No. 612,210. Patented Oct. 11, 1898.

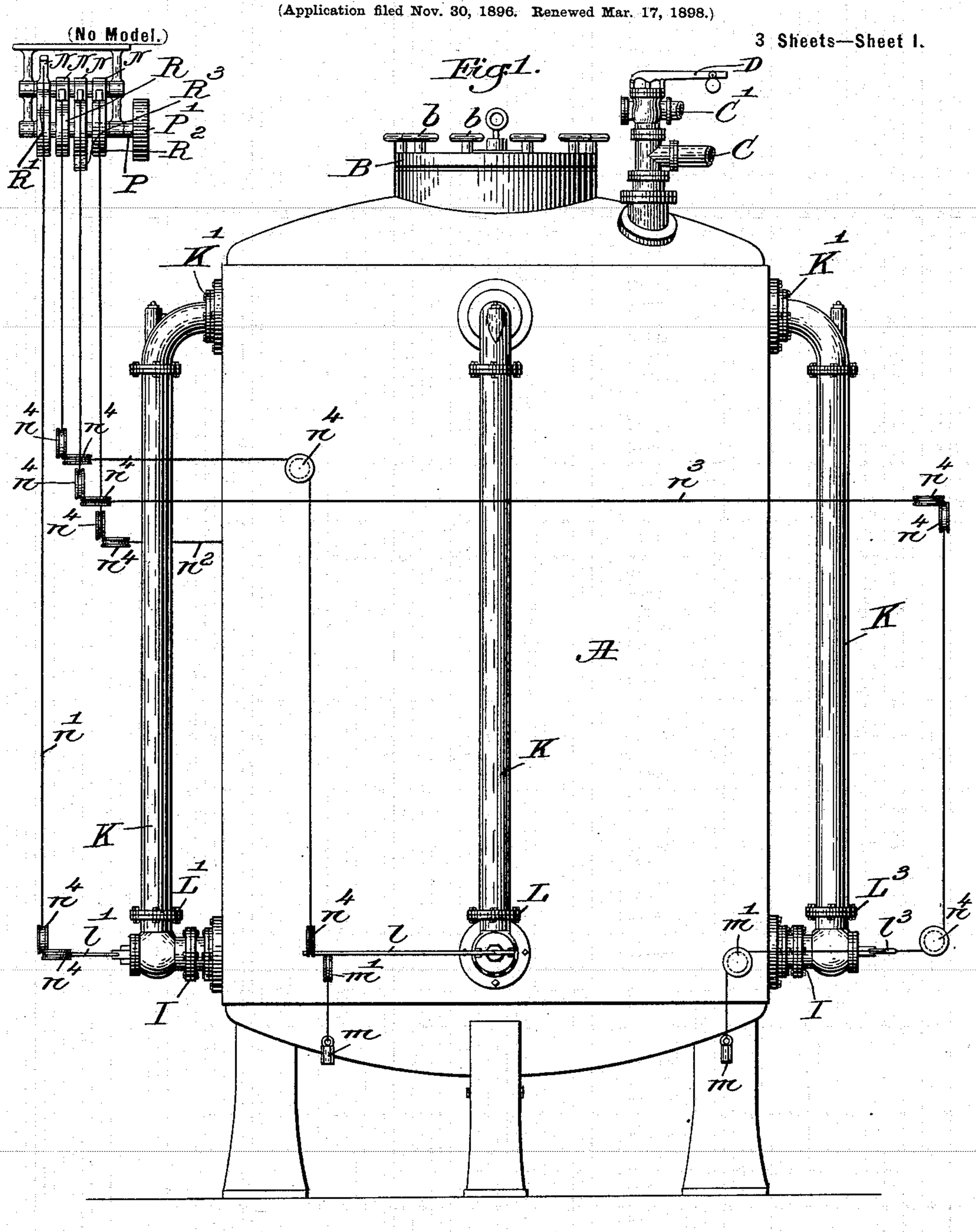
J. F. MONAGHAN.

CIRCULATING KEIR.

(Application filed Nov. 30, 1896. Renewed Mar. 17, 1898.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1.



