July 1, 1924. 1,499,758

P. D. BABCOCK

COLLAPSIBLE LAST

Filed Sept. 17, 1921

Fig. 1.

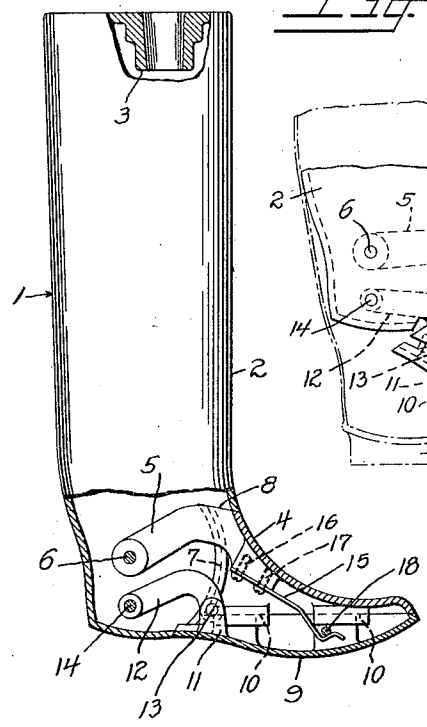


Fig. 2.

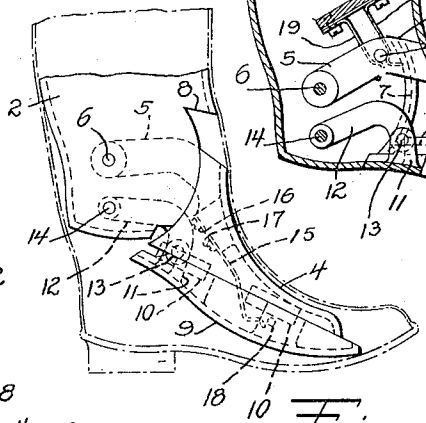


Fig. 5.

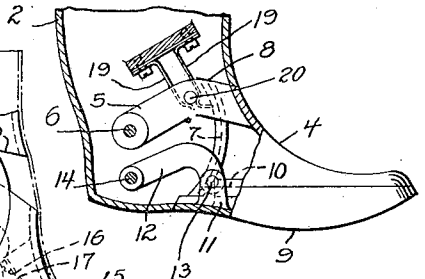


Fig. 6.

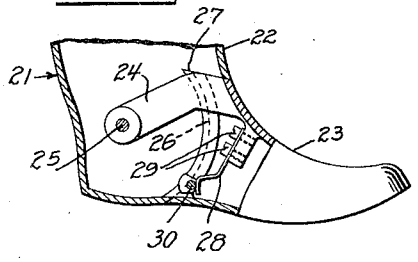


Fig. 3.

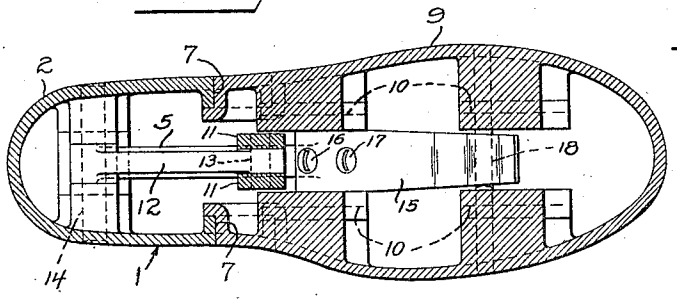
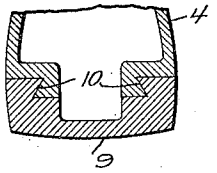


Fig. 4.



Inventor
PEARL D. BABCOCK.

By his Attorney
Ernest Stopelmoor

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UNITED STATES PATENT OFFICE.

PEARL D. BABCOCK, OF MILFORD, CONNECTICUT, ASSIGNOR TO L. CANDEE & COMPANY, A CORPORATION OF CONNECTICUT.

COLLAPSIBLE LAST.

Application filed September 17, 1921. Serial No. 501,374.

To all whom it may concern:

Be it known that I, PEARL D. BABCOCK, a citizen of the United States, and a resident of Milford, county of New Haven, and State of Connecticut, have invented certain new and useful Improvements in Collapsible Lasts, of which the following is a full, clear, and exact description.

This invention relates to a collapsible last, more particularly to a collapsible boot tree for use in the manufacture of boots which are vulcanized by the so-called "differential" cure.

