Aug. 24, 1948. J. F. LEAHY 2,447,512

HEEL ATTACHING

Filed March 22, 1947 4 Sheets-Sheet 1

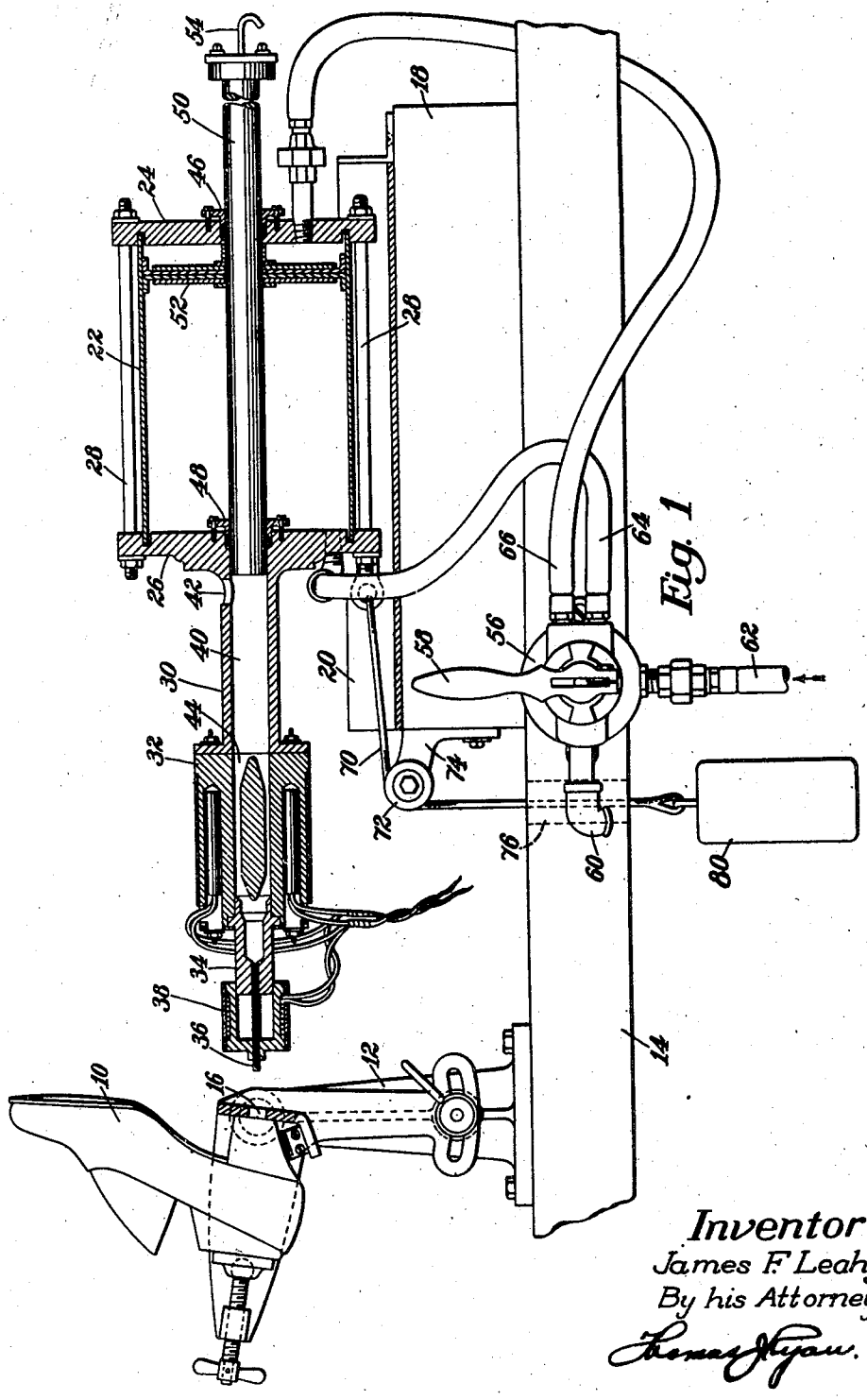


Fig. 1

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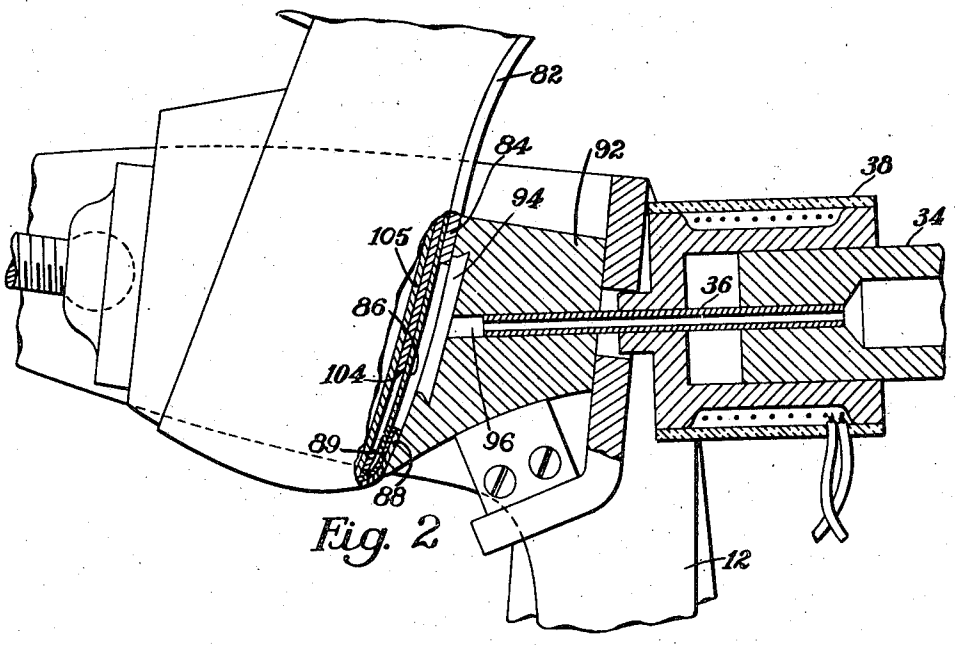


