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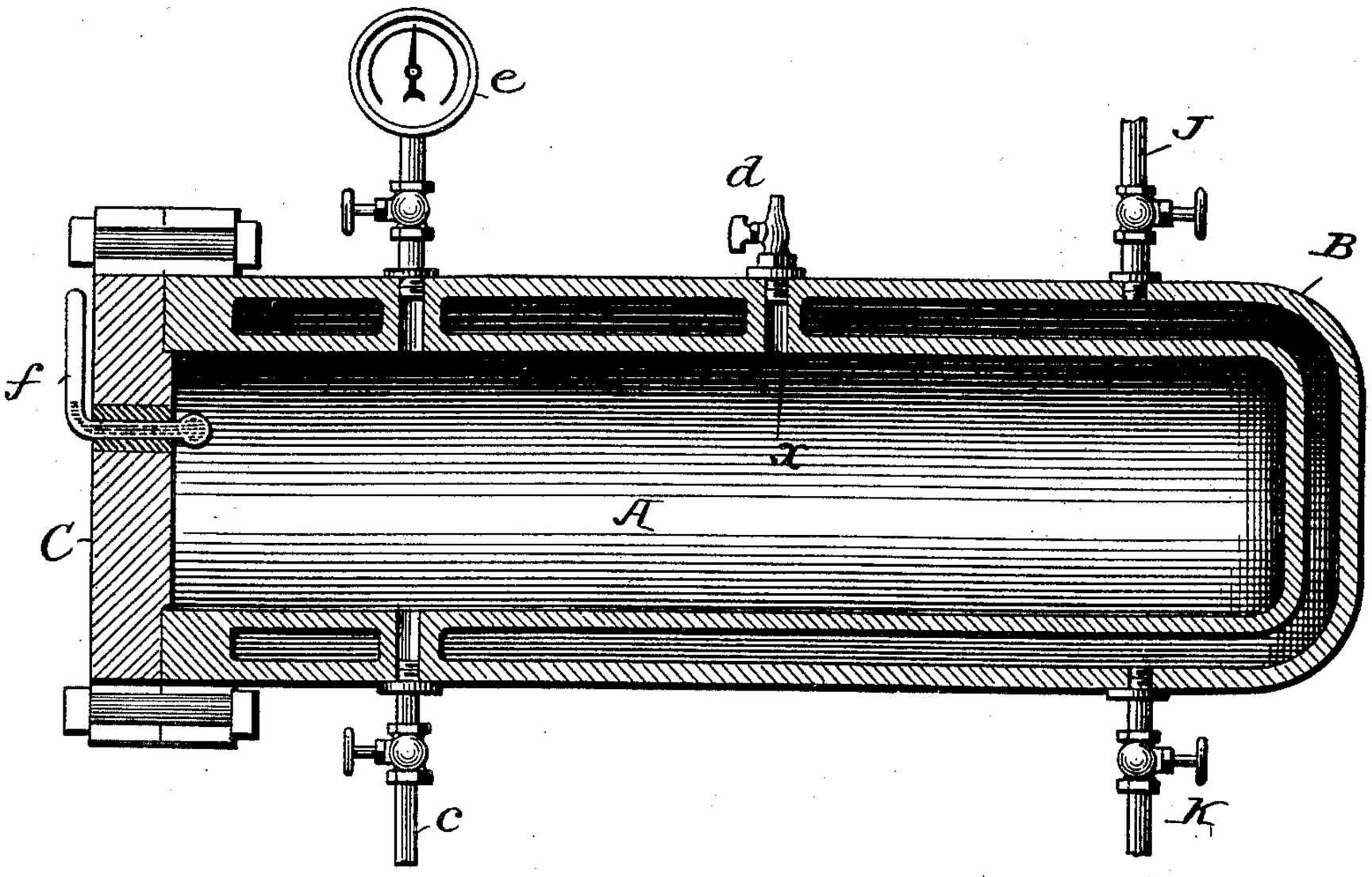
A. O. BOURN.

PROCESS OF VULCANIZING RUBBER.

(Application filed Jan. 2, 1902.)

(No Model.)



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UNITED STATES PATENT OFFICE.

AUGUSTUS O. BOURN, OF BRISTOL, RHODE ISLAND.

PROCESS OF VULCANIZING RUBBER.

SPECIFICATION forming part of Letters Patent No. 697,792, dated April 15, 1902.

Application filed January 2, 1902. Serial No. 88,072. (No specimens.)

To all whom it may concern:

Be it known that I, AUGUSTUS O. BOURN, a citizen of the United States, residing at Bristol, in the county of Bristol and State of Rhode Island, have invented a certain new and useful Process of Vulcanizing Rubber, of which the following is a specification.

