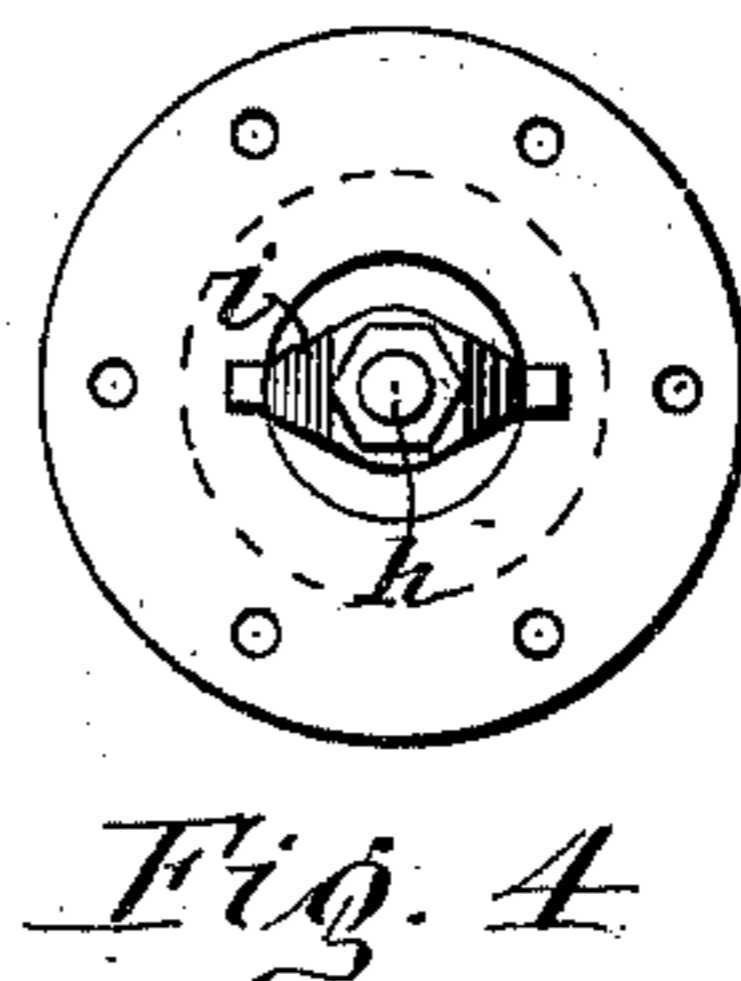
