(No Model.)

5 Sheets—Sheet 1.

L. F. HAUBTMAN.

DIFFUSION APPARATUS.

No. 435,747. Patented Sept. 2, 1890.

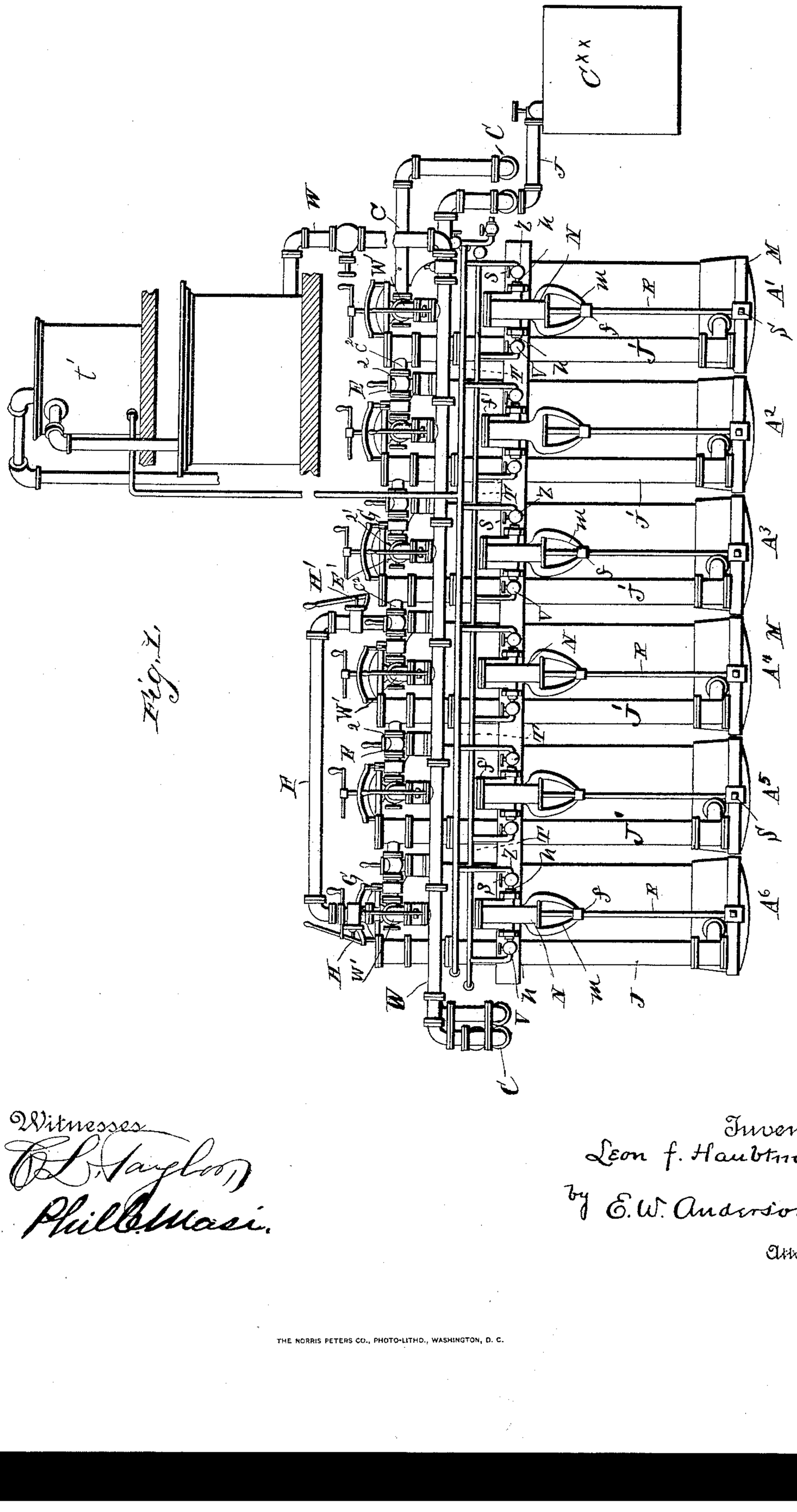

Fig. 1.

Witnesses
C. L. Naylor
Phil. C. Masi.

Inventor
Leon f. Haubtman,
by E. W. Anderson,
Attorney

(No Model.) 5 Sheets—Sheet 2.

L. F. HAUBTMAN.

DIFFUSION APPARATUS.

