E. D. JEFFERSON.

BOILING MACHINE.

APPLICATION FILED JAN. 19, 1917.

1,278,155. Patented Sept. 10, 1918.

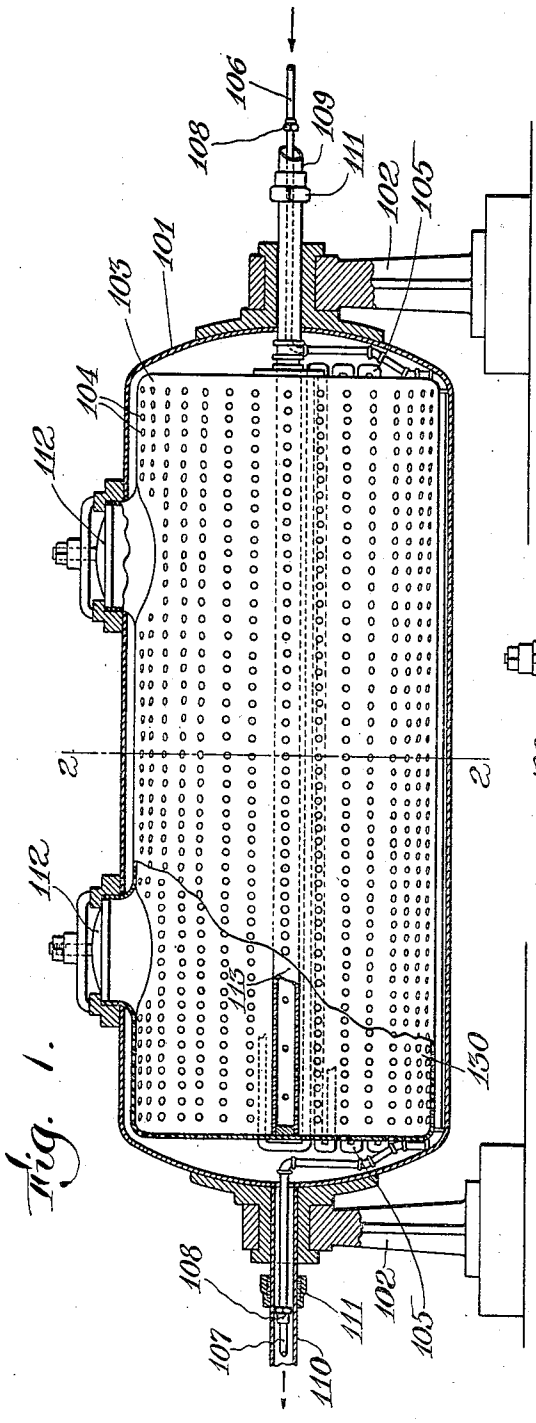


Fig. 1.

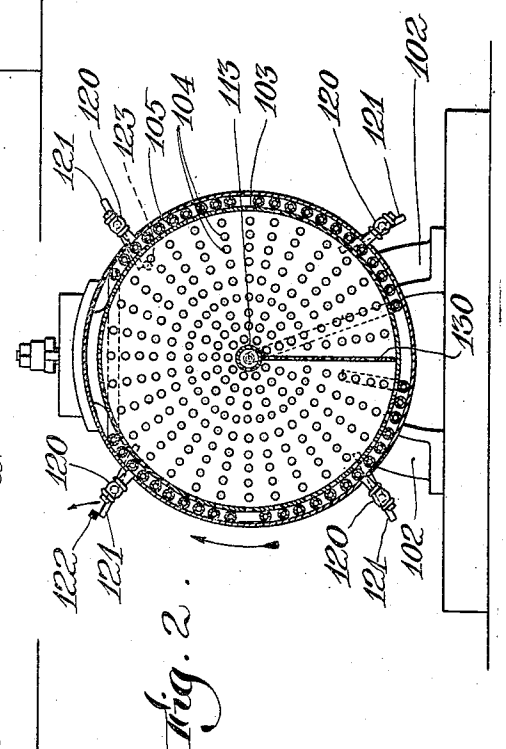


Fig. 2.

Inventor:
Eugene D. Jefferson
by his attorneys
Phillips, Van Etten & Frisk

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

EUGENE D. JEFFERSON, OF BOSTON, MASSACHUSETTS.

BOILING-MACHINE.