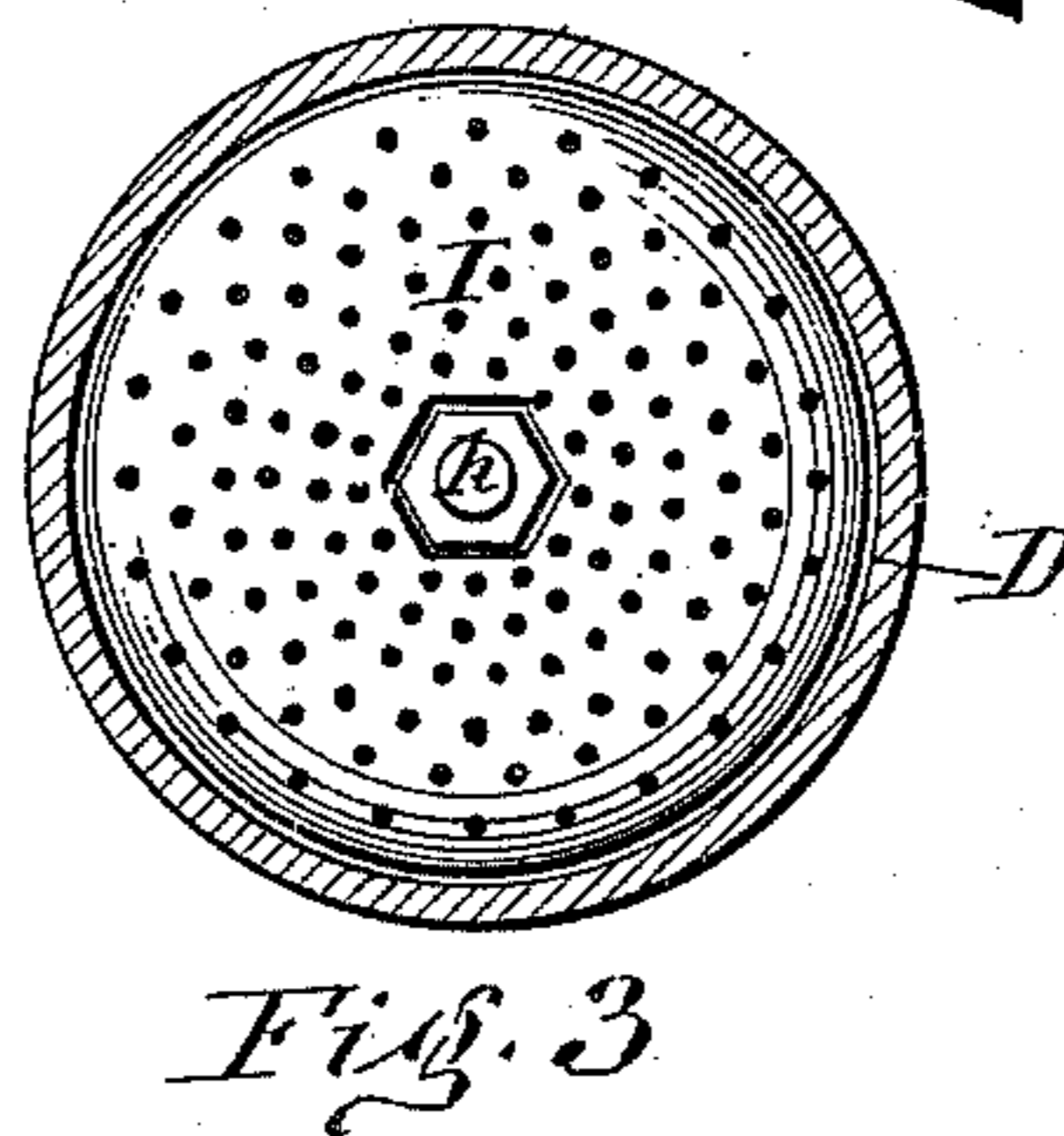
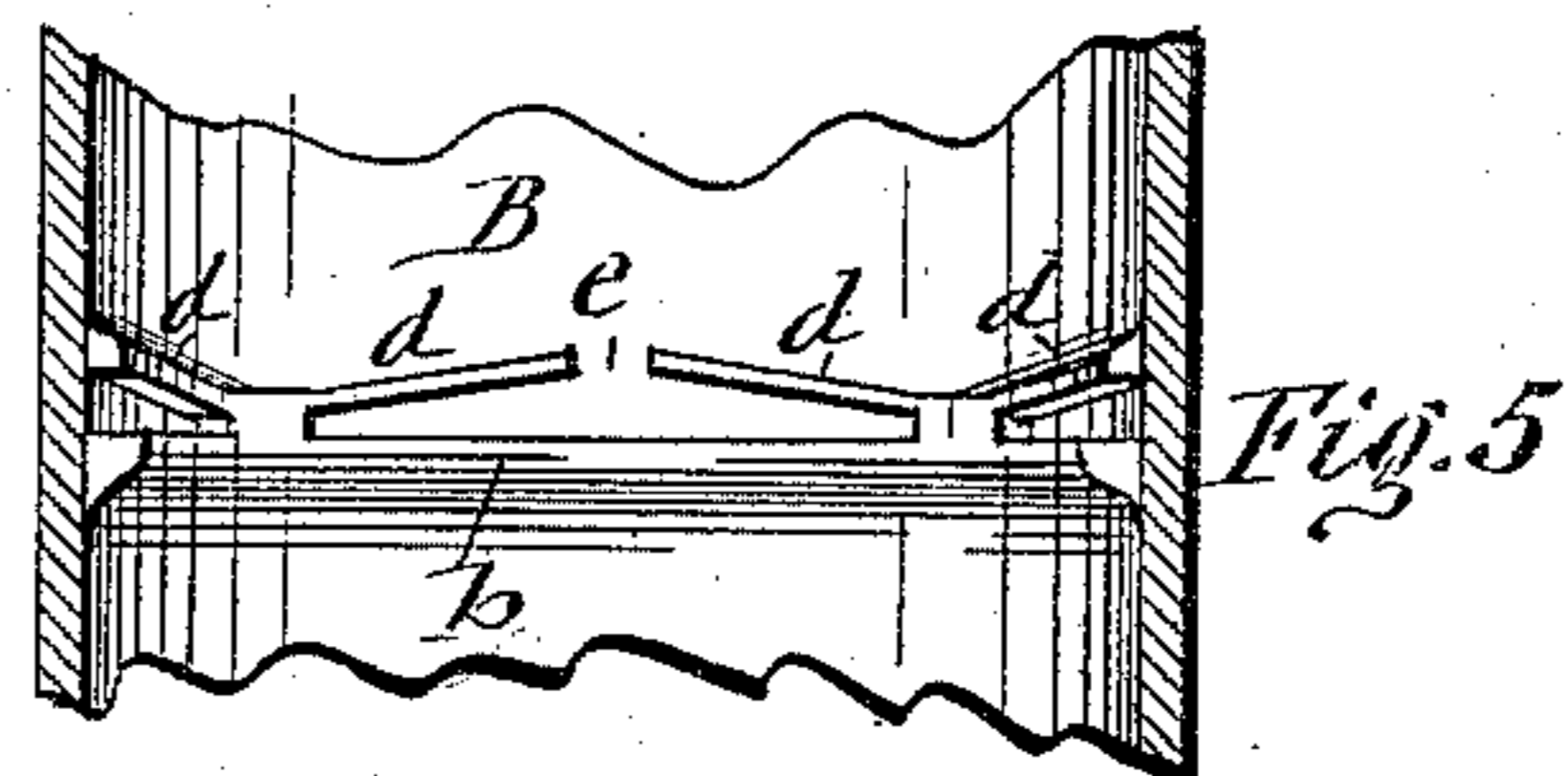