In the manufacture of rubber boots for many years the various parts of the boot were built up on the last by the operator and compacted by hand with a small roller and then vulcanized or cured in an open heat and without pressure. It was then discovered that by applying pressure to the outside of the boot during the vulcanizing that the parts would be much more evenly compacted; thus obviating to a certain extent the careful hand rolling previously required. However, even under this pressure cure bubbles of air which were entrapped between the various layers in building up the shoe would persist and cause blisters and incomplete joining in the finished article. It was then discovered that by using a hollow last or tree having openings communicating with the interior of the boot and exhausting the air from within the tree during the vulcanizing process the formation of blisters or bubbles in the finished product was almost completely done away with, and this method of vulcanizing footwear known as the "differential" cure has gone into extensive use. The last or tree commonly used for this purpose is a sectional one made of aluminum, in which a toe section is removably connected to a leg and heel section and the two parts held together by springs, bolts or some other means. It has been found advantageous, however, to use a rather high differential pressure during the vulcanizing operation, and as a result the rubber, which is rendered plastic by the heat in curing, is driven to some extent entirely through the fabric and into contact with the surface of the last, to which it adheres rather closely. In consequence considerable difficulty has been encountered in removing the lasts or trees from the finished article without injuring it, and to assist in removing the tree compressed air has been blown into the interior of the tree and allowed to escape through small openings in the walls thereof between the last and interior wall of the boot, thereby freeing the boot and allowing the last to be more readily withdrawn. It has been discovered, however, that while the leg section is readily freed by this method and withdrawn, that the air does not readily escape through the toe section into the toe of the boot, and as a result after withdrawing the leg section, it has been necessary to bend and pound the toe of the boot in order to release the toe section of the tree. This method adds to the time and labor taken in removing the tree from the boot and is also likely to injure the boot.

An object of my invention is to provide a readily removable last or tree.

Another object is to provide a last which is automatically collapsed and in which a portion of the toe part is automatically reduced in cross-section as the last is withdrawn from a footwear article.

Still another object of my invention is to provide a boot tree which may be stripped from a boot without the aid of expensive machinery.

A further object is to provide a hollow boot tree particularly adapted for use in boots vulcanized by the so-called "differential" cure.

For a detailed description of the invention reference is had to the accompanying specification and drawing, in which latter:

Fig. 1 is a view partly in vertical section of a boot tree embodying one form of the invention.

Fig. 2 is a view illustrating the manner in which the boot tree is collapsed or straightened in withdrawing it from the boot.

Fig. 3 is a section through the foot portion of the tree, taken just inside the sole and looking upwardly.

Fig. 4 is a vertical transverse section partly broken away showing the dove tail connection of the two toe sections.

Fig. 5 is a view similar to Fig. 1 illustrating a modified form of retaining means for holding the sections in lasting or closed position; and

Fig. 6 is a part sectional view illustrating a modification with a one-piece toe section.

Referring to the drawings the numeral 1

designates a hollow boot tree having a leg and heel section 2 provided at its upper end with a tapered socket 3, by which the tree may be held upon a support and through which air may be exhausted from the tree in curing, or compressed air introduced in stripping the tree from a finished boot. The toe section in the present instance is formed of two parts, the upper or instep portion 4 of which is provided with a rigid arm or extension 5 pivotally connected to the leg section at 6, and the side walls of the leg and heel section at its lower end are formed with circularly curved faces 7 adapted to contact with the complementarily curved faces of the portion 4, while the straight contacting face 8 acts as a stop to limit the upward movement of the instep portion 4 on its pivot 6. The lower or sole portion 9 of the toe section is slidably connected to the upper portion by the interrupted dove-tail 10, and adjacent its rear end the sole portion is provided with an upstanding lug 11 to which a curved link 12 is pivotally connected at one end, as shown at 13, the other end of the link being pivotally connected to the leg and heel portion at 14. In order to yieldingly maintain the last parts in their closed or lasting position a spring 15 is secured at one end to the upper toe portion 4 by the screws 16 and 17, while its free end presses against a pin 18 secured in the sole portion.

The modification shown in Fig. 5 is in all respects similar to that shown in Fig. 1 except that the spring retaining means in this case comprises two springs 19 secured in the leg portion and having their free ends bent toward each other to frictionally engage a pin 20 mounted on the arm or extension 5 of the instep portion 4.

In the form shown in Fig. 6 the tree 21 comprises a hollow leg and heel section 22 having a socket similar to the socket 3 at its upper end for the reception of a support, but the toe section 23 is in a single piece having an arm 24 extending therefrom and pivotally connected to the leg and heel section at 25. The lower portion of the side walls of the leg and heel section is provided with circularly curved faces 26 contacting with the complementarily curved faces of the walls of the toe section, and upward movement of the toe section on its pivot is limited by the stop face 27. The sections are held in closed or lasting position by the spring 28 secured to the toe section by the screws 29, while the free end of the spring frictionally bears against a pin 30 secured to the leg and heel section.

In use the boot is built up on the last while held in the closed position shown in Fig. 1, and after curing compressed air is introduced through the socket 3 to free the boot from the surface of the tree, after which the tree is withdrawn from the boot. As the leg section of the tree is drawn out the instep portion 4 of the toe section moves downwardly on the curved contacting faces 7, which latter are formed on an arc whose center is at the pivot point 6 of the instep portion 4. In this movement it also carries with it the sole portion 9, but as the portion 9 is pivotally connected to the link 12 at the pivot point 13, and this pivot point must move on an arc of smaller radius whose center is at the pivot point 14 of the link, which is below the pivot point 6, it will slide outwardly on the dove-tail connection 10 at the same time that it is moved downwardly by the instep portion 4. As a result the cross-sectional area of the toe section is reduced at the waist, and the distance between the back of the heel and the toe of the tree is materially shortened, thereby allowing the ready removal of the entire tree, as shown in Fig. 2. As the toe portions 4 and 9 are moved downwardly and the portion 9 moves outwardly the pin 18 rides over the bent end of the spring 15, and is freed therefrom. Upon pushing up the toe section for further use the sole portion is drawn inwardly again and the pin 18 snaps back behind the bent portion of the spring 15 to yieldingly hold the tree in its closed or lasting position.

