

March 22, 1966

G. F. JONAS
SHOE MANUFACTURE

3,241,166

Filed March 7, 1963

4 Sheets-Sheet 1

FIG. 1

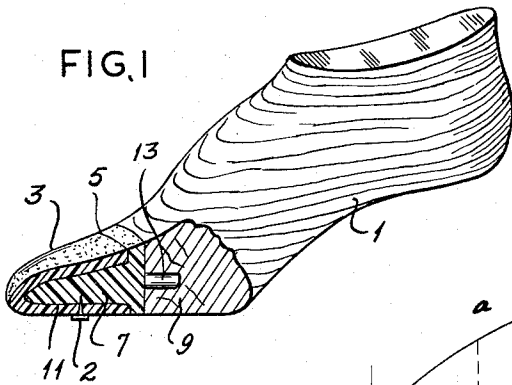


FIG. 2

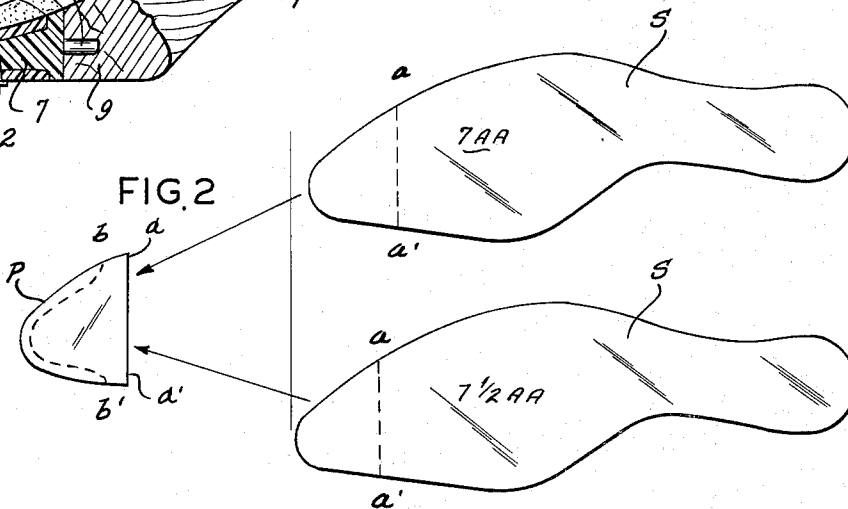


FIG. 3

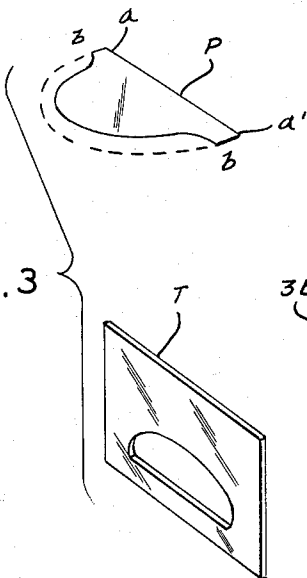
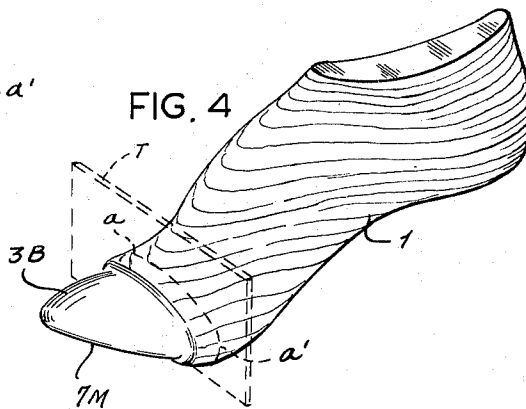