1,278,155. Specification of Letters Patent. Patented Sept. 10, 1918.

Application filed January 19, 1917. Serial No. 143,396.

To all whom it may concern:

Be it known that I, EUGENE D. JEFFERSON, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Boiling-Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The present invention relates to boiling machines and more particularly to machines for boiling fibrous materials with alkaline solutions to prepare them for paper making.

The fibrous materials such as chopped rags and the like which are used for paper making, are inclosed in a cage in a pressure-tight tank, and repeatedly and successively subjected to a boiling alkaline liquor and to steam. The chemical reaction due to the successive and repeated actions of the heated liquor and steam upon the materials causes the materials to be softened and whitened, and, in the case of colored materials, causes the color to be discharged more rapidly and completely than can be accomplished by machines now in use. The treatment in the machine also saponifies any oils present in the materials and eliminates foreign materials such as the motes and hulls of cotton fiber.

The invention also relates to certain other features and comprises the features and combinations of parts hereinafter described and particularly pointed out in the appended claims.

The machine of the present invention is disclosed but not claimed in my application Serial No. 1959, filed January 13th, 1915, for a method of treating fibrous materials, which issued June 20th, 1916, as Letters Patent No. 1,192,403.

The various features of the preferred form of the invention are illustrated in the accompanying drawings, in which Figure 1 is a view, partly in vertical section, of the boiling machine; and Fig. 2 is a vertical section of the boiling machine, taken on the line 2—2 of Fig. 1.

The machine illustrated in the drawings is described as follows: The tank or vessel 101 is an air-tight horizontally disposed cylindrical drum which is rotatably supported upon standards 102. Within the vessel 101 is a cage or hollow drum 103 which is rigidly secured in any convenient way to the tank 101. The cage 103 is packed with the materials to be treated. The cage 103 is provided with a large number of perforations 104 so that the liquor may freely pass through the walls of the cage. Between the tank 101 and the cage 103 are coils of steam pipe 105 by means of which the liquor in the drum is boiled. The cage 103 serves to keep the materials out of direct contact with the hot steam pipes so as not to scorch them. The steam enters through a steam supply pipe 106 and the condensed vapor runs off through the drip pipe 107. The pipes 106, 107 are provided with rotatable joints 108. The treating liquor and rinsing water may be run into the tank through a pipe 109 and run off through an overflow pipe 110. The pipes 109, 110 are provided with rotatable joints 111 so that the tank may be rotated. The goods are packed in the cage 103 and are removed therefrom through manholes 112. The pipe 109 or 110 is preferably connected with a safety valve, not shown, which prevents dangerous pressures in the tank 101. The steam which is admitted through the supply pipe 106 is preferably throttled by an automatic throttling valve, not shown, which is controlled by the pressure in the tank 101.

The treating liquor and the rinsing water coming into the tank through the pipe connection 109 pass into a hollow perforated pipe 113 which is centrally located in the cage 103 so that the goods may be thoroughly treated and rinsed. A retaining or baffle plate 130 is provided for the purpose of carrying the goods around with the drum when it is rotated.

The tank 101 is provided with a plurality of air vents 120. Each vent consists of a valve to the handle of which is connected a lever 121 which is turned to open or close the valve. A stop 122 is arranged in the path of the outer end of the levers 121 and another stop 123, indicated in dotted lines in Fig. 2, lies in the path of the inner ends of the levers 121. The tank is rotated in the direction of the arrow in Fig. 2. When a lever 121 strikes the stop 122 it opens its vent valve 120 and when a lever 121 strikes the stop 123 it closes its vent valve 120. Consequently, the vents are opened at the top of the tank and are closed at the bottom of the tank during the rotation of the tank. This allows the air to

escape from the top of the tank, but prevents the liquor from escaping through the vents.

