May 4, 1965 C. J. HUNT 3,181,186

SHOE LAST CONSTRUCTION

Filed March 13, 1963

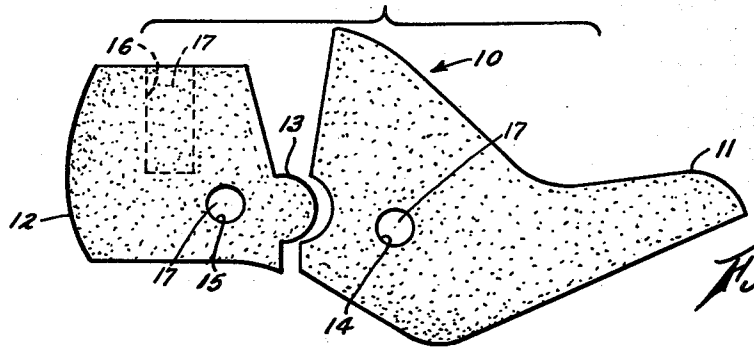

Fig. 1

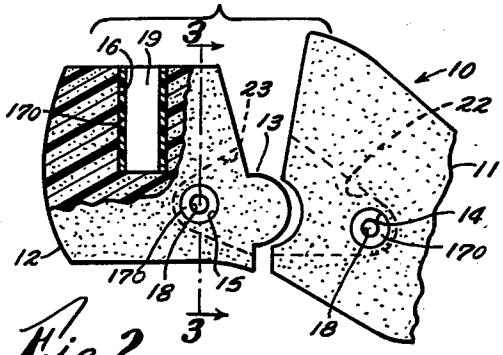

Fig. 2

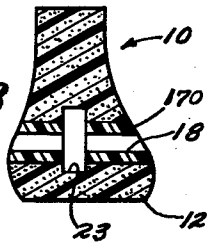

Fig. 3

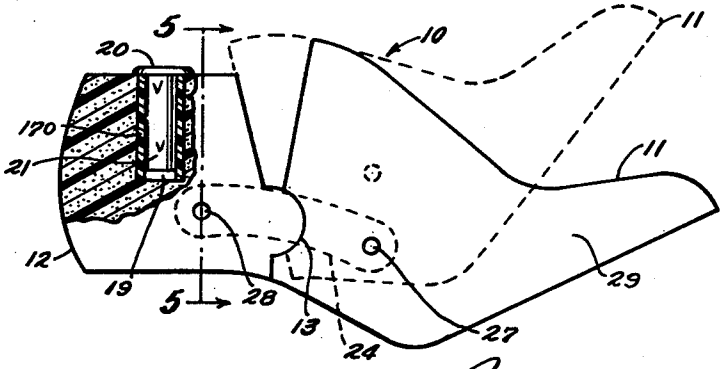

Fig. 4

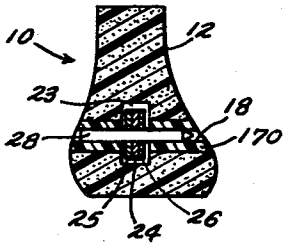

Fig. 5

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SHOE LAST CONSTRUCTION

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This invention relates to improvements in shoe lasts and is particularly directed to a novel shoe last construction which makes it practical to materially reduce the weight of the last and hence facilitate its handling by operators during the shoe making processes thereon.

It is presently customary to make shoe lasts of solid high density polyethylene which is commercially available as Marlex, Grex, Fortiflex, etc. to mention a few suitable plastic starter materials. Shoe manufacturers have generally approved such lasts because of their ease of hinge operation, the ease with which finished shoes are withdrawn from these lasts and their freedom from breakage and longer life in comparison with the conventional shoe lasts made of wood. A serious drawback to the universal use of plastic shoe lasts is their relatively heavier weight in comparison to wood lasts which causes an increase in transportation costs and creates serious handling problems throughout the shoe manufacturing processes thereon.

It is therefore the main object of this invention to provide a novel plastic shoe last construction that is considerably lighter than present plastic lasts but which retains all the desirable characteristics of wood and solid plastic lasts.

