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R. SULTAN

3,086,302

CONICAL SHELL HEEL CONSTRUCTION

Filed April 20, 1960

2 Sheets-Sheet 1

FIG. 1

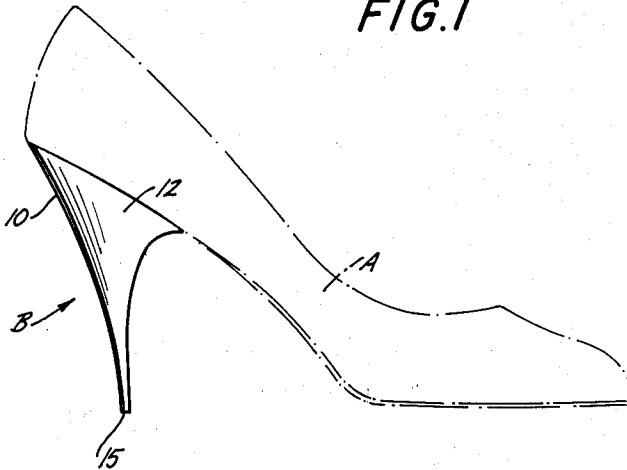


FIG. 2

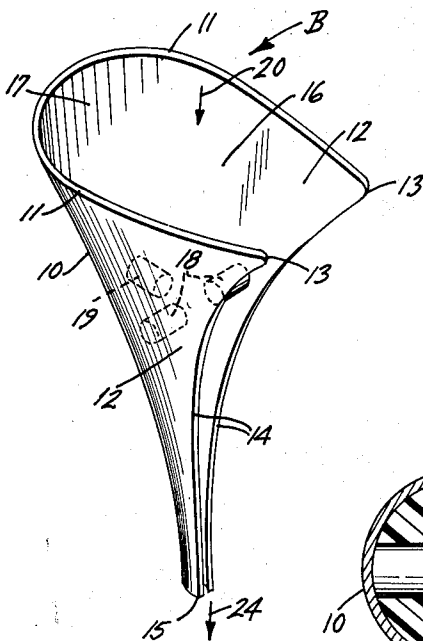


FIG. 3

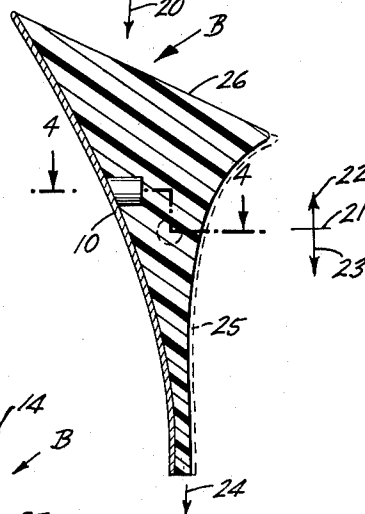
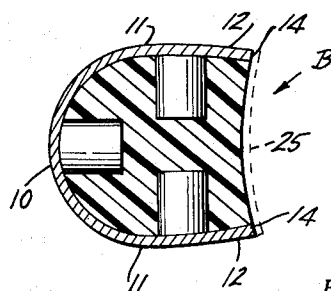


