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A. A. GLIDDEN ET AL

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PROCESS FOR MANUFACTURING RUBBER BOOTS

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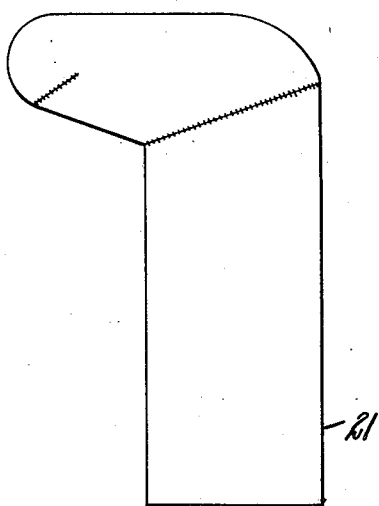


Fig. 1.

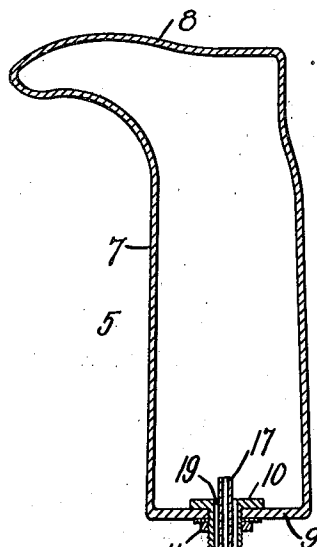


Fig. 2.

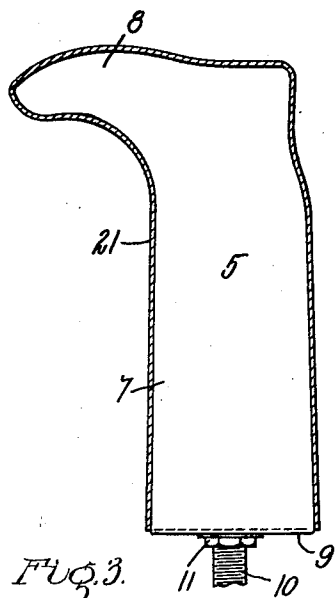


Fig. 3.

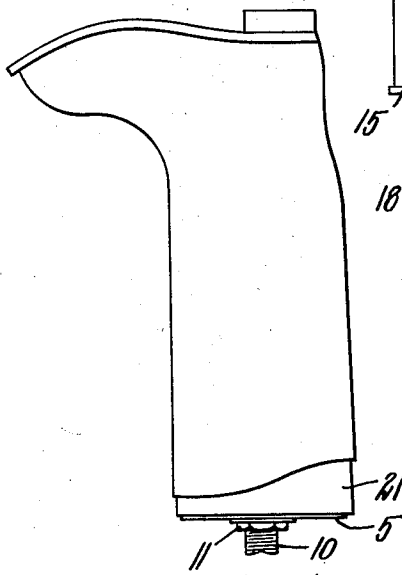


Fig. 4.

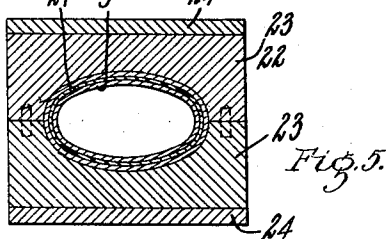


Fig. 5.

Inventors:

Alfred A. Glidden,  
Thomas M. Howland,  
Herbert L. Davis,

by Charles S. Gooding, Att'y.

## UNITED STATES PATENT OFFICE.

ALFRED A. GLIDDEN AND THOMAS M. KNOWLAND, OF WATERTOWN, AND HERBERT L. DAVIS, OF WALPOLE, MASSACHUSETTS, ASSIGNORS TO HOOD RUBBER COMPANY, OF WATERTOWN, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

## PROCESS FOR MANUFACTURING RUBBER BOOTS.

Application filed August 23, 1927. Serial No. 214,942.

This invention relates to an improved process for manufacturing rubber boots, the principal steps of the process comprising building a rubber boot upon a hollow boot tree of expandible material which has preferably drawn thereover a rubber boot lining of expandible material, such as, a knitted stocking; then placing the assembled tree, boot lining and boot in a heated mold until the boot is cured, and then removing it from the mold, together with the tree, and then removing the boot with its lining from the tree.