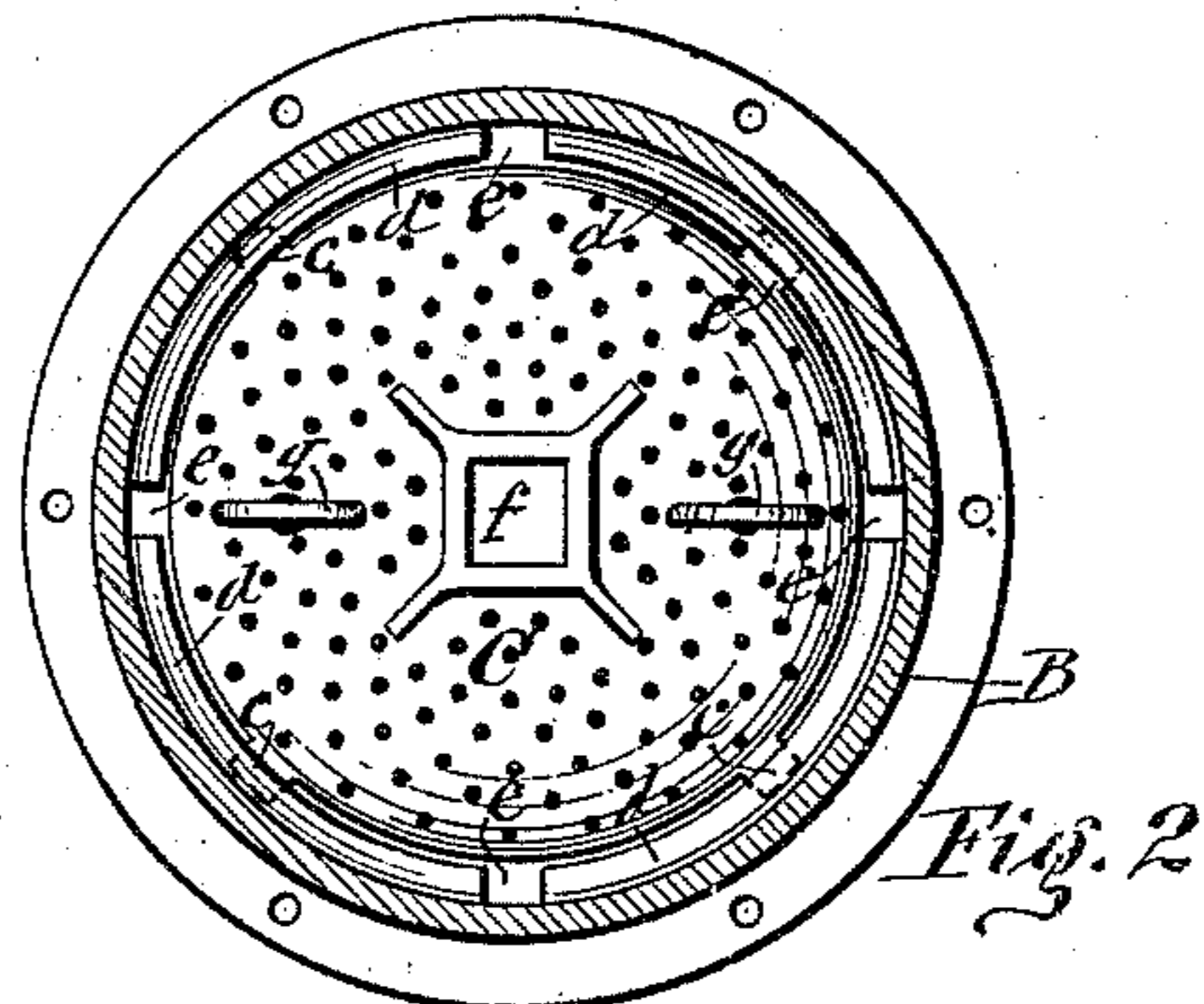