Fig. 2

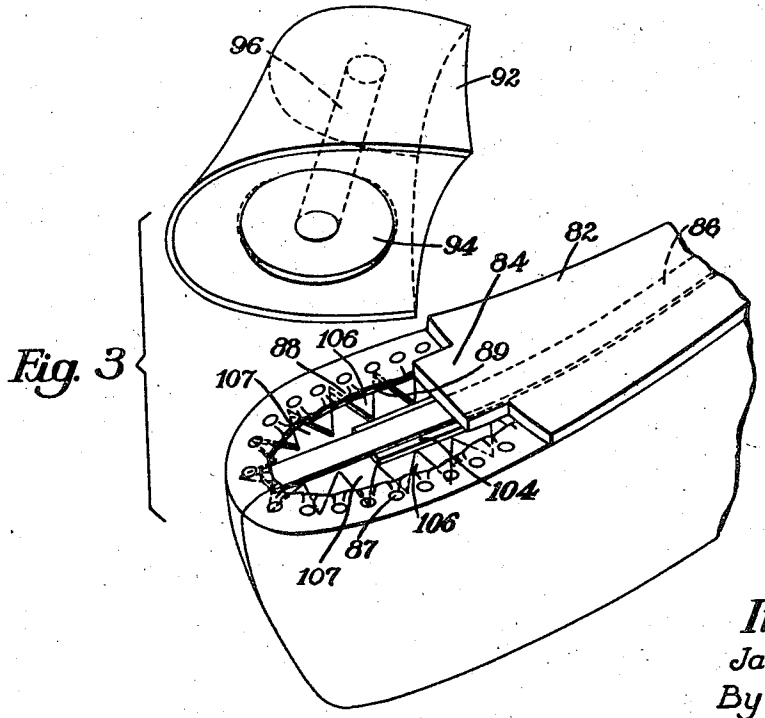


Fig. 3

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HEEL ATTACHING

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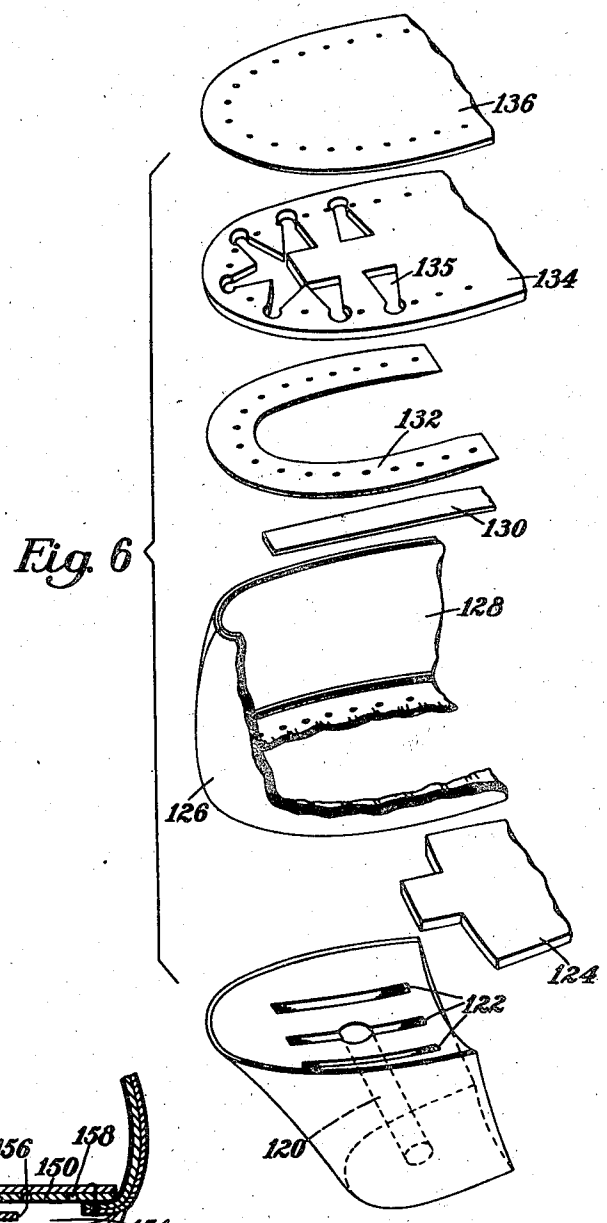


