18. PLASTICS

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v - Water bath

Aug. 25, 1925. 1,551,025

C. H. GRAY

MEANS FOR VULCANIZING ARTICLES IN FLUIDS

Filed June 17, 1924

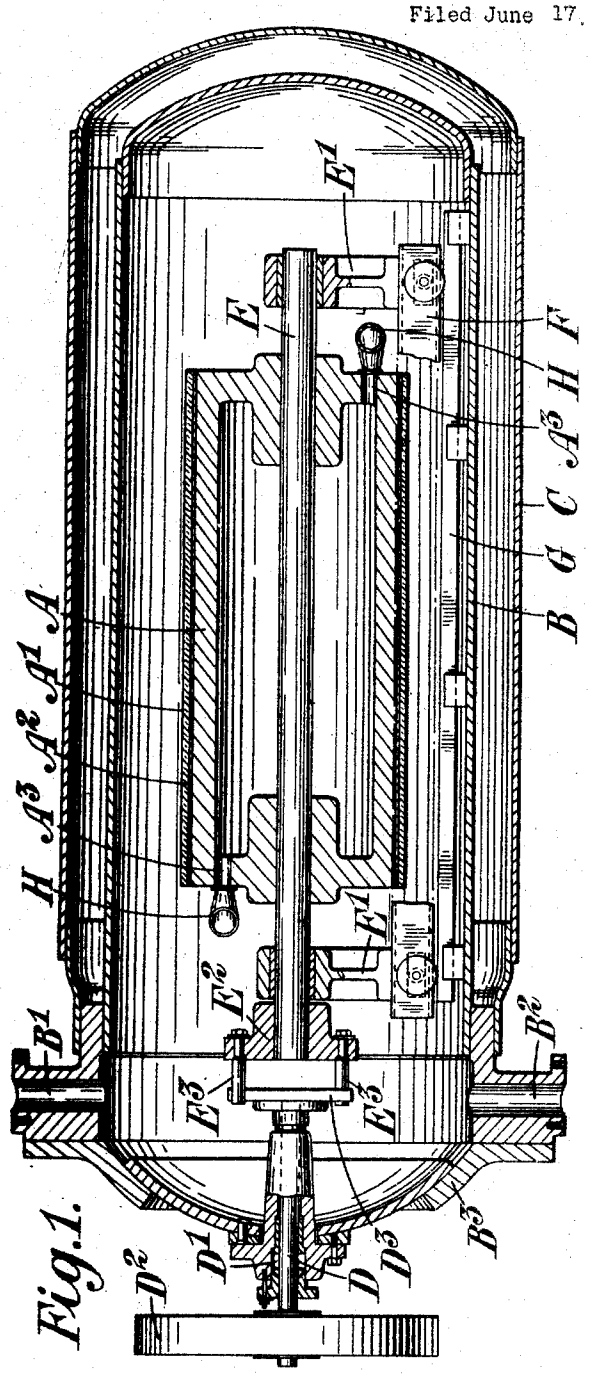


Fig. 1.

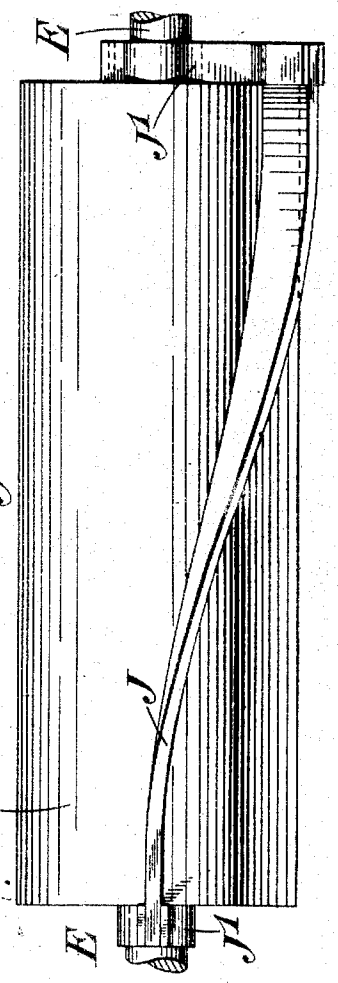


Fig. 2.