FIG. 4



INVENTOR.
ROBERT SULTAN
BY *James P. Price*
ATTORNEY

April 23, 1963

R. SULTAN

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FIG. 5

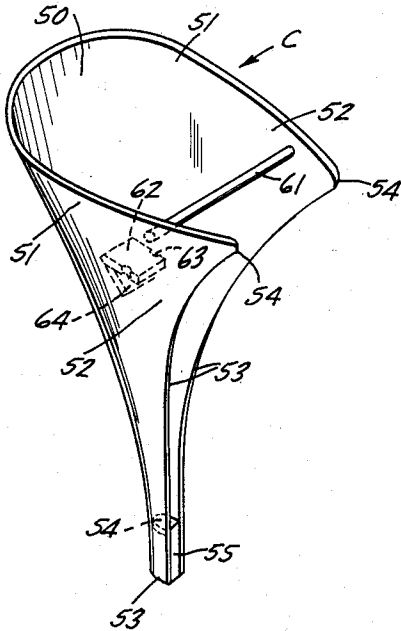


FIG. 6

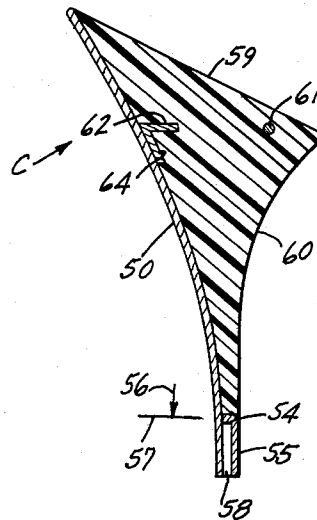


FIG. 7

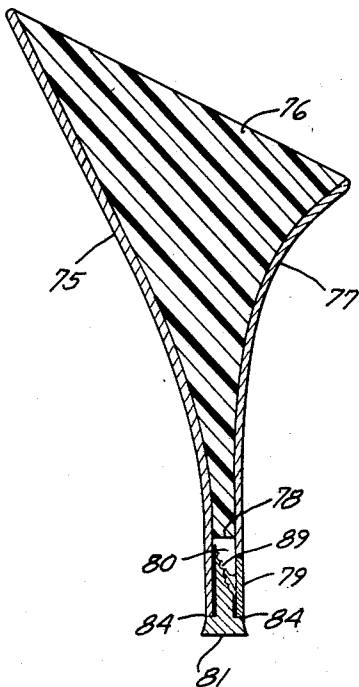


FIG. 8

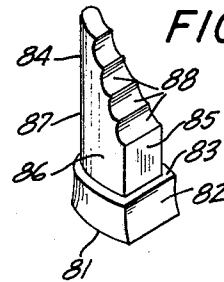
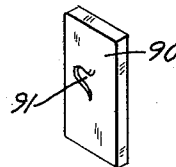


FIG. 9



INVENTOR.
ROBERT SULTAN

BY

Ann Price

ATTORNEY

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CONICAL SHELL HEEL CONSTRUCTION

Robert Sultan, Westbury, N.Y.
(1001 Pacific St., Brooklyn, N.Y.)
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7 Claims. (Cl. 36—34)

The present invention relates to a heel construction, and it particularly relates to a high heel construction for a woman's shoe.

In women's high heels, considerable difficulty has been experienced in making a strong yet firm construction which will not readily break or become detached, or which may be firmly anchored both to the upper of the shoe as well as to the lift which is in contact with the ground or pavement.

When the heels are made relatively high or of very thin section, there is a tendency for the heels to catch in various recesses or projections and to become subject to side wise bending stress with the result that breaking frequently occurs or the heel becomes detached from the shoe.

Furthermore, when these heels are made of plastic or wood construction, they are relatively weak and not capable of withstanding substantial lateral or transverse stress with resulting frequent breakage.

On the other hand, when made of aluminum or steel, they are extremely rigid as compared to the balance of the shoe construction and tend to exert a leverage upon the upper as well as the lift resulting in uneven wear and resulting in discomfort in walking and wearing and moreover are quite noisy.

An object of the instant invention is the provision of a novel process for the manufacture of a woman's heel structure.

A further object of the present invention is to provide a strong resistant flexible women's heel which will be highly resistant to walking or wearing stress or strain, and which will not be readily subject to breakage or detachment upon lateral stress or strain.

Another object is to provide a novel high heel construction which may be inexpensive and readily manufactured in a wide variety of shapes and sizes and cross-sectional areas and which will be light, flexible and devoid of the rigidity characteristic of solid metal heels and also resistant to breakage characteristic of wood or plastic heels.

A further object is to provide a novel heel construction in which both the lift and upper may be readily connected thereto without likelihood of separation and in which the heel will have all of the advantageous characteristics of wood or plastic heels on one hand and solid metal heels on the other.

Still further objects and advantages will appear in the more detailed description set forth below, it being understood, however, that this more detailed description is given by way of illustration and explanation only and not by way of limitation, since various changes therein may be made by those skilled in the art without departing from the scope and spirit of the present invention.

In accomplishing the above objects, it has been found most satisfactory according to one embodiment of the present invention to provide a heel having a thin sheath of metal which is desirably formed two sides thereof and back thereof.

In the preferred form of the invention, the sheath constitutes a modified cylinder or inverted frusto conical member with an open top, bottom and side and with the open side having substantially parallel or slightly converging side walls.

The enclosure within the partitioned conical sheath is

desirably filled with a relatively soft soluble thermoplastic resinous material desirably of the type of polypropylene or cellulose butyrate with less than 25% and desirably less than 10% of plasticizer so that it will form a non-flowable mass retaining its shape.

