R. B. PRICE.

APPARATUS FOR TREATING PLASTIC ARTICLES.

APPLICATION FILED JAN. 3, 1912.

1,295,595. Patented Feb. 25, 1919.

Fig. 1.

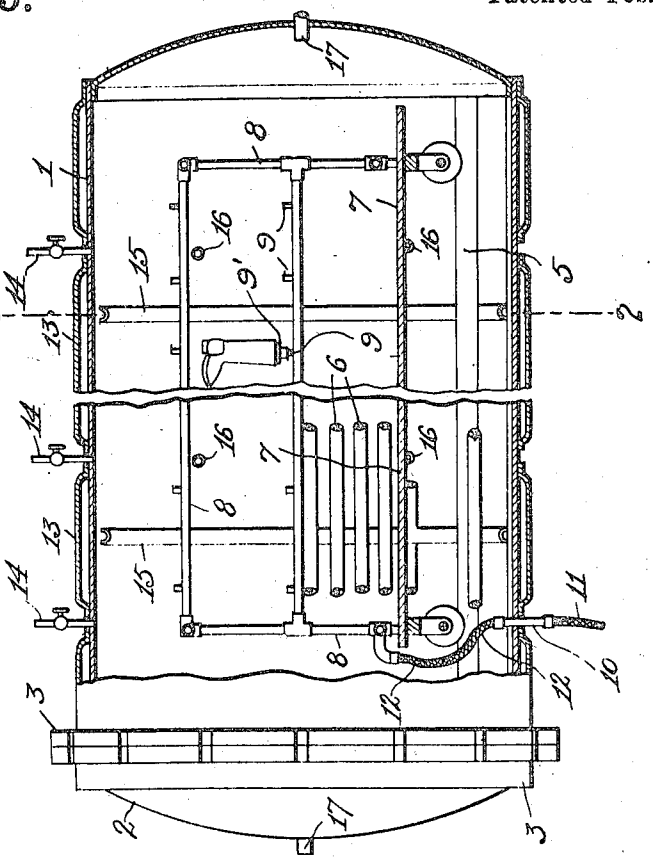
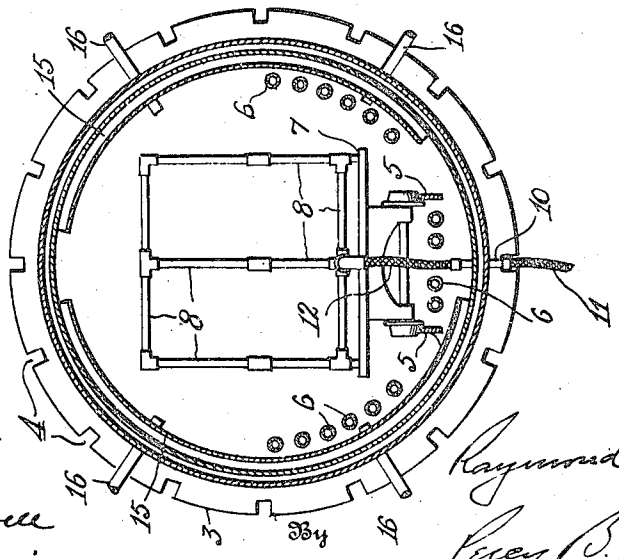


Fig. 2.



Witnesses

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APPARATUS FOR TREATING PLASTIC ARTICLES.

1,295,595. Specification of Letters Patent. Patented Feb. 25, 1919.

Application filed January 3, 1912. Serial No. 669,209.

To all whom it may concern:

Be it known that I, RAYMOND B. PRICE, a citizen of the United States, residing at Mishawaka, in the county of St. Joseph, State of Indiana, have invented new and useful Improvements in Apparatus for Treating Plastic Articles, of which the following is a specification.

My invention relates to apparatus for treating plastic material, and has for its object to provide certain improvements in the construction of same as will be hereinafter more definitely set forth and claimed, reference being had to the accompanying drawing in which:

Figure 1 is a longitudinal section of a vulcanizer embodying my improved construction.

Fig. 2 is a transverse section of same, taken on the line 2—2, Fig. 1.