FIG. 4



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FIG. 10

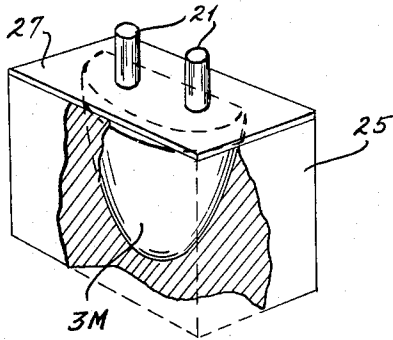


FIG. 11

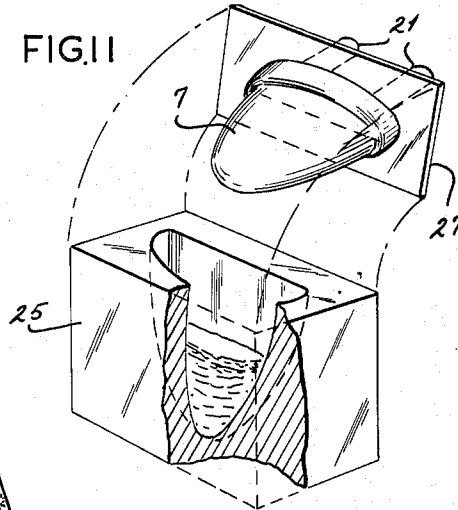


FIG. 12

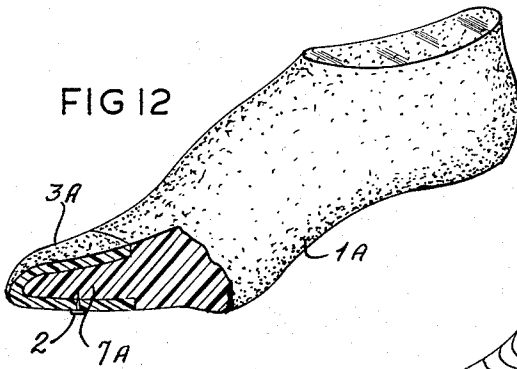
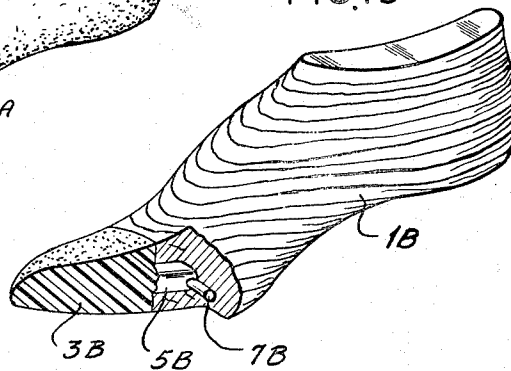


FIG. 13



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FIG 5

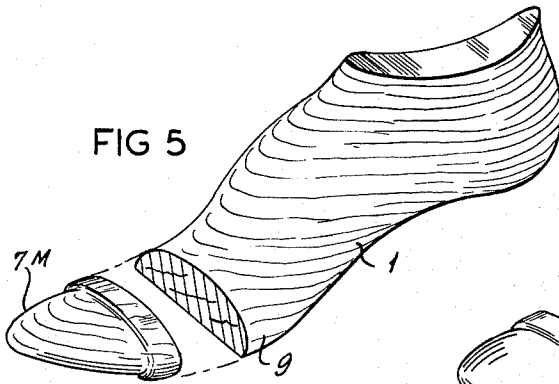
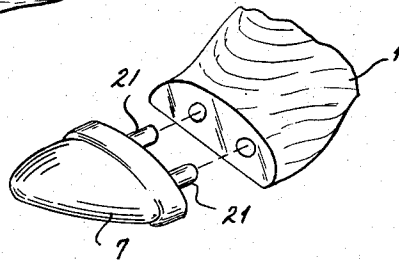


FIG.6



B

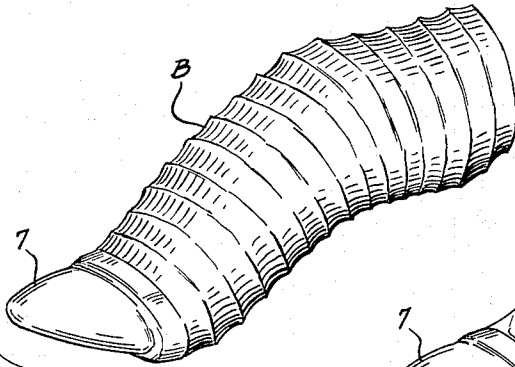


FIG.7

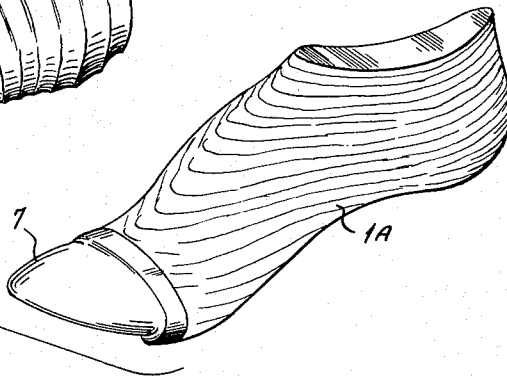


FIG.9

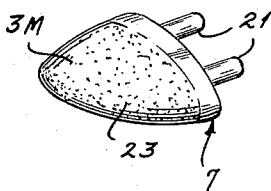
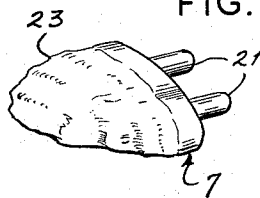


