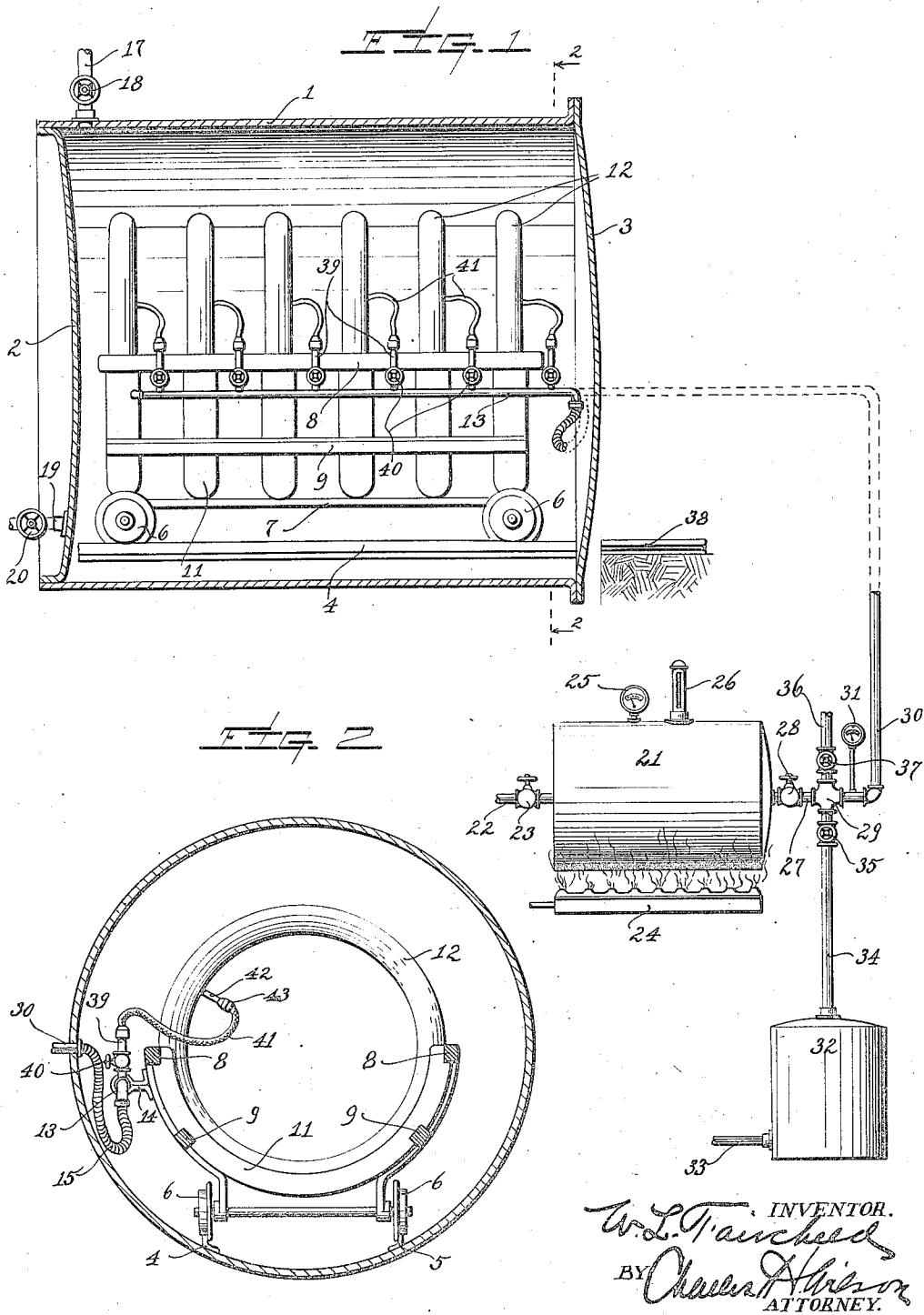


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METHOD OF VULCANIZING PNEUMATIC TUBES.
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METHOD OF VULCANIZING PNEUMATIC TUBES.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, WALTER L. FAIRCHILD, residing at New York, in the county and State of New York, have invented certain new and useful Improvements in a Method of Vulcanizing Pneumatic Tubes, of which the following is a specification.

This invention relates to a new and improved method of vulcanizing, more particularly to a method of vulcanizing tubes for pneumatic tires and the like, and the prime object of the invention is to provide a new and improved process for controlling the pressure and temperature within the molds during the vulcanizing operation.

Another object of the invention is to provide a new and improved method of freeing or loosening the product from the interior of the molds, and also whereby any obnoxious or poisonous gases utilized in the vulcanizing process are discharged to the atmosphere.

Other objects and aims of the invention, more or less specific than those referred to above, will be in part obvious and in part pointed out in the course of the following description of my improved method, and of the steps, and of the relation of each of the steps to one or more of the others thereof employed in carrying out my method, and the scope of protection contemplated will be indicated in the appended claims.