Fig. 6

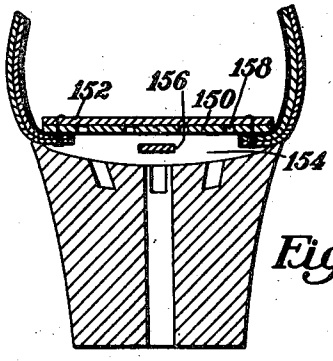


Fig. 7

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HEEL ATTACHING

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Fig. 4

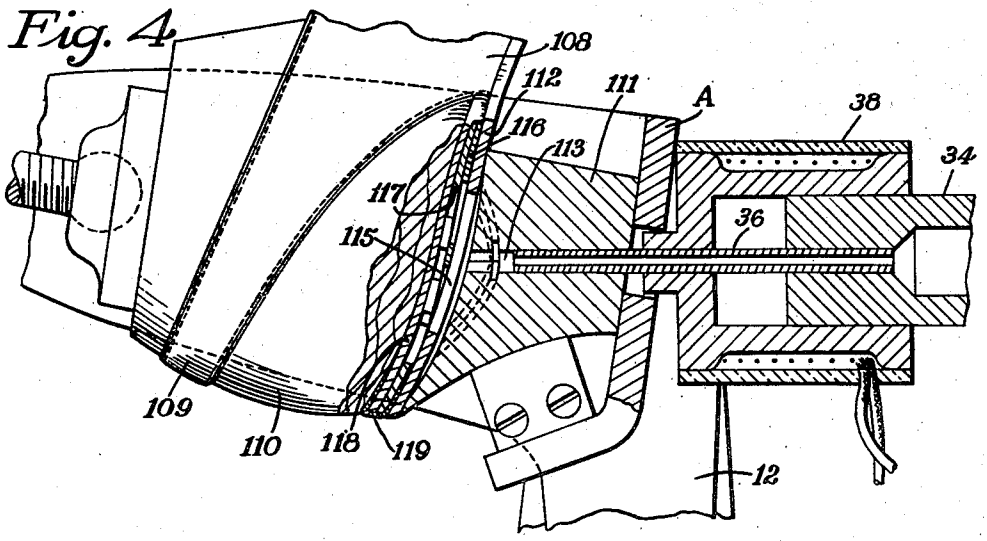
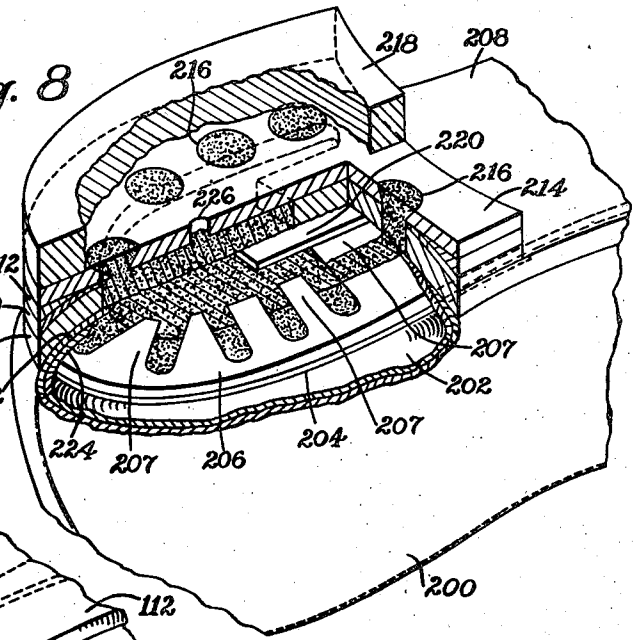


Fig. 8



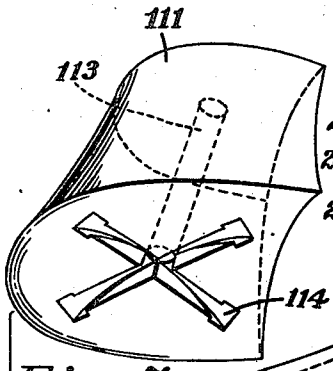
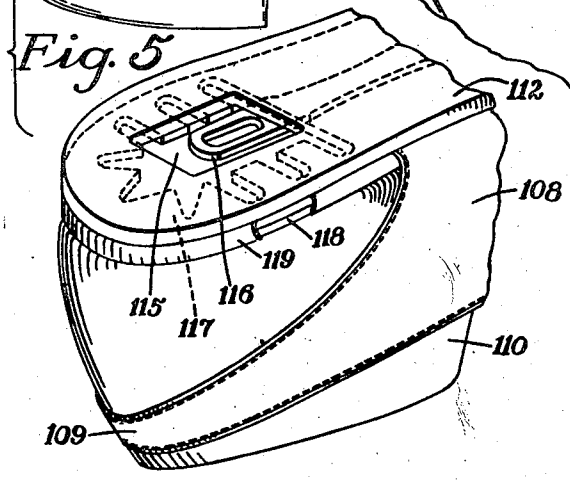


Fig. 5



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UNITED STATES PATENT OFFICE

2,447,512

HEEL ATTACHING

James F. Leahy, Beverly, Mass., assignor to United Shoe Machinery Corporation, Flemington, N. J., a corporation of New Jersey

Application March 22, 1947, Serial No. 736,548

21 Claims. (Cl. 36—24.5)

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This invention relates to a method of shoe construction, and more particularly to a method of attaching heels to shoes and also to the products thereof. The present application is a continuation-in-part of application Serial No. 572,451, filed on January 12, 1945, which is now abandoned.

The inside tread surfaces of shoes, as usually constructed, are frequently rough and uncomfortable, particularly at the heel end where metallic fastenings are used to attach the heels and the fastenings are clinched at the inside of the shoe and covered only with a thin lining. In some shoes, and particularly in the case of women's shoes, large fastenings are exposed within the interior heel seat areas and the large sizes of the fastenings aggravate the rough heel seat condition. In many cases, the exercise of care in lasting and fitting the heel to the heel seat, and the use of a heavy lining may serve to eliminate the roughness to a large extent when the shoes are new. Wear of the shoes, however, often causes roughness to appear as the shoe material is pressed down into any concealed voids which may be left between the heelcup and the heel seat. The interior heel seat surface of a shoe should obviously not be rough but should present a smooth unbroken surface which will constitute a firm, comfortable and permanent support for the foot of a wearer.

