

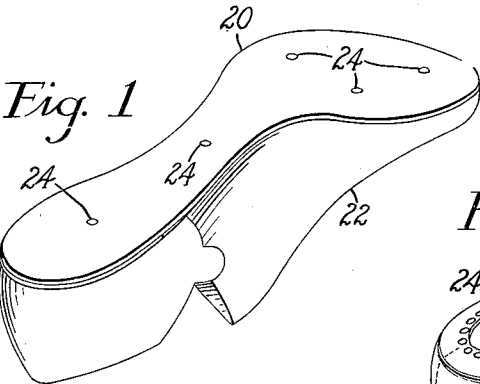
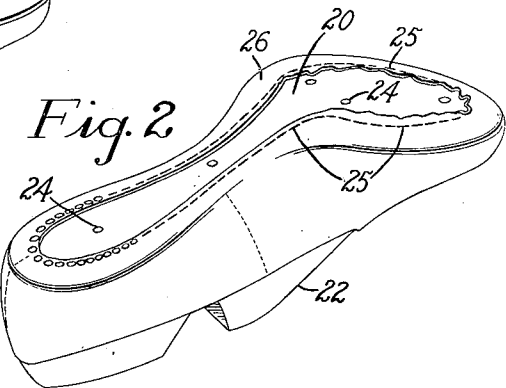
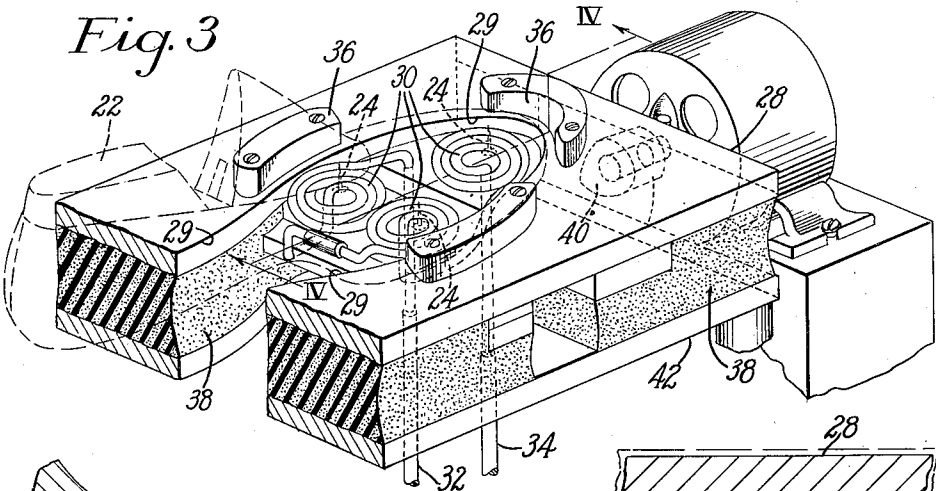
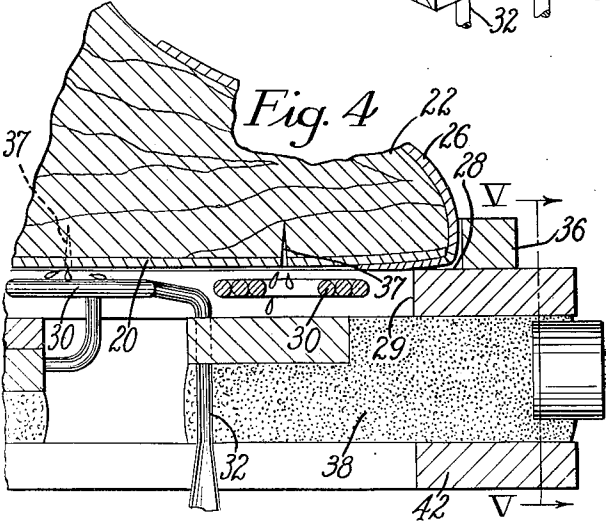
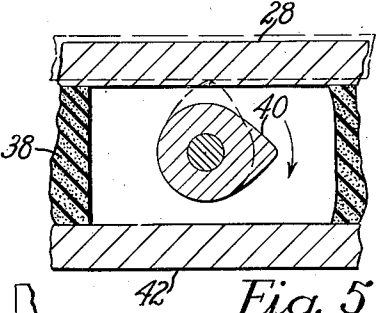
Sept. 5, 1950

