

(No Model.)

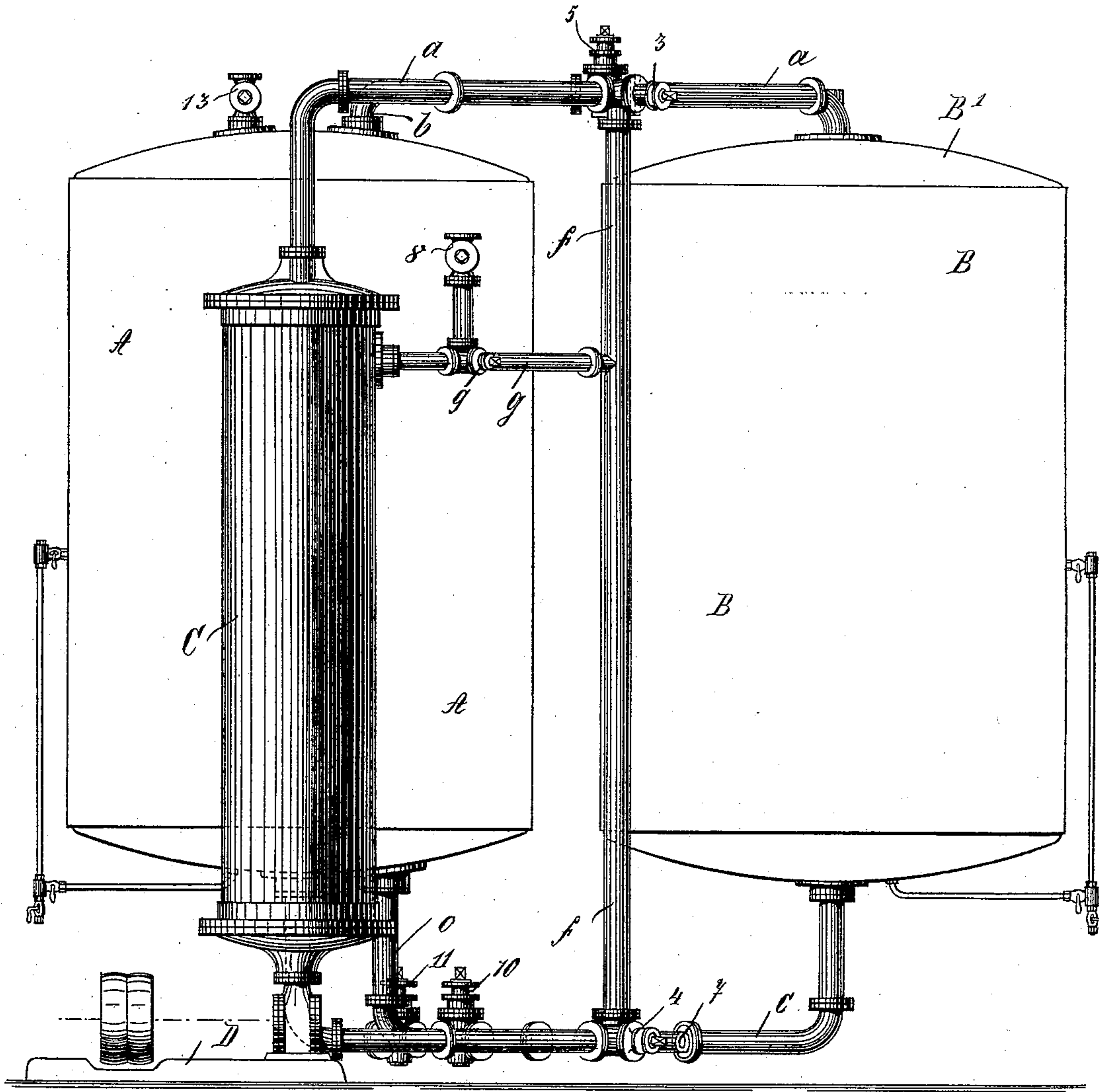
2 Sheets—Sheet 1.