Not only do customary metallic fastenings affect the shoe interiors adversely but they have other disadvantages. They tend to corrode and will cause staining and deterioration of leather and contribute much to the general breakdown of shoe structure. The lack of shoe material substance forming the heel seat of a shoe may well cause the nail or screw heads to pull through giving a weak and uncertain fastening of the shoe parts. If wooden heels are used nails or screws of large size have a tendency to split them and the splitting may not be detected until the shoes are actually in use. Another disadvantage is that a shoe will lose its shape if the shank piece is not firmly anchored and metallic fastenings for heel attachment are not conducive to proper fixing of the shank piece. Maintenance of the original character of the shoe relies upon a firm heel and shank piece construction.

Another difficulty with customary heel attaching methods and particularly in the case of women's shoes is that the heels are held on by attaching means located well in from the sides of the shoes thus making the attachment inherently weak. It is weak because of the lack of mechanical advantage possessed by the attaching means in resisting any tendency to twist or break the heel from the shoe. With a weak attachment an unsightly "wink" or opening occurs between the sides of the heel and the upper as stress is placed upon the heel attachment means.

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Heels have been attached to shoes heretofore by means of plastic material in attempts to eliminate the need for metallic fastenings and all their disadvantages, but the difficulties encountered have been so numerous that such attempts have been discarded. In prior attempts to use plastic material it was discovered that the handling of the plastic material was in itself a problem of considerable magnitude. If a fluid plastic mass was clamped between a shoe bottom and a heel to be attached, the plastic material would exude from between the shoe parts before any or sufficient pressure could be developed to force it into the crevices or recesses provided in the shoe bottom and heel as interlocking means. Without such pressure, the plastic material did not form a smooth and continuous backing for the interior surface of the heel seat and a strong attachment of the heel to the shoe was not assured. It was also thought necessary to depart from conventional shoemaking procedure to a considerable extent by using complicated heel structures or altering the shoe structure in order to utilize the plastic material. In every such attempt diligence was essential to prevent marring the appearance of the shoes by any undesired exudation of plastic material to their exterior surfaces.

The general object of the present invention is to provide a shoe having an interior heel seat of permanently smooth surfaced construction combined with a nonmetallic form of heel attachment, both the article and the method for producing that article serving to avoid the numerous disadvantages referred to above.

In accordance with the article aspect of the present invention, a heel is provided the edges of which engage the bottom of the shoe forming a seal, and hardened plastic material engages anchoring means on the heel and shoe to attach firmly the two parts together, the plastic material forming a broad and firm foot support as well as means for holding the shank piece in its proper position. Several modifications of structure are possible. Either a full length or a short sole may be used. The inner sole itself, a special spacing member, or a resinous sheet may be utilized to form the space required for the plastic material adjacent the shoe interior. Overlasted margins of the upper may be present at the heel seat but they are not essential as the invention may be employed on a woman's open-back type of shoe. The heel, in all cases, is provided with irregularities or plastic anchoring means on or at its attaching face and such an irregularity may take the form of an undercut recess.

As for the method aspect, fluid plastic material is extruded from a nozzle or injected into the void or voids formed between a shoe and its heel, the act of extrusion being terminated by the pressure

of the plastic material as such pressure is formed within the recess. The building up of this pressure is momentary only as the volume of plastic material extruded to form a part of the shoe is critically determined as to its extent by the volume of the recess or voids enclosed within the seal formed between the heel edges and the shoe bottom.

It is to be understood that the term "heel" as used herein is such as to include a heel portion such as a platform or the lift of a heel as well as a complete heel. The term "perforated sheet material" is used to define a portion of the shoe bottom such as the innersole or a tuck.

These and other features of the invention, including various specific details of construction of the articles and combination of parts as well as the method, will now be described in detail in the specification and then pointed out more particularly in the appended claims.

In the drawings,

Fig. 1 is an elevational view partly in section of the apparatus used in carrying out the method of this invention;

Fig. 2 is a view partly in section of parts of the woman's shoe and parts of the apparatus shown in Fig. 1;

Fig. 3 is a perspective view of the heel and shoe shown in Fig. 2;

Fig. 4 is a view similar to Fig. 2 but presenting a different type of shoe and a modification of the heel attaching means;

Fig. 5 is a perspective view of the heel and shoe shown in Fig. 4;

Fig. 6 shows an exploded view of the shoe parts used in another modification for attaching a heel;

Fig. 7 is a transverse vertical cross-sectional view through a shoe presenting one other modification; and

Fig. 8 is a perspective view, with sections broken away, of a man's shoe with a modified construction.