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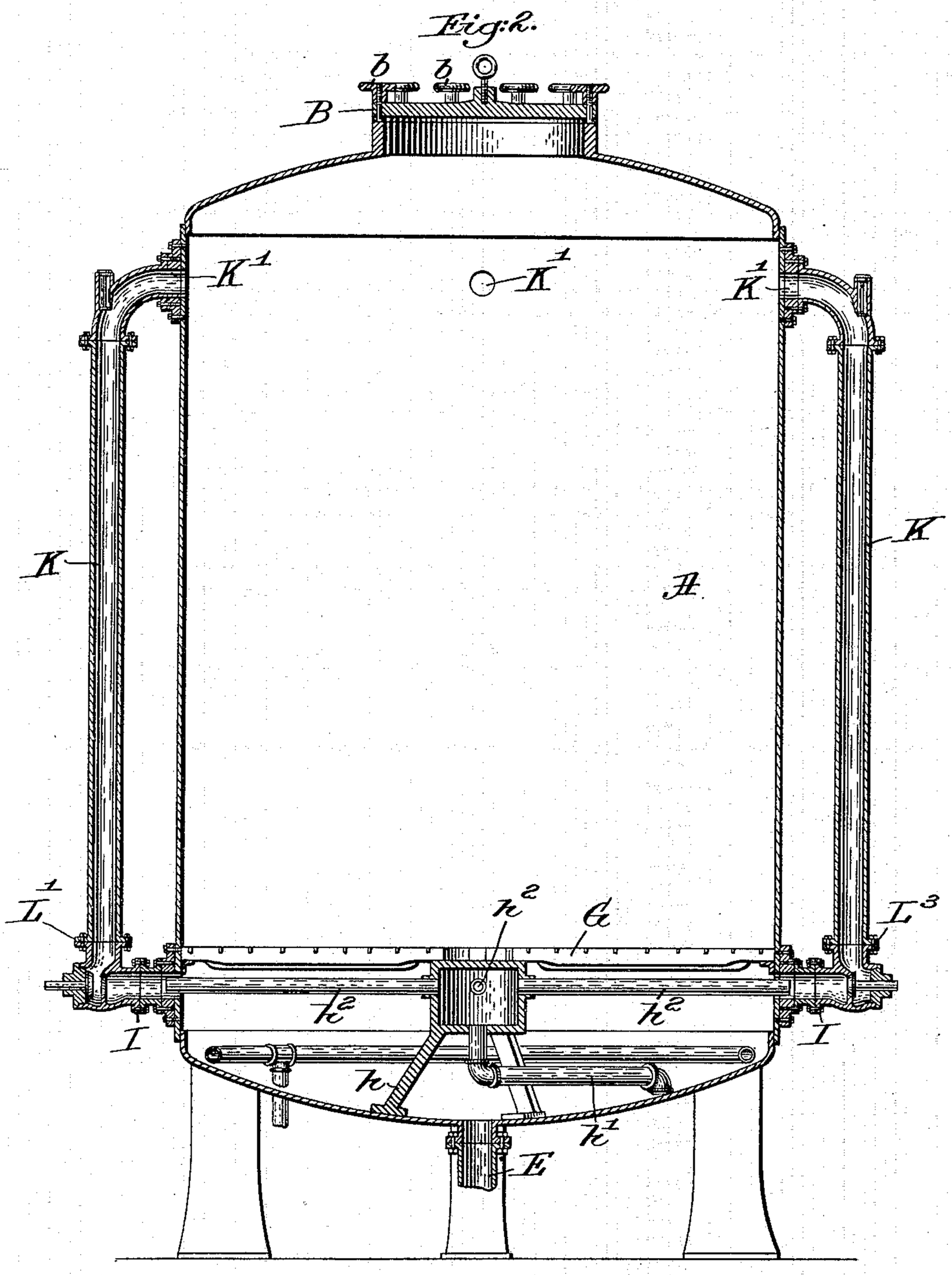
(No Model.) 3 Sheets—Sheet 2.

Fig: 2.



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(No Model.) 3 Sheets—Sheet 3.

Fig: 3.