FIG. 8



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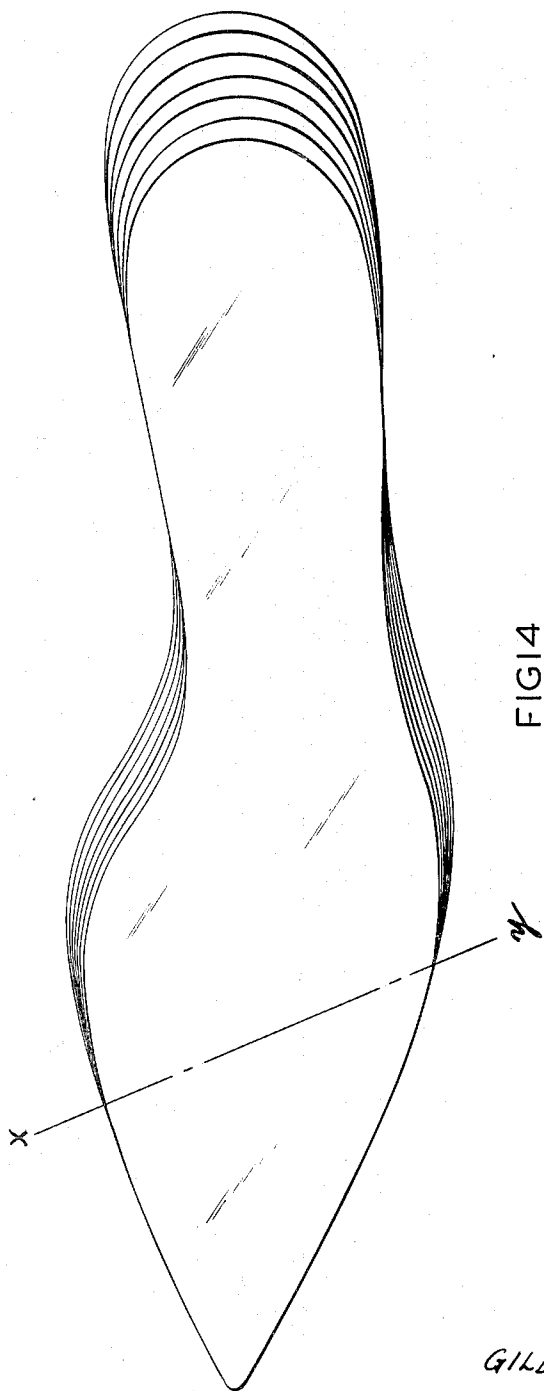
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4 Sheets-Sheet 4



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SHOE MANUFACTURE

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Filed Mar. 7, 1963, Ser. No. 263,564
15 Claims. (Cl. 12-133)

The invention relates generally to the manufacture of shoes, and is particularly concerned with lasts for such manufacture.

Without duplication, the lasts for a limited tariff of shoe "sizes," "widths," and heel heights will number about a hundred pairs in a single style; and a complete range of sizes requires about another fifty pairs. There are separate tariffs for each type (e.g., slipper, pump, or oxford), each variation in style, and (primarily women's shoes) for each variation in heel height. Accordingly, the expense, to a shoe manufacturer, of maintaining the necessary inventory of lasts (with hundreds of duplicates) for each tariff of shoes which he chooses to manufacture, is shocking to the uninitiate.

Many lasts are short-lived—less because of wear and tear than because of the fickleness of fad and fashion, which latter is aggravated by the relentless struggle among designers, and competing manufacturers, to set the style of the season and capture the fancy of the purchasing public with a "new look," or an old look in new trimmings. However, since changes in appearance are not to be underestimated as a boon to sales, the unceasing imminence of such changes bids fair to be the most unchangeable custom of the shoe business—at least as long as free competition and distaff whimsy go untrammelled.

In spite of the high capital investment required by the provision of new lasts, it is frequently more economical to create a new appearance by change of a nature which requires new lasts than by change which merely adds embellishment to shoes that can be made on lasts already on hand. Whereas the cost of adding a bow, a buckle, or a bandeau, is repeated with every pair made, regardless of volume, the investment in lasts once made, while more risky, usually costs less in the long run—at least where the model does not prove to be a commercial flop.

One of the objects of this invention, therefore, is to provide the method and means for reducing the cost of tooling up for every different change of appearance that heretofore has required new lasts.

The invention is predicated upon the discovery that the vast majority of changes in appearance (which heretofore have required new lasts) could have been made without necessitating new lasts; provided, however, that the model last had been initially designed and constructed so as to adapt it to changes in those extremities which do not affect fit without directly or indirectly affecting the dimensions of those portions of the shoe which do affect fit, or militating against the appearance.

More particularly, the premise for the invention recognizes that the toe-, comb-, and heel-portions of a last can, under some readily achievable conditions, be altered independently of the main body portion to change the appearance, without affecting any other characteristic, of the shoe made thereon. Hence, one or more of the toe-, comb-, and heel-portions can be separable from the main body portion of the last. This not only enables alteration in aesthetic effect of the shoe, as at the toe, merely by replacing an extremity of the last, but, when done in accordance with the invention, enables a given part to be used interchangeably on a whole family of last bodies. By "family," as the term is herein used, is meant two or more lasts, or last bodies, of the same "hand" and made from the same model, but each differing from all others

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in some dimension that does affect fit; but with the additional qualification, however, that all members of the family have, near at least one extremity, a cross-section (not necessarily planar) which is substantially uniform throughout the family. Thus, the term "family" embraces less than half the number of lasts in a given tariff (i.e., all variations in "size," "width," and heel height) of lasts, and in practice seldom more than a dozen.

There have been previous proposals of caps that fit over the toe portions of existing lasts. Such caps can add to, but cannot subtract from, the length of the last as originally made. They add to, but cannot subtract from, the girth (at those portions embraced by them) of the last as originally made. Such caps have led to difficulties in achieving uniform "pull" of the upper thereadjacent, and to unsightly irregularities at the junction between last and toe cap. Accordingly, it is a further object of the present invention to overcome such difficulties and resultant unsightliness. This is accomplished by providing a solid toe part which internally (i.e., well inside the confines of the active or exterior surface) interfits with the last body.

