J. V. WORTHINGTON.

PRESS.

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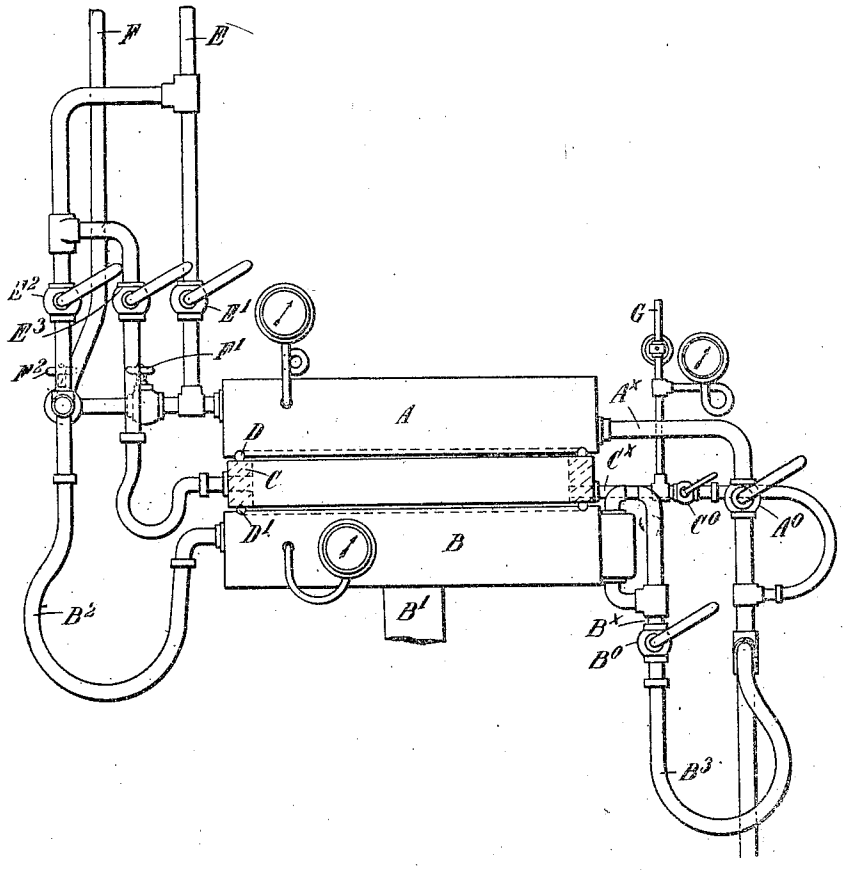
1,119,560. Patented Dec. 1, 1914.



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UNITED STATES PATENT OFFICE.

JOHN VIGERS WORTHINGTON, OF BIRMINGHAM, ENGLAND, ASSIGNOR TO THE DUNLOP RUBBER COMPANY, LIMITED, OF BIRMINGHAM, ENGLAND.

PRESS.

1,119,560. Specification of Letters Patent. Patented Dec. 1, 1914.

Application filed October 7, 1912. Serial No. 724,433.

To all whom it may concern:

Be it known that I, JOHN VIGERS WORTHINGTON, a subject of the King of Great Britain, residing at Manor Mills, Salford street, Aston, Birmingham, in the county of Warwick, England, have invented a certain new and useful Press, of which the following is a specification.

This invention relates to the manufacture of golf balls and similar molded articles and has particular reference to the application of heat and pressure to such articles when in their molds, the chief object being to eliminate as far as possible surface defects on the finished articles, and in some cases to enable this treatment to be performed more rapidly than hitherto.

According to the present invention the molds containing the balls or other articles are subjected to heat and pressure in a frame or chamber from which the air is exhausted before the heat and pressure are applied. The removal of the air from the chamber and hence from the molds also,—the sections of which are only loosely fitted together, not being yet subjected to pressure,—minimizes or eliminates the tendency for air bubbles to remain occluded in recesses or irregularities in the molds; such occluded bubbles have hitherto been the chief source of defects in the surface of the finished articles. The frame or chamber in which the articles are subjected to pressure comprises a ring having compressible packing on its edges. The press members, which are in the form of hollow plates, are adapted to clasp the aforesaid ring between them and the compressible packing permits of air tight joints being formed so that the space inclosed by the ring and plates can be exhausted before the pressure is actually applied to the molds by the further approach of the plates toward one another. The approach of the plates is of course limited by the intervening ring, the depth of which is suited to the depth of the molds. The heat is applied to the molds by circulating steam or other appropriate gases within the press members. The chamber can finally be cooled rapidly by circulating cold water or other fluid within it and within the said press members.

The plates may be arranged vertically above one another and the lower plate may be carried by a vertically movable hydraulic ram; means may also be provided for keeping the intervening ring suspended between the plates when the lower plate is lowered.

In order that the invention may be clearly understood and readily carried into effect the same will now be described more fully with reference to the accompanying drawing which illustrates in sectional elevation the constructional form of apparatus above referred to.