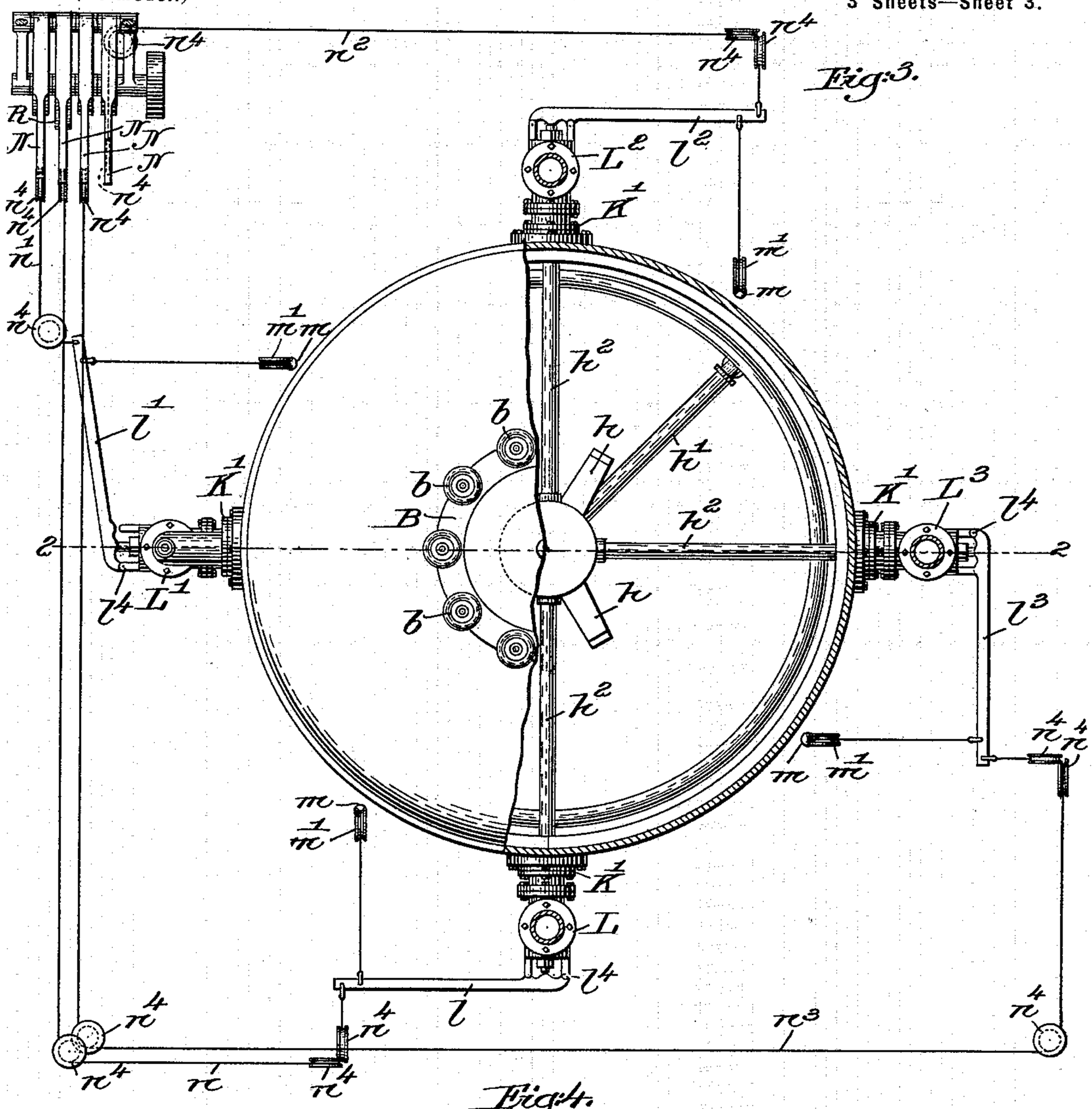
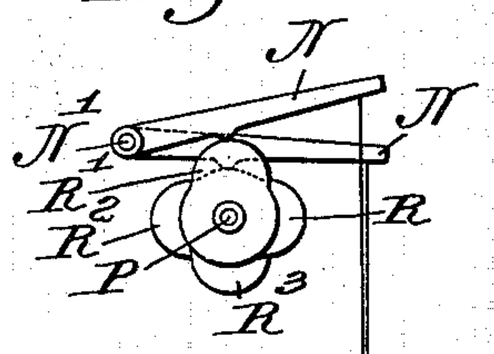


Fig: 4.