Conventional practice in producing lasts has been to turn or cut a wood "blank" on a machine wherein the cutter is automatically guided by a follower moving over a hand-made model. Variations for "size" and "width" are obtained from the same model by adjusting the linkage between the cutter and follower, and both right and left are made by reversing the machine. On the other hand, inherent looseness in the automation prevents the maintenance of tolerances closer than the "scuff allowance," and the toe- and heel-portions (where the block is held by chucks) must generally be hand finished, which is expensive.

In accordance with this invention, hand finishing of turned lasts may be avoided by utilizing separately formed or precision molded base or end parts, which can be attached to the blank before turning or after turning to the "scuff allowance." These end parts (toe or heel) can serve as templates to control the extent of cutting and may be complete in themselves, or may serve as a means of attaching other parts, which complete the toe or heel shape of the last. However, precise location of the point at which the end part is attached to the blank is of paramount importance in achieving the full benefits of the invention.

Precision-made lasts, from the same model, are usually sufficiently uniform that most of the duplicates (i.e., those for the same "hand," "size," "width," and heel height) can be bobbed at the same place so that the severed surfaces are, for practical purposes, identical in both size and shape. When so uniformly bobbed at a line or plane of severance, which is preferably beyond the active surface zones which affect fit, the bobbed duplicates are adapted for the reception of identical replaceable extremities in accordance with this invention. But the replaceable extremities must be different for each different last dimension. Such does not take full advantage of the economies which are made possible when a tariff of lasts is originally so designed and constructed that whole families permit of bobbing to produce severed surfaces of identical (for practical purposes) size and shape. In families so designed and constructed, the identical replaceable extremities will fit every member of the family, and hence the number of differently sized or shaped replaceable extremities necessary to equip an entire tariff of lasts is inversely proportional to the number in each family. As the invention contemplates molding the replaceable extremities, the number of molds required to produce them is thereby reduced to the number of families in the tariff.

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Other features of the invention will be in part apparent from and in part pointed out in the following detail description taken in connection with the accompanying drawings, in which:

FIGURE 1 is a perspective view, parts being broken away, showing a last made in accordance with this disclosure;

FIGURE 2 is a plan view of sole patterns showing how a common toe pattern is developed for several sole sizes;

FIGURE 3 illustrates the toe pattern of FIGURE 2 and a template for the girth at the back of the toe pattern;

FIGURE 4 shows how an existing last is shaped to the pattern and template of FIGURE 3, thereby to produce a last model;

FIGURE 5 illustrates a next step of cutting off the fore portion of the last model, preparatory to making a model fore portion for the remaining last body;

FIGURE 6 is a perspective view showing how the fore portion is modified for attachment to the wood last body;

FIGURE 7 is a perspective view showing the last model and a rough-turned wood block with an attached molded fore portion, which block is to be turned down as a duplicate of the model;

FIGURE 8 is a perspective view of a rough toe cap on a molded fore portion, preparatory to designing the toe shape;

FIGURE 9 is a view similar to FIGURE 8 after finishing the toe to the desired shape;

FIGURE 10 illustrates how the model of FIGURE 9 is used to make a mold for toe caps;

FIGURE 11 illustrates how the mold of FIGURE 10 and fore portion are used in making toe caps;

FIGURE 12 is a view similar to FIGURE 1 showing an alternative embodiment of the last;

FIGURE 13 is a view similar to FIGURE 12 illustrating another version of the last; and

FIGURE 14 is a trace of superimposed bottom patterns from family of lasts designed in accordance with the present invention.

While, as aforesaid, the principles of the invention are applicable to other last parts or extremities, the accompanying drawings have, in the interest of brevity, illustrated them with relation to the toe part. Regardless of whether the invention takes practical embodiment in one or all of heel-, comb-, or toe-parts of a given array of lasts, fullest advantage of the invention is attained when the lasts are originally designed with a view toward large "families."

As illustrated in FIGURE 14, the last bottom profiles of a seven-member family are illustrated superimposed upon each other. It is apparent that, for a considerable distance backward from the tip of the toe, the profiles are identical in both size and shape. Line x—y indicates the cross-section behind which the profiles of the patterns begin to depart from each other, and consequently line x—y delimits the region in which each last in the family may be bobbed so as to produce severance surfaces of uniform size and shape, and which, therefore, will accommodate all removable toe parts whose transverse rearward termini (for example, line 5 in FIGURE 1) are identical and of such size and shape as to be contrageneric with the transverse forward terminus of every last which has the same family trait.

