Sept. 26, 1939. J. T. LANCASTER 2,173,971

ART OF MANUFACTURING SHOES

Original Filed March 3, 1938 2 Sheets-Sheet 1

Fig. 1.

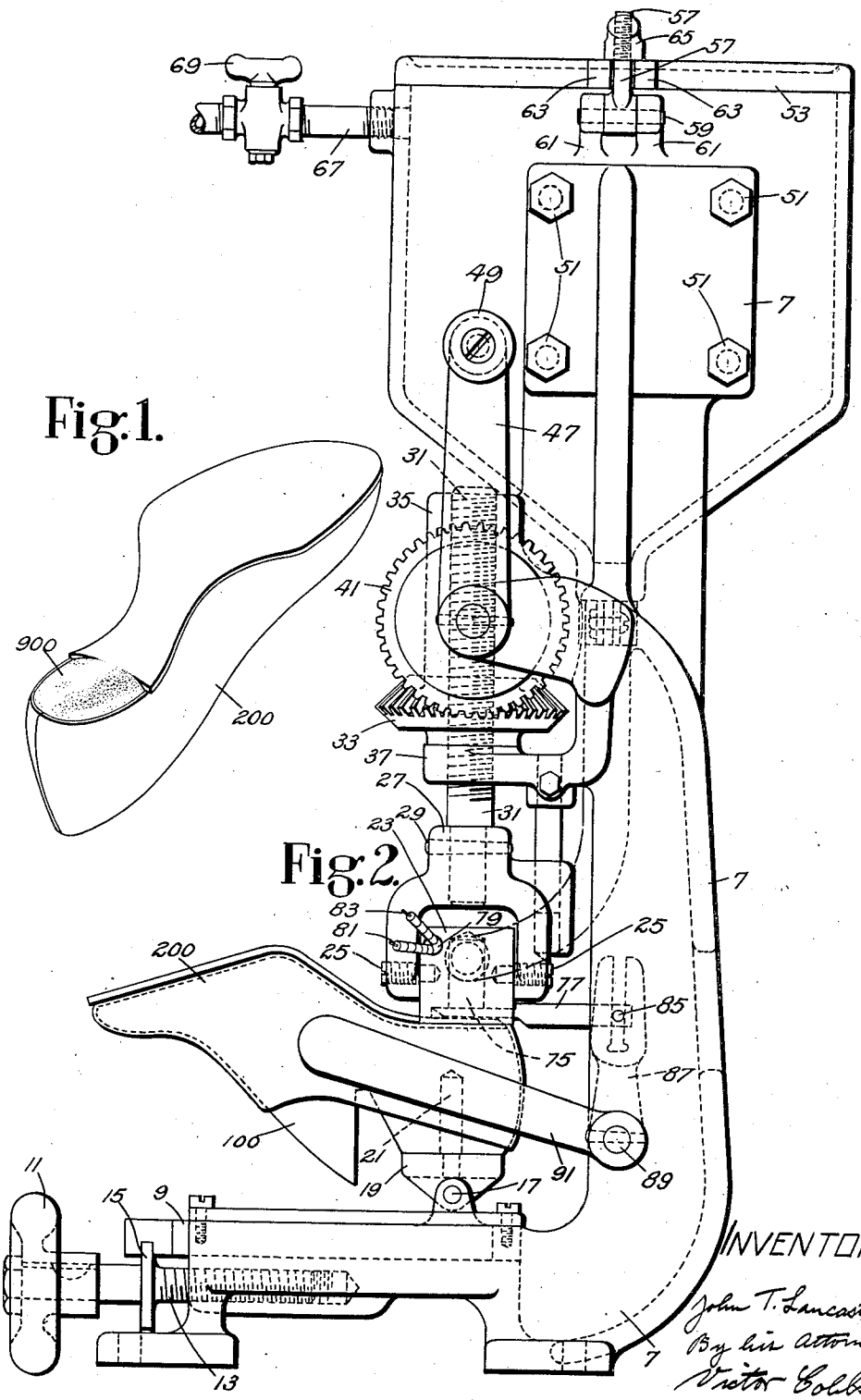


Fig. 2.