H. THIES & E. HERZIG.
PROCESS OF BLEACHING.

No. 529,089.

Patented Nov. 13, 1894.

Fig. 1.



Witnesses:
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(No Model.)

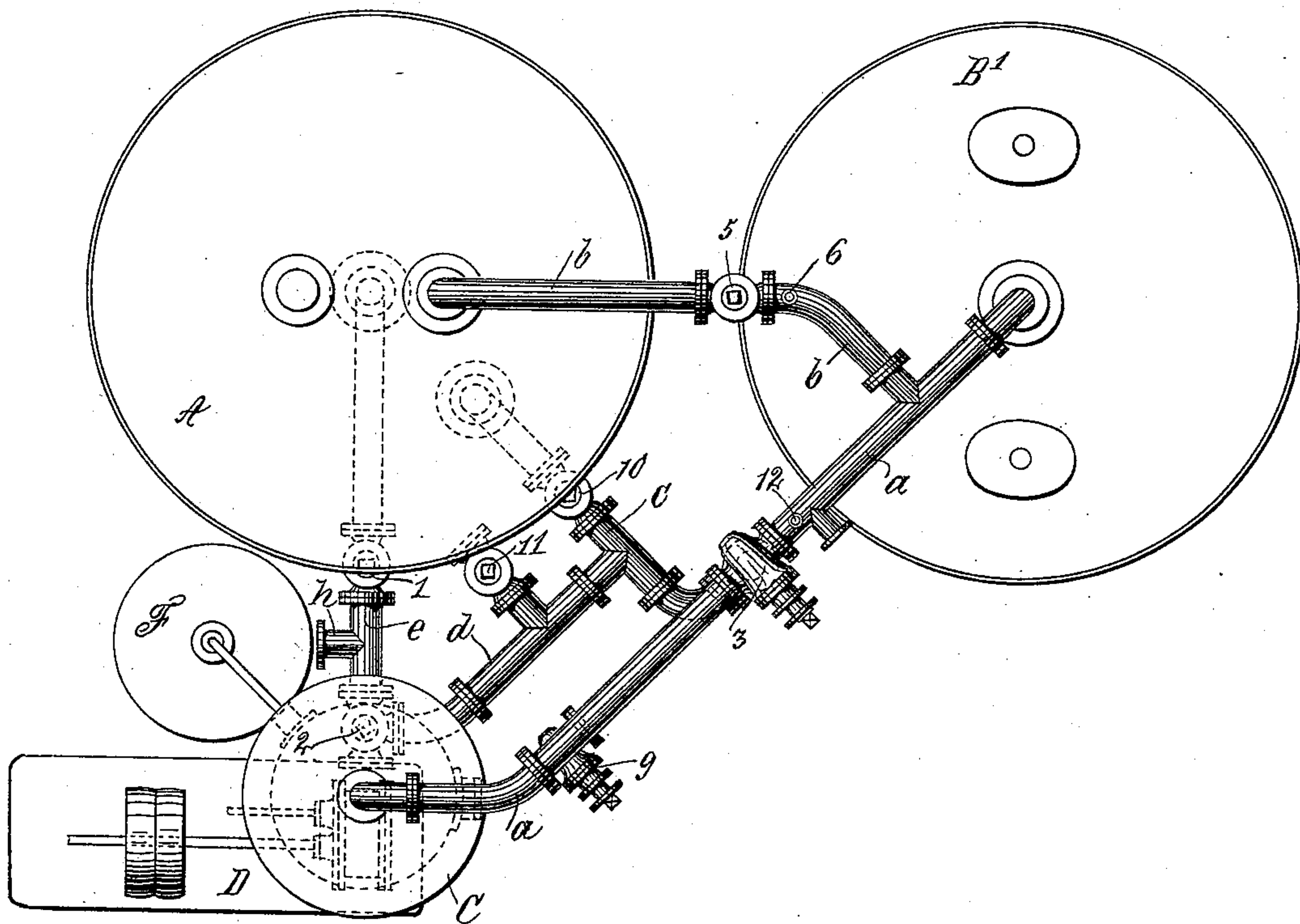
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Fig. 2.