Desirably, the inside of the metal sheath is roughened or abraded so as to closely contact and adhere to the resinous material, and this metal sheath is used substantially as a mold or form into which the plastic resinous material is poured or formed.

The final mold with its filling of resin forms a substantially integral assembly which will withstand weathering both lateral and longitudinal pressure and also any tendency to displace the plastic.

The plastic is desirably fed into the heel from the largest opening thereof at the top with the bottom and inside face closed by a templet, but there being sufficient space for removal of the air and if desired, a discharged opening may be provided at the base or narrow end of the heel.

The molding device is applied to the top wide opening of the heel, and then the resinous material and plastic in heated condition is injected thereto.

Desirably the resin is heated to a temperature of about 300° to 500° F. and either a plunger or screw may be utilized for forcing in the plastic which should be done at a relatively low pressure of about two to ten pounds per square inch.

Desirably, the pressure should not be sufficient to result in any compacting of the resinous material, and as contrasted to the usual injection molding procedures using 10,000 to 30,000 per square inch, the present invention utilizes a pressure much less than 100 pounds per square inch.

This is most desirably accomplished by heating the resinous or plastic material just before introduction to a relatively higher temperature so that it will flow more readily, and just before the resin passes into the heel structure, it is desirably subjected to an additional electrical heating by being passed into a heated orifice which enhances the density of the resinous material and also assures a better filling of the interior of the shell or sheath which forms the external face of the back and sides of the high heel structure.

With the foregoing and other objects in view, the invention consists of the novel construction, combination and arrangement of parts as hereinafter more specifically described and illustrated in the accompanying drawings, wherein is shown an embodiment of the invention, but it is to be understood that changes, variations and modifications can be resorted to which fall within the scope of the claims hereunto appended.

In the drawings wherein like reference characters denote corresponding parts throughout the several views:

FIG. 1 is a side elevational view of the shoe showing a heel in position attached to the rear of the upper of the shoe.

FIG. 2 is a top perspective view of the shell itself as formed before being filled with resinous material, and upon enlarged scale as compared to FIG. 1.

FIG. 3 is a side vertical sectional view of the heel of FIG. 2 after it has been filled with resinous material.

FIG. 4 is a transverse sectional view upon the line 4—4 of FIG. 3.

FIG. 5 is a top perspective view of the alternative form of shell with a bottom closure to limit the filling in the bottom part of the shell.

FIG. 6 is a vertical transverse sectional view of the heel of FIG. 5 with the resin filled therein.

FIG. 7 is a transverse sectional view similar to FIGS. 3 and 6, but showing a different lower heel construction with a lift attachment.

FIG. 8 is a side perspective view upon an enlarged view, the lift attachment which may be applied in FIG. 7.

FIG. 9 is a side perspective view of a partial wall member which may be mounted in the heel of FIG. 7, and which may be utilized for mounting a lift in the lower end of the heel.

Referring to FIGS. 1 to 4, there is shown a shoe upper A to which is attached the heel structure B of the present invention.

The heel structure B takes the form of a sheath of inverted frustoconical shape with a rounded back wall 10, curved side walls 11 and with slightly converging almost parallel forward walls 12.

The side walls 12 terminate at the forwardly extending points 13 and the edges 14 curved downwardly to the narrow minimum diameter portion 15 at the bottom of the heel.

The inside side faces 16 and the rear curved face 17 about one-third or one-half way down are provided with inwardly projecting stud members 18 and 19 with the back stud 19 being desirably substantially above the side studs 18.

These studs are shown as being cylindrical but they may be flat and horizontal but they are desirably not vertical.

The members 18 and 19 are offset from each other so that they will not interrupt or act as a dam when the resin or plastic is flowed into the heel in the direction indicated by the arrow 20.

However, it is desirable that they do slightly obstruct the flow and slow down the flow in the lower portion of the heel so that the upper part of the heel above the line 21 as indicated by the arrow 22 having the greatest volume will relatively rapidly fill with plastic material while the lower part of the heel below the line 21 as indicated by the arrow 23 will be filled relatively under lower pressure due to the obstructions 18 and 19 that there will be a substantially solid fill without entrapment of any large air bubbles.

The obstructions 18 and 19 will be seen to serve a plurality of functions: During the molding process they will slow down the flow of plastic material in the lower portion of the heel to prevent compacting the same; by forcing the plastic to flow around them, they will avoid the formation of air bubbles and allow for substantially complete filling of the sheath; and they will act as reinforcing and holding means in the finished article by serving to provide increased surface area and inward projections to prevent the plastic filling from pulling away from the metal sheath.