J. J. BROPHY
MANUFACTURE OF SHOES

2,520,995

Filed Dec. 22, 1948

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

Fig. 6

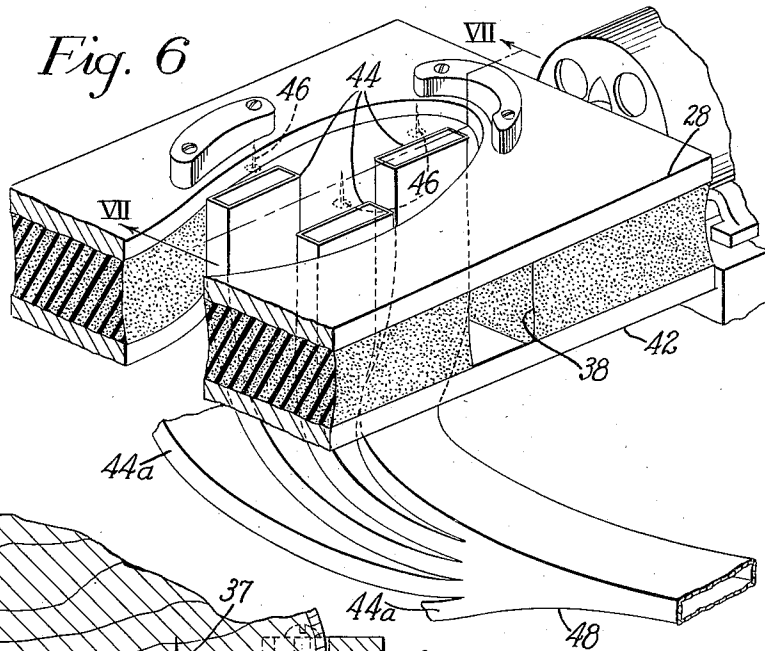


Fig. 7

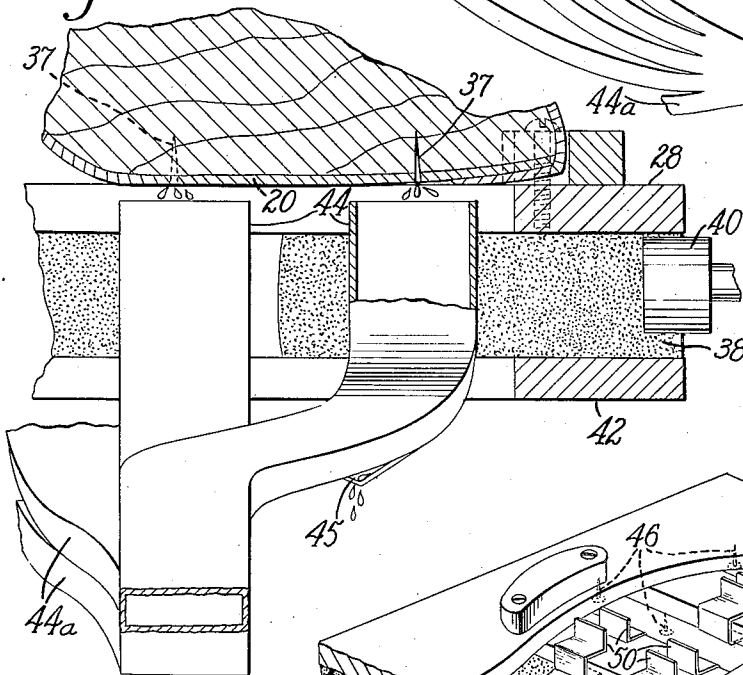
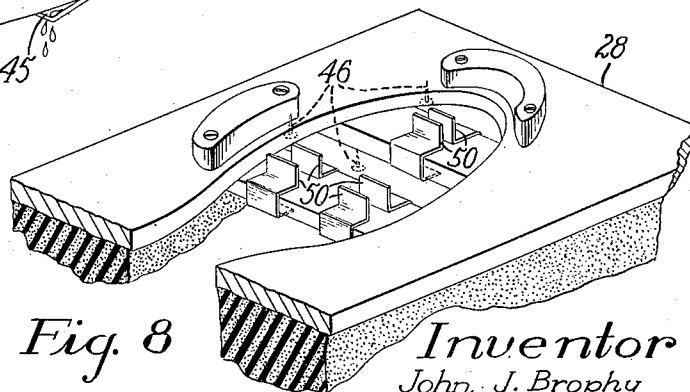


Fig. 8



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UNITED STATES PATENT OFFICE

2,520,995

MANUFACTURE OF SHOES

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Application December 22, 1948, Serial No. 66,607

10 Claims. (Cl. 12—142)

1

This invention relates to the manufacture of shoes and particularly to an improvement in methods of making shoes. However, in other aspects the invention contemplates a novel apparatus for use in practicing this improvement in methods of making shoes, as well as a novel product which results therefrom.

