

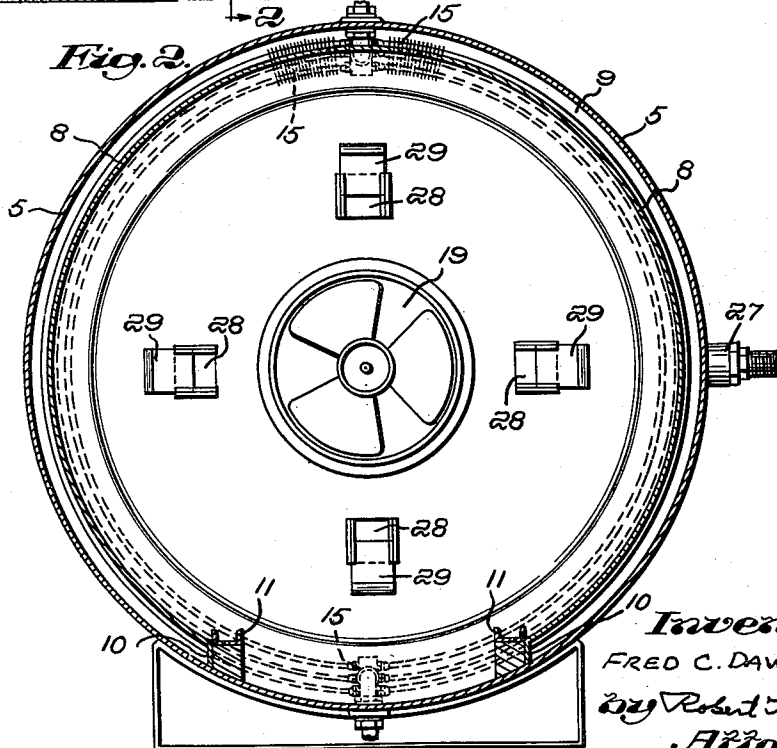
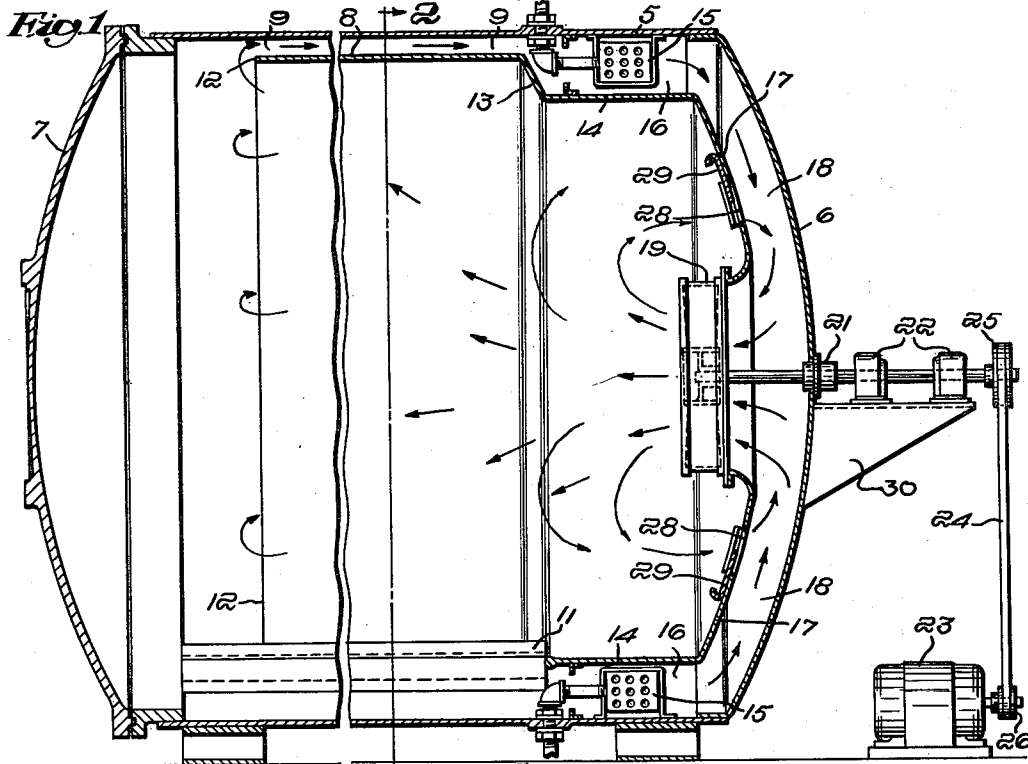
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VULCANIZER

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VULCANIZER

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This invention relates to vulcanizers and relates more particularly to pressure type vulcanizers for rubber footwear.