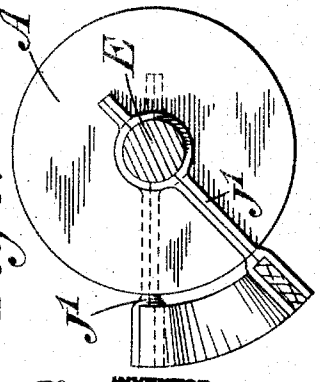


Fig. 3.

INVENTOR

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His Attys

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UNITED STATES PATENT OFFICE.

CHRISTIAN HAMILTON GRAY, OF LONDON, ENGLAND.

MEANS FOR VULCANIZING ARTICLES IN FLUIDS.

Application filed June 17, 1924. Serial No. 720,562.

To all whom it may concern:

Be it known that I, CHRISTIAN HAMILTON GRAY, a subject of the King of England, residing at London, England, have invented certain new and useful Improvements in Means for Vulcanizing Articles in Fluids, of which the following is a specification.

This invention is for improvements in or relating to means for vulcanizing hollow articles in fluids and has for its object to obtain a more homogeneous product than has heretofore been possible when vulcanizing articles of considerable size in fluids.

A roll such as is used for paper making comprises a hollow cylindrical metal shell to the surface of which a layer of rubber is attached through the medium of a layer of ebonite.

It is essential that the rubber on these rolls should be vulcanized to the same degree throughout, in order that its resulting resilience and strength should be uniform.

It is the practice to vulcanize these articles in a horizontal position in a vessel containing a fluid which is heated to bring it to vulcanizing temperature.

When the said articles are vulcanized in a fluid which is a bad conductor of heat (as for example water) it is found that the temperature of the fluid in the interior of the article does not rise with the temperature of the fluid exterior to the article, which results in the temperature of the metal shell of the roll rising much more quickly at the ends than at the center and consequently the portion of the covering adjacent the metal shell being vulcanized to a greater degree at the ends than at the center of the roll.

According to one feature of this invention, there is combined with means for so carrying the article within the fluid-containing vulcanizing chamber that it can be rotated therein, of means, such as scoops, secured to the article or a part carrying the same in such manner as to be operative to circulate the fluid through the interior of the latter as it rotates.

Another feature of this invention is the method of vulcanizing hollow articles in a fluid-containing vulcanizing chamber consisting in circulating the fluid through the interior of the said article.

In the acompanying drawings which illustrate one method of carrying out this invention—

Figure 1 is a central longitudinal vertical section through apparatus constructed according to this invention,

Figure 2 is an external view of a paper-roll showing a detail not illustrated in Figure 1, and

Figure 3 is an end view of the part shown in Figure 2.

In the drawings the article to be treated is illustrated as a paper-roll A having a rubber layer A^1 attached to the roll by an ebonite layer A^2. These two layers A^1, A^2 are to be vulcanized and in the description are treated as part of the article A. The container comprises a cylindrical chamber B surrounded by a jacket C. The interior of the jacket is supplied, by means not indicated, with the heating medium for vulcanizing, which may be steam.

At one end of the container is an inlet B^1 for fluid, and opposite this is an outlet B^2. This same end is provided with a detachable cover B^3 wherein is mounted a driving-spindle D. The driving-spindle extends through a stuffing-box D^1 in the cover. At its outer end it carries a pulley D^2, whereby it may be driven, and at its inner end it has a driving cross-arm D^3.