Referring to the vulcanizer construction disclosed, the reference numeral 1 denotes the body of the same, which is preferably cylindrical in outline, and which is permanently closed at one end, and is provided at its other end with a door 2 hinged in the usual manner at one side, said body portion and door being formed with meeting flanges 3 slotted at 4 to receive the usual hinged clamping bolts for hermetically closing said vulcanizer. Said vulcanizer in its interior is provided with longitudinally disposed tracks 5 in its bottom, adapted to receive a car, hereinafter to be described, and is also preferably provided at its bottom with steam pipes 6, which may also be extended up the sides of the vulcanizer as far as may be desired.

In the drawings I have illustrated a form of car to be used in said vulcanizer, which consists of a wheeled platform 7 on which is built up a rack of hollow piping 8 communicating internally throughout, and constituting a frame in skeleton form which rack is provided throughout with suitable boot tree receiving projections 9, each of which may, if desired, contain a valve self-closing inwardly, such, for instance, as the valves employed on the inner tubes of automobile tires.

Tapped through the body of the vulcanizer near its open end is a pipe 10 provided externally with a detachable connection 11 adapted to be connected with an exhaust apparatus, not shown. Said pipe is at its interior end adapted to be connected, for instance, by means of a suitable flexible pipe 12, with the tubing of which the car rack 8 is built up, all for the purpose of controlling the pressure in the interior of the tubing throughout the rack.

A suitable boot tree or form to use may consist of a hollow body 9′, preferably aluminum, closed at its top and provided throughout its surface with a plurality of minute apertures. Said boot tree top may also be provided with a valve similar to the valves in the projections 9 on the car rack, said valves coöperating, when said boot tree is mounted upon one of said projections, to be automatically opened, whereby any vacuum exerted upon the rack tubing will be simultaneously exerted upon the interior of the boot tree.

I may, if desired, however, entirely omit either or both of said valves, and simply provide for an air-tight detachable connection between said trees and said car tubing.

In an application filed by me June 19, 1911, Serial No. 634,030, and in an application filed by me December 30, 1911, Serial No. 668,791, I have described a method of controlling the internal and external pressures exerted upon articles in the process of vulcanization, and in the operation of the present apparatus it is my intention, if desired, to employ any of the methods described in said applications for controlling the internal and external pressures upon the articles being treated.

Thus, in the operation of the present device the boots are built up of rubber and fabric in the usual manner upon the boot trees 9′, and each boot tree is then mounted upon one of the projections 9 on the car rack 8 in such manner that the boot tree valves, as well as the respective projection valves, are automatically opened. The car is then run into the vulcanizer 1, and the car tubing connected, by means of the flexible pipe 12, with the pipe 10 tapped through the vulcanizer and connected to the pressure controlling apparatus. With said pressure controlling apparatus put in operation, a controllable vacuum may be exerted upon the car tubing 8, which will be communicated to the interiors of the boot trees mounted thereon, and, through the apertures in said boot trees, will be communicated to the interior of the boots built thereon, there-

by causing said boots to closely hug said trees, and thereby withdrawing any gas or moisture contained therein. The vulcanizer door 2 being closed, any suitable heat conveying medium may be admitted to the interior thereof to carry out the vulcanizing operation, and said vulcanizing medium, which may be air or other gas, steam, superheated or not, or other suitable medium, may be controlled as to its pressure in the manner described in my applications hereinbefore referred to.

In an application filed by me December 30, 1911, Serial No. 668,792, I have described a fluid medium for performing the vulcanizing operation upon plastic articles, and I wish it to be understood that I contemplate the use of such a medium in connection with the above described apparatus and in the manner set forth in said application, or in the manner set forth in said application in connection with my applications Serial Nos. 634,030 and 668,791 hereinbefore referred to.

I also contemplate using a modified form of boot tree to be used with my present apparatus, the same being formed solid of a porous material, such as unglazed earthenware, which form is at its upper end previously glazed or otherwise treated or covered to render its surface at that point air-tight, and which may have positioned in its upper end a self-closing valve similar to those employed with my trees heretofore described. With this form of tree the boot can be built up on the same just as with the aluminum tree, and said trees mounted in a similar manner upon the rack 8 to be inserted into the vulcanizer 1 for the subsequent vulcanizing operation. It will be apparent that, by reason of the porous character of that portion of the tree inclosed by the boot, the vacuum or suction exerted through the valve thereon will be communicated to the interior surface of the boot in a manner similar to the operation of the aluminum tree hereinbefore described.