In Fig. 1 a lasted shoe 10 is shown clamped in a suitable clamp fixture 12 which is bolted to a table 14. The preformed heel of the shoe has been placed and clamped in its correct position relative to the shoe and an orifice 16 is provided through a portion of the fixture whereby access may be had to the bottom of the heel. A block or other suitable support 18 is affixed to the table 14 and on the block 18 are placed two parallel angle bars 20 only one of which is shown in the drawing. A cylinder 22 having end plates 24 and 26 tied together by long bolts 28 rests upon the upturned flanges of the angle bars 20 in such a way as to be slidable thereon. The end plate 26 is provided with a reduced pipe extension 30 to which is affixed an electric heater 32 and a nozzle comprising a large portion 34 and a small portion 36 directed toward the orifice 16. A supplementary electric heater 38 is mounted for manual reciprocation, as desired, upon the large portion 34 of the nozzle and adapted to enclose the major length of the small portion 36. Pipe extension 30 is provided with a piston chamber 40 and a charging orifice 42. The electric heater 32 has a baffled passage 44 in alinement with cylinder 40. End plates 24 and 26 have packing glands 46 and 48 which permit a piston rod 50 to slide without leakage from the cylinder 22. The piston rod 50 is provided with a piston 52 which is adapted to be operated by fluid pressure. A hook 54 is attached to the end of the piston rod 50 whereby the operator may withdraw the piston rod 50 to a certain extent from the cylinder 22 to the position shown in Fig. 1. A two-way valve 56 is mounted on the side of the table 14 and this valve has an operating handle 58, an exhaust connection 60, a fluid pressure inlet 62 leading from some convenient source of supply, a hose connection 64 leading to one end of the cylinder 22 (as shown) and a hose connection 66 leading to the other end of the cylinder 22. Attached to the bottom of the cylinder 22 is a cord 70 passing over a sheave 72 held by a bracket 74 to the support 18. The cord 70 passes down through a hole 76 in the table and from the cord the weight 80 is freely suspended below the table.

In describing the operation of the apparatus shown in Fig. 1 reference should be made to Figs. 2 and 3 as well. In Fig. 3 the rear portion of a woman's shoe is shown with a special heel spaced therefrom for purposes of illustration. It should be noted that the sole 82 with the exception of the short tab 84, terminates in the vicinity of the heel breast in a conventional manner. A steel shank piece 86 extends into the heel seat portion of the shoe beyond the tab 84 and extends rearwardly to beneath the margins of the upper and counter and parallel with the shoe insole. The heads of the heel seat lasting tacks 87 are conventionally driven in such a way as to be substantially flush with the surfaces of the overlasted margins 88 of the shoe upper and are clinched between the insole and the steel plate on the last. A section of the counter 89 at its margin is clearly seen in Fig. 2. The heel 92 which may be of wood or some other material, is provided with an undercut recess 94 in its top and also with a drilled passage 96 leading from the recess 94 to the bottom of the heel. The steel shank piece 86 need not be as long as shown in Fig. 3 but sufficient length should be employed to result in the desired rigidity for the main portion of the shoe. For the purposes of the present invention, a supplementary holding means or tuck 104 is shown having tabs 106. The tuck 104 is a single piece of stiff sheet material attached by means of the lasting tacks 87 between the overlasted margins of the shoe and the insole shown at 105 in Fig. 2. A recess is essential to receive plastic material as will subsequently appear and a portion of this recess is formed by an operation performed on the tuck preliminary to assembly of the shoe parts. A portion of the tuck 104 is cut out to leave inwardly pointing tabs 106 and a rearwardly extending central tongue, as shown in Fig. 3. It will be noted that the tabs 106 are so cut that the spaces 107 between them extend some distance beneath the overlasted margins of the shoe. The tuck 104 may be a cut out piece of sheet material, as shown in Fig. 3, or it may be a piece of wire mesh or any other means of such form to which plastic material may physically and securely be attached and which will freely permit flow of such material (when fluid) to fill all voids across the heel seat area and almost to the edges of the heel thereby resulting in a broad and firm support for the insole 105 (if one is used) or for the foot.

In applying the heel of Fig. 3 to the shoe the two parts are placed and clamped in position in the fixture 12, as shown in Figs. 1 and 2. The cylinder 22 of Fig. 1 is moved on the supporting flanges 20 toward the shoe 10 until the small nozzle section 36 extends within the passage 96 as shown in Fig. 2. The supplementary heater 38, having performed its function of maintaining in a fluid state any residual plastic in the small noz-

zle section 36 during the interval between extruding operations, is permitted to slide back upon portion 34 of the nozzle. Suitable thermoplastic material is then introduced into the cylinder 40 through the orifice 42 (assuming that piston rod 60 has been pulled back, using the hook 54, into the position shown in Fig. 1). The thermoplastic material being maintained sufficiently fluid because of the heat from heaters 32 and 38, handle 58 of the valve 56 is manipulated to introduce fluid pressure from the inlet 62 through the hose connection 66 and into cylinder 22 to drive piston 52 and piston rod 50 to the left. Plastic material is thereby forced through the nozzle 34 and into the passage 96 to fill the entire void formed between the insole 105 and the bottom of the undercut recess 94 in the heel.

The plastic material will therefore extend across substantially the full width of the heel seat area enclosed within the seal formed between the heel edges and the shoe bottom. Such extension is possible because the tabs 106 form spaces between the insole and the over-lasted shoe margins. Because of the clamping together of the heel and shoe, the top edges of the heel form a seal with the shoe bottom (the shoe upper in the present instance) and thereby serve to prevent plastic from exuding to the exterior of the shoe, assuming that the pressure of fluid plastic within the heel is not permitted to exceed a practical limit. When the voids become filled with plastic (and not until such time) the pressure momentarily rises within the recess with the result that the nozzle 34 is pushed away from the recess, the cylinder 22 sliding on the flanges 20. The degree of pressure necessary to cause the withdrawal of the nozzle and therefore a termination of the extruding operation into the recess may be varied by changing the weight 30. Such pressure must not exceed that which may force the plastic material beyond the seal formed between the heel and the overlasted portions of the upper. The thermoplastic material quickly hardens upon contact with the cold shoe parts and the shoe may be promptly removed from the clamping fixture 12 for the operator to repeat the operation on the next shoe.