The invention consists in the improved process and in the various novel steps in the process, set forth in the following specification and particularly pointed out in the claims.

Referring to the drawings:—

Figure 1 is a side elevation of a boot lining.

Fig. 2 is a sectional elevation of an expandible boot tree.

Fig. 3 is a side elevation of the boot tree with the boot lining placed upon the tree and shown in section.

Fig. 4 is a side elevation of a boot positioned on an expandible tree and showing a portion of the boot lining and tree.

Fig. 5 is a sectional plan illustrating the boot tree, lining and boot positioned in a mold.

Like numerals refer to like parts throughout the several views of the drawings.

In the drawings, 5 is an expandible boot tree, the same forming the subject-matter of an application for United States Letters Patent on "boot tree" filed August 22, 1927, by Alfred A. Glidden, Thomas M. Knowland and Herbert L. Davis Serial No. 214,622, and consisting of a hollow body member comprising a leg portion 7, foot portion 8 and closed end portion 9. The hollow body member may be constructed of any suitable expandible water-proof material as, for example, vulcanized rubber.

Located in the closed end portion 9 of the body member is a flanged sleeve 10, said sleeve being externally threaded to receive a nut 11 by means of which the sleeve is tightly clamped to the material comprising the tree. The outer end of the sleeve 10 is detachably connected by means of a union 12 with a Y-branch pipe fitting 13, a nipple 14 being interposed between said pipe fitting and the union.

The pipe fitting 13 has bushings 15 and 16 detachably secured therein, and an inlet pipe 17 is mounted in the bushing 15 and extends inwardly through the pipe fitting 13, nipple 14, union 12 and sleeve 10 and projects a short distance into the body member of the tree. A flexible tube 18 is detachably secured to the outer end of the inlet pipe 17. Surrounding the exterior of the inlet pipe 17 is an outlet passage 19, the latter extending through the sleeve 10, union 12, nipple 14 and pipe fitting 13. A flexible tube 20 is detachably secured to the bushing 16.

In the carrying out of our improved process, the first step is to paint the outside of the expandible tree 5 with a mica solution or the like, so that after the boot has been cured it may be easily removed from the tree. A stocking 21 of elastic material, such as, knitted fabric, illustrated in Fig. 1, is then drawn over the boot tree 5, as illustrated in Fig. 3. This stocking constitutes the lining of the boot when completed. The different parts of which the boot is composed are then built upon the ling covered boot tree in a manner well known to those skilled in the art and include the leg and foot portions of the boot and the sole and heel. The boot is then rubbed down with a fine powder-like material, such as, talc. The object of this step in the process is to prevent air from being trapped between the outer surface of the rubber boot and the inner surface of the mold, thereby forming pockets which would be injurious to the appearance of the finished boot.

The mold 22, into which the boot is to be placed, is illustrated in Fig. 5 and consists fundamentally of two sides 23 and heating plates 24. After rubbing the boot down with a suitable powder-like material, the mold 22 is cleaned and has its inner surface dusted with asbestine or the like. The boot, together with the tree and the lining in assembled condition, are then placed in the heated mold and the mold locked.

The boot is inflated either with air under pressure through the inlet pipe 17, or with water, preferably heated and under pressure, through the pipe 17. Where heated water is used it circulates through the boot tree 5 and passes out through the passage 19; where air is used it is not necessary that it should circulate.

The mold 22 is heated by electrical means to a predetermined degree. After the boot has remained in the mold a sufficient length of time to become cured by the heat, the tree is deflated by removing the pressure of air or water, as the case may be. The mold is then unlocked, the boot is removed from the mold and stripped from the tree. The overflow from the tap and heel of the boot is then ground off and the overflow and the top of the boot are trimmed with scissors. The boot is then polished and otherwise rendered in condition for the market.

If desired, the herein described process may be carried out without the lining for the boot, in which case the different parts of which the boot is constructed would be built up directly on the boot tree instead of upon the lining superimposed upon said boot tree. If desired, the curing process may be carried out by heating the mold and omitting the heating of the boot from the inside thereof, but it is considered much more satisfactory to employ the heating of the mold and the heating of the boot from the interior by means of heated fluid supplied to the tree than it is to use either one of these heating means alone, the result in the process being more satisfactory on account of a greater rapidity and efficiency in the heating and curing operation being obtained where both means of heating are employed.