In the manufacture of shoes, it is of great importance that every tack, temporarily employed to hold the insole on the last, be withdrawn or removed from the insole and last before an outsole is applied, because thereafter a tack cannot be pulled out and the tack, left extending into the inside of the shoe, may only be partially removed, after the last is pulled, by the time-consuming job of snipping the point off from the inside of the shoe as close to the insole as possible. Such a shoe is likely to render but short service to the wearer before the remainder of the tack will work higher into the shoe and eventually penetrate the sock lining.

Heretofore, it has been necessary to withdraw each of the insole positioning tacks individually, either by a hand tool or by a tack pulling machine, and, in spite of all practical precautions and diligence on the part of the operators, tacks are frequently left in the shoe. This failure to remove all of the insole tacks continues to make numerous so-called "cripples" out of many otherwise well finished shoes. In some instances, the tack removing instrumentality will rip the head off the tack, leaving the embedded point difficult to detect and extract until after the last has been pulled.

Another objectionable feature of the present manner of removing tacks is that permanent damage may be occasioned to the insole by the tack puller which, in order to grasp and withdraw a deeply embedded tack, frequently has to bite deeply into the texture of the insole, thus producing large gouged out areas which weaken the ultimate shoe construction and necessitate subsequent "doctoring" with bottom filler in order to insure an even treading surface for the foot.

It is an object of this invention to provide an improvement in methods of making shoes which will result in the elimination of the difficulties which have just been mentioned. More specifically, this improvement comprises temporarily securing an insole to a last by means of fastenings which, after the upper has been attached to the insole and before the outsole is applied, may be easily and certainly removed without damaging the insole. For this purpose, and in accordance with a feature of the invention, the fastenings, for example tacks, are made of read-

2

ily fusible material so that they may be easily removed by melting at relatively low temperatures which will have no adverse effect on the insole itself. In the herein illustrated embodiment of the invention, two different types of fastening materials are suggested, namely, low melting point metals and plastics, the former of which may be melted by the action of induction heating, while the latter may be melted by means of dielectric heating.

Another object of the invention is to provide a novel apparatus for melting and removing fastenings of the kinds set forth above from the bottom of a shoe. For this purpose, there is provided a table for supporting a shoe by engagement with its bottom and having means for heating insole fastenings to melt them and cause them to drop out of the shoe bottom. Preferably, means are also provided for imparting a vibratory movement to the table for the purpose of dislodging the melted fastenings and thus facilitating their removal.

A still further object of the invention is to provide a novel product for use in the manufacture of shoes. Thus, invention will also be recognized in the novel intermediate product comprising a last having an insole secured thereto by means of readily fusible fastenings which may be easily removed, after an upper has been attached to the insole and before an outsole has been applied, by melting at a relatively low temperature without damage to the insole.

These and other novel features and objects of the invention will be apparent from the accompanying drawings and hereinafter described and claimed.

Referring to the drawings,

Fig. 1 illustrates an insole temporarily tacked upon a last;

Fig. 2 shows a shoe, comprising an upper and insole assembled on a last, with the lasting margin of the upper permanently secured to the insole;

Fig. 3 shows an apparatus, partially broken away, for removing the insole securing tacks in accordance with one mode of operation;

Fig. 4 is a sectional view of the apparatus shown in Fig. 3, taken on the line IV—IV of Fig. 3 and viewed in the direction of the arrows;

Fig. 5 is a sectional view of a feature of the apparatus shown in Fig. 3, when viewed in the direction of the arrows along the line V—V of Fig. 4;

Fig. 6 shows a modified apparatus, partially broken away, for removing tacks in accordance with another mode of operation;

Fig. 7 is a sectional view of the apparatus of Fig. 6, taken along the line VII—VII and viewed in the direction of the arrows, to further illustrate features of the invention; and

Fig. 8 illustrates still another modified apparatus for carrying out the invention in accordance with a further mode of operation.

According to one aspect of the improvement in methods of making shoes, and as illustrated in the drawings, Figs. 1 through 5, an insole 20 is spotted and temporarily tacked in proper position upon a last 22 using the customary arrangement of tacks except that the tacks 24 employed are formed of a metallic alloy, such for example, as Rose or Wood's Metal, characterized by a low melting point, a relatively high specific gravity and being capable of electrical conductivity. Then, after the usual operations, such as upper assembling, pulling over, side, heel and toe lasting, have been performed to attach the lasted upper 26 permanently to the insole, as by the staples 25, the temporary insole fastening tacks 24 are removed by melting, the heat being generated throughout the tacks by high frequency electrical induction.