In the vulcanizing of rubber footwear such as tennis or gymnasium shoes, for example, it is the practice to place the shoes in superimposed racks upon trucks designed for the purpose, and to roll the trucks upon tracks provided therefor, into the interior of vulcanizers, following which the door of the vulcanizer is closed and air pressure and heat are applied for the vulcanizing process.

Prior vulcanizers utilized steam coils extending crosswise at both ends of the vulcanizer, and side coils extending longitudinally of the vulcanizer for providing the heat. The coils were formed from horizontal tubing extending in parallel rows vertically of the vulcanizer. No forced or mechanical movement of the air was provided.

In such prior vulcanizers, the heating was not uniform due to the increased heat resulting from convection currents near the top of the vulcanizer. Also more heat in the form of radiant heat was provided near the steam coils than in the center of the vulcanizer. This has resulted in irregular quality in the vulcanized shoes, since the intensity of the heat applied to about every shoe, or row of shoes has been different.

This invention is for a vulcanizer in which the air is heated at a central heater and is then recirculated through the vulcanizer and the heater to provide a uniform vulcanizing heat throughout the height and length of the vulcanizer with the result that each shoe is heated the same degree. No radiant heat is employed.

In one embodiment of the invention, the vulcanizer comprises an outer cylindrical wall. An inner, substantially cylindrical wall is spaced from the outer wall to provide an air passage therebetween. The inner wall terminates short of the end of the vulcanizer at the door end thereof so that heated air from the interior of the chamber formed by the inner wall can enter the passage between the inner and outer walls. A fan is mounted axially of the vulcanizer at the other end thereof, with its inlet connected by an air passage with the passage between the inner and outer walls. The fan draws air from the interior of the vulcanizer, through the passage between the inner and outer walls, and discharges it axially into the space in the interior of the inner wall. Annular steam heating coils are mounted in the air passage leading to the inlet of the fan for heating the air recirculated through the vulcanizer. The usual track for the shoe contain-

ing trucks extends into the chamber formed by the inner wall. The heated air is blown at uniform velocity and temperature in contact with the surface of every shoe.

Advantages of this invention are that the heating surface used is substantially less, the cost of operation is substantially reduced, the length of the heating cycle is materially shortened, and the quality of the shoes is materially increased due to the uniformity of heating.

An object of the invention is to improve the quality of vulcanized articles.

Another object of the invention is to reduce the cost of operation of a vulcanizer.

Another object of the invention is to reduce the length of the heating cycle in a vulcanizer.

The invention will now be described with reference to the drawing, of which:

Fig. 1 is a longitudinal sectional view through one embodiment of a vulcanizer utilizing features of this invention, and

Fig. 2 is a sectional view along the lines 2—2 of Fig. 1.

The vulcanizer illustrated, consists of the outer cylindrical wall 5 which is closed at one end by the domed wall 6 and which has at the other end, the usual domed door 7 which is opened to permit the entry of and the removal of the trucks containing the shoes.

The inner wall 8 is spaced from the wall 5 to provide the air passage 9, and extends parallel to the wall 5 except at its extreme lower portion where it has the turned down portions 10 which contact the wall 5 adjacent the tracks 11.

The wall 8 terminates at 12 adjacent the door end of the vulcanizer so that air from the interior of the wall 8 can be deflected by the door 7 to flow, as indicated by the arrows of Fig. 1, into the passage 9.

At the other end of the vulcanizer, the wall 8 connects with the walls 13 and 14 to form an enlarged air passage 16 within which is supported and finned, annular heating coils 15.

The wall 14 connects with the wall 17 to form an air passage 18 connecting the air passages 16 and 9 with the inlet of the propeller fan 19.

The fan is supported from the wall 17 and is arranged to discharge the heated air axially into the center of the vulcanizer chamber formed within the wall 8.

The wall 17 adjacent the fan has the slots 28 provided therein for permitting the short circuit flow of small volumes of heated air from the outlet of the fan into the inlet thereof and through the cold spots which tend to form in the end

areas adjacent and around the periphery of the fan. The slides 29 are provided in the slots 28 for varying the volume of air through the slots. Through the use of such slots the temperature of the air in the fan end area of the vulcanizer is raised to that directly in axial alignment with the fan. Arrows indicating air flow on Fig. 1, illustrate the above described short circuit flow.