Another object of the invention is to provide a shoe last structure ideally suited to the production of so-called "hinge lasts" that comprise two parts secured together for relative hinging action by means of a case hardened, over-center spring link.

A further object of this invention is to provide an extremely strong and rugged plastic shoe last that will be of light weight and yet have all the desirable features of both wood lasts and the plastic shoe lasts.

Yet a further object of this invention is the provisions of a last body made of a structurally weak material having light weight characteristics and the reinforcement of this body throughout its greatest stress areas by a substantially stronger device composed of a relatively heavier material than the last body.

With these and other objects in view, the invention will be best understood and appreciated from the following description of a preferred embodiment of my shoe last structure selected for purposes of illustration and depicted in the accompanying drawing, in which:

FIG. 1 is a side elevational view of my shoe last construction shown in an intermediate step of its manufacture.

FIG. 2 is a fragmental, side elevational view of my shoe last structure also in an intermediate, but later stage of manufacture, than the last shown in FIG. 1, parts thereof being broken away and shown in section.

FIG. 3 is a section on line 3—3 of FIG. 2.

FIG. 4 is a side elevational view of my completed shoe last construction with the hinge hardware in position thereon, parts being broken away and shown in section.

FIG. 5 is a section on line 5—5 of FIG. 4.

It is generally understood that shoe lasts are forms on which shoes are shaped in their manufacture and presently these lasts are turned from rough blocks on profiling devices to the exact contours of "master" lasts corresponding to the shoe manufacturers' specifications. With reference to the drawings there is shown a shoe last body 10 that has, in a previous step of manufacture, been turned from a block of foamed polyethylene or other thermo-plastic material such as foamed polypropylene

or foamed cholorinated polyether, such materials being provided with controlled amounts of a foaming agent to produce a foamed plastic block having a density in the range of about 0.70, which is the same density as wood from which acceptable lasts are presently made. Foaming agents are well known in the art as well as the methods and procedures for producing masses of foamed, thermo-setting plastic materials and need not be detailed herein. Suffice it to say that the foamed, thermo-setting plastic materials utilized in producing the plastic block from which the last body 10 was turned in a lath, or the like, produces a porous last body 10 having literally thousands of small voids throughout its mass which materially reduces the amount of plastic material in a particular last body and hence results in a substantial reduction in weight of the body over comparable lasts composed of unfoamed, or solid plastic materials. I have found that by closely controlling the amount of the foaming agent introduced into the plastic pre-mix for a machine that delivers the molten plastic to the cooling molds for the last blanks that the finished last body will have a density substantially the same as a comparable last made of hard maplewood.

With reference to FIG. 1 it will be understood that the turned last body 10 shown therein has further been formed into a fore or toe part 11 and a rear or heel part 12 by the prior formation of a hinge knuckle 13 which divides the last body and provides mating surfaces around which the parts rotate from the extended shoe forming positions of the parts shown in full lines in the drawing to a collapsed position of the parts, indicated by the dotted lines in FIG. 4 of the drawings. Oversized holes 14 and 15 are formed laterally through the toe part 11 and the heel part 12, respectively, of the last body 10 adjacent the hinge 13 and the heel part is further provided in its upper portion with an enlarged, blind end hole 16 that is positioned at right angles to the hole 15 therein.