This operation may be accomplished by holding the shoe of Fig. 2 bottom down upon the novel tack removing apparatus as shown in Figs. 3 and 4, where for the sake of brevity, only so much of the apparatus as includes means for melting the tacks in the forepart of the shoe has been illustrated; it is however to be understood that the tacks in the shank and heel portions may be simultaneously removed by similar melting means associated with the broken away portion of the apparatus and concentrically located with the respective tacks. This induction heating mechanism consists of a horizontal work table 28, resiliently supported upon a relatively thick layer 38 of latex foam rubber which is sandwiched between and adhesively bonded to the bottom of the table and the top of a stationary base plate 42. The layer 38 has a central cutaway portion towards the front of the apparatus providing a cavity, Fig. 5, between the base plate and table, into which there is interposed a power driven cam 40. As shown in Fig. 3, the apparatus is provided with a central opening extending downward through the table, the resilient layer and the base plate. The edges 29, 29 of this opening approximate the peripheral shape of a shoe bottom but are of a smaller dimension so that when a shoe is operatively positioned above the opening the peripheral bottom margins of the shoe will extend over the edges 29 and be supported upon the upper surface of the table 28. Within this opening and slightly below the supporting surface of the table are a series of electrical induction heating coils 30 arranged in a predetermined pattern so that each coil may be in approximate concentric alinement with one of the tacks 24. As an aid to properly positioning the shoe to locate the tacks above the coils, the table 28 is shown provided with a plurality of edge guides 36. The coils may be joined in an electrical series as illustrated, having their terminal leads 32 and 34 connected to a suitable source of high-frequency alternating current, not shown. Preferably, the conductor material for these coils is formed of a continuous tube so that a cooling medium, such as water, may be circulated throughout the coils to prevent them from becoming so overheated as to adversely affect the texture of shoe leather in close proximity thereto.

It will be seen that when the shoe is held bottom down upon the work table the insole tacks will be directly exposed to the heating coils. When thus subjected to the high-frequency magnetic fields surrounding the coils the tacks are rapidly heated and become fluid in a very short time. Their melting speed, if desired, may be increased by the addition of a small amount of copper or iron to the constituent alloy of the tacks.

In order to assure that no residue is left in the apertures 37, formed in the insole and last by the tacks, Fig. 4, the entire shoe may be rapidly and vigorously vibrated during the melting out process. This may be accomplished by imparting reciprocal up and down movement to the work table 28 by the force of the rapidly rotating cam 40 striking against and elevating the under surface of the table, thereby upwardly distending the resilient layer 38. As the point of the cam moves downward the table, drawn by the resiliency of the layer 38 and the force of gravity, descends to a level where it is once more engaged and elevated by the upward travel of the rapidly moving cam point. This vibratory movement when transmitted to the shoe causes the tack residue to be shaken freely from out the holes 37, and to fall through the central openings of the coils 30 and down through the cutout portion of the work table from whence it may be recovered, if desired, for the subsequent production of new tacks.

In accordance with a modification, the temporary fastening tacks are formed from a suitable plastic material characterized by a high factor of dielectric loss, a relatively high degree of rigidity when in solid form and a relatively low viscosity when completely melted. When employing these tacks the fabrication of the shoe follows the same operational steps as previously outlined with respect to the use of electrical conductive tacks, except that the method of removing the plastic tacks and the apparatus therefor is essentially different.

In the case of plastic tacks, they likewise may all be removed simultaneously by melting out, the heat being uniformly generated throughout the tacks by high frequency dielectric heating. After the shoe has been lasted as shown in Fig. 2, the subsequent melting out operation is performed by holding the shoe down upon an apparatus similar to that of Fig. 3 except that the electrical induction heating coils are not employed because the plastic tacks are non-conductors of electricity. Instead of the coils 30, the central cutout portion of the work table 28 may be provided either with a number of wave guide tubes of conventional construction, as illustrated in Figs. 6 and 7, or with an arrangement of electrodes as shown in Fig. 8.

Referring to the apparatus of Figs. 6 and 7, the wave guide tubes 44 should each be centrally positioned beneath one of the plastic tacks 46 so as to direct its dielectric forces upwards into the tack. The electrical operating frequency for this apparatus will in each case be dependent upon the size, shape and composition of the tacks employed. The tubes 44 should be so selected as to obtain the minimum of reflection back into the tube, and as to provide the most directional and concentrated fields of dielectric forces into the tack. This directional concentration of the dielectric fields is an important factor for two reasons; first, if the area of the insole encompassed by the field is excessive it may cause an arcing

over to adjacent metallic objects such as the staples 25, and secondly, since any leather containing moisture may have a relatively high factor of dielectric loss, this area may be deleteriously affected by overheating, thus weakening the structure of the shoe.