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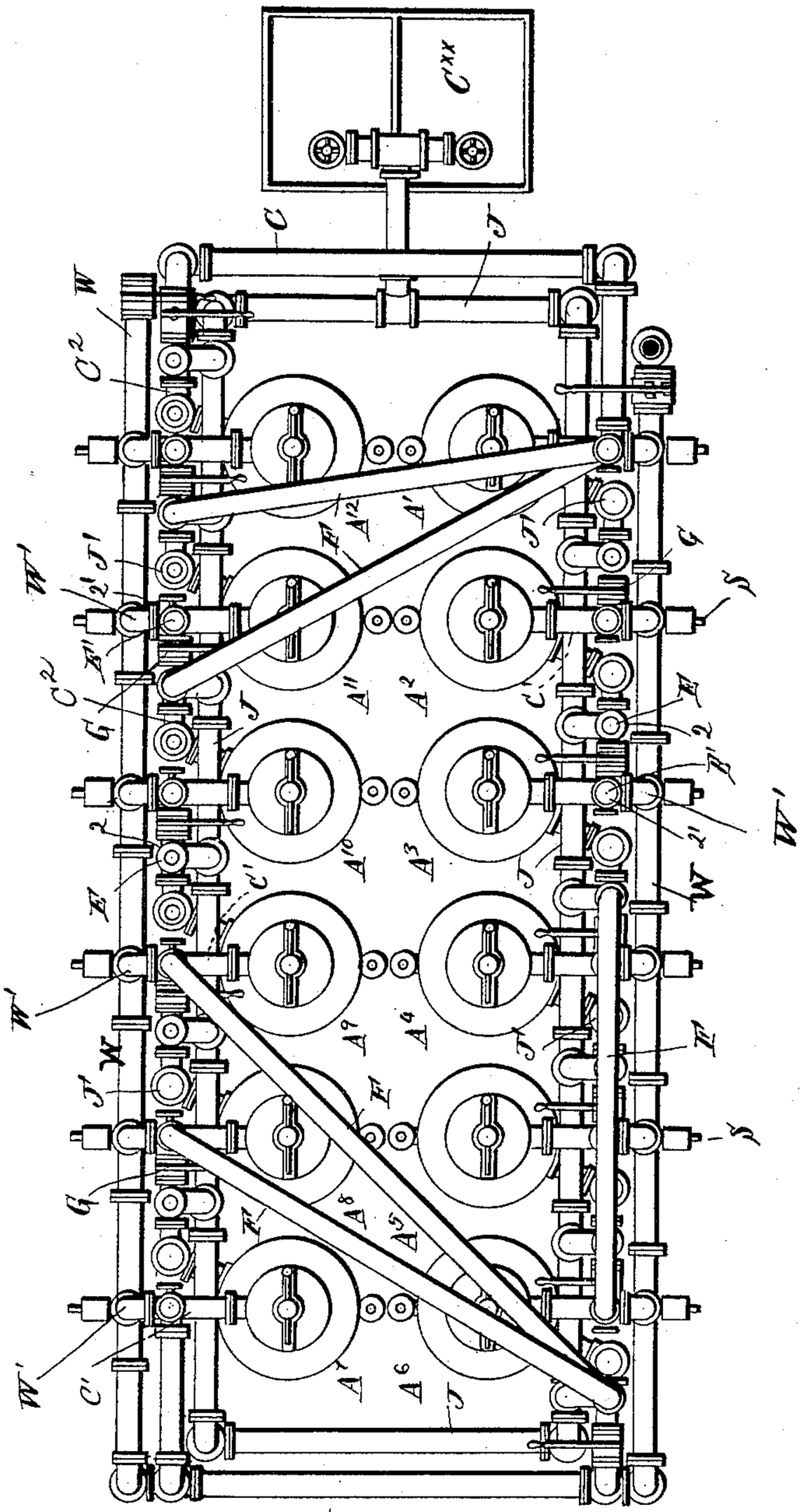


Fig. 2.

Witnesses
C. L. Taylor
Phil. C. Masi.

Inventor
Leon f. Haubtman
by E. W. Anderson,
Attorney

(No Model.) 5 Sheets—Sheet 3.

L. F. HAUBTMAN.

DIFFUSION APPARATUS.

No. 435,747. Patented Sept. 2, 1890.

Fig. 3.

