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PRESSURE TREATMENT OF SUBSTANCES SUCH AS LATEX

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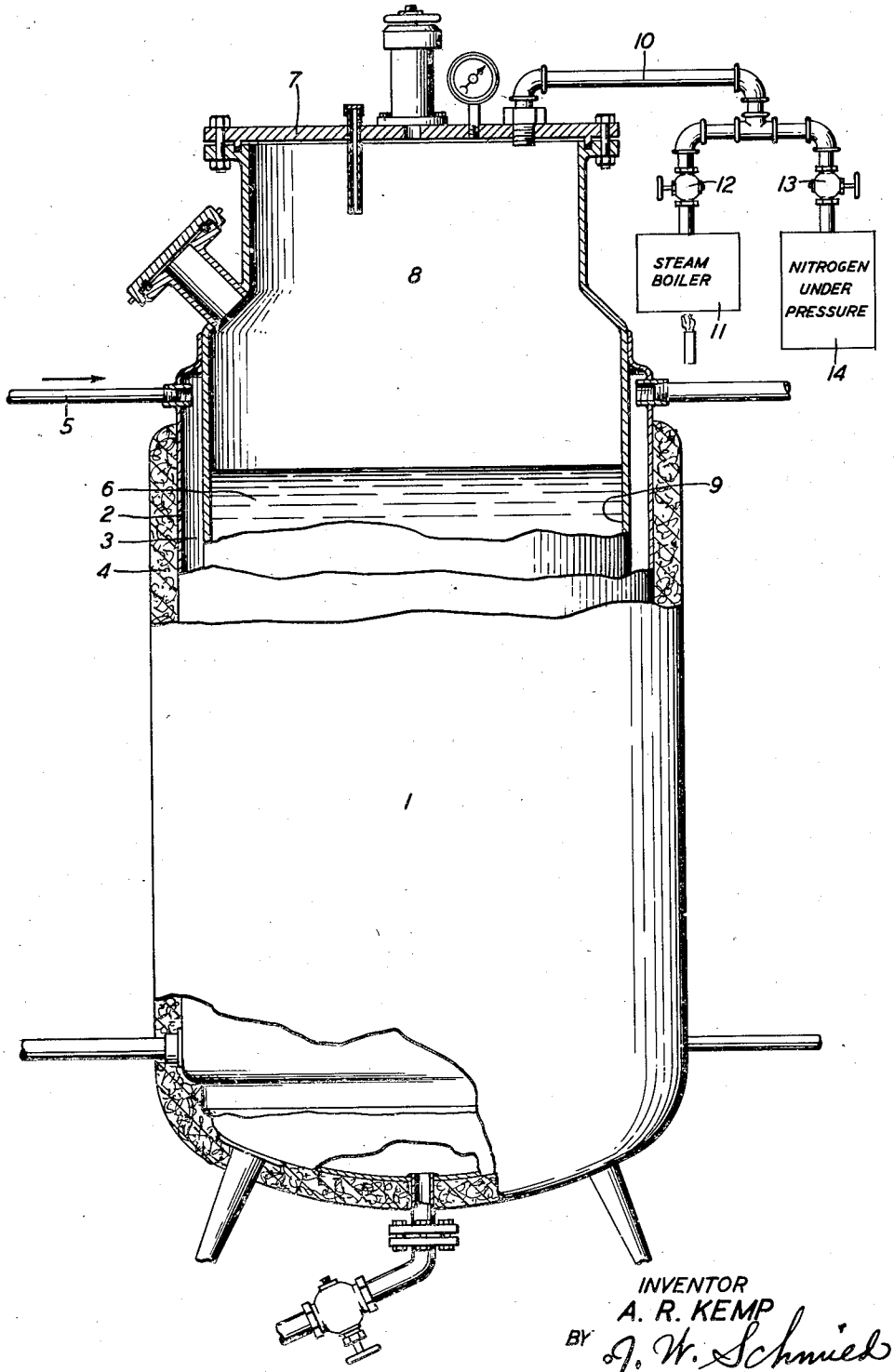

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PRESSURE TREATMENT OF SUBSTANCES SUCH AS LATEX

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Substitute for application Serial No. 454,370, May 21, 1930. This application April 22, 1931, Serial No. 531,937

3 Claims. (Cl. 18—50)

This invention relates broadly to treatment of solids dispersed in liquids at temperatures above the boiling points of the liquids in closed vessels and more particularly to treatment of rubber latex in water at temperatures of about 150° C.

In order to improve the properties of rubber for use as an insulation material it has been proposed to treat rubber latex in water at temperatures above 100° C. for periods of time ranging from one to several hours. Sometimes other substances are added to the water. This treatment is carried out in practice in a closed vessel known as an autoclave. It has been found that a film or layer of rubber from the latex deposits upon the inner surface of the autoclave during the treatment of each batch and trouble has been experienced owing to the necessity of removing this layer before using the autoclave for treatment of further batches of material.