The particular family shown in FIGURE 14 includes the sizes designated 4B, 4½B, 5B, 5½B, 6B, 6½B, and 7B. With other models, however, it could well be that sizes 4B, 4½B, 5AA, 5B, 5½A, 5½AA, 6AA, and 6½ AA, would constitute one family, and hence accommodate the same or identical removable toe parts; while sizes 6B, 6½B, 7AA, 7B, 7½AA, 7½B, 8AA, and 8½AA, would compose another family for a slightly larger removable toe part; and a third family might consist of sizes 8B, 8½B, 9AA, 9B, 9½AA, 9½B, 10AA, and 10B. For a still different shoe model, a limited range of sizes might well be divided into four families viz,

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(1) sizes 5AA, 5½AA, 6AA, 6½AA, 7AA, 7½AA; (2) sizes 5B, 5½B, 6B, 6½B, 7B, 7½B; (3) sizes 8AA, 8½AA, 9AA, 9½AA, 10AA; and (4) sizes 8B, 8½B, 9B, 9½B, 10B. In other words, while the lasts for one model of shoe may sufficiently differ from another model that the size designations which constitute a family for the first model do not so comport for the second model; and the maximum number of members of a family may be great for one model, but small for another. However, when lasts are originally designed in accordance with this invention, a given tariff will include one or more multi-member families wherein each member has the family trait of substantially uniform cross-section near an extremity, and preferably in a region which does not affect fit. Thus, all lasts having the family trait accommodate identical removable extremities.

Among lasts which were not originally designed to provide family traits, few instances of family trait will be found (and those by happenstance), but this does not preclude the applicability of some features of the invention to duplicate lasts. In modifying the toes of such lasts (that lend themselves to it), a recommended procedure is to secure the last in a jig which will locate a precise cut-off plane in all the duplicates. The toe portion of the existing last is removed, and, while still in the jig, holes, or other attaching formations, are made internally of the severed surface to receive the new toe part. Also, while the last is still in the jig, the portion of the last body adjacent the cut-off plane may, if desired, be trimmed to a predetermined profile by using a profiling cutter following a template or model, either to eliminate nonconformities among the duplicates, or to create an artificial family which will accept the same or identical replaceable toe parts.

Before profiling, an oversize cast or molded toe part may be attached to the severed surface of the last, by doweling into the previously formed holes or by means of other attaching formations, within the confines of the severed surface. Both the toe part and last body are then trimmed in the profiling operation, either to assure a smooth transition from the last body to the toe part, or to create an artificial family. The toe part may then be finished and used as a pattern for making more identical toe parts. The decision whether to mold, cast or turn the toe parts will generally depend upon the quantities involved.

Alternatively, the bobbed last body may receive a precision molded base, which is permanently attached to the last body and profiled or trimmed to a smooth transition. The base then serves as the support for the replaceable toe parts, and in this instance, it is preferable that the toe part be in the form of a cup internally configurated to snugly interfit and interlock with the permanently attached base, and to have its exterior (active) surface merge congruently with the adjacent exterior (active) surface of the permanent base or the last body, as the case may be. This is another way in which an artificial family may be created from stock lasts, but it may also be employed with lasts originally designed to have family traits.

Furthermore, the invention contemplates that the last body may itself be molded rather than turned, in which event the end portion of the last body could be shaped like the aforementioned molded base. Although molded lasts would be expensive, the use of separate toe-, heel-, and comb-parts designed to fit a family of last bodies offers compensating economies.

To illustrate the wide variety of means and procedures that may be utilized in carrying out the invention (whether applied to toe- or heel- or comb-extremities of lasts), several specific examples will now be described in connection with the drawings. To that end, there is shown in FIGURE 1, as an example, a shoe last having a body generally designated 1 and a replaceable toe part 3.

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The shape of the last body 1 is determined, inter alia, by considerations of fit, whereas the shape of the toe can be varied without affecting fit. Accordingly, the body 1 may be part of an existing last, it may be copied from an existing last known to produce a good fit, or the last body may be newly designed around pre-selected standards of size and fit with or without family traits. The toe part 3 is made to reflect the current fashion, with the expectation that a new toe part would be substituted whenever fashion dictated a change in toe shape.

Given a complete last, the toe portion is bobbed at a selected location, and, if desired, the portion of residual active surface, adjacent the bob, is reshaped to accept toe parts of differently shaped active surface. Such reshaping may involve creating family traits so that the same toe part may be used with several last bodies which otherwise vary in shape or dimension. Such family traits can be imparted by changing the contour of some or all of a group of lasts to bring the size and shape of their bobbed surfaces into conformity with each other, thereby to enable their acceptance of identical replaceable toe parts. On the other hand, FIGURE 1 illustrates the utilization of a preformed permanently attached base, which may have built-in family traits, or be shaped in situ to produce them.

The composite last shown in FIGURE 1 is characterized by a hollow molded plastic toe part 3, and a last body 1 having a molded plastic fore-base 7, permanently attached to a turned wood back portion 9. The fore-base 7 is preformed at 11 forwardly of the line 5, so as to produce a tongue extending within, and providing a large area of support for, the toe part 3. The toe part 3 is removably secured on the reduced tongue 11, as by wedging fit (Morse taper), a tack 2 or other means, and the fore portion 7 is permanently secured to the wood back 9, as by glue and dowels 13.

In making this type of last, a pre-shaped fore portion 7 is fastened to a rough turned block and the wood part 9 then turned, thereby achieving a smooth exterior transition between the adjacent active surfaces of portions 7 and 9. The precision of molded parts assures a smooth exterior transition between the adjacent active surfaces of parts 3 and 7. As will be explained, toe parts 3 may be made using the fore portion 7 as a pattern.