The paper-roll is ordinarily carried on a shaft E and this, for the purpose of vulcanizing, is supported in brackets E^1 which afford bearings wherein it can rotate. The brackets are mounted on a trolley F and this runs on guide-rails G within the container. A driving-head E^2 is attached to the shaft E at that end near the cover B^3 of the container, and two pins E^3 extend from the driving-head to engage the cross-arm D^3 of the spindle D.

These paper-rolls are ordinarily provided with end-openings A^3, and for the purpose of this invention these are taken advantage of to insert therein scoops H whose open ends face in opposite directions, that is, one in the direction of rotation and the other in the reverse direction.

The guide-rails G enable the paper-roll to be easily brought into proper position within the vulcanizing chamber B with the driving-head E^2 of the shaft E in proper position for engaging the cross-arm D^3 of the spindle D. When the cover-plate B^3 is

in position, the vulcanizing chamber is filled with a fluid, which may be water, and a heating medium, such as steam, is introduced into the surrounding jacket C. The spindle D is then set in motion so that the roll is rotated in the chamber. As the open mouth of the leading scoop H advances through the water, water will be driven in thereat, and the trailing one will permit water to escape therefrom so that a circulation of water will be maintained through the interior of the roll. This circulation of liquid through the roll is found to effect a more even vulcanization of the rubber towards the inner portion of the mass of rubber than has heretofore been possible.

Vanes may be provided on the article if desired to circulate the water round the container exterior to the article. A vane suitable for this purpose is illustrated at J, Figures 2 and 3. The vane is carried by radial arms J^1 secured on the shaft E and is made in form to correspond to a quick-thread screw so that, as the roll A rotates, the water or other fluid within the container will be propelled in the endwise direction of the container, as well as having imparted to it a rotary movement about the axis of the shaft E. More than one vane may be employed, if desired, and it is not necessary that these should extend from one end of the roll to the other, although the vane J is shown so arranged.

Obviously, the invention is not restricted to the vulcanizing of paper-making rolls, as it is applicable to any article which can be rotated, and can be made hollow and have communication with the exterior for the purpose of circulating the water through them.

The invention is not restricted to the use of liquid as the medium for conveying the heat in the jacket to the article, but it is applicable also to the use of a gas, such as air, for this purpose.

Where the article is not provided with end-holes through which the liquid could be circulated, these may be specially provided, and some articles which have heretofore been made solid might preferably be made hollow for the purpose of getting an even distribution of heat through the same during vulcanization.

I claim:—

1. In apparatus for vulcanizing a hollow article in a fluid, the combination of a vulcanizing chamber to contain the fluid, supporting means for rotatably mounting the article in said chamber, and fluid-circulating means movable with the article and arranged to circulate the fluid through the interior of the article as the article is rotated, substantially as described.

2. In apparatus for vulcanizing in a fluid a hollow article having openings in its wall, the combination of a vulcanizing chamber for the fluid, supporting means for rotatably mounting the article in said chamber, and scoops movable with the article and arranged to circulate the fluid by way of said openings through the interior of the article as the article is rotated, substantially as described.

3. In apparatus for vulcanizing a hollow article in a fluid, the combination of a vulcanizing chamber to contain the fluid, supporting means for rotatably mounting the article in the chamber, a driving-spindle extending through one wall of the chamber, means for operatively connecting the driving-spindle within the chamber to the article, and fluid-circulating means movable with the article and arranged to circulate the fluid through the interior of the article as the article is rotated, substantially as described.

4. In apparatus for vulcanizing a hollow article in a fluid, the combination of a vulcanizing chamber to contain the fluid, a hollow article of elongated form having orifices in its end-portions rotatably mounted in said chamber, and fluid-circulating means rotatable with the article and arranged to circulate the fluid through the interior of the article by way of the aforesaid orifies as the article is rotated, substantially as described.

5. In vulcanizing apparatus, the combination of a vulcanizing chamber for a fluid, a hollow article of elongated form to be vulcanized having orifices in its end-portions rotatably mounted in said chamber, a driving spindle extending through one wall of the chamber, means operatively connecting the driving spindle within the chamber to said article, and fluid-circulating means rotatable with the article and arranged to circulate the fluid through the interior of the article by way of said orifices as the article is rotated, substantially as described.

