(No Model.) 2 Sheets—Sheet 1.

G. L. & W. P. ALLEN.

BLEACHING KEIR.

No. 555,486. Patented Mar. 3, 1896.

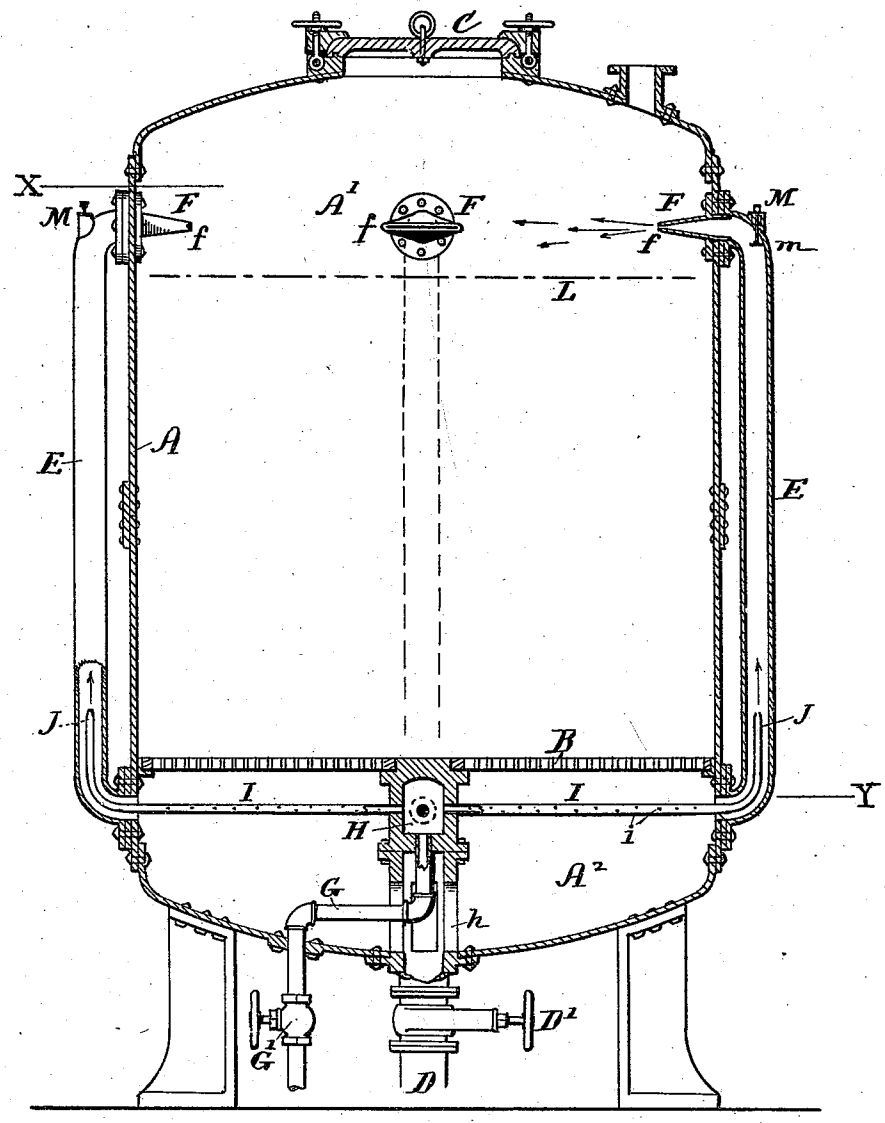

FIG. 1

Witnesses.