FIGURE 12 illustrates another embodiment. In this instance, the toe part 3A is the same in FIGURE 1, and the entire last body 1A is molded plastic. The forward portion 7A is an integral part of the body 1A and functions in the same manner as the molded plastic fore-base 7 described previously. Preferably, in a tariff of such lasts, the differently sized and shaped last bodies 1A are initially molded with family traits to mate perfectly with appropriate toe parts 3A.

FIGURE 13 illustrates a third embodiment, wherein the last body 1B is entirely made of wood and only the toe part 3B is of molded plastic. In this instance, the toe part 3B has an integral molded tongue 5B projecting rearwardly into the wood body and therein engaged by a pin 7B to lock the toe part on the body. This approach involves the least initial die expense, and while the development of family traits is not inherent as in the embodiment of FIGURE 12, it can be readily achieved by the procedure now to be described.

The initial models for a tariff of lasts can be made in any suitable manner, but the preferred procedure is to begin with last bottom patterns for a full range of widths and lengths, and then adjust the contours of their toe ends, outwardly of the portions which affect fit, so as to bring as many as possible into reasonable conformity with as few as possible basic toe profiles.

FIGURE 2 illustrates how last bottom patterns S of different sizes may conform to a basic toe profile of pattern P back to a line $a-a'$ which lies in front of the portions which affect fit. Rearwardly of the line $a-a'$,

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the last bottom patterns will progressively differ for lasts of different dimensions, as illustrated in FIGURE 14. Line $a-a'$ of FIGURE 2 and line $x-y$ of FIGURE 14 represent the approximate location of a plane of severance at which the last bodies such as 1B (in FIG. 13), of sizes corresponding to the given basic toe profile, may be bobbed to produce the aforementioned family trait, provided the cross-sections of the corresponding last be likewise conformed at or about that line. It is preferable to conform the cross-sections of the several lasts having the same basic toe profile precisely, thereby to eliminate the necessity for reshaping operations. The plane of severance at which the last bodies are bobbed cannot be located rearwardly of lines $a-a'$ or $x-y$ without necessitating some post-reshaping (with consequent risk of mal-fitting), but forwardly of those lines, a variety of locations is usually ascertainable whereat the cross-section of the last may readily be brought into such conformity that a bobbing plane at any one of them will produce the family trait without post-reshaping. To accomplish the bobbing at the pre-selected locations which will produce or approximate the desired family trait, the respective lasts are mounted in appropriate jigs, as hereinbefore described, and bobbed; then, preferably without removing a last from the jig, it is drilled and routed to accommodate tongue 5B on toe part 3B (see FIG. 13), and drilled transversely to accommodate pin 7B. Each of the lasts having the same basic toe profile; i.e., all members of a given family, must be jigged and drilled with such precision that the exterior or active surfaces of last body 1B and toe part 3B (when its tongue 5B is received in the hole provided in the bobbed end of last body 1B) merge congruently, else post-reshaping operations will be required.

FIGURES 3 and 4 illustrate a convenient way in which a pattern for the toe part 3 of the FIGURE 1 embodiment, or the toe part 3A of the FIGURE 12 embodiment, may be produced with the aid of last bottom patterns of basic toe profile, such as illustrated in FIGURE 2. The toe pattern P is reduced from the shape shown in full lines in FIGURE 2 (and in dotted lines in FIGURE 3) by reducing it forwardly of points $b-b'$ to the shape shown in dotted lines in FIGURE 2 and in full lines in FIGURE 3. A template T is made to correspond with the cross-sectional contour at the bobbing plane represented by line $a-a'$. Then using the toe pattern P and template T, one might next make a three dimensional model 7M for the fore portions for one family of last bodies, all of which use identical toe parts. This model is used in making molds for molded base 7 (FIGURE 1) or molded last bodies 1A (FIGURE 12), as well as for making the mold for the replaceable toe parts 3. An existing last may be trimmed down to the pattern P, and template T and the front portions of the existing last then cut off at a plane located by the template to produce the model 7M.

In making the FIGURE 12 type of last body, it will be necessary to prepare a last body mold for each size, but the models 7M would be used to assure that the molds for a given family have the same fore portion. In producing the FIGURE 1 style of last body (which includes parts 7 and 9), a mold is made for only the base 7, and a number of duplicates are then made in the mold for use with a given family of wood last backs 9. In making such bases 7, it is advisable to incorporate dowels 21, or other means of strengthening the attachment of base to a last body, as shown in FIGURE 6.

When turning new last bodies, it is desirable to attach a molded base 7 to a rough blank B (FIGURE 7) before turning, so as to simplify the operation. Normally, it is not feasible to turn the toe portion since the last is normally held by a chuck at this point, and heretofore the toe and heel of a turned last were hand finished after removing the last from the turning machine. With the molded fore portion 7, a special chuck conforming to the

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molded shape can be used to hold the turning block at its front. By shaping the block B after attachment of the molded base, one can achieve a smoother transition from the molded base to the wood portion.