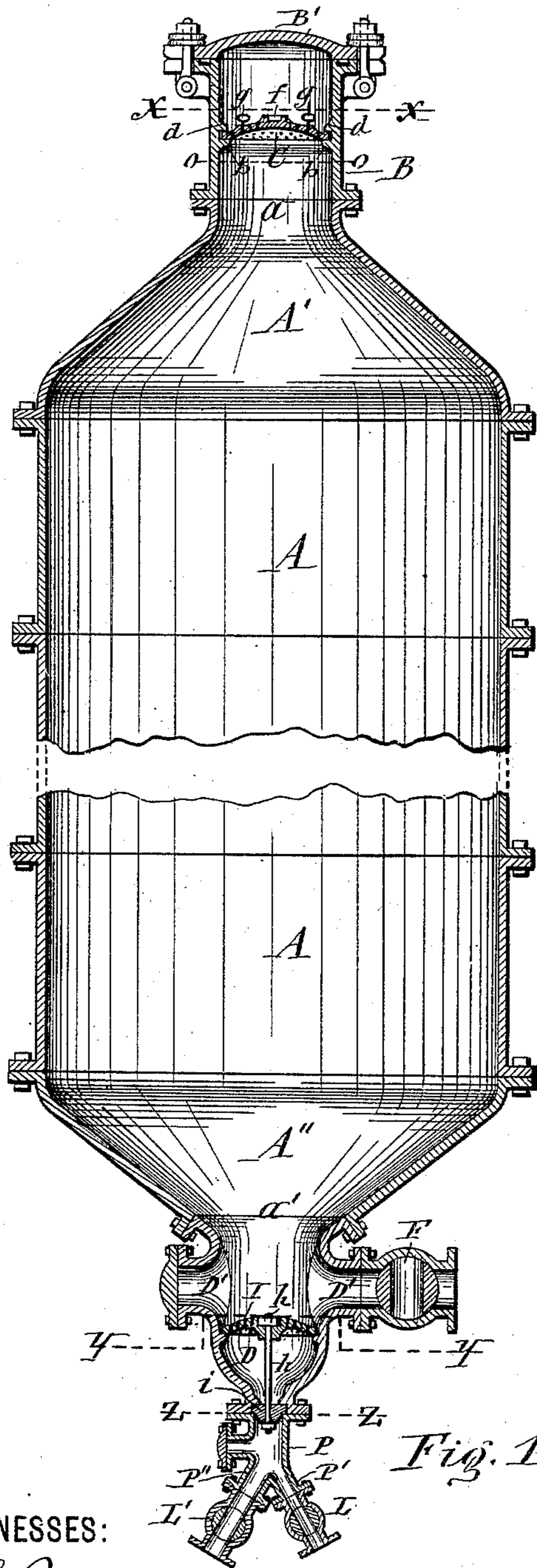


