought inwardly into engagement with the holddown member 26 by a sliding action, for which they are dovetailed (Figs. 2 and 4) into the bottom of a swingably mounted, semi-annular supporting member 62, whereupon they are held in position by means of wing bolts 64 entering the supporting member 62 obliquely to engage the upper surface of the feet 60. In accommodating differences in angularity of the holddown member at the points of location of the feet 60, with differently constructed shoes, the feet may be constructed as shown, in two parts joined at 65 for swiveling relative to each other.

The supporting member 62 is carried by oppositely extending arms 63 integrally formed with a vertically slidable collar 66 encircling a post 68. Terminating the lower end of the post 68 is a toe pad 70 adapted to press against the toe of a shoe in the usual manner, when a downward force is exerted on the post 68 by means of a suitable jack. The bottom portion 72 of such a jack is shown in Fig. 2. Initially the pressures imparted to the holddown feet and to the toe pad are the same owing to the coordinated movement of a pendulum-like cam 74 and the jack, the lower cam surface resting against a projecting shoulder 76 of the collar member 66. Subsequently, however, an additional amount of pressure may be applied to the holddown feet, and hence to the holddown electrode 26 for transmission to the welt strip of the shoe, by applying to the cam 74 a sidewise force which will be multiplied against the shoulder 76 and thereby effect an additional lowering of the supporting member 62 end hence of the holddown feed 60. Details of construction and operation of a suitable jack mechanism and cam, cooperating with a sole attaching pad, may be found in United States Letters Patent No. 2,138,960, issued December 6, 1938, upon an application of Sidney J. Finn, and wherein another form of sole attaching apparatus is disclosed.

With the welt holddown electrode 26 thus appropriately positioned and rigidified by a magnetic field, and with the appropriate sole attaching pressure applied thereto by means of the holddown feet 60, the shoe is now in condition for the activation of the bonding adhesive, which may be accomplished by the passage of a high-frequency electric field vertically through the marginal parts of the shoe. Thus the holddown electrode 26 and the pad cover electrode 20, with the former preferably grounded and the latter at high-voltage, will be connected to the appropriate terminals of a source, such as an oscillator 78 (Fig. 2), of high-frequency energy, over leads 80, resulting in the production of the desired high-frequency electric field passing vertically through the layer of adhesive. Inasmuch as the magnetized balls are in firm contact with one another, they form a continuous electrical conductor or electrode 26. The electrical resistance of this electrode 26 may be further reduced by copper coating the balls 30. The useful portion of the field will thus extend between the lower surface of the inner wedge-shaped portion of the electrode 26 and the general underlying surface of the pad electrode 20. If desired, a suitable timer may be employed in maintaining the oscillator circuit in operation for the desired interval of time thus removing the human factor in determining the heating period. For the purpose described, any suitable high-frequency oscillator may be employed, designed to operate at a frequency, for example, in the order of several megacycles per second and higher, a particularly desirable frequency being in the order of fifty megacycles per second.

Following the activation of the adhesive it will usually be desirable to maintain pressure against the shoe parts for an interval of time required for the adhesive to set. However, this interval may be relatively short in view of the quick setting time of many available thermoactive adhesives. For instance, it is contem-

plated that the entire process of placing a shoe in the apparatus, applying the holddown member to the welt crease, activating the cement under pressure and allowing it to set will require but a fraction of a minute and will thus effect a considerable saving of time over former methods of sole attaching.

This application is a division of my application Serial No. 766,825, filed August 6, 1947 for improvements in High-Frequency Electric Heating Apparatus in which features of the invention relating to the electrode have been claimed.

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

1. In high-frequency electric heating apparatus, electrodes adapted to set up an electric field when connected to a high-frequency electric supply means, one of said electrodes comprising a conformable, pressure-transmitting member including a casing of flexbile dielectric material, a mass of ferromagnetic particles contained within said casing in packed relation, and magnetizing means for rigidifying said electrode by passing a strong magnetic field therethrough when said electrode has been conformed to an object to be heated.

2. In combination, in high-frequency electric heating apparatus, electrodes adapted to set up an electric field when connected to a high-frequency electric supply means, one of said electrodes comprising a conformable, pressure-transmitting member ineluding an elongated casing of flexible dielectric material, a mass of ferromagnetic particles contained within said casing in packed relation, magnetizing means for rigidifying said electrode by passing a strong magnetic field therethrough when said electrode has been conformed to an object to be heated, and means for applying external pressure to said electrode at spaced intervals along its length for the transmission of pressure uniformly to the surface of said object.

3. In combination, a welt holddown comprising an elongated flexible casing having a wedge-shaped cross-section, discrete pieces of magnetic metal filling said casing, and a magnet having its poles magnetically connected to the filling at the ends of said casing for rendering rigid the metal-filled casing after the latter has been positioned in the welt crease of a shoe.

4. A welt holddown comprising an elongated flexible casing substantially filled with steel balls and adapted to be wrapped around a shoe to rest upon the welt extension thereof, means for setting up a magnetic field extending from one end to the other through said steel balls to cause them to be mutually attracted and to form a substantially rigid mass, and means for clamping together said holddown, a welt and a sole.

5. In combination, a flexible U-shaped elongated casing having an angular cross-section

adapted to enter the welt crease of the forepart of a shoe, a plurality of ferro-magnetic balls substantially filling said casing, a magnet having pivoted pole pieces which coact with the ends of the U-shaped casing to cause said balls to be mutually attracted so that the mass thereof is substantially rigid, and means engaging spaced portions of said casing for clamping together said casing, the adjacent welt and a cemented sole to cause the adhesion of the welt and the sole.

6. In combination, a sole-supporting pad provided with an electrode underlying the sole, said sole having a coating of thermoplastic cement which is dry and non-tacky, a welt holddown positioned in the welt crease of a shoe to be combined with said sole, said holddown comprising a U-shaped casing filled with steel balls, means for magnetizing said balls to cause them to become a substantially unitary mass, means for setting up a clamping pressure to press together the welt holddown, the welt and the sole, and conductive means joined to the balls and to the electrode respectively through which high-frequency electric power may be supplied to said holddown and to said beforementioned electrode to activate the dry thermoplastic cement.

7. In combination, in high-frequency electric heating apparatus, electrodes adapted to set up an electric field when connected to a high-frequency electric supply means, one of said electrodes comprising a conformable member including an elongated casing of flexible dielectric material, a mass of ferromagnetic particles contained within said casing in packed relation to provide a conductive member to which high-frequency power may be supplied, and magnetizing means for rigidifying said electrode by passing a strong magnetic field therethrough when said electrode has been conformed to an object to be heated.

8. In high-frequency electric heating apparatus, electrodes adapted to set up an electric field when connected to a high-frequency electric supply means, one of said electrodes comprising a conformable member including a casing having a wedge-shaped cross section and constructed of flexible dielectric material, a mass of ferromagnetic particles contained within said casing in packed relation forming the conductive part of said electrode, and magnetizing means for rigidifying said electrode by passing a strong magnetic field therethrough when said electrode has been conformed to an object to be heated.

MERWIN F. ASHLEY.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,057,040	MacDonald	Oct. 13, 1936
2,207,020	MacDonald	July 9, 1940