In carrying out the above method air was supplied to the cylinder 22 at a pressure of 80 pounds per square inch gage and in forcing the molten plastic material into the shoe pressures were built up in that material which reached up to 2000 and 4500 pounds per square inch. As stated above, realization of such pressures is but momentary and consecutive shoes may be treated rapidly and efficiently.

Many plastic compositions are suitable for carrying out the method of the present invention. An example of one composition which was used successfully follows:

	Grams
Ethyl cellulose (medium viscosity (ethoxy content 48.5 to 49.5%))	233
Calcium stearate	3
Diphenyl amine	3
Di(o-xenyl) monophenyl phosphate (plasticizer)	67
Phenolic resin, thermoplastic type	30

During injection of the plastic material into the heel the plastic composition, as described above, was at a temperature of about 360° to 370° F.

In Figs. 4 and 5 the invention is illustrated as applied to the manufacture of a woman's open-back shoe 108 having a back strap 109 and as retained on a last 110. In Fig. 4 the same apparatus is shown as is illustrated in Figs. 1 and 2. A heel 111 is clamped to the bottom of the shoe 108 and in this example, the bottom of the shoe is the sole 112 which extends the full length of the shoe. The heel 111 is drilled at 113 for the close fitting reception of the nozzle 36. An undercut recess 114 in the form of a cross (Fig. 5) is cut in the top of the heel in communication with the passage 113. A rectangular opening 115 is cut in the sole 112 before the sole is assembled on the shoe and in the present construction the rear end of a shank piece 116 is so placed as to extend to the center of the heel seat area, as shown in Fig. 5. A tuck 117 with a cut-out portion, as shown in dotted lines in Fig. 5, is placed between the shank piece 116 and an innersole 118. A covering 119 is used to cover the edges of the innersole 118 and the tuck 117 and thereby presents a neat appearance.

As may be seen in Fig. 4, upon placing the heel and shoe together, the edges of the heel 111 first contact the bottom of the shoe. This forms a seal and also a thin space within that seal between the plane of the sole 112 and the cup of the heel. In customary shoemaking procedure it is hoped to force the shoe bottom into the heel cup and eliminate the thin space referred to but such elimination is by no means assured when metallic heel attaching fastenings are used. In the use of the present invention, however, the generation of pressure within the void between the heel and shoe forces the plastic material outwardly to the seal formed between the heel edges and the shoe bottom. All voids or crevices are filled including those immediately above the heel cup and also immediately below the innersole. A smooth and lasting interior heel seat is assured and the heel as well as the shank piece are rigidly attached to give a reliable and lasting shoe construction.

A further modification of the heel attaching method is shown in Fig. 6. In this case the heel is provided with a passage 120 extending from the cup of the heel to the bottom of the heel. Three arcuate cuts 122 are made at the top of the heel, as shown, which may be inclined slightly to the vertical. A conventional sole 124 is used which terminates at the breast of the heel. The upper 126 with a conventional counter having a conventional lining 128 is also shown. The rear end of a steel shank piece or stiffener 130 is provided, and a U-shaped fiber member 132 is used to space the lining 128 which rests upon the overlasted margins of the upper from a perforated member 134, which is located just beneath the innersole 136. In using this form of shoe construction the innersole 136 is first placed on the last (not shown), a perforated member 134 with suitable perforations 135 (which may be of various forms) is placed thereover and upon this the U-shaped member 132, shank piece 130, lining 128, counter and upper 126 are placed. The lasting tacks will hold all these elements in their proper positions on the last. When such a shoe with a heel of the form shown in Fig. 6 is placed in position in the fixture 12 and plastic is extruded through the passage 120, it will form a strong reliable bond between the heel and the shoe as the plastic flows to fill the voids between the heel and the shoe and will approach the outer margins of the heel because of the perforations 135. The function of the U-shaped member 132 is to prevent the lining 128 from blocking the passage of plastic material along the perforations 135 toward the margins of the heel. If the in-

nersole 136 is made of transparent material, removal of the shoe from the last will permit inspection of the plastic attachment of the heel and will convince a prospective wearer of the permanence and excellence of the shoe construction.

Still another modification is shown in Fig. 7 in which a heel similar to that of Fig. 6 is used. In this case a piece 150 of thermoplastic sheet material (which may or may not be perforated) is lasted in beneath the insole 152. The thermoplastic material or sheet 150 is so chosen as to become tacky upon contact with hot and fluid thermoplastic material injected into the recess 154 in the heel attaching operation. In this way, the plastic within the recess 154 becomes a unitary structure with the material of sheet 150 and a rigid shoe structure is formed. It is to be noted that the shank piece 156 will be firmly embedded in the plastic material. The perforations 158 are not essential but are preferably provided to increase the area to be made tacky by contact with the hot themoplastic material. In using ethyl cellulose molding compound for the extrusion operation at about 360° F. a suitable material (which is suggested merely as one example of what may be used for the sheet 150) is of the following composition:

	Grams
Ethyl cellulose (medium viscosity)	100
Plasticizer	50
Diphenylamine	2
Cellulosic filler	25
Phenolic plastic	30

It is clear that various combinations of materials can be used to suit specific conditions.