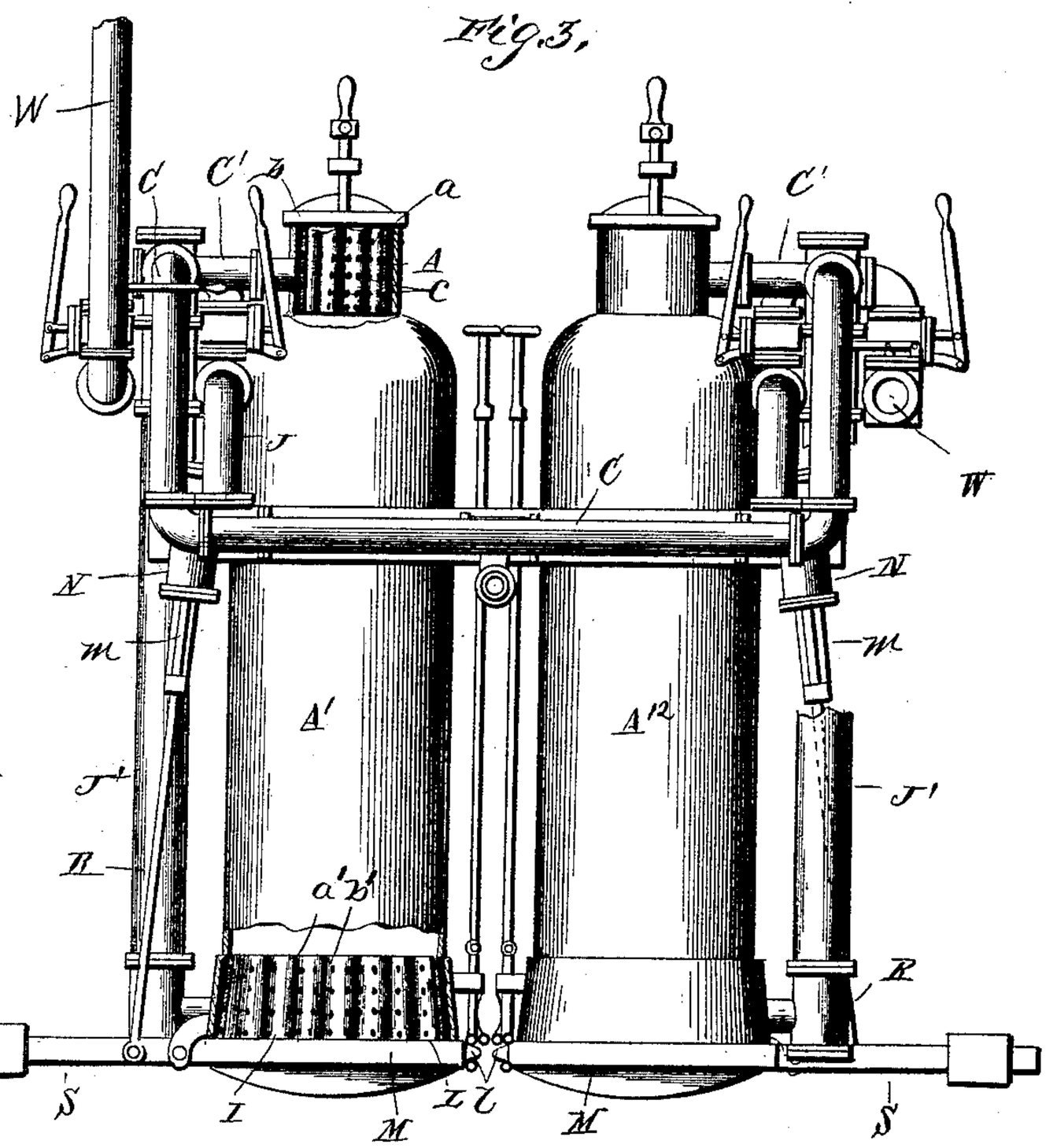


Fig. 6.

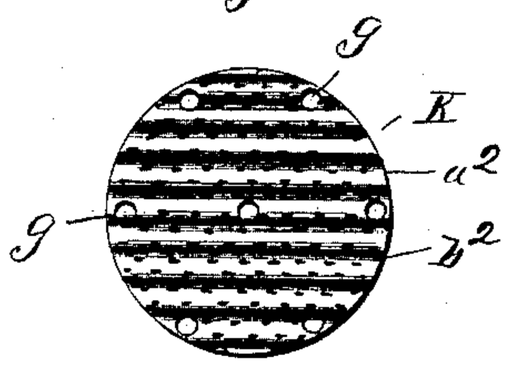
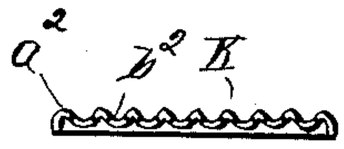


Fig. 7.



Witnesses.
C. L. Sayles,
Phill. Quasi.

Inventor
Leon F. Haubtman
by E. W. Anderson,
Attorney

(No Model.)

5 Sheets—Sheet 4.

L. F. HAUBTMAN.

DIFFUSION APPARATUS.

No. 435,747. Patented Sept. 2, 1890.

Fig. 4.