Desirably, an opening or sprue is formed as indicated by the lowermost arrow 24 so that the air may be pressed out as the plastic is formed downwardly and is confined within the heel by the molding form 25 which is pressed against the side edge walls 14, and which is indicated by the dotted line in FIGS. 3 and 4.

This molding form 25 desirably conforms closely to the curved edges 14 during the molding operation and is pressed against them with sufficient force to resist the pressure of the plastic as it is fed in the direction 20.

When the molding has been complete and the fill as indicated in FIGS. 3 and 4 of polypropylene or cellulose butyrate or other suitable thermo-plastic resin substantially completely fills the area between the walls 12, the heel may be removed from the molding form 25 and the molding machine.

After the heel has been removed, the excess plastic or resin is cut away from the end 14, and the top surface 26 curved to conform to the bottom of the rear of the upper, and then flash heat may be employed around the shell to cause a firmer attachment of the resinous or plastic mass to the shell.

This heel then has all of the strength of a metal heel, and due to the thinness of the metallic wall section and the low injection pressure of the relatively soft plastic

filling material, the heel has the flexible characteristics of a wood or plastic heel.

The metal may have a thickness varying from .020 to .030" and is desirably a low carbon steel which has been Parkerized, or it may be an aluminum killed steel.

In the alternative form of the invention as shown in FIGS. 5 and 6, the heel shell C has the curved back wall 50, the curved side walls 51 and the slightly converging side walls 52 all of which converge downwardly to the lower end 53.

The forward edge portions 53 extend downwardly from the points 54 to the lower end 53 at a point about one-half to three-quarters of an inch.

Above the bottom of the heel, there is a blocking plate 54 which may have an angular vertical extension 55 closing the opening inside face of the heel adjacent the lower end 53 of the heel.

The plate 54 will limit the downward flow of resin in the direction 56 to the line 57.

The recesses 58 may serve for receiving lifts or extension upon which lifts may be mounted.

In the form of FIGS. 3 and 4, the lift and upper of the shoe may be directly nailed or otherwise attached to the exposed upper and lower faces of the plastic filler whereas in FIG. 6, the upper may also be attached to the face 59 of the filler.

In both FIGS. 3 and 6, the inside curved face indicated at 60 in FIG. 6 may be covered by a shell or protection (not shown) or may be left exposed.

In FIG. 6 there is also shown a cross reinforcement bar 61 which holds the side walls in position and prevents separation thereof.

This is particularly desirable where a very thin wall section is used of flexible metal and where a higher pressure is employed.

Further in the embodiment of FIG. 5, there is shown a horizontal internal projecting plate 62 with side recesses 63 and a downwardly extending curved flange 64 which may be welded or otherwise attached to the rear curved face of the heel shell C for the same purposes as the stud members 18 and 19 in the embodiment of FIGS. 2 to 4.

In the alternative form shown in FIG. 5, the heel shell 75 is filled with plastic material 76, and in this form, the inside normally opened face of the heel may be closed by a curved plate 77, the side edges of which may be welded or otherwise permanently attached to the forward side edges 14 or 53 of the shells as indicated in FIGS. 2 and 5. The curved plate 77 is not shown in FIG. 5 for clarity but will be seen in FIG. 7.

If desired, the entire metal structure may be deep-drawn from a plate of metal.

The bottom of the heel is plugged so as to terminate the resin filler at 78 in FIG. 7.

There will be an additional separate plate 79 inserted with a vertical fin 80 having projecting members 89 which will serve as a connection to a lift 81 in a manner to be described hereinafter.

Such a typical lift is shown at FIG. 8.

The lift 81 has a ground contact leather, wood or plastic portion 82; a shoulder 83 to fit around the inner edges 84 of the heel shell of 75 of FIG. 7.

The upwardly projecting portion 84 will closely fit with its front face 85 against the insert plate 79.

The sides 86 and the back 87 are curved to closely fit against the curved back and side of the lower end of the heel.

The recessed portions 88 are designed to jam against and become locked with the corresponding shaped projecting members 89 on the vertical fin 80.

Instead of a plurality of locking projections 89 a plate 90 may be employed in lieu of the plate 79 with an inwardly projecting locking stud 91 to engage or lock with one of the recesses 88 or to cut into the soft material of the projection 84 and lock the lift in position.

The relationship of the filler to the level 78 will not

weaken and lower part of the heel and the vacant space below the full line 78 will leave about one-half to three-quarters of an inch for mounting of accessories to receive lifts.

