W. B. LEWIS.

BLEACHING APPARATUS.

APPLICATION FILED NOV. 27, 1908.

921,853.

Patented May 18, 1909.

3 SHEETS—SHEET 1.

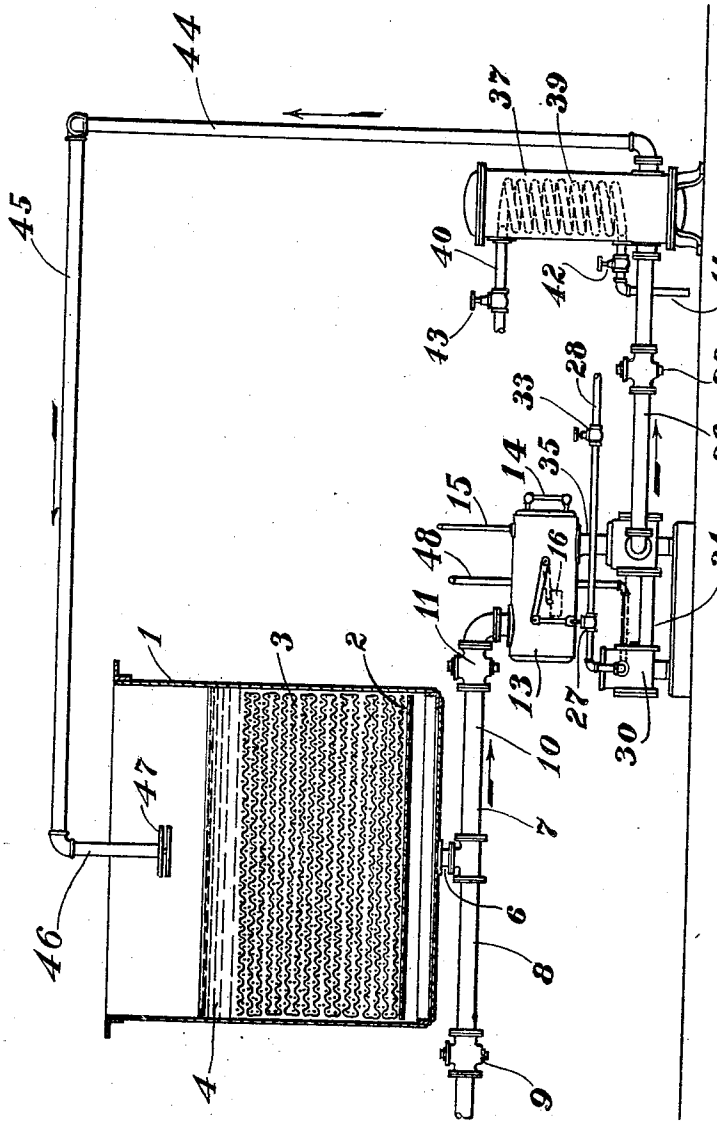

Fig. 1.

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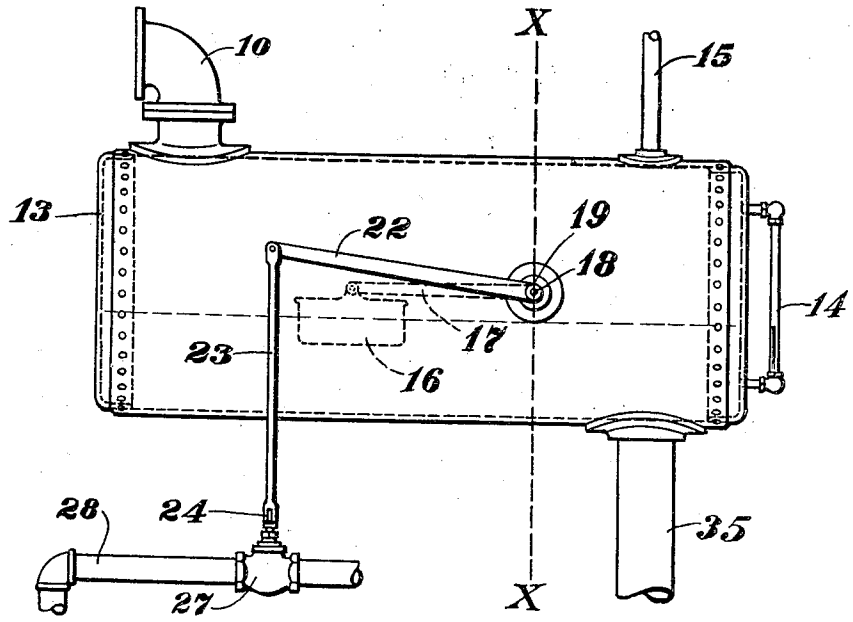