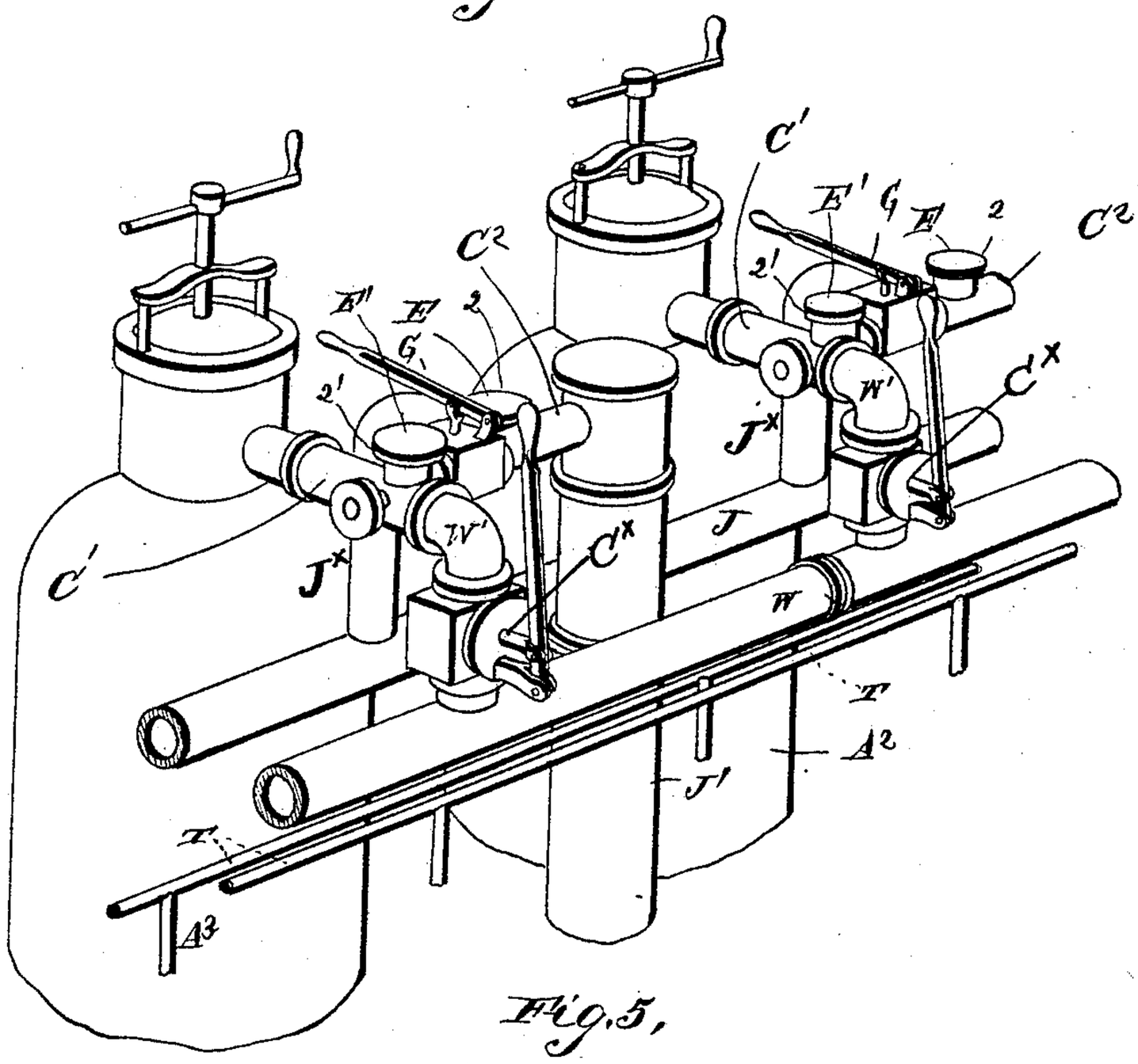
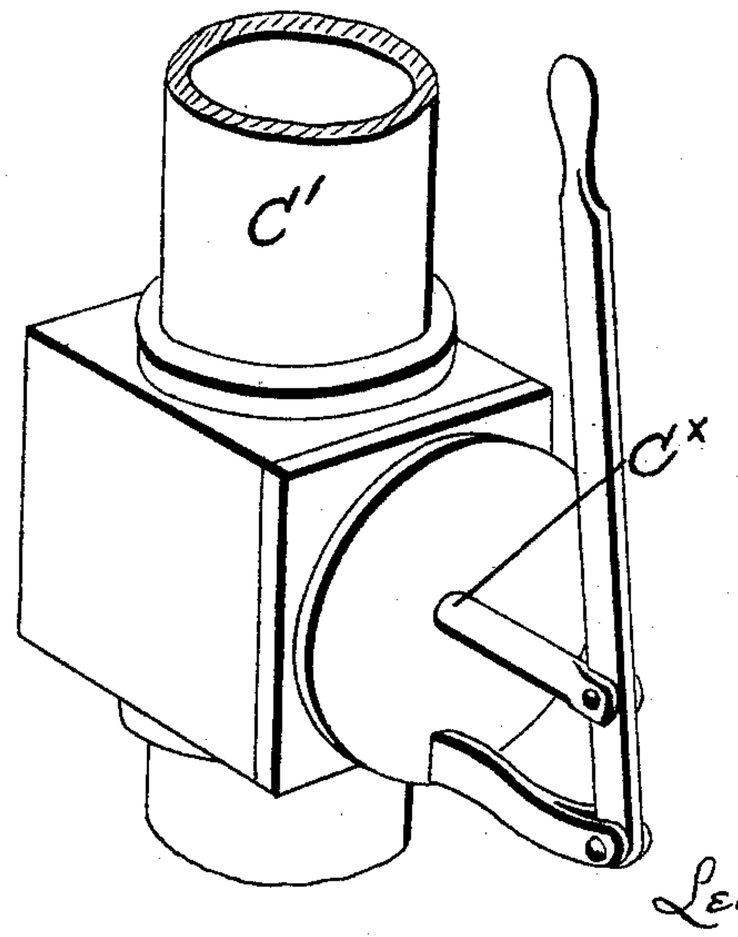