The structure 89 may form a ratchet to engage the probe 91 if desired, and the probe 91 may be made flexible.

It is thus apparent that the applicant has provided a novel combination metal shell and plastic filled heel structure having broad application to ladies' footwear and which is particularly useful in needle type heels which will frequently become wedged in grills, sidewalks, grading and the like.

The heel is flexible enough not to tend to rip or distort the shoe on sidewise or longitudinal stress, and it does not create any noise factor as the resinous material dulls or mutes any tendency of the metal shell to create noise or sound.

The present invention uses a formed or drawn shape as contrasted to cast metal, wood-casting combinations, and plastics, which are unsatisfactory. A casting must have thick section and must be of lightweight metal which is not expensive but also devoid of flexibility of design.

Each casting of metal or molding of plastic requires very expensive dies which can only be used for one specific shape and size, involving tremendous capital outlay for molds alone.

The breakage in plastic or wood is in the thin sections, which weak formation has been eliminated in the present invention.

There is no weakening of the plastic by insertion of a dowel in the present invention since the plastic acts solely as a filler and not as a structural member. The plastic serves to enable attachment of the shoe and lift to the heel itself without affecting or decreasing the strength.

Among the other thermoplastics are Implex of Rohm & Haas.

The plastic may be fed in from either the top or bottom of the heel in semi-plastic or semi-fluid or viscous state, and then it hardens by chilling with water by letting it stand at room temperature.

A range of carbon steels may be used in various thickness as dictated by design of industrial shapes. In a thick neck heel, the steel need not be heat treated. Aluminum or alloy shells may also be utilized although not preferred.

In the preferred heels, there should be a shield as indicated at 55 or 79 in FIGS. 5 to 7, which will prevent the plastic in the lower end of the heel from being pressed outwardly and the shield will keep the plastic in place, and both the nails and plastic will be compressed.

As many changes could be made in the above heel construction, and many widely different embodiments of this invention could be made without departing from the scope of the claims, it is intended that all matter contained in the above description shall be interpreted as illustrative and not in a limiting sense.

I claim:

1. In a shoe heel construction having a substantially frustro-conical metal shell with a narrow bottom opening and a heel lift insertable into said bottom opening, the improvement which comprises a plurality of stepped recessed portions on said heel lift and a locking fin attachable inside of said bottom opening, said fin having a plurality of projecting members with a shape corresponding to said stepped recessed portions, whereby when said heel lift is inserted

into said bottom opening said recessed portions will be jammed against, and locked in position by, said projecting members.

2. In a shoe heel construction having a substantially frustro-conical metal shell with a narrow bottom opening and a heel lift insertable into said bottom opening, the improvement which comprises a plurality of stepped recessed portions on said heel lift and a locking fin attachable inside of said bottom opening, said fin having an inwardly projecting stud engageable with said heel lift when said heel lift is inserted into said bottom opening.

3. A shoe heel construction comprising a hollow thin-walled metal shell of substantially inverted frustro-conical shape having curved back and side walls and a relatively flat front face, said thin metal shell further having a narrow bottom opening, a wide top opening, and an inside surface, said thin metal shell being filled with a resinous filling material having an outside surface corresponding in shape to said inside surface of said thin metal shell and integrally bonded thereto, and at least one inwardly projecting member fixed to said inside surface between said narrow bottom opening and said wide top opening and surrounded by said resinous filling material.

4. A shoe heel construction in accordance with claim 3, wherein said inside surface is roughened.

5. A shoe heel construction in accordance with claim 3, wherein said thin metal shell has a thickness between 0.020 and 0.030 inch.

6. A shoe heel construction in accordance with claim 3, further comprising a blocking plate fixed to said inside surface at a predetermined distance from said narrow bottom opening and an unfilled portion of said thin metal shell between said blocking plate and said narrow bottom opening to receive a heel lift.

7. A shoe heel construction comprising a hollow thin-walled metal shell of substantially inverted frustro-conical shape having curved back and side walls and a relatively flat front face, said thin metal shell further having a narrow bottom opening, a wide top opening, and an inside surface, said thin metal shell being filled with a resinous filling material having an outside surface corresponding in shape to said inside surface of said thin metal shell and integrally bonded thereto, and at least one inwardly projecting member contacting and pressed against said inside surface between said narrow bottom opening and said wide top opening and extending transversely into the space within said shell and surrounded by said resinous filling material.

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