The principles of the present invention are also illustrated in the construction of a man's shoe, as shown in Fig. 8. The man's shoe 200 is shown as placed upon a last 202, the last having a conventional steel heel seat plate 204. An insole 206 is placed next to the last and its plate 204 and the central heel seat portion of the insole is cut out to form inwardly extending tongues 207, as illustrated in Fig. 8. The counter and upper are fastened to the insole 206 with tacks as is customary in lasting operations. The sole 208 is a full length outsole extending to the rear of the shoe and the heel seat area thereof is cut out, as shown in dotted lines in one half of the heel structure. The two layers 210 and 212 of a laminated rand are placed upon the heel seat portion of the outsole 208. A lift 214 having seven tapered or outwardly flaring recesses 216 is placed upon the rand layer 212 and forms a flat base for the remainder of the heel, which remainder is subsequently attached. In the present instance a top lift or rubber heel 218 is subsequently cemented to the lift 214. Such a rubber heel could be nailed to the lift 214 but it is preferable to cement it in order to fully eliminate the use of metallic heel attaching elements. It is also possible to attach the top lift 218 by making it integral with the lift 214. In such a case the recesses 216 would extend into the top lift. It will be noted that the rear end of a shank piece 220 extends rearwardly as far as the central portion of the cut out section of the insole 206 and also that the overlasted margin 222 of the upper as well as the overlasted margin 224 of the counter extend between the innersole 206 and the outsole 208.

In joining the parts together all of the parts (with the exception of the rubber heel 218 in the present specific instance) are clamped in the same position as are the parts shown in Fig. 4. The clamp plate A (Fig. 4) will serve to block up the perforated recesses 216 in the lift 214 when the shoe parts are clamped together. The central portion of the lift 214 is provided with a small orifice 226 through which the extrusion nozzle 36 may pass.

During the extrusion operation the plastic material will enter into the recess formed by the shoe parts, will radiate outwardly into the spaces cut from the insole 206 and above the overlasted margins 222 and 224. The plastic material also fills up all the perforations 216 and is stopped by the plate A which forms a part of the clamping mechanism. The plastic material, upon hardening, firmly joins the parts together and assures a smooth interior heel seat.

After removal of the shoe from the clamping mechanism the rubber heel 218 is preferably attached by cementing the same, as referred to heretofore. Removal of the last 202 from the shoe 200 permits interior examination of the heel seat structure and no hidden defects need be tolerated.

It is to be noted that in all modifications of this invention the heels may be quickly attached to the shoes with the assurance that a firm strong structure will be built without extruding too much or too little plastic regardless of the variation in sizes or shapes of the shoes. If desired, the mechanical or physical bond between the parts may be supplemented by an adhesive bond. However, the physical bond (without the use of an adhesive) has been found to be of such strength that a wood heel, if dealt a severe blow, would itself splinter and crack without the bond giving way. It will be noted that the physical or mechanical bond extends substantially the full width of the heel seat area enclosed within the seal formed between the heel and the bottom of the shoe. When heels are so attached all voids between the heel and the shoe are filled and there is assurance that the heel seat conforms to the last as the plastic material forms a smooth backing for the innersole. As irregularities on the shoe adjacent to the seal between the heel edge and the bottom of the shoe are intimately engaged by the plastic material, the mechanical bond between the heel and the shoe is characterized by possessing a large mechanical advantage. In prior shoe construction long shank pieces are essential but when shank pieces are embedded in plastic they may be shorter, without sacrificing shoe quality. The structure embodying the features of the present invention is such as to give reliability, satisfactory wear and comfort in use.

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

1. A method for permanently fastening adjacent shoe parts together, which comprises forming the lasted heel seat of a shoe with a central recess extending substantially to the outer edge of the heel seat, providing a heel with plastic retaining means at its attaching face, clamping the said heel in position upon the lasted heel seat, injecting a flowable resin to substantially fill the said central recess and engage the plastic retaining means, and causing the plastic material to harden to unite the parts.

2. That improvement in the art of manufacturing boots and shoes which comprises the steps of placing perforated sheet material forming a part of the bottom of the shoe in position upon the heel seat portion of a last, providing a heel

portion with a retaining means at its top, maintaining the said heel portion in position on the shoe bottom to form a seal between the heel portion and the shoe bottom, injecting plastic material from an exterior source to fill at least one perforation of said sheet material and substantially all voids enclosed by said seal and to engage said retaining means, causing the injected plastic material to harden and thereby unite the parts, separating the last and shoe, and inspecting the interior heel seat for a visual indication of proper heel attachment.

3. That improvement in the art of manufacturing boots and shoes which comprises the steps of placing perforated sheet material such as an innersole or tuck upon the heel seat portion of a last, folding the marginal portions of the upper and fastening them in position to overlap at least one perforation of said sheet material, providing a heel portion with a retaining means at its top, maintaining the said heel portion in position on the shoe to form a seal between the heel portion and the shoe, injecting plastic material from an exterior source to fill the said perforation and substantially all voids enclosed by said seal and to engage said retaining means, and causing the injected plastic material to harden, thereby firmly uniting the parts together.

4. A shoe with a heel portion, the attaching face of said heel portion engaging the shoe to form a seal, sheet material forming a part of the bottom of said shoe, said material being perforated in an area extending almost across the width of the heel seat in a plane above said attaching face, hard plastic material firmly anchored to said heel portion and substantially filling all voids enclosed by said seal and extending upwardly through at least part of the said bottom and outwardly into the perforated marginal area of said sheet material.

5. That improvement in the art of manufacturing boots and shoes which comprises the steps of placing perforated sheet material forming a part of the bottom of a shoe upon the heel seat portion of a last, providing a heel portion with a retaining means at its top, maintaining the said heel portion in position on the shoe bottom to form a seal between the heel portion and the bottom, injecting plastic material from an exterior source to fill at least one perforation of said sheet material and substantially all voids enclosed by said seal and to engage said retaining means, and causing the injected plastic material to harden thereby uniting the parts together.