(No Model.)

W. P. HAWLEY.
WOOD FIBER DIGESTER.

No. 445,767.

Patented Feb. 3, 1891.



WITNESSES:
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UNITED STATES PATENT OFFICE.

WILLARD PRESCOTT HAWLEY, OF WATERTOWN, NEW YORK.

WOOD-FIBER DIGESTER.

SPECIFICATION forming part of Letters Patent No. 445,767, dated February 3, 1891.

Application filed April 28, 1890. Serial No. 349,789. (No model.)

To all whom it may concern:

Be it known that I, WILLARD PRESCOTT HAWLEY, of Watertown, in the county of Jefferson, in the State of New York, have
5 invented new and useful Improvements in Wood-Fiber Digesters, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

10 This invention relates to apparatus employed in the process of chemically reducing wood to pulp, and it has special reference to the digester in which the wood, previously reduced to chips by mechanical means, is introduced and subjected to the action of an
15 acid solution heated by steam under pressure.

The object of this invention is to introduce the steam and acid solution exclusively through the bottom of the digester, and in
20 such a manner and such a position in relation to the blow-off pipe as to heat the acid solution at its ingress in the digester, and diffuse the same, together with the steam, throughout the digester from the bottom upward, and at
25 the same time guard against the clogging of the valve of the blow-off pipe; and to that end the invention consists in the combination with, the digester formed with a funnel-shaped base, of a supplemental chamber provided with the blow-off pipe beneath said
30 base, a screen beneath the blow-off pipe, a main induction-pipe connected to the bottom of the supplemental chamber, and a steam-supply pipe and an acid-supply pipe branching from the main induction-pipe, all as hereinafter fully described, and specifically set forth in the claim.

In the annexed drawings, Figure 1 is a vertical or longitudinal section of a digester
40 embodying my improvements. Figs. 2 and 3 are enlarged horizontal transverse sections, respectively on lines $x x$ and $y y$, Fig. 1. Fig. 4 is an enlarged view of the under side of the joint, taken on the line $z z$, Fig. 1; and
45 Fig. 5 is a sectional view of the dome, showing the means for securing the screen thereto.

Similar letters of reference indicate corresponding parts.

A represents the digester proper, which is
50 of the form of an upright cylindrical retort, as hereinbefore stated, and is formed with the conical crown A' and funnel-shaped base

A'', as shown in Fig. 1 of the drawings. The top of this crown is formed with an opening
55 a , through which to introduce the chips to be treated, and this opening is usually provided with a removable cover. In lieu of this cover I mount on the crown A' the dome B, which is preferably also cylindrical shaped and of the same diameter as the opening A, and thus
60 considerably smaller than the digester A, which reduction in size is an important feature. The cap or top plate B' of the dome is removably connected to the dome to allow the chips to be introduced through the top of the
65 dome.