Parts made from foamed plastic material are not as strong as solid masses of the same material and thus areas therein that are to be subjected to the greatest stresses or strains tend to collapse and break down in use. With particular reference to the plastic shoe last 10 these stress areas occur in the parts 11 and 12 around the hinge 13 and around the last mounting area adjacent the upper portion of the heel part. To strengthen and reinforce these areas in the foamed plastic last body 10 the oversize, laterial holes 14 and 15 and the hole 16 are filled by driving thereinto solid plugs 17 (FIG. 1) composed of high density polyethylene, or other relatively strong material and fixing said plugs in their respective holes by a suitable cement, or other fastening means. These solid plugs made of polyethylene have a density in the range of .960 which creates a strong plug material that is stronger and is also much heavier than hard maplewood. Subsequently, and as indicated in FIG. 2, the last parts are mounted in suitable jigs and hinge pin holes 18 are drilled through the central portions of each plug to form sleeves 170 in the fore and heel part, respectively, it being noted that the exact distance between the two hinge pin holes 18 can be minutely controlled to very close tolerances in the jig whilst the distance between the centers of the plugs 17 themselves is not critical and may vary somewhat without destroying their effectiveness in the structure. Thus the positions of the large lateral holes 14 and 15 need not be held to close tolerances, it being only necessary that the hinge pin holes 18 be drilled through the central portions of the plugs and themselves held to the required critical minute tolerances. A similar hole 19 is also formed through the plug 17 that is fixed in the hole 16 in the heel part, it being also noted that

the enlarged hole **16** need not be accurately positioned in the heel part as the jack-thimble receiving hole **19** may be accurately positioned even though it is not coaxially located in the plug **17**. A suitable metal jack receiving thimble **20** (FIG. 4) is anchored in the hole **19** of sleeves **170** by any suitable fastening means, such as sharp detents **21**.

Upon completion of the hinge pin holes and the jack hole in the last parts, routs **22** and **23** are formed in each last part **11** and **12**, respectively, for the reception of the last hinge hardware which may comprise a hardened metal spring link **24** and two rub plates **25** and **26** disposed on each side of the link. With reference to FIG. 3 it is to be noted that the formation of the routs cuts the drilled hinge pin receiving sleeves **170** into two laterally spaced apart sections both fixed in the last body on opposite sides of the routs. As most clearly illustrated in FIGS. 4 and 5 the link **24** and the plates **25** and **26** are located in the routs and extend across the hinge knuckle **13** of the parts, one side of the link and plates being hingedly connected to the fore part **11** by a tapered pin **27** driven through the hinge pin hole **18** in the sleeve **170** and through the link and through lost motion holes in the plates. A tapered pin **28** is then entered into the pin hole **19** in the sleeve **170** for the heel part and the tapered pin end is then forcibly driven through the hole in the link and through lost motion holes in the plates in the heel part sides thereof to place the hinge under stress and hold the parts in strong over-center positions at their mating surfaces. During the driving of the pins to their home positions across the routs the severed sleeves serve to effectively reinforce the last body against collapse whilst the resulting last, although of light weight, will be sufficiently rugged to withstand all forces placed on its during the shoe making process thereon.

The surface of a foamed plastic last constructed in accordance with this invention has many open pores and small holes therein which tend to collect dirt and it is therefore requisite that the surface be treated to fill up and seal said holes and this is best accomplished by dipping the last in a bath of melted paraffin or applying to its surface a polyethylene finish **29** (FIG. 4) commercially available as Amiloc, a product of C. L. Rowe Corp. of Brooklyn, New York.

It was found that the completed shoe last formed from foamed polyethylene compared favorably in weight to a wood last of similar mass, was substantially the same weight as the comparable wood last but was about 50% lighter than solid polyethylene lasts of comparable size and mass. I have found that a last formed in accordance with this invention has good nailing qualities and it was tested for strength and was suitable as a form on which to manufacture shoes.

Having thus described my invention what I claim as new is:

A collapsible shoe last comprising a forepart and a heel part having mating, contact surfaces; said parts each having a cellular body formed essentially of foamed plastic material; a laterally extending hole formed through the body of each last part adjacent a contact surface; a sleeve cemented in and filling each hole; said sleeves comprised essentially of a non-cellular and stronger plastic material than the material of the last parts; a hinge pin receiving hole extending laterally through the central portion of each sleeve; the hinge pin receiving holes in the sleeves being longitudinally spaced apart in the last within accurately controlled, minute tolerances; confronting routs formed in the last parts and through the sleeves; a last part connecting link disposed in the routs and extending across the mating, contact surfaces of the last parts; and a hinge pin positioned in each of the divided sleeves and each pin connected to an end of the link.

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