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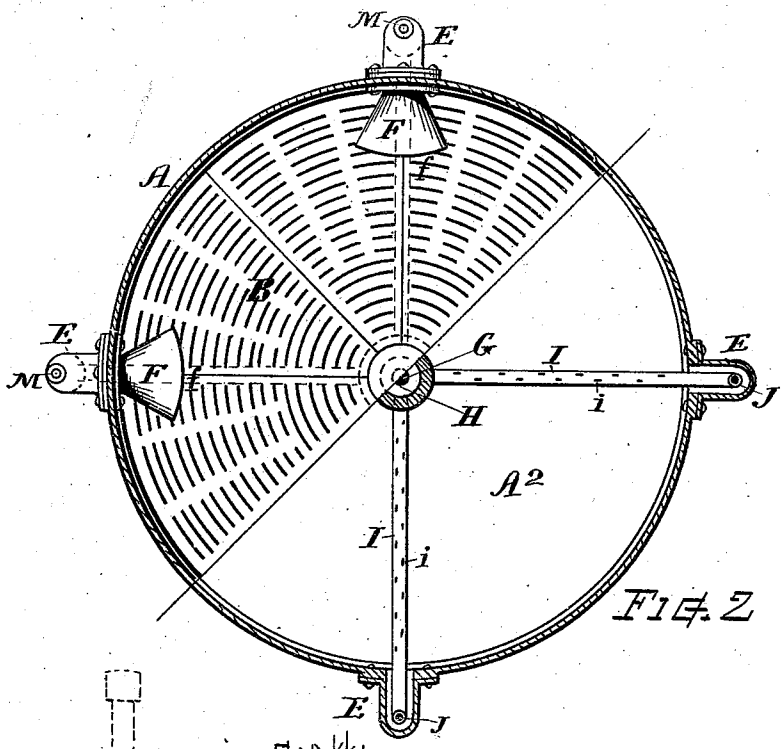

Fig. 2

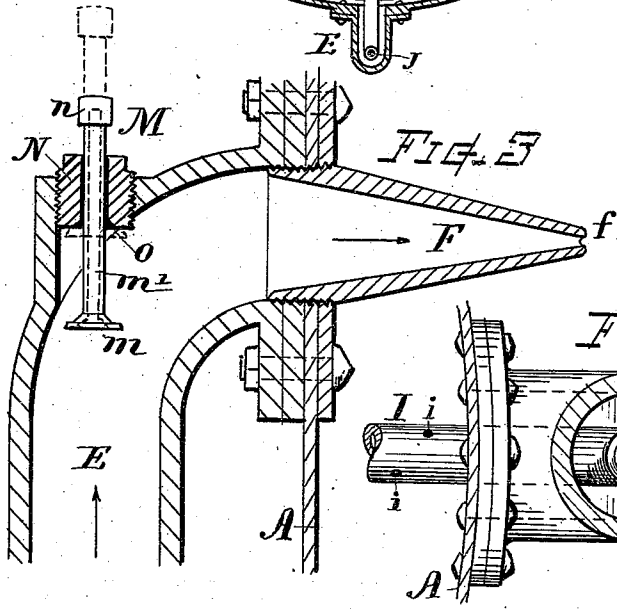

Fig. 3

Fig. 4

Witnesses.

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UNITED STATES PATENT OFFICE.

GEORGE L. ALLEN AND WILLIAM P. ALLEN, OF WORCESTER, MASSACHUSETTS.

BLEACHING-KEIR.

SPECIFICATION forming part of Letters Patent No. 555,486, dated March 3, 1896.

Application filed July 15, 1895. Serial No. 555,978. (No model.)

To all whom it may concern:

Be it known that we, GEORGE L. ALLEN and WILLIAM P. ALLEN, citizens of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in Bleaching-Keirs, of which the following, together with the accompanying drawings, is a specification sufficiently full, clear, and exact to enable persons skilled in the art to which this invention appertains to make and use the same.

The object of this invention is to provide a more desirable and practically economical apparatus, and to render the keir rapid and efficient in its operation, convenient for attendance, and adapted for more certain and accurate control.