INVENTOR.

John T. Lancaster

By his attorney

Victor Cobb

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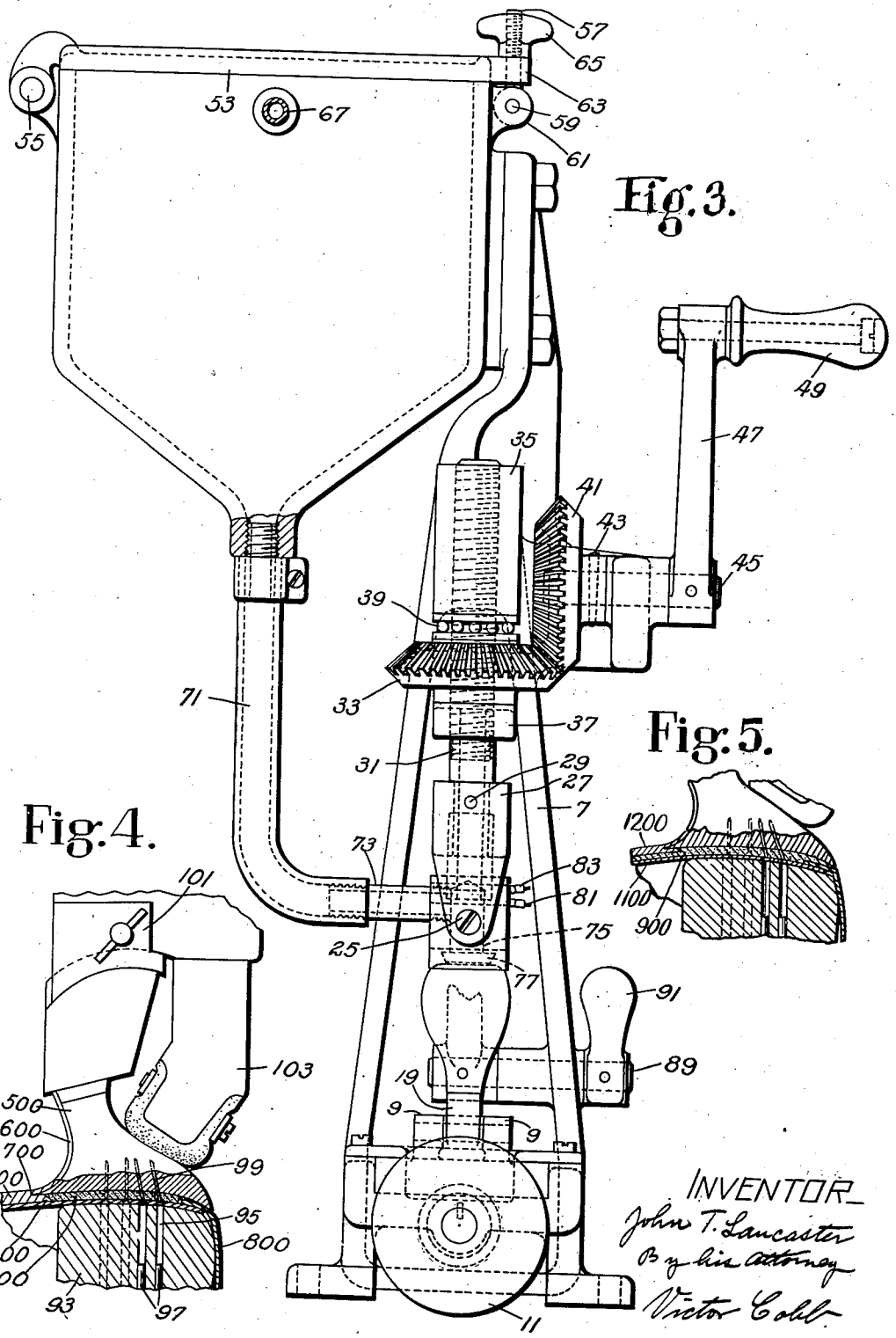


Fig. 3.