It will be noted that in the illustrated tube arrangement, the waves are guided from a suitable common generating source not shown, through a branch tube 48 leading into the several outlet tubes 44 and 44a, the latter tubes when extended being operatively positioned beneath the tacks in the shank and heel portion of the insole. These guide tubes beneath each tack have a downward opening 45 so that the residue from the melted tacks may drop down and pass out through the bottom of the tubes.

When using the dielectric melting means shown in Fig. 8, the electrodes 50 should be arranged in pairs beneath each tack 46, and the faces of the electrodes in each pair should be so positioned as to produce a dielectric field which extends outward as far as the point of the tack. Here again it is important to restrict the area of insole leather strongly affected by the field because of the danger of scorching the leather and of arcing over onto metallic fastenings such as staples or tacks.

While the herein disclosed novel method of temporarily fastening a sole to the last has been exemplified in the drawings as employed in the manufacture of a cement type of shoe construction, it is to be clearly understood that the invention and claims thereto are equally applicable to all types of shoe constructions wherein a sole is attached to a last by fastenings which penetrate through the sole and into the last.

It is also to be understood that in the illustrations of the apparatuses for removing the tacks the specific electrical arrangements are only shown by way of example. Since the choice of the best electrical heating elements and their arrangement as to size, configuration, and position may vary according to the chemical, electrical and physical characteristics of the particular fastenings employed, and since this choice may be readily ascertained by one skilled in the arts of induction or dielectric heating, the scope of the present invention is not intended to be limited to the specific arrangements disclosed in the drawings.

The temperatures, which must necessarily be produced within the fastenings in order to effect a complete melting thereof, will vary according to the material of which the particular fastening is composed. This invention contemplates the employment of such materials as will have a relatively low melting point, so that complete fusion will take place below 400° F.

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

1. That improvement in methods of making shoes which comprises the steps of positioning an insole upon a last, temporarily securing said insole to the last with readily fusible fastening means, and, after an upper has been secured to the insole, removing the temporary fastening means by subjecting them to heat sufficient to cause them to melt out from the last and insole.

2. That improvement in methods of making shoes which comprises the steps of positioning an insole upon a last, temporarily securing said insole to the last by means of readily fusible fastenings, and, after an upper has been secured to the

insole, removing said fastenings by subjecting them to a high frequency field until the internal heat thus produced throughout the fastenings causes them to melt out from the last and insole.

3. That improvement in methods of making shoes which comprises the steps of positioning an insole upon a last, temporarily securing said insole to the last by means of readily fusible fastenings formed of an electrically conductive alloy, and, after an upper has been secured to the insole, removing said fastenings by subjecting them to high frequency electro-magnetic fields until the internal heat thus produced throughout the fastenings causes them to melt out from the last and insole.

4. That improvement in methods of making shoes which comprises the steps of positioning an insole upon a last, temporarily securing said insole to the last by means of fastenings formed of a readily fusible electrically conductive alloy, and, after an upper has been secured to the insole, removing said fastenings by subjecting them to high frequency induction heating until the internal heat thus produced throughout the fastenings causes them to melt out from the last and insole.

5. That improvement in methods of making shoes which comprises the steps of positioning an insole upon a last, temporarily securing said insole to the last by means of fastenings formed of readily fusible dielectric plastic material, and, after an upper has been secured to the insole, removing said fastenings by subjecting them to high frequency electric fields until the internal heat thus produced throughout the fastenings causes them to melt out from the last and insole.

6. That improvement in methods of making shoes which comprises the steps of positioning an insole upon a last, temporarily securing said insole to the last by means of fastenings formed of a readily fusible material having a high dielectric loss, and, after an upper has been secured to the insole, removing said fastenings by subjecting them to high frequency dielectric heating until the internal heat thus produced throughout the fastenings causes them to melt out from the last and insole.

7. A step product for use in the manufacture of shoes comprising a last and a sole member secured to the bottom of the last by readily fusible fastenings.

8. A step product for use in the manufacture of shoes comprising a last and a sole member secured to the bottom of the last by readily fusible metallic fastenings.

9. A step product for use in the manufacture of shoes comprising a last and a sole member secured to the bottom of the last by readily fusible plastic fastenings.

10. A step product for use in the manufacture of shoes comprising a last and sole member secured thereto by fastening means which may thereafter be melted out by fusion at a temperature below 400° F.

JOHN J. BROPHY.

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