About midway the height of the dome is a screen or perforated diaphragm C, extended across the dome and seated on a horizontal
70 ledge b , formed on the interior of the dome, and in order to dispense with bolts, which by corrosion are rendered difficult to be removed, I secure the screen C removably on its seat b by forming said screen with radially-projecting lugs $c c c c$, and providing the interior of the dome B with ribs $d d d d$, over
75 the ledge or seat b , and a sufficient distance therefrom to allow the said lugs to enter between said ledge and ribs. The ribs are provided with notches $e e e e$, which allow the
80 lugs to pass through them and enter under the ribs, which latter are preferably inclined, as shown in Fig. 5 of the drawings, so that by turning the screen C after the same has been seated on the ledge b the lugs $c c c c$ become
85 wedged under the ribs $d d d d$, and thus hold the screen firmly in its position.

For turning the screen as aforesaid it is provided on its top with a square or other
90 angular socket f , into which to insert a correspondingly-shaped wrench, and handles $g g$ are secured to the screen to facilitate the lifting of the screen out of the dome when desired to charge the digester with wood chips to be treated. The funnel-shaped base A''
95 of the digester is also formed with an opening a' at its bottom and with outward flanges around said opening, and to said flanges I bolt a supplemental chamber D, provided with a corresponding top opening with out-
100 ward flanges thereon. Said chamber thus communicates with the interior of the digester A.

Immediately beneath the opening a' the

chamber D is formed with lateral branches D' D', to one or both of which is connected a blow-off cock F, from which a pipe leads to the so-called "blow-pit." (Not shown in the drawings.) Immediately below the branches D' D' is a screen or perforated diaphragm I, seated on a horizontal ledge formed on the interior of the chamber D, on which ledge the screen is secured by a bolt *h*, passing vertically through the center of the screen and having its head countersunk in the top of the screen, and its screw-threaded lower end passing through a bridge *i*, placed across an opening in the bottom of the chamber D and provided with a nut on its lower end. Said chamber is provided with a circumferential outward flange around said bottom opening, and to this flange is bolted a pipe P, which is branched, as shown at P' and P'' in Fig. 1 of the drawings. To these branches are connected stop-cocks L and L', and to one of these cocks is connected the steam-supply pipe and to the other is attached the acid-supply pipe. (Not shown in the drawings.) The branches P' P'' are preferably disposed at an acute angle at their intersection with the pipe P, so that the steam which enters under considerable pressure produces a suction on the inlet of the acid solution, and thereby facilitates the ingress of said acid, and at the same time heats the same immediately at its entrance.

In the operation of the described apparatus the digester A is completely filled with the wood chips which descend to the screen I, which, together with the inclined bottom of the funnel-shaped base A, support the chips.

A sufficient quantity of chips is introduced to also partly fill the portion of the dome B below the screen C, or about to a height indicated by the dotted line *o* in Fig. 1 of the drawings, and a sufficient quantity of acid solution and steam is introduced to bring the top of the acid about to the line *xx* above the screen C, leaving the portion above said line for collection of heated gases. The steam and acid solution being admitted simultaneously at the bottom of the chamber D causes the heated acid to be forced up through the body of chips and become thoroughly diffused through the same. The complete filling of the digester with chips excludes the gases which can only occupy the top portion of the dome B, and thus the deterioration or destruction of the digester by the influence of the gases is effectually obviated.

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

The combination, with the digester A, formed with a funnel-shaped base A'', of the supplemental chamber D, provided with a blow-off pipe immediately beneath the base A'', the screen I beneath the blow-off pipe, the pipe P, connected to the bottom of the chamber D, and a steam-supply pipe P' and acid-supply pipe P'' branching from the pipe P, substantially as described.

In testimony whereof I have hereunto signed my name this 25th day of April, 1890.

WILLARD PRESCOTT HAWLEY. [L. S.]

Witnesses:

MARTIN GILLIGAN,
GEORGE S. HOOKER.