It has been found desirable, in order to obtain the necessary degree of heat in the interior of the vulcanizer, to jacket the same in order to provide a steam space thereabout, but, in order to provide for the admission of certain pipes to the interior of the vulcanizer, as will be hereinafter described, I have found it advisable to form said jacket in sections 13 annularly of the vulcanizer 1, as shown in Fig. 1, said jacket sections being separately bolted annularly to said vulcanizer, leaving intervening annular spaces sufficiently wide to permit the insertion of piping through the vulvanizer body. It will be understood that, in the operation of the vulcanizer, this sectional steam jacket will be suitably supplied with steam, and may serve as an auxiliary heating medium for the interior of the vulcanizer, as well as to maintain the interior heat generated by the steam piping in the interior thereof, or may be the sole heating means.

In the operation of vulcanizers of this general character heretofore difficulty has been found in obtaining and maintaining an even temperature throughout the same, it having been found that at times at the top thereof a pocket of the heat transmitting medium will be formed appreciably colder than the temperature throughout the rest of the vulcanizer. To remedy this defect several means have been devised, as follows:

First, providing at the extreme top of the vulcanizer one or more small valved pipes 14 which may be controllably opened to vent the interior thereof, thereby permitting the escape of the cold stratum of heat transmitting medium, and thereby establishing a more uniform temperature throughout.

Secondly, this same result may be accomplished by locating upon the sides of the interior of the vulcanizer a series of vertical pipes 15 following the curvature of the vulcanizer and open at both ends, the upper ends of said pipes opening near the extreme top of the vulcanizer, while their lower ends open beneath the lowermost of the steam heating pipes, as shown. By this arrangement a means is provided for automatically circulating the stratum of cold heat transmitting medium at the top of the vulcanizer, which may through such pipes be led and discharged beneath the steam heating pipes at the bottom, the rising heated medium taking its place at the top of the vulcanizer.

Thirdly, I may provide at a plurality of, say, four equally spaced points in the body of the vulcanizer a series of pipes 16 tapped through said vulcanizer between the steam jacket sections, and through said pipes intermittently discharge a medium similar to that in the interior of the vulcanizer, thereby agitating thoroughly the medium in said vulcanizer and producing a substantially even temperature throughout the same. And I may supplement these pipes by similar pipes 17 projected through the ends of the vulcanizer, so as to obtain a longitudinal agitation of the medium. And I do not wish to limit myself to any particular method of operating these pipes, as their operation may be conducted in an intermittent manner such as is best calculated to produce the desired agitation and even temperature. And I also wish it to be understood that I contemplate the use of any one of the three above described means for agitating the medium, or the conjoint use of any two of them or of all three of them, or any equivalent agitating means.

While my present apparatus is described in connection with the vulcanization of rub-

ber boots, I wish it to be distinctly understood that it is equally applicable to the vulcanization of such articles as rubber tires and tire shoes and to the manufacture of rubber hose. In fact, this application is not intended to be limited to any particular class of articles and is designed for use in the treatment of any article to which it can be applied.

It will be understood that in employing with the present apparatus the means described in my application filed June 19, 1911, Serial No. 634,030, and in my application Serial No. 668,791 I may employ any of the methods of varying either the vacuum or the pressure, and on either the outside or the inside of the article, and as to the inside may arrange the same to "bleed" only, all as clearly described in said applications.

In operating the above described vulcanizer I contemplate employing a bath of any suitable heat conveying medium fluid under the vulcanizing temperature within the vulcanizer, into which a portion of the articles being treated, such as the soles and heels of boots and shoes, may be dipped, to remain therein during the vulcanizing operation.

I also contemplate the employment of a source of heat entirely distinct from the vulcanizer, whereby the medium to be employed as the heat transmitting medium therefrom, which may be air or other gas, water, or any fluid solution suitable for the purpose, or even a metallic bath having a melting point below the vulcanizing temperature will receive its heat units at a distance from the vulcanizer and be then conveyed to said vulcanizer to impart said heat units to the material being treated, and at the same time form the medium surrounding and in contact with said material. The above will also include steam when superheated outside of the vulcanizer.