A is the upper and B the lower of the two parallel plates which are circular and hollow.

C is the metal ring, and D, D^1 are the rubber rings mounted in its upper and lower edges.

The faces of the plates A and B are slightly grooved or recessed, as shown, to permit of the projecting rubber rings D, D^1, becoming well bedded against their surface and to provide space in which the said rings can become compressed without, however, becoming unduly crushed when the final pressure is exerted between the plates. The lower plate B is mounted upon a vertically movable hydraulic ram B^1.

E is a water supply pipe and E^1 E^2 E^3 are valves for controlling the supply of water to the interior of the plates A and B and the ring C respectively.

F is a steam supply pipe and F^1 F^2 are valves for controlling the supply of steam to the interior of the plates A and B. A portion B^2 of the piping to the lower plate B is flexible to permit of the vertical movement of the plate B.

G is a pipe leading to an exhaust pump.

A^x is a steam or water exhaust pipe leading from the plate A, and A° a valve in said pipe; similarly B^x is a pipe leading from a box on the plate B, and B° a valve in said pipe.

B^3 is a flexible portion of exhaust piping to permit of the vertical movements of the plate B.

C^x is a water exhaust pipe leading from the ring C, and C° a valve in said pipe.

In using the apparatus for the manufacture of golf balls, any desired number of molds containing the assembled portions of the balls are placed upon the lower plate B when in its lowered position; and the ram B^1 is then caused to raise this plate sufficiently to bring its groove or recess into con-

tact with the lower rubber packing ring D^1 of the suspended metal ring C and bring the upper rubber packing ring D against the groove or recess on the under-surface of the upper plate A. A chamber is thus formed, with the molds within it, but the plates A and B are not at this time brought sufficiently near one another to cause pressure to be exerted upon the different sections of the molds, or even allow the molds to touch the face of the upper plate. The vacuum pump is then set in operation to exhaust this chamber by the extraction of the inclosed air through the exhaust pipe G. Steam is then admitted to the interior of the hollow plates by opening the valves F^1, F^2, and the full pressure exerted upon the molds by further raising the lower plate B, the rubber packing rings becoming compressed to permit of this movement. When the balls inside the molds have been heated sufficiently, the steam supply is cut off by closing the valves F^1 and F^2, and cold water is freely circulated in the hollow plates, and also in the chamber, by opening the valves E^1, E^2, E^3, and A^9, B^9, C^6, thereby rapidly cooling the plates and the molds. The hollow plates can then be separated and the balls removed from their molds.

Although the invention is particularly applicable to golf balls, since a large number of balls can be dealt with in a comparatively short period of time, it may also be adopted in the manufacture of molded articles generally where heat and pressure treatment is required and especially in the manufacture of rubber and ebonite articles requiring complicated molds.

What I claim and desire to secure by Letters Patent of the United States is:—

1. Apparatus for use in the manufacture of golf balls or similar molded articles by the application of heat and pressure to them when they are in their molds, comprising a cylindrical ring, the depth of which is suited to that of the molds, compressible packing on the flat edges thereof, plates adapted to be pressed against the flat edges of said ring thus forming a mold chamber and also applying pressure to the articles in the molds, means for exhausting the chamber, and means for controlling the temperature within said chamber.

2. Apparatus for use in the manufacture of golf balls or similar molded articles by the application of heat and pressure to them when they are in their molds, comprising a cylindrical ring the depth of which is suited to that of the molds, compressible packing on the flat edges thereof, hollow plates adapted to be pressed against the flat edges of said ring thus forming a mold chamber, and also applying pressure to the articles in the molds, means for exhausting the chamber, means for circulating a fluid heating medium within the hollow plates, and means for circulating a fluid cooling medium within the said plates.

3. Apparatus for use in the manufacture of golf balls or similar molded articles by the application of heat and pressure to them when they are in their molds, comprising a horizontally situated cylindrical ring with vertical walls the depth of which is suited to that of the molds, compressible packing carried by and projecting from its upper and lower edges, upper and lower hollow plates for clasping the ring between them thus forming a mold chamber, and also applying pressure to the articles in the molds, means for exhausting the chamber, means for moving the plates toward and away from each other, means for circulating a fluid heating medium within the plates, and means for circulating a cooling medium within the plates and within the chamber.

4. Apparatus for use in the manufacture of golf balls or similar molded articles by the application of heat and pressure to them when they are in their molds, comprising a horizontally situated cylindrical ring having vertical walls, the depth of which is suited to that of the molds, compressible packing carried by and projecting from its upper and lower edges, upper and lower hollow plates recessed on their opposing faces to partially accommodate the projecting packing of the ring when the latter is clasped between the plates to form a mold chamber, and also to apply pressure to the articles in the molds, means for exhausting the chamber, means for moving the plates toward and away from each other, means for circulating a fluid heating medium within the plates, and means for circulating a cooling medium within the plates and within the chamber.

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

JOHN VIGERS WORTHINGTON.

Witnesses:
ARTHUR F. DERRETT,
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