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UNITED STATES PATENT OFFICE.

HEINRICH THIES, OF LAAKEN, AND EMIL HERZIG, OF MULHOUSE, GERMANY.

PROCESS OF BLEACHING.

SPECIFICATION forming part of Letters Patent No. 529,089, dated November 13, 1894.

Application filed March 18, 1892. Serial No. 425,476. (No specimens.)

To all whom it may concern:

Be it known that we, HEINRICH THIES, a resident of Laaken, near Barmen - Rittershausen, Kingdom of Prussia, and EMIL HERZIG, a resident of Mulhouse, Alsace, in the German Empire, subjects of the King of Prussia, German Emperor, have invented certain new and useful Improvements in Bleaching, of which the following is an exact specification.

Our invention relates to an improvement in the preparatory treatment of fibrous materials, prior to bucking the same, as described in our application for a patent, Serial No. 370,034, filed November 1, 1890. The preparatory treatment as described in the said patent application, consists in precipitating alkaline earths on the fibers and in steaming the same hereinafter. The object of these operations is to protect the material from the noxious influence of the boiling caustic alkaline lye by expelling the air from the fibers.

We have now made experiments with the mentioned preparatory treatment, and have found that the same may be replaced with equally good results, and sometimes with more advantageous effect, by the treatment described hereinafter.

Instead of forming a deposit of alkaline earths on the fibers and of steaming the same subsequently, we employ another method for the purpose of expelling the air from the fibers, said method consisting in subjecting to a pressure the materials placed in the bucking vessel filled with water, which thereby absorbs the air adhering to the fibers, and in driving hereinafter the said water into an accessory reservoir, where it is freed of the absorbed air by reducing the pressure, and whence it is drawn back into the bucking vessel in order to undergo the same operations again. By means of this continuous circulation of the water the absorption of air by alternately applying and removing the pressure to and from the water is effected in a very thorough manner, and we secure a still better result by mixing in the water, toward the end of the operation, such chemicals as will readily combine with oxygen. Immediately after this treatment or during the last part of the same, the bucking vessel containing the materials and the water is heated,

whereupon the boiling lye is introduced into the same.

In the accompanying drawings Figure 1 is an elevation, and Fig. 2 a top view of an apparatus of the kind employed for carrying our improved method into effect, like letters and numerals of reference denoting like parts in both views.

B is the vessel or vat in which the goods to be treated are placed, and is made with a removable top B' by means of which it may be closed hermetically. A is another similar, but smaller vessel for receiving the solutions which are to be let on the goods.

C is a tubular boiler for heating the circulating liquids.

a is a pipe connecting the tops of boiler C and vessel B.

b is a branch-pipe connecting the top of vat A to the pipe a.

D indicates an oscillating or rotary pump driven by a steam-engine. This pump is connected to the vessels A and B and boiler C.

F is a reservoir for collecting the condensation water from boiler C.

c is a pipe connecting the bottoms of the vessels A and B, and d is a branch-pipe by which pipe c communicates with a pipe e, fitted to the bottom of vessel A. An upright pipe f connects the pipes a and c, and a branch-pipe g is inserted between this upright pipe and the upper part of the boiler C.

h is a socket for the entrance of the water or other liquid.

2, 3, 4, and 9 are three-way cocks inserted in the pipes e, a, c, and g respectively. The single-way cocks 1, 5, 10, and 11, inserted in the pipes e, b, c, and d respectively serve the purpose of shutting off or draining the liquids. Cocks 7 and 8 (in pipes c and g respectively) are for letting in steam, and cocks 6, 12 and 13 (the two former in pipes b and a respectively, the latter at the top of vat A) for allowing the escape of air or steam. G is a gage-glass fitted to vessel A.