My invention relates to the vulcanizing of articles from compounds of rubber or allied gums; and it consists in subjecting the articles to an atmosphere of a gas which has an affinity for sulfur as it exists either separately or in any of its compounds, together with means whereby a surrounding atmosphere of the said character may be secured in a closed chamber at any desired pressure without the use of any pressure appliances.

In carrying out my invention I make use of any suitable substance which in the form of a gas or vapor will combine with sulfur or sulfur compounds to form combinations not injurious to rubber, and I may employ any suitable apparatus.

As shown in the accompanying drawing, there is illustrated one form of apparatus which has proved to be effective, the same consisting of a casing A, provided with a removable cap or cover C, with a pressure-gage *e* and thermometer *f* and with an inlet-opening *x*, to which is secured a detachable plug *d*, the latter being shown also in the form of a cock, which may be opened to permit the escape of gas, while the removal of the plug permits the volatilizable material to be inserted after the cap is secured in place, if so desired. One means of heating the casing consists in surrounding it with a jacket B, forming a space into which steam may be introduced through a pipe J, provided with a cock, a drip-pipe K, also provided with a cock, serving to withdraw any condensed moisture.

The articles to be vulcanized are placed within the casing A, together with the substance which is to be volatilized to form an atmosphere surrounding the articles. As before stated, this substance may be passed through the opening afforded by removing the plug *d*, or it may be placed in the casing before the cap C is applied. The said substance (whatever it may be) is of such character that it will be volatilized under the action of heat and will thus create a pressure within the chamber, and the amount of the substance introduced is such that the proper pressure will be so secured, while the vaporized material will combine with any sulfur compounds liberated from the articles to neutralize the deleterious action of the same. While different substances may be employed, as bromid of ammonium, iodid of ammonium, &c., I have found effective results to ensue from the use of carbonate of ammonium, which when volatilized exerts a peculiar beneficial effect upon the compound by increasing the tensile strength of the product. By introducing the carbonate of ammonium in the form of a salt into the chamber before heating the same the pressure resulting from the volatilization of the ammonium is secured without the use of pumps, the degree of pressure being regulated by the quantity of material thus introduced, and this will be varied (as also will be the time and temperature) according to the character of the materials or compositions operated upon. When the articles are not of unusual thickness and are placed in a chamber five inches in diameter and twenty-four inches in length, one-half an ounce of carbonate of ammonium will secure a pressure sufficient with a temperature of approximately 270° or 300° Fahrenheit to thoroughly vulcanize the articles in about three-quarters of an hour.

While I prefer the means above described of securing an atmosphere under pressure and heat for vulcanizing the articles, it is not absolutely necessary in carrying out that portion of my invention which consists in submitting the articles to an atmosphere that will act upon the sulfur to secure the pressure in this way, and I therefore may provide the apparatus with a pipe *c*, through which the desired gas may be introduced under pressure secured by other means.

The above-described process, consisting in subjecting an article to an atmosphere which has an affinity for sulfur in any of its forms, may be a process under which the articles are treated throughout, or they may be subjected to such a process for a limited time and thereafter be subjected to the action of hot air under pressure or steam, as in other vulcanizing processes, to complete the operations.

It has been found that ammoniacal gas not only has no injurious action on rubber or allied gums, but, in fact, it is actively beneficial, as it tends, in addition to the results before specified, to neutralize any injurious gases or substances that may be formed during the process of vulcanization, so that it therefore has an active effect in the process of vulcanization, and as it is forced by the pressure into the outer portions of the articles operated upon this active neutralization of any injurious substances which might be formed within the body of the rubber imparts to the said articles for a depth corresponding to the extent to which they are penetrated a superior quality, which otherwise would not be secured.

Without limiting myself to the use of any special apparatus or to the precise steps set forth, I claim—

1. The within-described process of vulcanizing articles made of rubber compounds, consisting in subjecting the articles to heat and pressure in an atmosphere of a gas having an affinity for sulfur compounds, that will neutralize those compounds injurious to rubber, substantially as set forth.

2. The within-described process of vulcanizing rubber articles, consisting in subjecting the articles to heat and pressure in an atmosphere of volatilized ammonium salt, substantially as set forth.

3. The within-described improvement in vulcanizing articles of rubber under heat and pressure, consisting in heating the articles, together with a volatilizable substance having an affinity for sulfur compounds, in a closed chamber, substantially as set forth.

4. The within-described improvement in vulcanizing articles of rubber under heat and pressure, consisting in heating the articles, together with a volatile ammonium salt, in a closed chamber, substantially as set forth.

5. The within-described improvement in vulcanizing articles of rubber under heat and pressure, consisting in heating the articles in a closed chamber, together with a volatilizable substance having an affinity for sulfur compounds, in proper quantity to produce when volatilized the desired pressure in said chamber, substantially as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

AUGUSTUS O. BOURN.

Witnesses:
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