Fig. 5.



Witnesses
C. L. Taylor,
Phil. C. Wasi.

Inventor
Leon f. Haubtman,
by E. W. Anderson
Attorney

(No Model.)

5 Sheets—Sheet 5.

L. F. HAUBTMAN.

DIFFUSION APPARATUS.

No. 435,747. Patented Sept. 2, 1890.

Fig. 8.

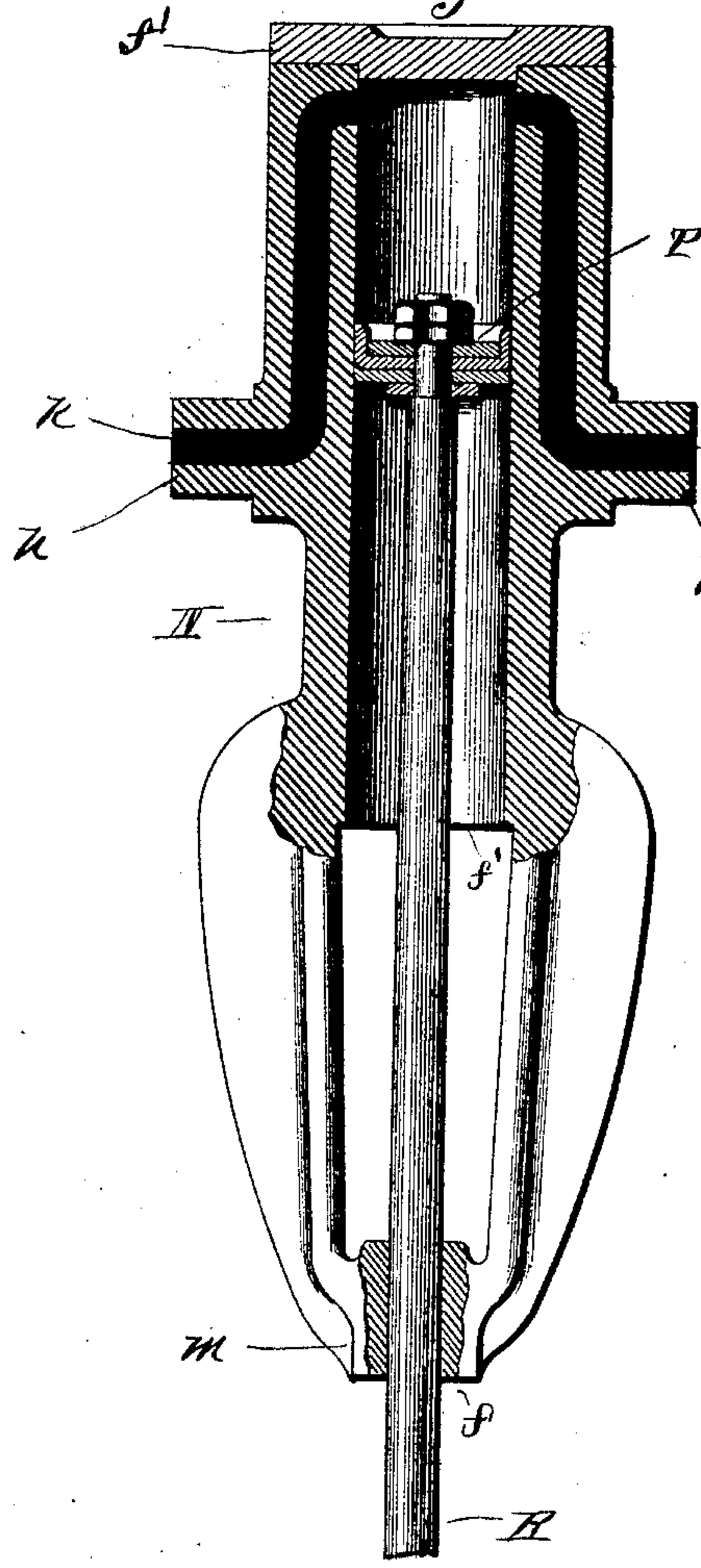
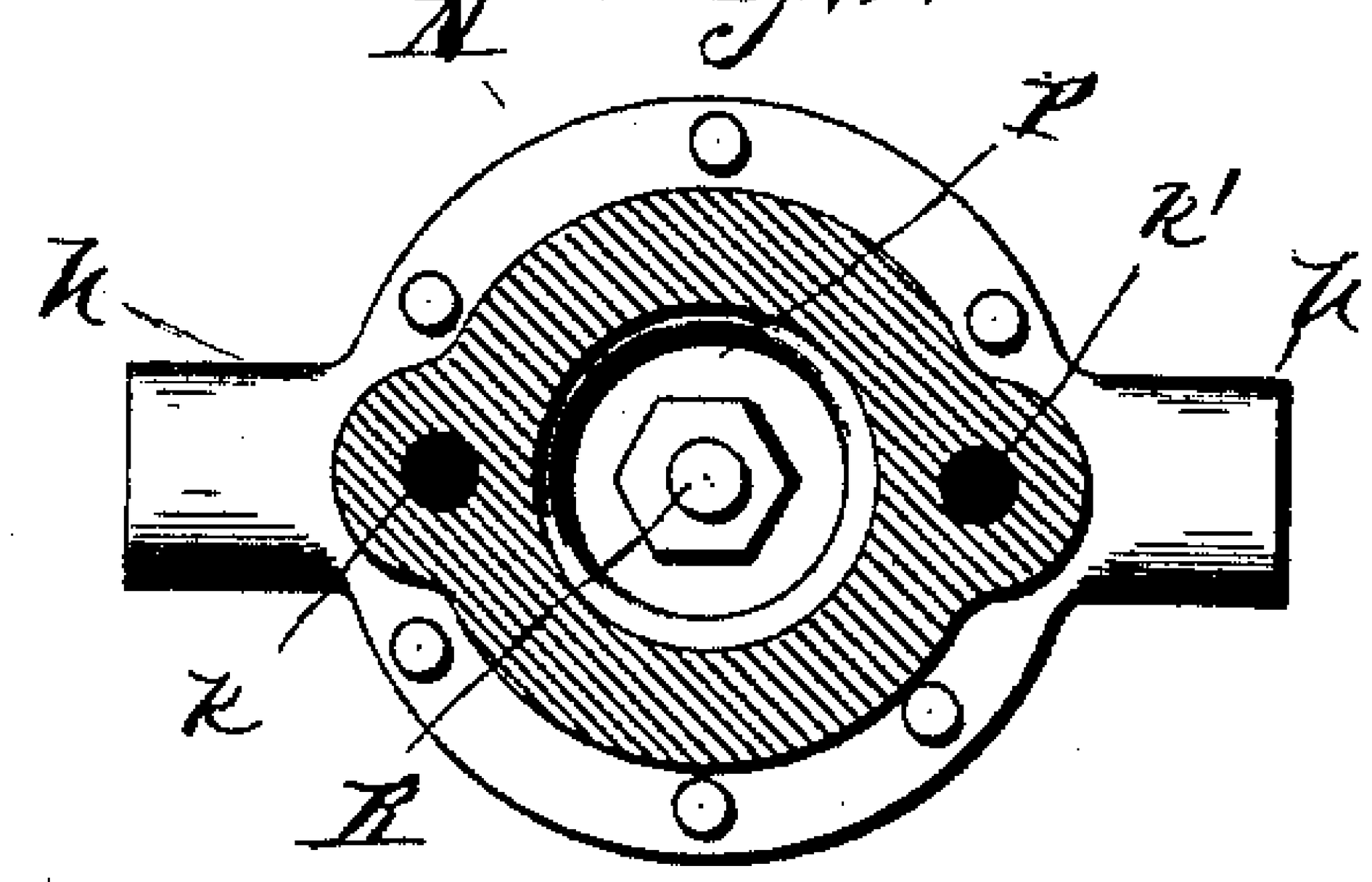


Fig. 9.