6. In apparatus for vulcanizing a hollow article in a fluid, the combination of a vulcanizing chamber to contain the fluid, supporting means for rotatably mounting the article in said chamber, fluid-circulating means movable with the article and arranged to circulate the fluid through the interior of the article as the article is rotated, and means rotatable with the article and arranged to impart movement to the fluid within the chamber about the exterior surface of the article as the article is rotated, substantially as described.

7. In vulcanizing apparatus, the combination of a vulcanizing chamber for a fluid, a hollow article of elongated form to be vulcanized having orifices in its end-portions rotatably mounted in said chamber, fluid-circulating means rotatable with the article and arranged to circulate the fluid through the interior of the article by way of said orifices as the article is rotated, and means rotatable with the article to impart movement to the fluid within the chamber

about the exterior surface of the article as the article is rotated, substantially as described.

8. In vulcanizing apparatus, the combination of a vulcanizing chamber for a fluid, a hollow article of elongated form to be vulcanized having orifices in its end-portions rotatably mounted in said chamber, fluid-circulating means rotatable with the article and arranged to circulate the fluid through the interior of the article by way of said orifices as the article is rotated, and a vane carried on the circumferential surface of the article and arranged to impart movement to the fluid within the chamber about the exterior surface of the article as the article is rotated, substantially as described.

9. In apparatus for vulcanizing a hollow article in a fluid, the combination of a vulcanizing chamber to contain the fluid, supporting means for rotatably mounting the article in the chamber, a driving-spindle extending through one wall of the chamber, means for operatively connecting the driving-spindle within the chamber to the article, fluid-circulating means movable with the article and arranged to circulate the fluid through the interior of the article as the article is rotated, and means rotatable with the article and arranged to impart movement to the fluid within the container about the exterior surface of the article as the article is rotated, substantially as described.

10. In apparatus for vulcanizing in a fluid a hollow article having orifices in its wall, the combination of a vulcanizing chamber for the fluid, supporting means for rotatably mounting the article in the chamber, a driving spindle extending through one wall of the chamber, means for operatively connecting the driving spindle within the chamber to said article, scoops movable with the article and arranged to circulate the fluid through the interior of the article by way of said orifices as the article is rotated, and a vane rotatable with the article and arranged to impart movement to the fluid within the container about the exterior surface of the article as the article is rotated, substantially as described.

11. In apparatus for vulcanizing a hollow article in a fluid, the combination of a vulcanizing chamber to contain the fluid, a hollow article of elongated form having orifices in its end-portions rotatably mounted in said chamber, fluid-circulating means rotatable with the article and arranged to circulate the fluid through the interior of the article by way of the aforesaid orifices as the article is rotated, and means rotatable with the article and arranged to impart movement to the fluid within the container about the exterior surface of the article as the article is rotated, substantially as described.

12. In vulcanizing apparatus, the combination of a vulcanizing chamber for a fluid, a cylindrical paper-making roll having orifices in its end-portions rotatably mounted in said chamber, fluid-circulating means rotatable with said roll and arranged to circulate the fluid through the interior of said roll by way of the said orifices as the roll is rotated, and means rotatable with the roll and arranged to impart movement to the fluid within the container about the exterior surface of the roll as the roll is rotated, substantially as described.

13. In vulcanizing apparatus, the combination of a vulcanizing chamber for a fluid, a cylindrical paper-making roll having orifices in its end-portions rotatably mounted in said chamber, scoops carried in said orifices and arranged to circulate the fluid through the interior of the roll as the same is rotated, and a vane carried on the circumferential surface of the roll and arranged to impart movement to the fluid within the container about the exterior surface of the roll as the latter is rotated, substantially as described.

In testimony whereof I have signed my name to this specification.

CHRISTIAN HAMILTON GRAY.