6. A shoe with an innersole, a heel and overlasted margins of the upper at the heel seat, the margins being spaced from the innersole, the attaching face of said heel engaging the shoe to form a curved contact area, hard plastic material firmly anchored to said heel and filling substantially all voids between the heel and shoe, said material extending from the heel and between the said margins and the said innersole.

7. A shoe with a heel and overlasted margins of the upper and counter at the heel seat, the attaching face of said heel engaging the shoe to form a seal, hard plastic material anchored within a recess of said heel and filling the voids between the heel and shoe, said material extending from the heel past the edges of said margins and outwardly above said margins forming a broad attaching means for said heel.

8. A shoe with an innersole, a heel and overlasted margins of the upper at the heel seat, spacer means forming spaces between said innersole and said margins, the attaching face of said heel engaging the shoe to form a curved sealing area, hard plastic material firmly anchored to said heel and filling substantially all of said spaces and substantially all of the voids between the heel and shoe to form a broad attaching means for said heel.

9. A method of attaching a heel to a shoe without the use of metallic fastenings said method comprising providing a shoe having spacer means forming a space extending above the overlasted margins of the upper, providing a heel with plastic retaining means at its top, maintaining the heel in position on the shoe to form a seal between the heel and the shoe, injecting plastic material from an exterior source to fill the said space and substantially all voids enclosed by said seal and to engage said plastic retaining means, and causing the injected plastic material to harden, thereby firmly uniting the parts together.

10. A method of attaching a heel to a shoe, said method comprising providing a heel with plastic retaining means at its top, maintaining the heel in position on the shoe with pressure sufficient to form a seal between the heel and the shoe, injecting plastic material from an exterior source with pressure sufficient to fill the voids enclosed by said seal and to force plastic material above the overlasted margins of the upper and also to force plastic material to engage said retaining means, and causing the injected plastic material to harden, thereby firmly uniting the parts together.

11. A method of attaching a heel to a shoe, said method comprising providing a heel with an undercut recess in its attaching face, maintaining the heel in position on the shoe with sufficient pressure to form a seal between the heel and the shoe, injecting plastic material into said recess with sufficient pressure to fill substantially all voids enclosed within said seal and to force said plastic material above the overlasted margins of the shoe counter, and causing the injected plastic material to harden, thereby firmly uniting the parts together.

12. A shoe with an innersole and a sole, the latter terminating in the vicinity of the heel breast and a heel having a cupped attaching face with an edge engaging the outer edges of the overlasted portions of the upper to form a sealing strip, hard plastic material firmly anchored to said heel and closely engaging the shoe to form a backing for the inner sole, means for holding said overlasted portions to said innersole, the said hard plastic material gripping the edges of said portions and extending between the said portions and the innersole.

13. A method of attaching a heel to a shoe having a short sole and also supplementary heel attaching means fastened thereto, said method comprising providing a heel with an undercut recess in its top, maintaining the heel in position on the overlasted portions of the shoe upper to form a seal therewith, injecting plastic material from a source exterior to the shoe and heel into said recess to form a backing for the innersole and to attach itself to the said supplementary means adjacent to said seal, terminating the injection by action of the plastic material pressure as developed within the recess and as determined by the said seal, and causing the injected plastic material to harden thereby firmly uniting the parts together.

14. A shoe with a sole terminating in the vicinity of the heel breast and a heel engaging the overlasted portions of the upper as a seal, the said

heel having a recess in its top and being attached to the shoe by hardened plastic material extending from within said recess and closely engaging irregularities on the shoe adjacent to said seal.

15. A shoe with a short sole and a heel with a recess in its top and engaging the sole and the overlasted portions of the upper as a seal, the said heel being mechanically attached to the shoe by hardened plastic material within said recess and extending to said seal for embedding irregularities adjacent to said seal and exterior to said recess.

16. A shoe with a sole terminating in the vicinity of the heel breast, a heel forming a seal with the overlasted portions of the upper, and hardened plastic material extending from within an undercut recess of said heel and across substantially the full width of the heel seat area enclosed within said seal, the said plastic material engaging irregularities on the shoe exterior to said undercut recess.

17. A method for attaching a heel to a shoe including the placing of a heel in position upon a shoe, said shoe having a U-shaped spacer member and a perforated sheet member interposed between the insole and overlasted portions of the upper and the perforations extending over the overlasted portions, extruding fluid plastic material into a recess in the top of the heel to fill the said recess and said perforations.

18. A method for attaching a heel to a shoe including the placing of a heel in position upon a shoe, said shoe having a resinous sheet fastened between the innersole and the overlasted portions of the upper, extruding thermoplastic material into a recess in the top of the heel to fill the said recess and closely contact the resin sheet.

19. A shoe having a U-shaped spacing member and a perforated sheet lasted in between the innersole and the overlasted portions of the shoe upper, the perforated sheet being adjacent the innersole and having a perforation extending over one of said overlasted portions, said shoe having a heel attached by plastic material filling a recess in the top of the heel and said perforation of the perforated sheet.

20. A shoe having a resinous sheet lasted in between the innersole and the overlasted portions of the shoe upper, a heel attached to said shoe by plastic material filling a recess in the top of the heel and formed with the resinous sheet into a unitary structure.

21. A shoe with a heel, the edges of said heel engaging the bottom of the shoe forming a seal, a recess in the heel seat portion of said shoe bottom, said recess projecting outwardly close to said heel edges and adjacent to the shoe interior, the top of said heel having anchoring means, and hardened plastic material filling said recess and engaging said anchoring means, said material forming a broad and firm foot support and a rigid heel attaching means.

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