Fig. 2

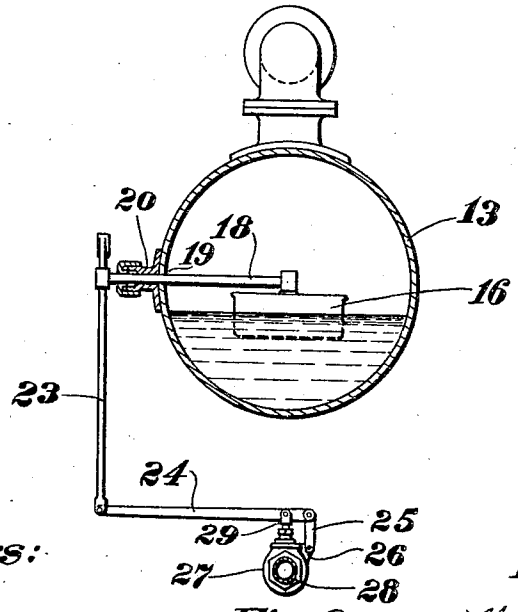

Fig. 3

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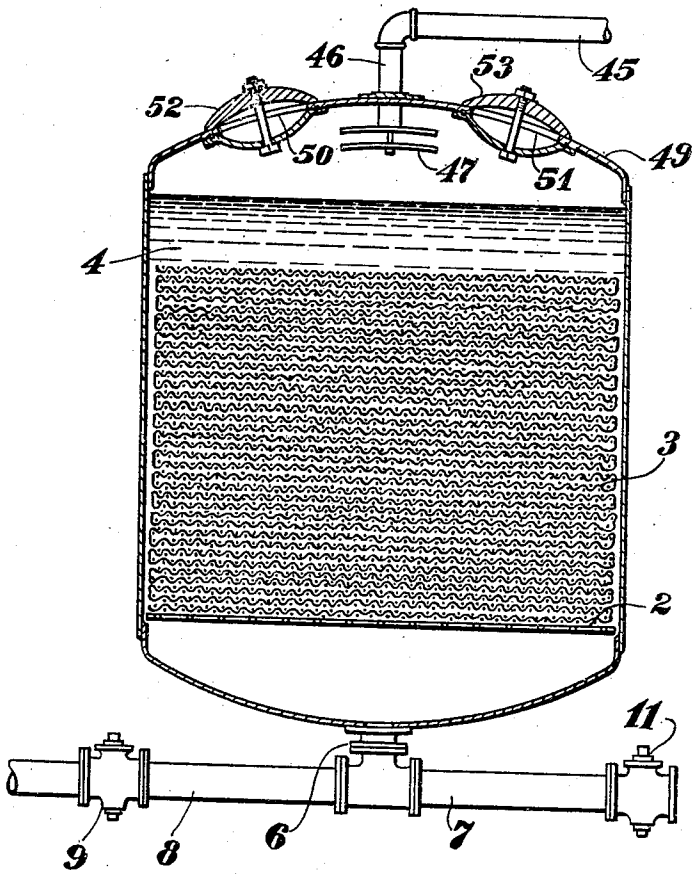

Fig. 4.

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UNITED STATES PATENT OFFICE.