When pressure is desired in excess of that normally created by the expansion of the treating medium under the treating heat, I may, instead of applying said pressure mechanically, as contemplated in my application No. 668,791 hereinbefore referred to, obtain the same by the introduction into the vulcanizer of such materials as will raise the pressure beyond that which would be ordinarily created by the heating of the treating medium alone. Thus, alcohol, ammonia, ammonium carbonate, ammonium chlorid, and the like have been found to satisfactorily accomplish this result, the use of dry ammonium carbonate in a jacketed kettle, and the admission of steam to the jacket, giving a pressure of 20 pounds at a temperature of 310° F., whereas without said ammonium carbonate the kettle pressure, at the same temperature, was only 7½ pounds.

And I may employ the combination of two or more substances which by their interaction would generate gas to increase the pressure, such as whiting and sulfuric acid, wherein the liberated carbon dioxid would generate considerable pressure.

Where such a bath as calcium chlorid is used as a vulcanizing medium, of course, there is some vaporization of the water of the bath, and if this occurs in a closed vessel a pressure will be produced from the resulting steam. In place of calcium chlorid in a water solution, a mixture of glycerin and alcohol might be used, or a large variety of solids dissolved in more or less volatile solvents, all of which would tend to have the solvents more or less vaporized, consequently producing a pressure from the heat of vulcanization.

Again, to secure the necessary heat, it is common to use either directly or indirectly, the heat produced by condensation of steam, that is, the latent heat of vaporization of water. Now I contemplate using the latent heat of vaporization of other liquids, and, in fact, this would be involved indirectly if one used an alcohol bath for curing with external heating coils and raised the temperature to such a point that the alcohol was vaporized in the coils and condensed in the heater.

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

1. An apparatus for treating plastic articles comprising a vulcanizing chamber, means whereby the heating medium in said chamber may be brought to the vulcanizing point, a hollow frame for supporting and communicating with the interior of said article or articles and provided with openings for the free circulation of said medium, a duct connected with said frame, and pressure controlling means in communication with said duct, whereby the interior treatment of the article or articles may be controlled.

2. An apparatus for treating plastic articles, comprising a vulcanizing chamber, means whereby the heating medium in said chamber may be brought to the vulcanizing point, a hollow skeleton frame for supporting and communicating with the interior of said article or articles, said frame permitting free circulation of said medium, a duct connected with said frame, and pressure controlling means in communication with said duct, whereby the interior treatment of the article or articles may be controlled.

3. An apparatus for treating plastic articles comprising a vulcanizing chamber, means whereby the temperature in said chamber may be brought to the vulcanizing point, a rack formed of hollow, connected tubing, means whereby said rack may be re-

movably inserted in said chamber, a duct connected with said rack, means carried by said rack whereby a hollow body containing a plastic article may be mounted thereon and in communication with the interior thereof, and pressure controlling means in communication with said duct, whereby the interior treatment of an article on said hollow body may be controlled through said rack.

4. An apparatus for treating plastics, comprising a vulcanizing chamber, means whereby the temperature in said chamber may be brought to the vulcanizing point, a rack formed of hollow, connected tubing, and having a plurality of nipples communicating therewith and each adapted to receive a hollow body containing a plastic article, means whereby said rack may be removably inserted in said chamber, a duct connected with said rack, and pressure controlling means in communication with said duct, whereby the interior treatment of all articles on said hollow bodies may be simultaneously controlled through said rack.

5. An apparatus for treating plastic articles comprising a vulcanizing chamber, means whereby the temperature in said chamber may be brought to the vulcanizing point, a hollow skeleton support for an article or articles, whereby free circulation is permitted about said articles, a duct connected with said support, and a suction creating means in communication with said duct whereby the interior treatment of an article may be controlled.

6. An apparatus for treating plastic articles comprising a vulcanizing chamber, means for delivering a vulcanizing medium thereto, a hollow skeleton support for the article or articles, whereby free circulation is permitted about said articles, a duct connected with said support, and pressure controlling means in communication with said duct, whereby the interior treatment of an article may be controlled.