The mold preferably used in the carrying out of our improved process is made the subject matter of another application for United States Letters Patent for "mold for rubber boots" filed August 23, 1927 by Alfred A. Glidden, Howard G. Ellis and Herbert L. Davis, Serial No. 214,941, and the lining is also made the subject matter of another application for United States Letters Patent for "lining for rubber boots and method of manufacturing," filed by Alfred A. Glidden and Frank R. McKenzie on July 26, 1927, Serial No. 208,567.

In the specification and claims the word "rubber" has been used in connection with the material of the boot which is to be formed and cured, but it is evident that any other material which is a substitute for rubber or the various compounds thereof may be used without departing from the spirit of this invention.

By employing an expandible boot tree in the process hereinbefore described, the boot will be shaped to exactly the form of the mold and the pressure of the boot against the mold will be even in every portion thereof. It is also evident that the pressure may be of any desired amount and the temperature of the fluid may be of any degree desired according to the material used in the construction of the boot. The heating of the mold is preferably accomplished by electrical means, and by this means an even degree of heat of the

desired temperature may be maintained, all as fully described in said application "mold for rubber boots."

It is evident that the boot may be placed in a mold and the mold then heated and kept heated until the boot is cured, but the preferred manner of procedure is to have the mold heated first and then the boot placed in the heated mold and the mold kept heated until the boot is cured. As stated, however, the boot may be placed in a mold and the mold then heated and kept heated until the boot is cured.

By employing the process hereinbefore described, the boot lining is brought into contact with and pressed into the interior surface of the rubber boot throughout every portion thereof, leaving the same smooth and firmly attached to and embedded in the rubber of which the boot is constructed.

While the mold has been described as being heated by electrical means, it is evident that that the same may be heated by means other than electrical without departing from the spirit of this invention.

#### We claim:

1. The process of manufacturing rubber boots which comprises pulling a lining for a rubber boot over a hollow boot tree of expandible material; then building a rubber boot on said lining covered tree; then placing the assembled boot tree, lining and boot in a heated mold for rubber boots; then closing the mold; then inflating the boot tree, lining and boot; then leaving the boot tree, lining and boot in the mold until the boot is cured; then deflating the tree; then removing the boot and lining and tree from the mold, and then removing the boot and its lining from the tree.

2. The process of manufacturing rubber boots which comprises pulling a lining for a rubber boot over a hollow boot tree of expandible material; then building a rubber boot on said lining covered tree; then placing the assembled boot tree, lining and boot in a heated mold for rubber boots; then closing the mold; then inflating the boot tree, lining and boot with a heated fluid; then leaving the boot tree, lining and boot in the mold until the boot is cured; then deflating the tree; then removing the boot and lining and tree from the mold, and then removing the boot and its lining from the tree.

3. The process of manufacturing rubber boots which comprises pulling a lining for a rubber boot over a hollow boot tree of expandible material; then building a rubber boot on said lining covered tree; then applying a powder-like material to the outer surface of the boot; then placing the assembled boot tree, lining and boot in a heated mold for rubber boots; then closing the mold; then inflating the boot tree, lining and boot; then leaving the boot tree, lining and boot in the

mold until the boot is cured; then deflating the tree; then removing the boot and lining and tree from the mold, and then removing the boot and its lining from the tree.

5 4. A step in the process of manufacturing rubber boots which consists in pulling a lining for a rubber boot over a hollow boot tree of expandible material.

10 5. A step in the process of manufacturing a rubber boot which consists in building a rubber boot on a hollow boot tree of expandible material covered with a lining for a rubber boot.

15 6. The process of manufacturing rubber boots which comprises painting the outer surface of a hollow boot tree of expandible material with mica solution or the like; then

pulling a lining for a rubber boot over the said hollow boot tree; then building a rubber boot on said lining covered tree; then placing 20 the assembled boot tree, lining and boot in a heated mold for rubber boots; then closing the mold; then inflating the boot tree, lining and boot; then leaving the boot tree, lining and boot in the mold until the boot is cured; 25 then deflating the tree; then removing the boot and lining and tree from the mold, and then removing the boot and its lining from the tree.

In testimony whereof we have hereunto set 30 our hands.

ALFRED A. GLIDDEN.  
THOMAS M. KNOWLAND.  
HERBERT L. DAVIS.