The operation of the modification shown in Fig. 5 is in all respects similar to that shown in Fig. 1, the pin 20 on the extension or arm 5 moving outwardly toward the ends of the springs 19 as the toe section is bent downwardly or straightened, and snapping back again into its former position when the toe section is returned to its closed or lasting position.

In the operation of the form shown in Fig. 6 the toe section also automatically moves downwardly on the curved contacting faces 26 of the leg section as the tree is withdrawn thereby moving the bent end of the spring 28 over the pin 30, while upon return of the toe section to lasting position the spring 28 snaps over the pin 30 to yieldingly hold the toe section against the stop face 27 in lasting position. As no provision is made in this form, however, for reducing the cross-sectional area of the toe at the waist, the form shown in Figs. 1 and 5 is to be preferred.

While in the embodiment shown the invention is applied to a hollow boot tree and is particularly adapted for use in the manufacture of boots cured by the differential process, it is not limited in its application to the form shown, and it is evident that it may also be used for other footwear articles.

Having thus described my invention, what I claim and desire to protect by Letters Patent is:

1. A collapsible last formed of relatively movable heel and toe sections forming a

complete last foot, and means operable by withdrawal of the last from a footwear article for automatically simultaneously collapsing the last and reducing the cross sectional area of a portion of the toe section.

2. A collapsible last comprising a heel section, a toe section pivotally connected thereto and including relatively longitudinally movable toe portions, and means operable by withdrawal of the last for relatively moving said toe portions.

3. A collapsible last comprising a heel section, a toe section including a plurality of toe parts forming a continuous wall and having a collapsible connection with the heel section, said connection including means for reducing the cross sectional area of the toe section at the waist when collapsing the last.

4. A last comprising a heel section, and a toe section including slidably connected parts pivotally connected with the heel section, whereby the last may be collapsed, said connection including means whereby the toe parts may be relatively moved when collapsing the last.

5. A last comprising a heel section, a continuous wall toe section including upper and lower parts coacting with the heel section, and means whereby the last may be broken to increase the angle of the toe section with respect to the heel section, said means including means for relatively moving the toe parts.

6. A collapsible last comprising a heel part, an upper toe part pivotally connected to the heel part, a lower toe part slidably connected to the upper one, and means whereby the toe parts may be relatively moved in collapsing the last.

7. A last comprising a heel section, a toe section including two slidably connected parts, one of said parts being directly pivoted on the heel section and the other part having a link connection with the heel section.

8. A last comprising a heel section, a toe section including two parts having a dovetail connection, one of said parts having an arm pivoted on the heel section, and a link pivoted to the other part and also to the heel section.

9. A collapsible last having movably and permanently connected sections forming, when extended, a continuous outer surface for the building up of a footwear article thereon, and means operable by withdrawal of the last for relatively moving adjacent sections to reduce the cross sectional area of a portion of the last.

10. A hollow collapsible boot tree comprising a hollow leg and heel section, a hollow toe section having a rigid extension pivotally secured in the leg and heel section, said sections having continuously contacting portions curved on a circular arc whose center is the pivot of said extension, and means for yieldingly holding the sections in closed or lasting position, whereby on withdrawal of the tree from a boot said sections may automatically move to open or extended position.

11. A hollow boot tree comprising a hollow leg and heel section, a hollow toe section movably connected to the leg and heel section and adapted to be straightened out with respect thereto by withdrawal of the tree from a boot, and means for reducing the cross sectional area of the toe section at the waist as the tree is withdrawn.

12. A hollow boot tree comprising a hollow leg and heel section, a hollow toe section including upper and lower portions slidable on each other and pivotally connected to the leg and heel section, said pivotal connection including means for sliding one toe portion on the other as the toe section is moved on its pivots.

13. A hollow boot tree comprising a hollow leg and heel section, a hollow toe section including upper and lower portions having a sliding dovetail connection, a rigid arm extending from the upper portion into the leg and heel section and pivoted therein, a link pivoted at one end to the lower portion, its other end extending into the leg and heel section and pivoted therein, and means for yieldingly holding the sections in closed or lasting position.

14. A hollow collapsible boot tree comprising a hollow leg and heel section, a hollow toe section including upper and lower portions slidably united by a dove-tail connection, said sections having circularly curved contacting faces, an arm extending from said upper portion and pivotally connected to the leg and heel section, a curved link pivotally connected at one end to the lower toe portion and at its other end to the leg and heel section, and means for yieldingly maintaining the parts in closed or lasting position.

Signed at New Haven, Connecticut, this 13th day of September, 1921.

PEARL D. BABCOCK.