To this end our invention consists in providing a keir with a series of external uptake-pipes or vomit-pipes, the respective ends of which are connected with the cylindrical body-shell and open into the interior near the upper and lower ends of the body, their upper ends having combined therewith inwardly-directed flat-mouthed nozzles adapted for discharging laterally across the interior upper space, and, further, in combining therewith, within the lower space underneath the grate, an interior central steam-supply chamber having a series of radially-disposed steam-pipes therefrom underlying the stock-supporting grating and respectively leading into the several uptake-pipes for boiling the liquor within the lower space and forcing the circulation through the said uptake-pipes, the parts of the apparatus being constructed and organized to form a compact, simple, and highly efficient keir, as hereinafter particularly specified; also, in the combining with the uptake-pipes devices arranged in the manner described for indicating the force of the internal action, as more fully explained.

The particular subject-matter claimed is hereinafter definitely specified.

In the drawings, Figure 1 is a vertical section of a bleaching-keir constructed in accordance with our invention. Fig. 2 is a horizontal section, one half at the upper part at line X, and one half at the lower part at line Y on Fig. 1. Fig. 3 is a vertical section showing the head of the vomit-pipe and spray-nozzle on a somewhat larger scale; and Fig. 4 is a horizontal section on a similar scale, showing the foot of the vomit-pipe and injector-pipe.

Referring to parts, A denotes the main body or shell of the keir comprising a cylinder and heads formed of metal plates riveted together in usual manner and inclosing an interior space which is separated by the grating or perforated diaphragm B of well-known construction into an upper space, A′, for containing the material treated, and lower space, A^2, for the liquor. The manhole and cover C at the top of the keir, and the drainage-pipe D and gate D′ at its bottom are of well-known or any suitable construction.

At the outside of the body there is arranged a series of upright vomit-pipes E leading from the lower space, A^2, beneath the grating, to the upper part of the upper space, A′, the ends of said pipes being curved inward and attached to the exterior of the cylindrical shell A, through which openings are formed corresponding with the caliber of the pipes. In the present instance, and preferably for general practice, four of these vomit-pipes E are employed, disposed at opposite sides of the body, but a greater or less number can be in similar manner combined with the body of the keir, if in any instance desired. These pipes and the accompanying parts are each of similar construction, and a description of one will apply to all.

For a keir of, say, nine feet diameter, pipes E of about five inches diameter are suitable. The top of the vomit-pipe E where it enters the space A′ is provided with a delivery-nozzle F, having a broad flattened inwardly-directed end with a vertically-narrow but horizontally-extended opening or mouth *f*, as indicated in Fig. 1, adapted for delivering and distributing the liquor over the top surface of the contained material in thin but forceful spray, which is projected across the interior space mingling and falling in showers from the oppositely-directed nozzles, so as to copiously drench the entire top surface of the mass.

G indicates the steam supply having a suitable controlling cock or valve G′, which pipe leads into a hollow head or steam-chamber H, formed at the upper part of the central sup-

porting-column *h*, upon which the inner ends of the grate-sections rest. From said hollow head there is arranged a series of radial steam-pipes I that underlie the grating and respectively extend into the lower ends of the vomit-pipes E, their extremities turned upward therein and terminating with an injecting-nozzle or open end J within the upright part of the pipe E, as illustrated.

The radial portion of the steam-pipe I is perforated with suitable small holes *i* for emitting steam for boiling the liquor within the lower space, A^2. Such holes, however, are not of sufficient size and number as to prevent the forcing of steam through the end opening J when sufficient pressure is let on at the supply-cock.

At the upper end of the vomit-pipe we provide an indicating device M, consisting of a vertically-movable puppet, (see Fig. 3,) formed of a rod or tube *m'*, having on its lower end a cup or flange *m* that depends within the curved passage of the vomit-pipe. Said puppet is supported to slide freely within a guide or stopper N that is fitted with screw-threads into an opening through a suitable boss formed on the pipe. The top end of this tube *m'* is closed by a head or cap *n*, which prevents its dropping through the stopper. The top surface of the flange *m* is fitted to serve as a valve and acts against a valve-seat *o* on the lower end of the stopper when the indicator is at its highest position. The weight of the puppet is such as will balance the desired upflow of liquor in the vomit-pipe, so that it normally descends when there is but little or no upward current in the vomit-pipe, so that its head *n* rests upon the stopper N; but when a strong upward current is induced within the vomit-pipe the puppet will be forced upward, bringing its valve against the seat *o* and closing the same against leakage around the tube, (see dotted lines, Fig. 3,) and by its elevation indicating when a strong boiling action is going on within the keir. The surface of the tube *m'* may be graduated with horizontal lines to show what proportion of its length is at any time above the stopper.