Witnesses
C. L. Taylor
Phil C. Masi.

Inventor
Leon F. Haubtman,
by E. W. Anderson.
Attorney

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UNITED STATES PATENT OFFICE.

LEON FRANÇOIS HAUBTMAN, OF NEW ORLEANS, LOUISIANA.

DIFFUSION APPARATUS.

SPECIFICATION forming part of Letters Patent No. 435,747, dated September 2, 1890.

Application filed April 27, 1889. Serial No. 308,848. (No model.)

To all whom it may concern:

Be it known that I, LEON FRANÇOIS HAUBTMAN, a citizen of the United States, and a resident of New Orleans, in the parish of Orleans and State of Louisiana, have invented certain new and useful Improvements in Diffusion Apparatus; and I do 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, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

Figure 1 of the drawings is a side view of the apparatus. Fig. 2 is a top plan view of the same. Fig. 3 is an end elevation thereof having parts broken away and others in section. Fig. 4 is an enlarged detail broken perspective view more fully disclosing the pipe-connections and their valves between the tanks or cells, and the circulation-pipe and branch-pipe connections between the juice-pipe and one of the stand-pipes and said tanks or cells, as also the cut-off valves in the branch-pipe connections between said stand-pipes and the branch-pipe connections between said tanks or cells and said circulation-pipe. Fig. 5 is a similar view of a valve in a branch pipe between the circulating-pipe and a cell. Figs. 6 and 7 are a plan and an edge view, respectively, of the bottom of one of the cells and its strainer; and Figs. 8 and 9 are an enlarged detail vertical section and a horizontal section, respectively, of the hydraulic cell-bottom-actuating mechanism.

This invention has relation to diffusion apparatus designed, mainly, for the extraction of sugar-sap from tropical cane, sorghum, and beet-root; and it consists in the novel construction and combination of devices, all as hereinafter set forth.

In the accompanying drawings, illustrating a double-line diffusion-battery, the letters A′ A^2 A^3, &c., designate the cells or tanks; W, a receiving or water pipe, which connects with said cells or tanks by branch pipes W′; C, the circulation-pipe connected to said receiving-pipe W, and also to said cells or tanks, by branch pipes C′, which connect by means of branch pipe C^2 with the stand-pipes J′, and J is the juice or discharge pipe connecting by branch pipes $J^\times$ with said branch pipes C^2 and leading to the measuring-tank $C^{\times\times}$.

When a large number of cells is employed, as in diffusion-apparatus of this class, delay is apt to happen through the failure of one or more of the cells to perform its function, owing to accident from clogging or injury to the cells, and when such failure occurs the action of the entire battery is stopped and great delay is caused with much loss of time and money. In order to provide a remedy for these difficulties, the pipe-connection W′ between the water-pipe W and the branch pipes C′ is provided with a valve $C^\times$, and has connection with the stand-pipe J′ by means of a branch pipe C^2, provided with an opening 2, which, when not in use, is closed by a blank cap E or by a valve, as at G, and a similar opening 2′, having a cap or valve E′, is provided in said pipe-connection W′. The valves $C^\times$ provide for obtaining access to the interior of the pipes C′ for cleaning or flushing them. These valves or openings come into use only when it is necessary to jump from one cell to another in such a way as to cut out the inoperative cell or cells. Then the opening 2′ of the pipe which is delivering to the defective cell or collection of cells is immediately connected to the receiving-opening 2 of the receiving-pipe of the first active cell on the other side of the defective cell or section of cells by means of a pipe F, which is joined to said openings; and the cut-off valves G in said pipes C^2 next to the openings 2 and 2′ referred to (one of which pipes is connected by pipe J′ with the opposite cell near its bottom) being closed the circulation in the battery is effected through the pipe F, the defective cells being entirely shut off, so that they can be easily inspected and overhauled or repaired. The cut-off pipe F may be allowed to remain in position upon the battery, if desired, and in this case it is provided with end valves, as at H H′, so that it can be closed off when the normal circulation through the cells spanned by the pipe F is effected. The cut-out may be made in either line of a double-line battery, or the pipe F may extend across from one line of cells to the other, cutting out cells of both lines.

To prevent clogging, and thereby avoid the necessity of cutting out any of the cells of

the battery as far as possible, as well as to bring the cells up to their full capacity of working, I provide the corrugated strainers or sieves A, I, and K for the cells.