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UNITED STATES PATENT OFFICE.

JOHN F. MONAGHAN, OF LOWELL, MASSACHUSETTS.

CIRCULATING-KEIR.

SPECIFICATION forming part of Letters Patent No. 612,210, dated October 11, 1898.

Application filed November 30, 1896. Renewed March 17, 1898. Serial No. 674,261. (No model.)

To all whom it may concern:

Be it known that I, JOHN F. MONAGHAN, of Lowell, in the county of Middlesex and State of Massachusetts, have invented an Improvement in Keirs, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

My invention relates to improvements in bleaching-keirs, whereby constant and positive circulation of the bleaching solution is maintained through the mass of fabric stacked within the keir.

The cloth to be bleached is stacked in a pile in the keir in usual manner, and thereafter the bleaching solution is discharged on the pile.

Keirs as now commonly made have a series of pipes connected outside from near the bottom to near the top, and these pipes are normally unobstructed, so that when the bleaching solution is to be put in circulation to pass through the cloth steam under pressure is admitted to the interior of the keir, and it is expected that the steam will find its way into the pipes referred to and take with it the bleaching liquid and discharge it uniformly on the pile of cloth in the keir; but this frequently is not the case, for when the pressure within the keir becomes considerable it almost invariably results that unless a pump or injector is used the circulation will become sluggish and liable to cease altogether. The problem has long been how to get both circulation and proper pressure together in the same apparatus without the use of any special forcing apparatus, such as a pump or injector, the difficulty being that when proper pressure has been obtained the pressure stops the circulation of the solution. To overcome this difficulty and make the keir uniform and constant in the discharge of the bleaching liquid on the pile of cloth, I have provided, in connection with the pipes referred to, a system of valves which must be opened to enable the steam-pressure to force the bleaching solution through them, and I have provided mechanical devices to automatically open and close these valves one after another in regular or in any predetermined or desired order, so that the liquid will be passed through said pipes and be discharged therefrom onto the pile constantly and will equally penetrate the entire mass and insure uniform bleaching. By my invention the solution is discharged intermittingly from different directions in a succession of discharges, thus distributing the solution uniformly over the pile, keeping it even and continuous.

My invention will be more fully comprehended in the course of the following description and claims taken in connection with the accompanying drawings.

In the drawings, Figure 1 is a front elevation of my invention. Fig. 2 is a central vertical section thereof, taken on line 2 2, Fig. 3. Fig. 3 is a top plan view thereof, parts being broken away to show the internal arrangement of the keir. Fig. 4 is a detail in end elevation of the cam mechanism for operating the valves.

The keir A, provided with a cover B, secured in place by hand-nuts *b*, and having the pipe connections C C′, blow-off valve D, outlet E, heating-pipe F, and open grate G for the cloths to be stacked upon may be and are such as are commonly employed for bleaching purposes.

In the preferred embodiment of my invention, as herein shown, H designates a steam-chest supported on legs *h* centrally within the keir A, immediately below the grate G, and also furnishing a support for the latter. The steam-chest H receives its steam from a suitable source of steam-supply through a pipe *h′* and is provided with a plurality of outlet-pipes h^2, four being shown in the present instance, extending radially to and preferably into the connections I. The connections are secured to the keir below the grate G, so as to freely communicate with the bleaching solution used. Return-pipes K extend from the connections I, respectively, and enter the upper part of the keir at K′ to provide for the circulation of the contained solution.

Valves L L′ L^2 L^3 are provided, one for each pipe K, these valves being preferably located in the connections I, adjacent to the free ends of the steam-pipes h^2, the latter delivering the bleaching, rinsing, or other solution through the connections I and circulation-

pipes K into the keir again at the top to flow down through the cloths over and over again. The valves are of usual construction and are controlled by levers $l\,l'\,l^2\,l^3$, respectively, pivoted, as at l^4, Fig. 3, and normally held closed by means of weights m, suspended therefrom over pulleys m'.

Connected with the free end of each valve-lever is an operating cord or cable, designated, respectively, as $n\,n'\,n^2\,n^3$, and passing over direction-pulleys n^4 to the free ends of levers N, the latter being suitably pivoted, as at N', over a shaft P. The shaft P is provided with a drive-pulley P' and has a plurality of cams keyed or otherwise secured thereon and out of step with each other, one for each lever N, and designated, respectively, as R R' R^2 R^3, Figs. 1 and 4. I do not restrict my invention to this arrangement or operating means, nor to the detailed embodiment as above described, inasmuch as many changes and modifications may be resorted to within the spirit and scope of my invention.