In the accompanying drawing wherein I have illustrated a preferred form of apparatus for carrying out my invention,

Figure 1 is the schematic view, partly illustrating in section the manner of carrying out my improved method, and

Figure 2 is a vertical sectional view taken through the apparatus for carrying out the said process, said view being taken on line 2-2 of Figure 1, looking in the direction of the arrows.

Referring now to the drawings, wherein similar reference characters refer to similar parts in both views thereof the reference 1 denotes a steam chest or vulcanizer, the same comprising a hollow cylindrically-formed box or container, provided with the end walls 2 and 3, the latter being preferably removable for a purpose which will be presently explained. Located within the container are tracks 4 and 5 adapted to receive the wheels 6 and truck or mould carriage 7.

The carriage 7 is provided with a plurality of longitudinally extending members 8 and 9 which carry a plurality of open-

sided semi-circular members 11, the latter being so connected with the longitudinally extending members 8 and 9 so that a rigid superstructure is provided for the carriage. 60

The semi-circular open-sided members 11 are spaced apart and are disposed in parallel vertical planes, the open-ended sides thereof being uppermost so that each of said members provides a pocket adapted for receiving one of the moulds 12. 65

The moulds 12 in the present instance comprise circular hollow receptacles, each of which is formed in sections, the construction being such that when the sections are disconnected the tube upon which the vulcanizing operation is to be effected can be inserted therein, whereby when the sections of the moulds are united by clamping means (not shown), it being understood that the construction of the moulds is such that a gas-tight fit is established between the points of jointure of said sections. 70 75

Extending in parallel relation with the sides of the longitudinally extending members or braces 8 and 9 is a tube 13, said tube being carried upon brackets 14 supported exteriorly of the pocket members 11, one end of said tube being closed as at 14 and the opposite end being connected by means of the flexible connection 15 with a source of gas supply presently to be explained. 80 85

Leading into the vulcanizer 1 is a conduit 17, valved as at 18, and leading out of said container is a conduit 19 valved as at 20. Conduit 17 leads from a suitable source of steam supply (not shown) the conduit 19 operates as a discharge conduit. 90

At this point it may be noted that as is usual in vulcanizing apparatus the conduits 17 and 19 are utilized for the purpose of maintaining such head of steam within the vulcanizer as will maintain the interior of the latter at the desired temperature to be utilized in carrying out the vulcanizing process, the temperature being increased or diminished by a regulation of the steam pressure within the vulcanizer. 95 100

21 denotes a tank or container adapted to receive a gas such as air or, in fact any gaseous mixture, which may be found desirable in assisting in the vulcanizing process. Leading into tank 21 is a conduit 22 valved at 23. This conduit 22 leads from a suitable source of air or gas provided with a pump adapted to maintain a supply of air or gas under pressure in the tank 23. 110

24 denotes a heater or burner disposed underneath the tank 21 through the instrumentality of which any desired temperature may be maintained in the air or gaseous mixture within the tank 21. Suitable pressure and temperature gauges or indicators are shown respectively at 25 and 26 upon the container 1.

Leading from the container 21 is a conduit 27 valved as at 28, said conduit in the present instance leading into the fitting 29. Leading from the fitting 29 is a conduit 30, the latter leading to and being connected with the flexible conduit 15. A pressure gauge 31 is provided in the conduit 30.

The reference numeral 32 indicates a vacuum tank in which a vacuum of any desired degree may be maintained by means of suction applied to the conduit 33, the conduit 34 connecting the vacuum tank 32 with the fitting 29, said conduit 34 being valved as at 35.

Leading from the fitting 29 is a conduit 36 valved as at 37. The conduit 36 leads into the atmosphere and it is intended that the same shall be so disposed that the exit end thereof will be in a point remote from the apparatus, so that any obnoxious or poisonous gases may be discharged into the atmosphere without danger of injury to the operatives of the apparatus.

Located exteriorly of the vulcanizer, are tracks 38, the latter being disposed in parallel relation with the tracks 4 and 5, so that when the end wall or door 3 of the vulcanizer 1 is removed the truck or carriage for the moulds may be rolled out on to the tracks 38, the flexible conduit 35 being either long enough to permit of the removal of the truck 31, or such detachable connection being provided for the flexible conduit 15 as will permit the carriage to be removed from its vulcanizer.

The conduit 13 is provided with a plurality of branches 39, each of which is valved as at 40, said branches 39 being preferably rigidly supported upon the conduit 13. Each of the branches 39 is provided with a flexible tube 41 which connects with the valve stem 42 of each of the tubes within the mould 12. A detachable connection 43 is provided upon the tubes 41 which connects tubes with the valve stems.

At this point it may be noted that the check valve usually employed in valve stems is omitted during the vulcanizing operation, the valves 40 operating to maintain the pressure within the tubes in the mould.