After the goods are packed in the cage 103 the manholes 112 are closed and the tank is half filled with the alkaline liquor. The tank is rotated and steam is let into the steam coils 105. The steam pipes 105 bring the liquor to a boil and the steam generated from the boiling alkaline liquor drives out the air. The stops 122 and 123 are, during this time, held in the paths of the ends of the levers 121 so as to keep the vent valves open at the top of the tank and closed at the bottom. After the generated steam has expelled the air from the tank the stop 122 is first removed and then after the vents are all closed the stop 123 is removed. The expulsion of the air from the tank is important in that the goods are not scorched or weakened by the oxidizing effect of air on the heated goods. While it is of particular importance to expel the air during the process of treating the goods in which the goods are lifted out of the treating liquor, it is also important and desirable to expel the air from the tank during the process in which the goods are treated with boiling alkaline liquor and the goods are not lifted out of the liquor. For example, the usual process in which the goods remain immersed in the liquor is improved by providing the boiling keir or tank with vents which permit the air to escape so that the goods at the surface of the liquor are not chemically affected by oxygen.

The tank 101 is slowly rotated so that the liquor has a good chance to drain out of the goods which are lifted above the liquor level. The steam or alkali fume penetrates the goods and, as above pointed out, assists in the chemical reaction of discharging the color and whitening the goods. This chemical reaction is further accentuated by the drying effect of the steam or alkali fume in the area above the liquor. The steam is in contact with the heating coils 105 which are above the liquor level and these heating coils serve to dry the steam.

It will be noted that in the apparatus shown, the steam which is used for boiling the liquor does not come into contact with the liquor but is carried through heating coils or a steam jacket. In this way the liquor level in the tank is not increased, nor is the liquor weakened, as is the case when boiling is carried out by introducing the steam directly into the tank. Moreover, in the apparatus shown, the steam coils which are above the liquor level serve to superheat the steam, a thing impossible when the liquor is boiled by the direct introduction of steam into it.

The successive and repeated immersions of the goods in the boiling liquor with the consequent draining give an effective washing action. It will be seen that the cage in which the goods are held is spaced apart from the tank. This space between the cage and the tank serves as a depository for dirt, gravel, precipitates from the chemical reactions, undissolved alkalis, and the like. The cage is rotated so slowly that this foreign material is not stirred up much, and, consequently, is not brought back into contact with the goods after it has been once deposited. The boiling of the goods under pressure, therefore, serves not only to bleach them and dissolve foreign materials such as silex, but also thoroughly washes the goods.

Heating the liquor by means of the steam jacket or steam coils is known to the trade as heating "by radiation" as distinguished from heating by introducing the steam directly into the liquor which is to be boiled, which is known in the trade as "direct" heating.

A preferred form of the invention having thus been described, what is claimed is:

1. A boiling machine, having, in combination, a rotatable tank, a foraminated cage supported within and rotatable with the tank, and heating means distributed entirely around the inner periphery of the tank.

2. A boiling machine, having, in combination, a rotatable tank, a foraminated cage supported within and rotatable with the tank, heating tubes distributed around the entire inner periphery of the tank, means to supply to and exhaust a heating medium from said tubes during the rotation of the tank, and an inlet and outlet tube for the tank by which the treating solution may be circulated through the tank during its continued rotation.

3. A boiling machine, having, in combination, a rotatable tank, a radiating heater secured within the tank, a series of air exhaust valves mounted in the tank, and means for opening and closing the valves during the rotation of the tank.

4. A boiling machine, having, in combination, a rotatable tank, a radiating heater secured within the tank, means for maintaining a surface of a treating solution at approximately the center of the tank, and means located above the surface of the solution for opening and closing the valves whereby the valves will only be opened while they are above the surface of the solution.

5. A boiling machine, having, in combination, a rotatable tank, a foraminated cage supported within and rotatable with the tank, and a series of heating tubes secured to the tank between the tank and the cage.

6. A boiling machine, having, in combination, a rotatable tank, a series of steam tubes secured to the inner periphery of the tank, a foraminated cage within the tubes for holding materials out of contact with the

tubes, and means for supplying and exhausting steam from the tubes.

7. A boiling machine, having, in combination, a rotatable pressure-tight tank, a cage secured within and rotatable with the tank, a foraminated tube mounted approximately in the axis of the cage, and connections with the tube for supply treating solutions within the cage while it continues to rotate.

8. A boiling machine, having, in combination, a rotatable pressure-tight tank, a foraminated cage supported within and rotatable with the tank, heating tubes distributed around the inner periphery of the tank and located between the cage and the tank, means for supplying the tubes with steam, means for circulating a treating solution through the tank during its continued rotation, exhaust valves mounted in the tank, and means for opening and closing the valves as the tank rotates.

EUGENE D. JEFFERSON.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents. Washington, D. C."