Fig. 4.

Fig. 5.

INVENTOR
John T. Lancaster
By his attorney
Victor Cobb

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2,173,971

ART OF MANUFACTURING SHOES

John T. Lancaster, Newton, Mass., assignor to United Shoe Machinery Corporation, Paterson, N. J., a corporation of New Jersey

Original application March 3, 1938, Serial No. 193,755. Divided and this application May 22, 1936, Serial No. 81,299

9 Claims. (Cl. 12—147)

This invention relates to the manufacture of shoes and more particularly to a shoe having a stiffened heel seat, to a method of stiffening the heel seat preparatory to attaching a heel, and to a method of attaching heels which includes the stiffening of the heel seat.

In the manufacture of shoes it is customary to attach the heels temporarily, for example by cement, while a shoe is on its last, then to perform certain operations upon the shoe, and subsequently to pull the last and permanently fasten the heel in place by nails driven from inside of the shoe. The heel seat of a shoe commonly consists of the heel end of the insole, a stiff fiber reinforcing piece, the overlasted margins of the upper materials, and a portion of the heel and of the outsole in the form of a tab of the general outline of a horseshoe the margin of which has been beveled so as to give its upper surface a convexity which corresponds to some extent to the concavity in the attaching face of the heel. A heel seat is thus made up of parts which are fastened together at separated localities, does not present a continuous surface corresponding in shape to the attaching face of the heel, and consists of parts which are spaced from each other at several localities so that certain voids are present.

It is desirable that the heel seat should be as nearly as possible a firm solid mass including a substance which fills all the voids, presents a surface which is as nearly as possible the counterpart of the attaching face of the heel, is or can readily be made adhesive so that a heel pressed against it will readily adhere to it, and, when set, is strong and elastic enough to receive and firmly hold the heel attaching nails. To this end the invention relates to a method of strengthening and stiffening the heel seat of a shoe for the reception of a heel which comprises placing upon the heel seat a quantity of plastic adhesive material comprising a comminuted solid and a binder of cement capable when set of forming with the solid a substance of sufficient strength and elasticity to receive and firmly hold the heel attaching nails subsequently to be driven, and acting upon the filling material to force it into the extremities of the cavities in the heel seat and to impart to its exposed surface a shape which is the counterpart of the attaching face of the heel. Preferably the filling material, which has a latent rigidity approximately equal to that of wood, will consist of particles of wood such as coarse sawdust mixed with pyroxylin cement. The heel may be pressed into place while the cement is still sticky, or the cement may be allowed to set hard in which case it will be activated by application of a solvent before the heel is pressed into place. In either event, nails will subsequently be driven from the inside of the shoe into the heel. The shoe which results has a strong rigid heel seat by reason of the presence of the filling material which fills all the voids, binds the other parts of the heel seat together and is sufficiently strong and elastic to receive and firmly hold the portions of the heel attaching nails which pass through it.

Referring to the accompanying drawings,

Fig. 1 is a perspective of a shoe having a heel seat made according to the present invention;

Fig. 2 is a side elevation of a machine for applying filling material to the bottom of the heel end of a shoe;

Fig. 3 is a front elevation of the machine shown in Fig. 2;

Fig. 4 is a detail partly in section and partly in elevation showing a shoe in process of having a heel attached by nails; and

Fig. 5 is a similar detail showing a Goodyear welt shoe having no shank stiffener and with the filling material extending into the space between the shank portions of the insole and the outsole.

The heel seat of a shoe commonly comprises a cavity the bottom of which is formed by a portion of the under face of the insole and the edge of which is defined around the sides and rear of the heel end of the shoe by the edges of the overlasted margins of the upper materials, this cavity being more or less covered, if a long outsole is present, by a tab at the heel end of such a sole. Sometimes a small filler piece is placed in the cavity. In any case, the parts of the heel seat are separated more or less so that voids are present.