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BLEACHING APPARATUS.

No. 921,853. Specification of Letters Patent. Patented May 18, 1909.

Application filed November 27, 1908. Serial No. 464,514.

To all whom it may concern:

Be it known that I, WARREN B. LEWIS, a citizen of the United States, residing at Providence, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Bleaching Apparatus, of which the following is a specification.

My invention relates to apparatus for performing an initial step in bleaching cotton cloth, consisting of the removal of natural oils, gums, and other foreign matters from the fabric by boiling in an alkaline solution. This removal is commonly performed by submerging the fabric in an open or closed keir wherein both the high temperature of the bleaching liquors and their circulation is maintained by the continuous and direct introduction of steam into the keir either above or below the liquors. This method involves the escape of quantities of steam and the use of excessive heat, resulting in great waste and expense.

I have discovered by experiment that a moderate degree of heat is sufficient to loosen or dissolve foreign matters and insure the necessary chemical combinations and changes; that the use of heat as a circulating agent is superfluous; and that the circulation may be more efficiently and economically performed mechanically.

The essential objects of my invention are to convey the bleaching liquors from the bottom to the top of the keir; to automatically regulate the speed and volume of this transfer of liquors in accordance with the rapidity of their percolation through the particular fabric in the keir; to heat the liquors exteriorly of the keir and independently of the volume of liquors in circulation; and to attain these objects in a simple, efficient, and inexpensive structure.

To the above enumerated ends my invention consists in the novel construction and combination of parts hereinafter described and claimed.

In the accompanying drawings which form a part of this specification, Figure 1 is a side elevation of an apparatus embodying my invention, showing the keir in longitudinal central section, Fig. 2, is a side elevation of the float tank and adjacent parts, Fig. 3, a section of the same on line *x x* of Fig. 2, and Fig. 4, a central longitudinal section of a modified form of keir.

Like reference characters indicate like parts throughout the views.

In the form of my invention herein shown, 1 represents an open iron tank or keir provided with the usual false bottom or grating, 2, upon which rests the fabric to be bleached, 3, submerged in alkaline liquors, 4. In the floor of the keir is a drain pipe, 6, leading to an intermediate portion of a pipe, 7, one section of which, 8, leads to a sewer and is provided with a valve, 9; and the other section of which, 10, is provided with a valve, 11, and leads to the top of a horizontally disposed cylindrical float tank, 13, of iron. Upon one end of this tank is mounted a sight glass, 14, by means of which the level of the liquor within the tank may be observed. In the top of the float tank is a vent pipe, 15, through which accumulated air may be expelled. Within the tank is a float, 16, pivoted to one end of a rod, 17, whose end is fixed to a horizontal rock shaft, 18, passing through an opening, 19, in the side wall of the tank in which it is rotatably mounted. Upon the tank wall is fixed a stuffing box, 20, for the rock shaft. The outer end of this shaft has fixed thereto an arm or lever, 22, to whose free end is pivoted a vertical link or rod, 23, pivotally connected with the end of a lever, 24. The opposite end of lever, 24, is connected by a link, 25, to an extension or lug, 26, upon a globe valve, 27, of a horizontal steam pipe, 28. Frictionally or otherwise fixed to or contacting with the lever, 24, near its linked end is the vertically slidable valve stem, 29, of the globe valve, 27. The steam pipe, 28, leads from any source of steam power to the cylinder, 30, of a pump, 31, and is provided with a valve, 33, for controlling the steam supply.

Leading from the bottom of the float tank to the pump below is a suction pipe, 35. The pump discharge pipe, 36, connects the pump with the lower portion of a heating tank, 37, and is provided intermediate its length with a valve, 38. Mounted in the tank, 37, above the point of entrance of the pipe 36, is a heating coil, 39, upon the end of a steam pipe, 40, leading to any convenient source of steam supply, and having upon its lower end a drain pipe, 41, extending through the wall of the tank, 37. This drain pipe has a stop cock, 42. The pipe, 40, is provided with a valve, 43. Leading from the heating tank at a point opposite to the

entrance of pipe, 36, is a vertical pipe, 44, whose upper end is joined to a horizontal pipe, 45, having upon its outer extremity a downwardly directed pipe, 46, provided with a spraying nozzle, 47, upon its lower end within the upper portion of the tank above the liquors. The pump is provided with an exhaust pipe, 48.