The upper or receiving annular strainer A is removable, and is formed with vertical corrugations, as indicated at *a* and *b*, *a* representing the outer convexity and *b* the inner convexity of each corrugation. Through the inner and outer convexity *a* and *b* the small apertures *c* are made for the passage of the liquid. These apertures or perforations *c*, being made small and close together and being protected by the outer and inner convexities *a* and *b* from direct contact with the chips in the cell, are not liable to be clogged by either the current of liquids from the bottom to the top or that from the top to the bottom, as in many cases this current has to be reversed, and the corrugations being in the upright direction do not catch or stop the chips as they fall into the cell. The lower annular strainer I is also made with upright corrugations, as indicated at *a'* and *b'*, respectively representing the outer convexities and the inner convexities of each corrugation. This strainer is made slightly tapering or conical, its lower diameter being a little larger than its upper diameter, in order that the descent of the chips, especially in discharging an exhausted mass through the base-opening L, may be unobstructed. This tapered wall also prevents much friction of the descending chips against the perforations of the sieve.

The lower or base sieve K is secured to the top of the bottom door M of the cell, its perforated surface standing away from said bottom. This door is held up against the base of the cell and closes the base-opening, the sieve K being formed with corrugations, (indicated at a^2 b^2,) said corrugations running from the pivot side of the door toward the free or falling edge thereof, in order to present no transverse obstructions or ledges to catch the particles of the chips or refuse when the door is opened downward to discharge the load of the cell. The sieve K is supported on the base-door M by means of screws or bolts, as indicated at *g*.

In order to operate the door M with facility and with certainty, I provide a hydraulic cylinder N, which is pivoted to a cell or to the framing thereof by means of trunnions *h*, through which passages *k* and *k'* are made for the flow of the operating-liquid.

As the entire weight of the contents of the cell is upon the door M when the catch *l* thereof is unfastened, the door, if unprovided with check devices, is liable to swing downward suddenly with great force at much risk of breaking the joint. The object of this improvement is to control the movement of the door.

The cylinder N is formed with a guide *m* at the end *f*, which is open to the atmosphere, the other end *f'* being closed. A hydraulic piston P is provided in the cylinder, said piston consisting usually of a piece of leather held between two plates secured to the piston-rod R, which is connected to the lever-arm S of the door M. When the cell is charged with the chips and water, the piston is at the lower end of the cylinder, and the door of the cell is locked in closed position by means of its catch at *l*. When the contents of the cell is to be discharged, precaution is taken to fill the cylinder between its closed end and the piston with water, and in order to accomplish this an inlet-valve V and an outlet-valve Z, having checks *s*, are provided in connection with the supply and discharge pipes T, leading to the hollow trunnions of the cylinder. The water should be supplied to the cylinder from some source of pressure, as an elevated tank *t* or a main. When the door is unlocked, the weight of the load of chips in the cell is supported by the door and comes upon the piston P, which is connected to the arm thereof. By regulating the outlet trunnion-valve Z the door can be opened with more or less speed and can be stopped in any desired position, thereby preventing many breaks and accidents liable to occur in the practical handling of a diffusion battery when constructed without such controlling devices. When the contents of the cell have been discharged, the door can be caused to rise to its closed position by opening the inlet trunnion-valve V, and it can then be hooked or fastened. The cylinder being capable of a rocking motion is designed to accommodate itself to the different angular positions of the lower arm of the door and the piston-rod connected thereto. Usually in the construction of this battery it is designed to connect the discharge of the cylinder-operating system of pipes to the reservoir which supplies the water to the diffusion-cells, in order that the water which is used in operating the pistons may be saved and utilized in supplying the cells, the pressure upon the water used in said cylinders being sufficient to force it into the common reservoir of said cells. The water being supplied under pressure to the cells from the bottom after charging the cells with the required quantity of chips passes upward through the bottom sieves I into contact with said chips and successively out through the upper sieves and into and through the circulation-pipes C C' C^2, &c., thus treating continuously the contents of each cell or tank. It is obvious that the juice, as occasion may require, can be drawn off through the pipes J and be discharged into the tank $C^{\times\times}$ at certain intervals, thus effecting the required treatment of the chips or solid mass in said cells.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a diffusion apparatus, the combination, with a diffusion-cell having a pivoted door at its bottom and provided with the necessary pipe-connections, of a pivoted hydraulic cylinder having a piston connected by its rods

to said door, and having trunnions provided with valved pas ages, and means for supplying fluid under pressure to said passages, whereby the piston is actuated, all substantially as and for the purpose set forth.

2. In a diffusion apparatus, the combination, with the series of diffusion-cells and their pipe-connections, of the lever-doors of said cells, the pivoted hydraulic cylinders, and their pistons, the trunnions of said cylinders having the valved passages, and the means for supplying fluid under pressure to said passages, substantially as and for the purpose set forth.

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

LEON FRANÇOIS HAUBTMAN.

Witnesses:

J. W. DAVIS,

E. A. DECKBAR.