The fan is driven by the shaft 20 which extends through the stuffing box 21 and bearings 22 and which in turn is rotated through the belt 24 and pulleys 25 and 26, by the motor 23. The bearings 22 are mounted upon the bracket 30 which in turn is supported from the domed end wall 6 of the vulcanizer. Due to this and to the flexible belt 24, when the wall 6 is heated and expands, thus changing its shape and position, the drive automatically accommodates itself to the changes without binding or friction.

The pipe 27 extends through the outer wall 5 and is provided for connection to a suitable compressed air or other gas source for applying pressure within the vulcanizer.

In operation, the door is opened to permit the shoe laden trucks which may be four in number, to be moved on the tracks 11 into the interior of the chamber formed within the interior of the wall 8. The door is then replaced and adjusted by the usual mechanism to form an air tight closure. A thirty pounds air pressure is built up within the vulcanizer by air supplied under pressure through the usual air inlet pipe 27. Heat is applied to the coils 15 and the fan 19 is rotated. The fan draws air from the vulcanizing chamber, draws it through the surfaces of the coils 15 and recirculates it continuously through the vulcanizer. The heated air is forced at high velocity in contact with the surface of every shoe and heats all surfaces to the same temperature.

In order to maintain uniform quality in the footwear a 4° F. temperature differential is permissible. In prior vulcanizers, 30° temperature variations were common resulting in many "seconds" and in many shoes of inferior quality. With this invention, the temperature differential may be maintained at 3° or less with the result that there are no "seconds" due to improper vulcanizing, every shoe being vulcanized to the same quality. This has resulted largely from eliminating radiant heat with its attendant necessity for, and difficulty of, control.

By varying the speed of the fan 19 through varying the pulley sizes, the length of the heating cycle may be varied as desired.

While the invention has been described as applied to the vulcanizing of rubber footwear, it should be understood that it may be applied to the vulcanizing of other articles incorporating natural or synthetic rubber.

While one embodiment of this invention has been described for the purpose of illustration, it should be understood that the invention is not limited to the exact apparatus and arrangement of apparatus disclosed, as modifications thereof may be suggested by those skilled in the art without departure from the essence of the invention.

What is claimed is:

1. A vulcanizer for rubber footwear and the like, comprising an outer shell, an inner shell having its walls spaced from said outer shell for forming an air passage therebetween, said inner shell forming a vulcanizing chamber in the interior thereof, said chamber communicating with said passage at one end of said vulcanizer for admitting air from said chamber into said passage, said vulcanizer having a door end and an opposite closed end, a propeller fan at said closed end, an inner end wall spaced from said closed end and forming an air passage connecting said passage with the inlet of said fan, said fan being mounted to have its outlet discharge axially into said chamber, for recirculating air through said passages and chamber, an annular heating coil in said first mentioned passage, and means including an opening in said end wall for permitting air from the outlet of said fan to flow into the inlet thereof, for preventing cold spots around said outlet.

2. A vulcanizer for rubber footwear and the like, comprising an outer shell, an inner shell having its walls spaced from said outer shell for forming an air passage therebetween, said inner shell forming a vulcanizing chamber in the interior thereof, said chamber communicating with said passage at one end of said vulcanizer for admitting air from said chamber into said passage, said vulcanizer having a door end and an opposite closed end, a propeller fan at said closed end, an inner end wall spaced from said closed end and forming an air passage connecting said passage with the inlet of said fan, said fan being mounted to have its outlet discharge axially into said chamber, for recirculating air through said passages and chamber, an annular heating coil in said first mentioned passage, and means in said end wall comprising a plurality of slots around the periphery of said fan for permitting air from the outlet of said fan to flow into the inlet thereof, for preventing cold spots around said outlet.

3. A vulcanizer for rubber footwear and the like, comprising an outer shell, an inner shell having its walls spaced from said outer shell for forming an air passage therebetween, said inner shell forming a vulcanizing chamber in the interior thereof, said chamber communicating with said passage at one end of said vulcanizer for admitting air from said chamber into said passage, said vulcanizer having a door end and an opposite closed end, a propeller fan at said closed end, an inner end wall spaced from said closed end and forming an air passage connecting said passage with the inlet of said fan, said fan being mounted to have its outlet discharge axially into said chamber, for recirculating air through said passages and chamber, an annular heating coil in said first mentioned passage, means in said end wall comprising a plurality of slots around the periphery of said fan for permitting air from the outlet of said fan to flow into the inlet thereof, for preventing cold spots around the outlet, and means in said slots for varying the effective area thereof.

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