Autoclaves as usually employed consist of an inner vessel, containing the material to be treated, surrounded by a steam jacket. It is customary for a portion of the vessel around the top, and usually the lid thereof, not to be provided with a steam jacket for which reason during operation the top of the vessel will usually be cooler than that part which is subjected to the direct action of steam in the outer jacket. Under such circumstances the water or other fluid containing the material to be treated will evaporate from the surface immediately adjacent the steam jacket and condense in the space next to the lid or cover of the autoclave. The present invention is based upon the observation that the deposition of a layer of the material under treatment in the autoclave occurs upon the surface at which bubble formation is taking place and that if this bubble formation can be prevented the deposition of the layer will be prevented. It has been found in actual practice that application of measures designed to prevent bubble formation from the surface of the autoclave next to the steam jacket and condensation in the space above the material being treated prevents the deposition of a layer of material thereon.

Bubble formation can be prevented by several methods. One method is to admit steam at a greater pressure than that corresponding to the temperature of treatment into the upper portion of the autoclave. This same result can be attained by other means such as the introduction of an inert gas, nitrogen, for example. Thus, for example, with latex dispersed in the water to be treated at 150° C. nitrogen at a pressure greater than that corresponding to water vapor at a temperature of 150° C. may be admitted into the autoclave. In lieu of nitrogen, equivalent results may be obtained by the use of carbon dioxide or other suitable inert gases. The gas pressure should be employed during the heating-up process as well as when the contents of the autoclave have reached their highest temperature of treatment.

Apparatus suitable for practicing the invention is shown in the accompanying drawing representing an autoclave, partly in section, provided with an inlet pipe and valves suitable for admitting either steam or gas into the space above the liquid under treatment.

Referring more specifically to the drawing the autoclave 1 is provided with a jacket 2 enclosing a steam space 3. The autoclave usually has its lower portion covered with insulation 4. The steam is applied through an inlet pipe 5 under a pressure of 55 pounds per square inch (3.9 kg. per sq. cm.) which is suitable for the treatment of rubber latex mixed with water contained in the main portion 6 of the autoclave. In practice the rubber latex is diluted in from one to five times its own weight with water. A cover 7 for the autoclave is bolted or otherwise suitably secured to the top to form an air-tight cover. Heat will be radiated from the cover 7 which will have a tendency to cause the space 8 above the liquid to be cooler than the main body of the material under treatment and, in particular, cooler than the inner surface 9 which is exposed to the steam in the steam jacket 3. In order to prevent evaporation of water from the surface 9 and consequent formation of steam bubbles at said surface, superheated steam at a pressure of, for example, 60 pounds per square inch (4.22 kg. per sq. cm.) may be admitted through a coil 10 by means of a valve 12 from any suitable steam boiler 11.

It is important that the steam be admitted through pipe 10 during the heating-up process as well as when the material under treatment has reached its maximum temperature and during cooling. The pressure and temperature of steam in the space 8 should at all times be preferably slightly greater than the pressure and temperature of the steam in the steam jacket 3.

In lieu of steam, nitrogen or other gas under a pressure greater than 55 pounds per square inch (3.9 kg. per sq. cm.) may be admitted into the space 8. Other suitable inert gases under pressure may be employed. The pressure in the space 8 may be applied by opening valve 13 and

maintained by means of a gas pump or by gas under pressure supplied directly from a steel cylinder 14 of the form in which gases are usually supplied commercially.

If the temperature of treatment is higher or lower the pressure is proportionally greater or lesser.

With suitable variations in details of pressure, temperature, etc., the principles of the invention are applicable to treatment of colloids or solids similar to latex which, when suspended in a liquid and treated under pressure, are found to deposit upon the walls of the autoclave.

This application is a substitute for applicant's application Serial No. 454,370, filed May 21, 1930.

What is claimed is:

1. The method of treating substances such as a natural latex or rubber dispersed in a liquid under a pressure above the boiling point of the liquid at atmospheric pressure, which comprises raising the temperature of the mixture to be treated by an external source of heat in a closed vessel to above the boiling point of the liquid at atmospheric pressure, and maintaining the space above the liquid at all times during the treatment at an equal or higher pressure than that corresponding to the vapor pressure of the liquid at the temperature of the external source of heat at the point of application to the liquid under treatment to prevent deposition of the colloid or solid portion of the treated material upon the walls of the vessel.

2. A method in accordance with claim 1, characterized in that the pressure is maintained by the introduction of steam under pressure.

3. A method in accordance with claim 1, characterized in that the pressure is maintained by introducing an inert gas of the character of nitrogen.

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