The purpose of the machine shown in Figs. 2 and 3 is to stiffen and strengthen the heel seat by placing upon the bottom of the heel end of the shoe a quantity of plastic filling material comprising a comminuted solid and a sticky binder, and by applying pressure to the filling material in such manner as to force said material into the voids and to impart a properly shaped surface to the finished seat.

Slidably mounted in a suitable horizontal guideway near the bottom of the frame 7 of the machine is a carrier 9 which may be adjusted in and out (to the right or left as viewed in Fig. 2) by turning a hand wheel 11 which is fast to the stem of a screw 13. This screw is threaded into the frame and has integral with it a collar 15 which extends into a groove in the carrier 9 so that turning the screw adjusts the carrier. Pivoted at 17 between lugs on the carrier is a block 19 carrying a last pin 21 adapted to be received in the last-pin hole in a last 100 on which a partly fabricated shoe 200 is mounted. The above construction as a whole forms a jack or support for the shoe which can

be adjusted to aline the heel end of the shoe with the die presently to be described and which permits the shoe to swing more or less to accommodate itself to the die. Above the jack is a die 23 having in its lower face a cavity the wall of which corresponds to the shape of the attaching face of the heel which is to be attached, the rim of the cavity being adapted to be forced against the generally horseshoe-shaped margin of the upper materials at the heel end of the shoe and across the shoe at approximately the locality in which the forward edge of the heel will be located in the finished shoe. The shape of the cavity will vary somewhat not only according to the shape of the heel which is to be attached but also according to the kind of sole which is employed. The shoe illustrated in Fig. 4 has a short sole 300 having a small tongue or tab 400; and the forward edge or lip of the Louis heel 500 fits into the space between the tab and a heel breast covering flap 600. In the case of such a heel and shoe, the forward part of the rim of the cavity in the die extends across the tab and part of the overlasted margins of the upper materials at each side of it at a locality containing the point 700 on the forward edge of the lip of the heel. In the figure, the upper materials have been shown for convenience as consisting of a single layer 800 although it will be understood that there are usually an upper, a counter and a lining at the heel end of the shoe.

The die 23 is mounted for swinging movement by means of alined screws 25 having portions which are threaded through the arms of a fork 27 and cylindrical inner ends which are received in sockets formed in opposite sides of the die. The fork is fastened by a tapered pin 29 to the lower end of a screw 31 which is threaded through a bevel gear 33 and is guided in vertical alined bores formed in two guide members 35, 37 which are rigid with the frame of the machine, said members being located respectively above and below the bevel gear 33, there being above the gear between its hub and the upper guide member 35 a ball thrust bearing 39. A second bevel gear 41 meshes with the bevel gear 33, said gear 41 being fastened by a tapered pin 43 to a short rotatable horizontal shaft 45 to which is also pinned the hub of a crank 47 having a handle 49 by which it may be turned to rotate the bevel gear 33 and thereby raise or lower the die 23.

Fastened to the upper part of the frame by cap screws 51 is a receptacle for filling material which consists of a mixture of coarse sawdust with a sticky binder of pyroxylin rendered soft by a volatile solvent so that the material may be forced out of the receptacle through a conduit into the die. The receptacle has its open top normally closed by a cover 53 hinged to the receptacle at 55 and adapted to be clamped down by an eye bolt 57 through the eye of which passes a stud 59 mounted in alined bores in two lugs 61 formed on a wall of the receptacle, the upper end of the eye bolt being adapted to be swung into the position shown between two lugs 63 formed on the cover and having its upper end threaded to receive a clamping screw 65. The cover carries on its under side a gasket which makes an air-tight joint with the top of the receptacle. Into the upper part of the receptacle leads one end of a pipe 67 the other end of which is connected to a source of compressed air, a valve 69 being provided in said pipe. When the valve has been closed the cover 53 may be raised and the receptacle may be charged with filling material. The cover may then be closed and the valve opened, whereupon the compressed air exerts a pressure upon the filling material which acts, when permitted to do so, to force the filling material from the receptacle.