In the operation the keir may be filled with material to about the line L. The steam-pipes I serve to boil the liquor in the lower space, A^2, and at the same time to inject steam up the vomit-pipes, thereby inducing a strong upward current within said vomit-pipes, exhausting the liquor from the space A^2 to an extent that creates a powerful downward suction through the mass of material, at the same time delivering the hot liquor at the top of the vomit-pipes through the several nozzles F in all directions across the space A' in a spray or shower that covers the surface of the contained mass, thereby producing a rapid and uniform circulation that effects the required bleaching action in much shorter period of time and in a more efficiently thorough manner than is attained by the ordinary practice.

We do not claim broadly placing a vomit-pipe at the outside of the body of a keir, as we are aware that differently-constructed outside pipes have been heretofore employed. Neither do we claim broadly the inducement of a current within a pipe by injection of steam; but our invention has reference to the improved construction and specific arrangement of the parts as defined.

What we claim, and desire to secure by Letters Patent, is—

1. In a bleaching-keir, the combination, as described, with the main body-shell, and the grating separating the interior into an upper and lower space; of the series of vomit-pipes leading from the lower to the upper space, disposed adjacent to the exterior of the main body with their inwardly-curved ends attached to said body-shell, the central grate-supporting column below and terminating at the grate, and having the supply-head with interior steam-chamber therein, a steam-supply pipe connected with said steam-chamber, a series of radial steam-pipes underlying said grate and leading from said steam-chamber into the respective vomit-pipes and fitted with upwardly-directed injector ends therein, and the inwardly-directed flat-mouthed delivery-nozzles at the upper ends of said vomit-pipes, for the purpose set forth.

2. In a bleaching-keir, the combination with the body or cylindrical shell having the horizontal supporting-grating supported therein, of the series of vomit-pipes attached to the exterior of said body with their respective ends opening into the interior at the upper and lower parts of said body, the central column or head having a steam-chamber therein, the series of steam-pipes leading out from said steam-chamber, and having perforations therein for delivering steam into the space beneath the grating, the ends of said steam-pipes respectively extending into the vomit-pipes and terminating with suitable openings for injecting jets of steam longitudinally within said vomit-pipes, and a steam-supply pipe leading into said central steam-chamber, provided with a stop cock or valve at the exterior for controlling said supply-pipe, substantially as and for the purpose set forth.

3. In a bleaching-keir having an externally-disposed vomit-pipe, the combination, with the vomit-pipe, of the indicating device consisting of the guide or stopper having an opening therethrough and fitted with a valve-seat at its lower end, and the vertically-movable puppet arranged through said guide or stopper, and depending within the passage of said vomit-pipe, and having a cupped or flanged end with a valve-surface upon the upper side thereof that acts against said valve-seat, substantially as set forth.

4. In a bleaching-keir, the combination, of the body of the keir, a vomit-pipe at the side thereof leading from the lower to the upper interior space; and having an injecting-pipe within said vomit-pipe for inducing or increasing a current therein, and an indicating

device arranged on said vomit-pipe and comprising an endwise movable stem, having its lower end depending within the interior passage thereof, its upper end projecting externally and adapted to be controlled for rising or falling movement by the force of said current within the vomit-pipe, for the purpose set forth.

Witness our hands this 12th day of July, A. D. 1895.

GEO. L. ALLEN.
WILLIAM P. ALLEN.

Witnesses:
CHAS. H. BURLEIGH,
ELLA P. BLENUS.