The operation of the apparatus is as follows: Vessel A is filled with water, to which reducing agents may be admixed, such as a sulphite. The goods to be bleached are introduced into the vessel B. The liquid contained in vessel A is drawn off through pipe e Fig. 2 and cocks 1 and 2 by means of the pump D and

hereinafter forced upward through the tubular boiler C, pipes *a*, *f*, and *c*, and cocks 3 and 4 into the vessel B. The air escapes at the top of the latter through cock 6. As soon as the rising liquid reaches this cock, the latter is closed. Thereupon the pressure in vessel B is increased by means of the pump D up to about two atmospheres, and then the cock 5 is opened so as to afford a communication between the vessels A and B. Cock 5 is only opened to such an extent, that the pressure in B remains constant as long as the pump D is at work, while the liquid flows back into A through the top pipe *b*. In consequence of the action of the pump, a vacuum is formed in A, and the liquid, having absorbed the gases (especially the air) adhering to the goods owing to the pressure to which said liquid is subjected in vessel B, is freed from these gases by the reduction of pressure in vessel A. The liquid is continuously pumped back into the vessel B, and thence again drawn into A by the production of a vacuum, and thus the circulation is continued till a manometer provided on vessel A (said manometer is not shown on the drawings) does not indicate any appreciable change in the condition of the gas (air) or liquid contained in said vessel. Thereafter the circulating liquid is heated by means of the tubular boiler C till the contents of the latter attain the boiling point, or a pressure of one and one-half atmospheres. Thereupon the liquid is driven out of B through cock 11 by means of steam or by means of the pump D. If that liquid is simple water, it is allowed to flow away; if it contains a reducing agent, it is collected within a tank or the like, and preserved for further use. Meanwhile the bucking or scalding lye is boiled in A. For five thousand kilograms of cotton we take for instance about six thousand liters of clear caustic lye, which is prepared by mixing with water two hundred kilograms of soda containing ninety-eight per cent. of carbonate of soda, and one hundred and fifty kilograms of caustic lime. After having subjected this lye to a pressure of two atmospheres in vessel A, it is pumped through the pipe *e* and cocks 1 and 2, the tubular boiler C and the cock 3 into the upper part of vessel B. The pressure in A is thereby reduced, and the pressure in B increased. When the level of the liquid in vessel A sinks to the bottom—which may be ascertained by the aid of the gage-glass G—the cock 10 is opened so as to allow the lye to flow back from the lower part of vessel B through pipe *c* and cock 4 into vessel A. By employing a difference of pressure of

about one and one-half atmospheres (in the vessels A and B), a very rapid circulation is obtained, which is already found in our patent application Serial No. 370,034, but which has been greatly improved in our present invention. This difference of pressure is kept constant by heating the boiler C and by blowing off steam through the cock 13 at the top of vessel A. After the circulation has been kept up for about three hours, the bucking even of very difficult goods is completed. The bleaching liquid is collected in A, to be used at the following operation, and the contents of the vessel B are washed with water, which is admitted at the top. As a rule the goods are sufficiently white when taken out of the vessel B, so that it is but necessary to wash them first in a weak acid bath and then in water in order to remove the remainder of alkalies and to obtain goods bleached thoroughly. When the fibrous materials are strongly soiled, they may be treated with chloride of lime in the vessel B; but the quantity used is greatly reduced, being only one-sixth of the amount required hitherto.

What we claim, and desire to secure by Letters Patent of the United States, is—

The preparatory treatment of fibers prior to the bucking operation, consisting in exerting a pressure upon a body of water containing the fibers to be treated, and producing simultaneously therewith a vacuum over another body of water by drawing off part of the latter and forcing it to the said former body of water; letting escape from the first to the second body of water a quantity less than that forced independently to the former, and forcing at the same time a like quantity back from the second body of water to the first, this escaping and forcing back being maintained in a continuous course without interrupting the pressure exerted incipiently upon the water containing the fibers, substantially and for the purpose as described.

In testimony whereof we have signed this specification in the presence of two subscribing witnesses.

HEINRICH THIES.
EMIL HERZIG.

Witnesses as to the signature of Heinrich Thies:

WM. ESSENWEIN,
RUDOLPH FRICKE.

Witnesses as to the signature of Emil Herzig:

H. B. SCHWAMDER,
J. SCHMITT.