From the bottom of the receptacle a flexible pipe 71 leads to a short horizontal metal pipe 73 which in turn leads into the upper end of a vertical conduit 75 formed in the die 25. The lower end of this vertical conduit opens into a dovetailed horizontal groove which is in communication with the cavity in the die; and slidable in this groove is a valve 77 the lower face of which, when the valve is closed, forms a continuation of the curved wall of the cavity. When the valve is opened, filling material will flow into the cavity, and the pressure upon the filling material will force it into the voids in the heel end of the shoe so as to fill these voids completely and also fill the cavity in the die. When now the valve has been closed by being moved to the left (Fig. 2) into the position shown, the die may be raised and the shoe removed with the filling material 900 (Fig. 1) located properly on the heel end of the shoe and presenting an exposed surface which is the counterpart of the attaching face of the heel. In order to lessen the tendency of the filling material to stick to the polished surface of the wall of the cavity in the die, the die may be heated if desired, for example by means of an electrical heat unit 79 the leads of which are indicated at 81, 83. The valve 77 carries near its outer end a pin 85 received between the arms of a fork 87 the hub of which is fast to a rock-shaft 89 to which is also fast the hub of a handle 91.

In the operation of the machine the die is raised by turning the crank 47 in the proper direction, and a shoe is placed upon the jack which has previously been adjusted in the proper position. The crank 47 is turned to force the die down upon the heel end of the shoe as shown in the drawings, the generally horseshoe-shaped part of the rim of the cavity in the die engaging the overlasted margin of the upper material around the rear and along the sides of the bottom of the heel end of the shoe, and the forward part of the rim of the cavity extending across the bottom of the shoe in the locality in which the forward edge of the heel will lie in the finished shoe. The die is pressed against the shoe with considerable force so as to form a tight joint between the rim of the cavity in the die and the bottom of the shoe, as well as to form a horseshoe-shaped indentation in the overlasted upper material. The handle 91 is manipulated to open the valve 77 whereupon filling material is forced into the cavity in the die and upon the bottom of the shoe. The valve is then closed, the die is raised, and the shoe is removed.

The filling material is sticky when the shoe is removed from the machine, and a heel may be attached at once by pressing it into place. Otherwise the cement may be permitted to set hard, in which case it will be activated by treatment with a softener such as acetone just before the heel is pressed in place. In either case, after the heel has thus been attached by cement, various operations will commonly be performed upon the shoe, the last will then be pulled and the heel nailed to the shoe. For this nailing operation any suitable nailing machine may be employed. In Fig. 4 there are shown the work-engaging parts of a heel nailing machine which is disclosed in United

States Letters Patent No. 1,081,917, granted December 16, 1913, upon an application filed in the name of Eliphalet A. Tripp. As shown in this figure, the heel end of the shoe rests upon a shoe support **93** having vertical passageways **95** to receive nail drivers **97**. The heel is clamped against the heel end of the shoe and held firmly during the driving of the nails **99** by means of a tread plate **101** and an auxiliary support **103** having a rubber heel-engaging surface. It will be noted that the heel seat of the shoe is exceedingly stiff and firm due to the presence of the hardened filling material, that the holding power of the nails is greatly increased due to the quantity and nature of the filling material through which they are driven, and that with this rigid heel seat and firm attachment of the heel, the tendency for an unsightly gap to appear between the rim of the heel and the adjacent overlasted margin of the upper is obviated.

Although the invention has been described above with relation to filling and strengthening the heel seat, it is pointed out that filling material will also be forced into whatever space may exist in the shank portion of the shoe. Commonly there is a shank stiffener in the shank portion between the insole and the outsole, said shank stiffener being of such width that there is a narrow space between the insole and the outsole on each side of the shank stiffener into which filling material will be forced to stiffen the shank of the shoe as well as the heel seat. And, by omitting the usual shank stiffener, the filling material may be caused to fill all the space between the insole and the outsole so that, when hardened, it takes the place of the usual shank stiffener.