The operation of the apparatus as above set forth is obvious. The cloths are inserted through the top opening of the keir and are stacked on the grate G, as usual. The desired bleaching solutions, water, &c., are admitted. The cover B is secured, and steam is let into the chamber H. The rotation of shaft P causes the cams thereon to raise and lower the levers N in succession, thereby correspondingly opening the valves and permitting them to be closed by their weights m. As each valve opens the steam from the adjacent pipe h^2 is thereby given a forward impulse by the removal of the obstructing-valve, and the bleaching solution is thereby forced out through the valve-opening and up through the circulation-pipe K, to be discharged at its end K' to again flow through the cloths, the cam arrangement, as shown, permitting this discharge of the solution in a series of discharges or spurts, one after the other, following around the keir, if desired, in rotation. First, cam R lifts the lever N, thereby pulling up cord n to draw out lever l and open valve L. The continued rotation of shaft P turns down cam R, permitting valve L to close, and raises cam R', as shown, Figs. 1 and 4, thereby pulling on cord n' and lever l' to open valve L'; and so on and valve L' is closed and valve L^2 is opened, and the latter is closed and valve L^3 is opened. Valve L^3 is then closed and valve L is opened again, the valves being successively opened and closed in regular rotation, the order thereof and the duration and speed of opening depending on the arrangement and shape of the cams and the speed of the driving-shaft.

The arrangement of the steam-chest and injector apparatus entirely within the keir and below the grate is not only compact and economical, but it serves to maintain the bleaching solution at the required temperature.

The gist of my invention resides in providing in the several circulation-pipes an obstruction, (herein shown as a valve,) which may be suddenly removed from in front of the confined liquor, thereby releasing the pent-up fluid and giving it a forward impulse, which, being rapid, keeps a constant flow of the solution, as required. Even with my apparatus if all the pipes were left open the circulation would cease, (it being remembered that the solution is maintained within the keir under pressure,) but by closing a pipe and then suddenly opening it it "kicks" the liquor, as it were, by a kind of momentum on the release of the pressure or resistance of the valve in the pipe. My invention is therefore not restricted in any wise to providing the valves and valve mechanism for obtaining a predetermined order of successive impulses or spurts, but resides, broadly, in providing means for rendering the flow of the liquid through the pipes intermittent. The problem presented to bleachers has been how to obtain a continuous or practically continuous flow of the liquor under pressure, and I have discovered that this problem may be solved simply by checking and releasing the flow of the liquor through the pipes. This, broadly stated, is my invention, and I intend herein to claim any and all means for accomplishing the same, inasmuch as it will readily be understood that my invention may be carried out by a great variety of mechanical expedients.

Having fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. A keir, provided with a plurality of circulation-pipes, means for forcing the contained solution from the bottom of said keir through said pipes, a controlling-valve for each pipe, and means to automatically operate said valves in succession, substantially as described.

2. A keir, provided with a plurality of circulation-pipes, means for forcing the contained solution from the bottom of said keir through said pipes, a controlling-valve for each pipe, a shaft, a plurality of cams thereon, and connections between said cams and said valves, whereby the latter are operated by said cams, substantially as described.

3. A keir, provided with a plurality of circulation-pipes, a controlling-valve for each pipe, and mechanism to automatically operate said several valves in succession in predetermined order of rotation, substantially as described.

4. A keir provided with a plurality of circulation-pipes, means for forcing the contained solution from the bottom of said keir into the top thereof through said pipes, and means for rendering the flow of the liquid

through said pipes intermittent, substantially as described.

5. A keir provided with a plurality of circulation-pipes, a controlling-valve for each pipe, and automatic mechanism for operating said several valves, substantially as described.

6. A keir provided with a plurality of circulation-pipes, a controlling-valve for each pipe, and mechanism for operating said several valves, whereby the discharge from said pipes into the keir may be varied in one and another of the pipes as desired, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHN F. MONAGHAN.

Witnesses:
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JOHN H. RIORDAN.