FIGURE 7 further shows a finished model which would be used to guide the turning machine in cutting duplicates from the rough blank B. It will be understood that, in the mass production of shoes, it is necessary to have available a number of duplicate lasts, and for the most common sizes of popular models, the number of duplicates in a given factory's inventory runs into the hundreds. The necessity for such duplicates is not overcome by the present invention, but by making a given last body adaptable for the making of more than one style, the necessary total inventory of lasts at a given factory is markedly reduced.

A molded base 7 can be used in producing the replaceable toe parts 3. FIGURE 8 shows how material 23 is first built up upon a molded base 7, and FIGURE 9 shows how the material 23 is carved away to the desired toe shape, thereby producing a model 3M of a toe cap. This model is then used to prepare a mold for injection molding or casting of the toe parts.

FIGURE 10 illustrates how a casting mold 25 is shaped about the model 3M using a plate 27 at the back of the base 7M, with the dowels 21 projecting therethrough. The resulting mold 25 and the plate 27 can then be used with a base 7 as a core, in casting hollow toe parts, as shown in FIGURE 11.

It will now be apparent that the purpose of the reduction (ahead of lines *b—b'* in FIGURES 2 and 3) is to provide for the wall thickness of the toe part. Ideally, this reduction is at least an amount corresponding to the minimum required wall thickness (e.g., a sixteenth of an inch) for a toe part. Also, the rear edge 5 of the toe part is preferably precipitate, with reference to its inner and outer surfaces, and of substantial thickness, so that there are abutting surfaces of substantial area at the junction line, which surfaces are substantially normal to the active surface of the composite last. This is in contrast to a cap having a feathered edge. The toe part may have a slight force or Morse taper fit with the tongue on a last body, or it may be secured with a tack through its bottom. Other methods of detachable attachment may be used, provided they do not produce, in the active surface of the last, irregularities which will leave objectionable tracks on the shoes made upon it.

Insofar as concerns the mode of attachment, the embodiment of FIGURE 13 is the reverse of that shown in FIGURES 1 and 12, in that the toe part 3B has a tongue 5B, which tongue is received within a recess in the last body and locked therein by a pin 7B which may be driven out to release the toe part from the last body. When, in modifying existing lasts to the structure of FIGURE 13, it is found that the active surfaces of the toe part 3B and bobbed last 1B do not merge with adequate congruity, and it is undesirable to further trim the last body, an oversized toe part may be employed. The oversized toe part is attached to the body, and is then trimmed down to fit smoothly with the body.

As has been indicated, the replaceable toe parts are preferably made of moldable material. Synthetic resins are ideal for the purpose, but when trimming and shaping operations on the molded parts are envisioned, it is desirable to select molding materials which are readily trimmed or abraded; and when trimming at the junction between wood parts and molded parts is envisioned, it is desirable to select a molding material whose trimming characteristics are as comparable to those of the wood (usually maple) as possible. Where, as is usually the case on the bottoms, it is necessary to tack or nail shoe parts on to the replaceable toe parts, the molding material selected must either be nailable itself, or provided with plugs of nailable material at the likely nailing locations. What has been said of the characteristics of the material

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for replaceable toe parts is equally applicable to replaceable heel- and comb-parts, as well as to permanently attached fore-bases such as 7, and indeed to complete last bodies such as 1A.

From the foregoing description, those skilled in the art will readily perceive that the invention makes possible striking economies in the manufacture of shoes—especially women's shoes; and that the prevalent high order of last waste through obsolescence due to fashion changes is virtually eliminated, at least insofar as concerns the fit affecting parts of lasts. Furthermore, by initially designing and constructing lasts with family traits, the number of replaceable extremities necessary to be purchased, or made to adapt old lasts to new styles, is but a fraction of that which would otherwise be required—the fraction being the reciprocal of the average number of members per family—and consequently the cost of tooling up for production of the vast majority of fashion-dictated changes in appearance fades into such comparative insignificance that the manufacturer can afford to produce a greater variety of styles and models at reduced cost, with less risk of capital and greater prospect of profit; all while the consumer has greater freedom of choice either at less cost or the power to purchase more pairs on the same old allowance, as her little heart may desire.

While there has been fully disclosed several modes by which lasts can be inexpensively modified by the interchange of toe parts, it is emphasized that the same principles may be practiced to modify other extremities of lasts. For example, the heel portion of a last changes within limits with changing fashions and among different types of shoes. Open heel lasts differ from lasts for closed heels; lasts for shoes with counters are different from those for shoes without counters; and boots require back curves which differ from those for pumps. Also, the combs of last vary with the kind of shoe made over them—a boot requiring a comb higher than that of a pump; an oxford having a comb lower than that of a pump. Accordingly, the detail devoted herein to illustrating the practice of the invention with respect to toe parts is not to be regarded as detracting from the broader spirit and scope of the invention in its applicability to other last extremities and other last parts.

It may be further noted that there is no intent to limit the disclosure to particular materials. Although most lasts are made by turning wood, plastic may also be turned. Also, a number of materials may be molded or cast.