In Fig. 4 is shown a modified form of keir having a roof, 49, provided with man-holes, 50, 51, covered with clamped plates, 52, 53.

The operation of my invention is as follows: The material to be operated upon, 3, is placed in folds upon the grating, 2, within the bleaching liquors, 4. The liquors pass by gravity through the pipes, 6 and 10, into the float tank, 13, and thence through pipe, 35, into the pump, 31. By the action of pump, 31, the liquors are forced through pipe, 36, into the heating tank, 37, and thence through pipes, 44, 45 and 46, against the distributer, 47, whereby the liquor is returned to the interior of the keir in a broken stream. The volume and speed of travel of the liquor through the described circuit is automatically governed and regulated by the rapidity of the percolation of the liquors through the fabric in the keir, and the consequent volume of liquors accumulated in the float tank, as follows: As the accumulation of liquors in the float tank increases, the float, 16, is gradually elevated thereby, which movement, communicated through rod, 17, shaft 18, lever 22, rod 23, and lever 24, elevates the valve stem, 29, and opens the valve, 27, thereby admitting an increased volume of steam through pipe, 28, to the pump, by which means the action of the pump is accelerated, and the circulation of the liquors is proportionately increased. As the level of the liquors in the tank, 13, descends the movement of the float and described valve connections is reversed, and the valve gradually closes and diminishes the speed of the pump. The moderate degree of heat required in the liquors for proper chemical action is furnished by the coils, 39, in tank, 37, through which tank the liquors pass.

What I claim is:

1. In a bleaching apparatus, the combination with a circulation circuit embodying a heating device in circuit and means for delivering the liquors from said heating device into the keir, of a keir for the liquors within the circuit, a pump in the circuit for forcing the liquors through the circuit, and means in the circuit and operated by the liquors for regulating the speed of the pump.

2. In a bleaching apparatus, the combination with a keir, of a circulation circuit leading from the bottom to the top of the keir, a float tank in the circuit, a pump also in the circuit, a supply pipe upon the pump, a slidable valve in the pipe, a float in the tank, and operative connections between the float and valve.

3. In a bleaching apparatus, the combination with a keir, of a circulation circuit leading from the bottom to the top of the keir, a float tank in the circuit, a pump also in the circuit, a supply pipe upon the pump, a movable valve in the pipe, a float in the tank, and lever connections between the float and valve.

4. In a bleaching apparatus, the combination with a keir, of a circulation circuit leading from the bottom to the top of the keir, a float tank in the circuit below the keir, a pump in the circuit below the tank, a supply pipe upon the pump adjacent the tank, a valve in the pipe, a rock shaft mounted in the wall of the tank, a rod upon the inner end of the shaft, a float upon the end of the rod, an arm upon the outer end of the rock shaft, a rod pivotally connected with the arm, a lever pivotally connected with the rod, a valve stem upon the lever entering the valve, and a link connecting the lever with the exterior of the valve.

5. In a bleaching apparatus, the combination with a keir, of a circulation circuit leading from the bottom to the top of the keir, a float tank in the circuit below the keir, a pump in the circuit below the float tank, a supply pipe upon the pump, a slidable valve in the pipe, a float in the tank, operative connections between the float and valve, and a heating tank in the circuit.

6. In a bleaching apparatus, the combination with a circulation circuit, of a keir and pump in the circuit, a heater for the liquors in said circuit a float tank also in the circuit, a float in the tank, and means actuated by the float for regulating the speed of the pump.

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

WARREN B. LEWIS.

Witnesses:
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