7. An apparatus for treating plastic articles comprising a vulcanizing chamber, means adjacent the bottom thereof whereby the temperature in said chamber may be brought to the vulcanizing point, ducts extending vertically of said chamber, said ducts being open at the top and bottom whereby a circulation of the vulcanizing medium within said chamber is maintained, a hollow support for an article, means whereby said support may be removably inserted in said chamber, a duct connected with said support, and pressure controlling means in communication with said duct, whereby the interior treatment of an article may be controlled.

8. An apparatus for treating plastic articles comprising a vulcanizing chamber, means adjacent the bottom thereof whereby the temperature in said chamber may be brought to the vulcanizing point, means for delivering a vulcanizing medium at different points of said chamber to agitate the vulcanizing medium therein contained, ducts extending vertically of said chamber, said ducts being open at the top and bottom whereby a circulation of the vulcanizing medium within said chamber is maintained, a hollow support for the article, means whereby said support may be removably inserted in said chamber, a duct connected with said support, and pressure controlling means in communication with said duct, whereby the interior treatment of an article may be controlled.

9. An apparatus for treating plastic articles, comprising a vulcanizing chamber, means whereby the temperature in said chamber may be brought to the vulcanizing point, a hollow skeleton support for the article or articles, a body adapted to have an article formed thereon, coöperating means whereby the said body may be removably mounted upon and the interior thereof placed in communication with said hollow support, and pressure controlling means in communication with said support, whereby the interior treatment of the article on said body may be controlled through said support and said body.

10. An apparatus for treating plastic articles comprising a vulcanizing chamber having a removable, fluid-tight head, tracks in said chamber, means whereby the temperature within said chamber may be brought to the vulcanizing point, a rack comprising a tubular frame adapted to have movement upon said tracks, all parts of said tubular frame being in connection with each other, means carried by said frame whereby fluid-conducting bodies may be removably secured thereto, a duct connected with said tubular frame, and pressure controlling means in communication with said duct whereby the interior treatment of an article may be controlled.

11. An apparatus for treating plastic articles, comprising a vulcanizing chamber, a steam jacket therefor comprising a plurality of parallel independent sections, spaced apart, ducts located intermediate of said sections adapted to deliver a vulcanizing medium to said chamber, and means supplemental to said ducts whereby the temperature in said chamber may be brought to the vulcanizing point.

12. An apparatus for treating plastic articles comprising a vulcanizing chamber, means whereby the temperature in said chamber may be brought to the vulcanizing point, a hollow skeleton support for the article or articles, means whereby said support may be removably inserted in said chamber, a duct, detachable connec-

tions between said duct and said support, and pressure controlling means in communication with said duct, whereby the interior treatment of an article may be controlled.

13. Apparatus for use in manufacturing rubber foot wear comprising a vulcanizing chamber, a frame insertible in and removable from said chamber and comprising hollow bars, a plurality of hollow lasts or forms, means for effecting an air-tight connection between the lasts or forms and said bars, and means connecting the interior of said hollow bars with the exterior of the vulcanizing chamber.

14. Apparatus for use in manufacturing rubber foot wear comprising a vulcanizing chamber having a track, a truck adapted to run on said track and having a rigid frame comprising connected hollow supporting bars provided with upwardly extending nipples, a plurality of hollow lasts adapted to carry rubber footwear, said lasts having in their ends means for engaging said nipples, and means for connecting the interior of said hollow bars with the exterior of the vulcanizing chamber when the latter is closed.

15. An apparatus for vulcanizing boots or shoes comprising a vulcanizing chamber, a hollow frame, a plurality of lasts for supporting boots or shoes during the process of vulcanization, said lasts being provided with apertures opening on the inner surface of the boots or shoes supported thereon, interfitting parts on said lasts and said hollow frame, providing a passage from the surface of the last to the hollow frame, means for applying a heated fluid medium to the outer surface of said boots or shoes and means for establishing a lower fluid pressure on the interior of said boots or shoes than that of the fluid heat conveying medium on the exterior thereof.

In testimony whereof, I have hereunto set my hand in the presence of two subscribing witnesses.

RAYMOND B. PRICE.

Witnesses:
GEO. A. COLSON,
A. M. DISCH.