Having thus described the invention, what is claimed and desired to be secured by Letters Patent is:

1. A family of replaceable-part lasts, each last having a body and a part detachably secured to a mating portion of the body, the several parts being identical and the several bodies being identical with each other at their mating portions but differing from one another in portions thereof whose dimensions affect at least one of size, width and heel-height.

2. A set of replaceable-part lasts for a range of shoe sizes, each last having a body and a part detachably secured to a mating portion of the body, all of the parts being of a relatively few basic sizes, the mating portions of the bodies being of a relatively few sizes which fit with the parts, the bodies otherwise being different from each other in a dimension which affects at least one of size, width and heel-height.

3. The method of manufacturing a plurality of lasts varying in shape which comprises providing a standardized shape and size for an external part of the several lasts, molding a set of last parts of such standardized shape, producing a plurality of last bodies which mate with said molded last parts but which otherwise differ in a dimension which affects at least one of size, width and heel-height, and attaching one of said molded parts to each last body.

4. The method of making lasts suitable for use in making a plurality of different tariffs of shoes that comprises grading sole patterns to a relatively few basic toe shapes, molding a number of toe parts to each such basic shape, all said basic toe parts having identical transverse rearward termini, making a wider variety of last bodies differing from each other in a dimension which affects at least one of size, width and heel-height, said bodies having foreportions that are contrageneric with said rearward termini, and detachably securing toe parts to the last bodies.

5. The method of varying the shape of an extremity in a set of lasts which differ from each other in a dimension which affects at least one of size, width and heel-height that comprises providing a set of last bodies each having a terminal portion of standardized shape and size, said standardized terminal portion being in front of the fit-affecting region of the last, said last bodies otherwise differing from each other in a dimension which affects at least one of size, width and heel-height, providing a variety of extremity parts to fit interchangeably with the standardized terminal portion of said last bodies, the extremity parts being of different shapes but each having a terminal portion of said standardized shape, and interchanging one extremity part for another to vary the extremity shape of the lasts.

6. The method of making a family of lasts which comprises, providing the member lasts of dimensions such that each differs from the other in at least one fit-affecting dimension and all are substantially identical at a region beyond the fit-affecting dimensions, providing each last with a body piece and at least one separate extremity piece, said pieces having a parting surface between them at said region, each extremity piece having a parting surface that is identical in shape and size with all other extremity pieces of the family, each body piece having a parting surface that is identical in shape and size with all other body pieces of the family, the parting surfaces of the respective extremity and body pieces being contrageneric with each other so that each extremity piece mates with all body pieces and is interchangeable among them, and internally connecting an extremity piece with a body piece.

7. The combination with a family of shoe lasts wherein each member of the family has an active surface differing from that of every other member in at least one fit-affecting dimension, and each member has an inactive surface precipitately intersecting the active surface thereof at a location beyond its fit-affecting dimension, said inactive surfaces being of substantially identical size and shape on all members of the family; of a last extremity having an inactive surface shaped and sized to mate interchangeably with the inactive surface of any member of the family of lasts, said last extremity having an active surface which, when its inactive surface is mated with that of a member of the family, is substantially congruent with the active surface of the member adjacent the intersection of its active and inactive surfaces.

8. A family of bobbed lasts of different sizes each having a bobbed surface transverse to its active surface, said bobbed surface being of substantially identical size and shape among the members of the family.

9. The combination with the family of claim 8 of a plurality of differently shaped extremity parts, each of said parts having a mating surface of size and shape which complements the bobbed surface of the bobbed lasts.

10. The combination of claim 9 wherein releasable connecting means is provided interiorly of at least one of said bobbed lasts and extremity parts.

11. The method of making shoes of different styles and sizes which comprises: providing a family of bobbed last bodies of different sizes, all having an extremity mating surface of substantially identical size and shape; providing a plurality of groups of last extremities, the last extremities composing a group being identical with each other, and differing in contour from those in another group, and all extremities in all groups having a mating surface which is complementary to that on the bobbed last bodies; selecting a first group of last extremities, attaching individual ones of the group respectively to last bodies in the provided family, and making shoes of one style thereon; then replacing the first group of extremities with a different group thereof, and making shoes of a different style thereon.

12. The method of claim 11 wherein there is provided a second family of bobbed lasts which differ from said family in at least one respect but are identical with said family with respect to mating surface.

13. A last for making footwear comprising a body having a toe portion extending forwardly therefrom, said toe portion being of reduced section separated from the adjacent body by a shoulder, a hollow toe element fitting over said toe portion, covering the same, and fitting snugly against said shoulder, and assembly means including a detachable fastening element inserted through one of said toe element and said toe portion and cooperating with the other of said toe element and toe portion to permit removal of and replacement of the toe element by another interchangeable toe element.

14. A last for making footwear comprising a body having a toe portion integral therewith and extending forwardly therefrom, a hollow toe element fitted about said toe portion and covering the same, and assembly means including a detachable fastening element inserted through one of said toe element and said toe portion and cooperating with the other of said toe element and toe portion to permit removal of and replacement of the toe element by another, interchangeable toe element.

15. A last according to claim 14 wherein said toe portion is formed on said body by a portion of reduced section separated from the rest of the body by a shoulder, said toe element fitting over said toe portion and snugly against said shoulder.

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