In the drawing I have shown the tube 13 through which the air or gases to be utilized in the vulcanizing of the tubes operation must pass. This tube being located within the vulcanizer insures a heating of the gases passing into the interior of the tubes to a temperature equal to that surrounding the

moulds. Inasmuch as the temperature of the steam within the vulcanizer 1 determines the vulcanizing temperature to which the exterior of the tubes is subjected, it will be seen that the provision of this tube 13 is a decided advantage, in that it insures a temperature interiorly of the moulds equal to the temperature exteriorly thereof.

Having thus described this embodiment of apparatus employed to carry out my improved process, the operation thereof may now be described.

It will be understood that preliminary to starting the vulcanizing operation, the door of the vulcanizer 1 is removed or swung open so that the carriage carrying the moulds may be moved upon the tracks 38. The moulds carrying the tubes to be vulcanized are next inserted in the respective pockets or receptacles 11. During this operation the valves 40 are open so that when the air or other gas to be used in carrying on the vulcanizing process are liberated from the tank 21, they will be discharged into the tubes within the moulds. In the event that the full number of moulds is not to be utilized, such valves 40 whose branches would ordinarily lead to the moulds are closed, thus preventing a discharge of the air or other vulcanizing gases into the interior of the vulcanizer.

When the several moulds have been connected with the conduit 13, the truck carrying all the moulds is run into the vulcanizer and door 3 thereof closed. The valve 28 is then opened, it being understood that the valves 35 and 37 are in closed positions, permitting the air or vulcanizing gases from the tank 21 to pass into the tube. The initial pressure maintained in the tubes in the mould is of course less than the ultimate pressure will be, due to the heating of the moulds by the steam within the vulcanizer.

It will be seen by the arrangement just described that any gas desired to be utilized in the vulcanizing process may be discharged from the tubes by the supply tank 21. Having arranged the truck within the vulcanizer as shown, the steam is let into the said vulcanizer through the said conduit 17 and valve 18, such a pressure being maintained within the vulcanizer as will maintain the moulds at the required vulcanizing temperature. Inasmuch as the air or other gases which pass into the tube, pass through the coil 13, the temperature within the tubes may if desired be kept equal to that of the temperature without the moulds. It will be noted, however, that the temperature of the air or gases within the tubes may be raised or lowered relative to the exterior pressure by regulating the burner 24. When the vulcanizing operation has been completed within the vulcanizer, the valve 28 is closed and the valve 37 opened, whereby the gases lo-

cated within the tubes of the moulds can be discharged into the atmosphere. If it is then desired to loosen the tubes from the interior walls of the moulds, the valve 37
 5 may be closed and the valve 35 opened, thereby subjecting the interior of the tubes to a negative pressure—the effect of which is to contract the tubes and close them, to be separated from the walls of the moulds.

10 If desired, the valves 35 and 28 may be alternately opened and closed, causing the tubes within the moulds to be vibrated, whereby they may be thoroughly and completely disengaged from the walls of the
 15 moulds should there be any tendency for them to stick or adhere thereto.

It will accordingly be seen that I have provided a method well adapted, among others, to obtain all the ends and objects
 20 above set forth, in an exceedingly and efficiently simple manner. The means of my improved method and exact pressure and temperature may be maintained both interiorly and exteriorly of the tubes being
 25 vulcanized. Moreover, any desired gas which may be useful in the moulding operation may be easily projected within the tubes. For instance it may be desirable in some cases to project steam within the tubes
 30 being vulcanized, or a mixture of steam, and the vapors of other substances, whereby all of the material of the tube may be more thoroughly subjected to the vulcanizing operation.

35 The elimination of the usual check valve provided in the valve stems also effects a saving, inasmuch as these valves are ordinarily injured by being subjected to the heat of vulcanization.

40 As many changes could be made in this construction without departing from the

scope of the following claims, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative 45 only and not in a limiting sense.

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

1. The method of vulcanizing rubber 50 tubes consisting in encasing them in suitable molds and subjecting the same to the heat of steam applied to them externally in a closed steam chest, and applying gaseous pressure to the tubes interiorly at the same time, and
 55 then connecting the interiors of the vulcanized tubes with a vacuum tank to free them from the molds.

2. The method of vulcanizing rubber tubes consisting in encasing them in suitable 60 molds and subjecting the same to the heat of steam applied to them externally in a closed steam chest, and applying hot gaseous pressure to the tubes interiorly, and then connecting the interiors of the vulcanized 65 tubes with a vacuum tank to free them from the molds.

3. The method of vulcanizing rubber tubes consisting in encasing them in suitable molds and subjecting the same to the heat of steam 70 applied externally to them in a closed steam chest, and applying gaseous pressure to the interiors of the tubes at the same time, and connecting the vulcanized tubes alternately with a pressure tank and with a vacuum tank 75 to free the tubes from the molds.

In testimony whereof I affix my signature in the presence of two witnesses.

WALTER L. FAIRCHILD.

Witnesses:

EMMA WEINBERG,
 IRVING A. HAMER.