In Fig. 5 there is shown a Goodyear welt shoe having an insole **1100** and an outsole **1200**, there being no shank stiffener between them so that, in the lasted shoe before the filling **900** is applied, there is a space between the insole and the outsole in the shank portions thereof. With a shoe of this type some of the filling material is forced into this space and, when hardened, takes the place of the usual shank stiffener.

The machine which has been shown and described is not claimed herein but forms the subject-matter of a divisional application, Serial No. 193,755, filed Mar. 3, 1938.

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

1. The method of attaching a heel to a partly fabricated shoe which comprises applying under pressure to the bottom of the heel end of the shoe a quantity of filling material comprising a comminuted solid and a cement capable when set of forming with the solid a substance sufficiently strong and elastic to receive and firmly hold heel attaching nails and driving said nails through the substance into the heel.

2. The method of attaching a heel to a partly fabricated shoe which comprises placing upon the bottom of the heel end of the shoe a quantity of filling material comprising a comminuted solid and a cement capable when set of forming with the solid a substance sufficiently strong and elastic to receive and firmly hold heel attaching nails, imparting to the filling material an exposed surface which is the counterpart of the attaching face of the heel, putting the heel in place with its attaching surface upon the exposed surface of the filling material, and pressing the heel into place while the cement is still adhesive.

3. The method of attaching a heel to a partly fabricated shoe which comprises placing upon the bottom of the heel end of the shoe a quantity of filling material comprising a comminuted solid and a cement capable when set of forming with the solid a substance sufficiently strong and elastic to receive and firmly hold heel attaching nails, imparting to the filling material an exposed surface which is the counterpart of the attaching face of the heel, permitting the filling material to harden, treating it with a solvent for the cement to render it sticky, and pressing the heel into place.

4. The method of attaching a heel to a partly fabricated shoe which comprises placing upon the bottom of the heel end of the shoe a quantity of filling material comprising a comminuted solid and a cement capable when set of forming with the solid a substance sufficiently strong and elastic to receive and firmly hold heel attaching nails, imparting to the filling material an exposed surface which is the counterpart of the attaching face of the heel, permitting the filling material to harden, treating it with a solvent for the cement to render it sticky, pressing the heel into place and driving nails through the filling material into the heel.

5. The method of stiffening the heel end and shank portion of a partly fabricated shoe which comprises forcing upon the bottom of the heel end of the shoe and into the space between the insole and the outsole at the shank portion of the shoe a filling material consisting of a comminuted solid and a cement capable when set of forming a solid mass and thereby stiffening the heel seat and shank portion of the shoe.

6. The method of providing a partly fabricated shoe with a one-piece heel-receiving portion and shank stiffener which comprises forcing upon the heel end of the shoe and into the space in the shank portion between the insole and the outsole a quantity of filling material comprising a comminuted solid and a cement capable when set of forming with the solid a strong solid mass.

7. A shoe having a heel-contacting portion composed of a mixture of particles of a solid and a hard cement which forms with the solid a substance sufficiently strong and elastic to receive and firmly hold heel-attaching nails and an adjacent cavity in the shank portion filled with the same mixture, said heel-contacting portion having a surface which is the counterpart of the attaching face of the heel, and nails driven through the mixture into the heel.

8. The method of attaching a heel to a partly fabricated shoe which comprises applying under pressure to the bottom of the heel end of the shoe a quantity of filler comprising a fibrous material and a cement capable when set of forming with the fibrous material a substance sufficiently strong and elastic to receive and firmly hold heel attaching nails and driving said nails through the substance into the heel.

9. The method of operating upon a partly fabricated shoe which comprises pressing upon the heel end of the shoe a plastic filling material having a latent rigidity approximately equal to that of wood, permitting the material to become rigid, and driving nails through the material into the heel of the shoe.

JOHN T. LANCASTER.