

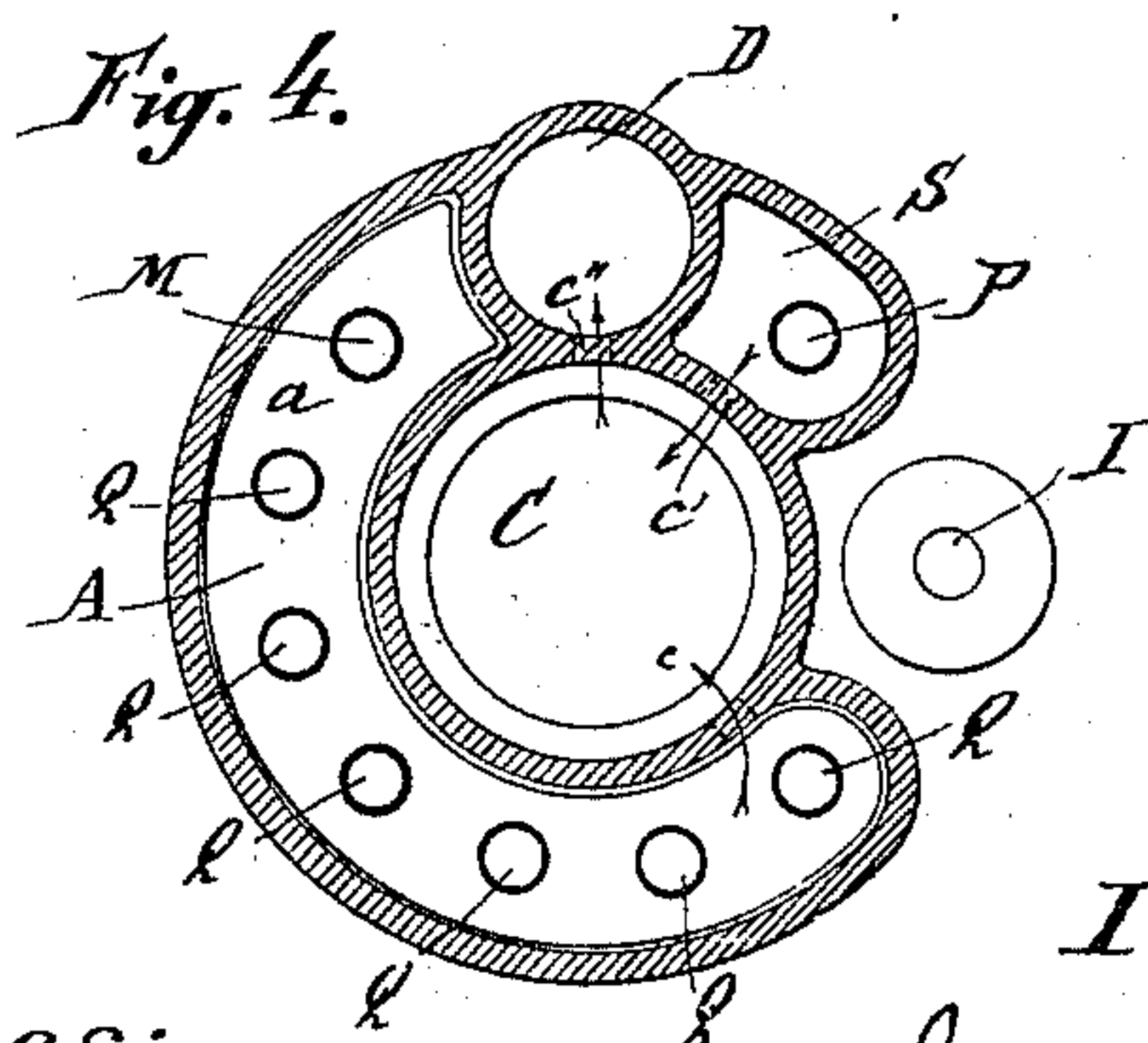
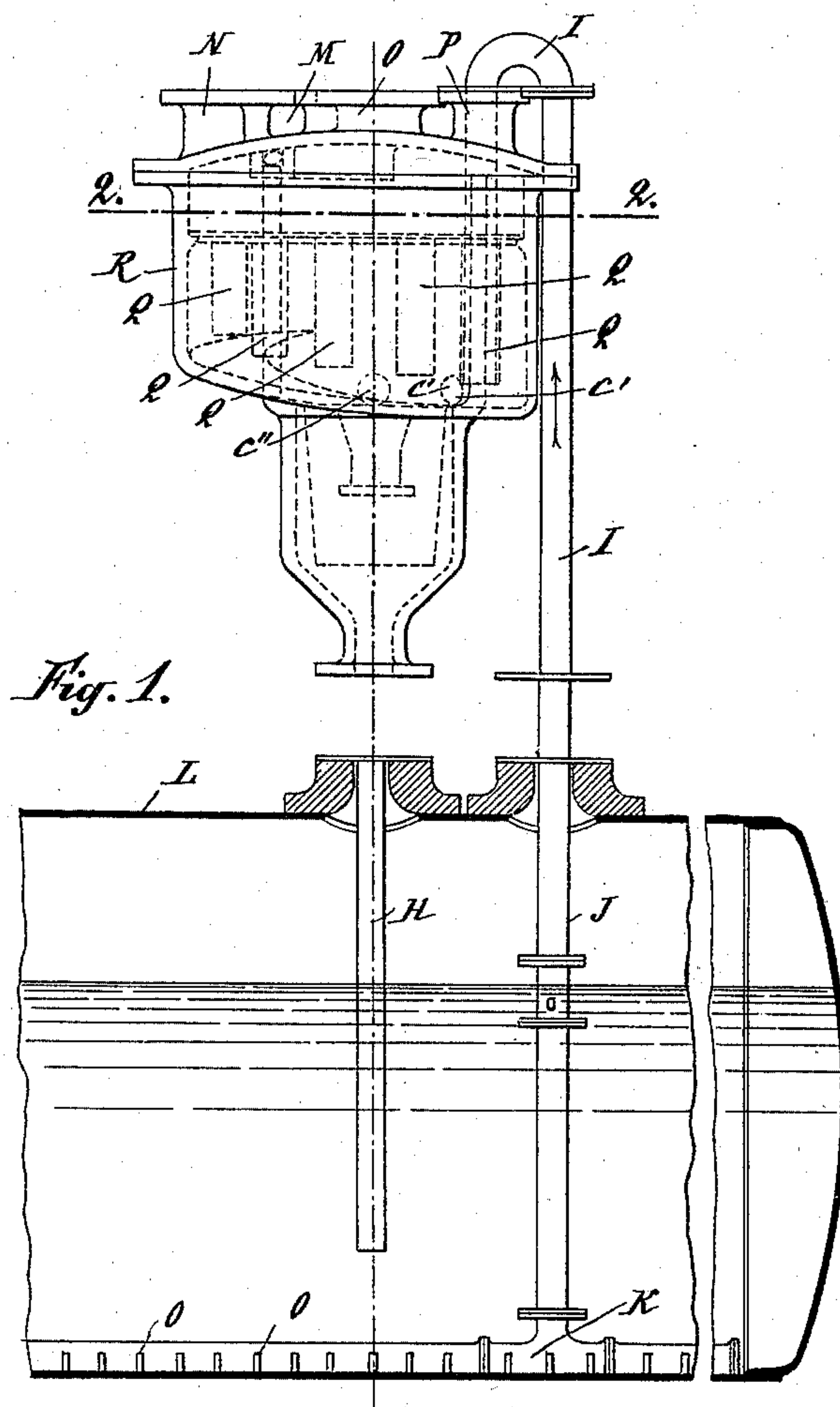
(No Model.)

3 Sheets—Sheet 1.

J. DEMOULIN.
APPARATUS FOR PURIFYING WATER.

No. 589,937.

Patented Sept. 14, 1897.



Witnesses:

E. B. Bolton

Otto Munk

Inventor:

Jean Demauler

By

his Attorneys.

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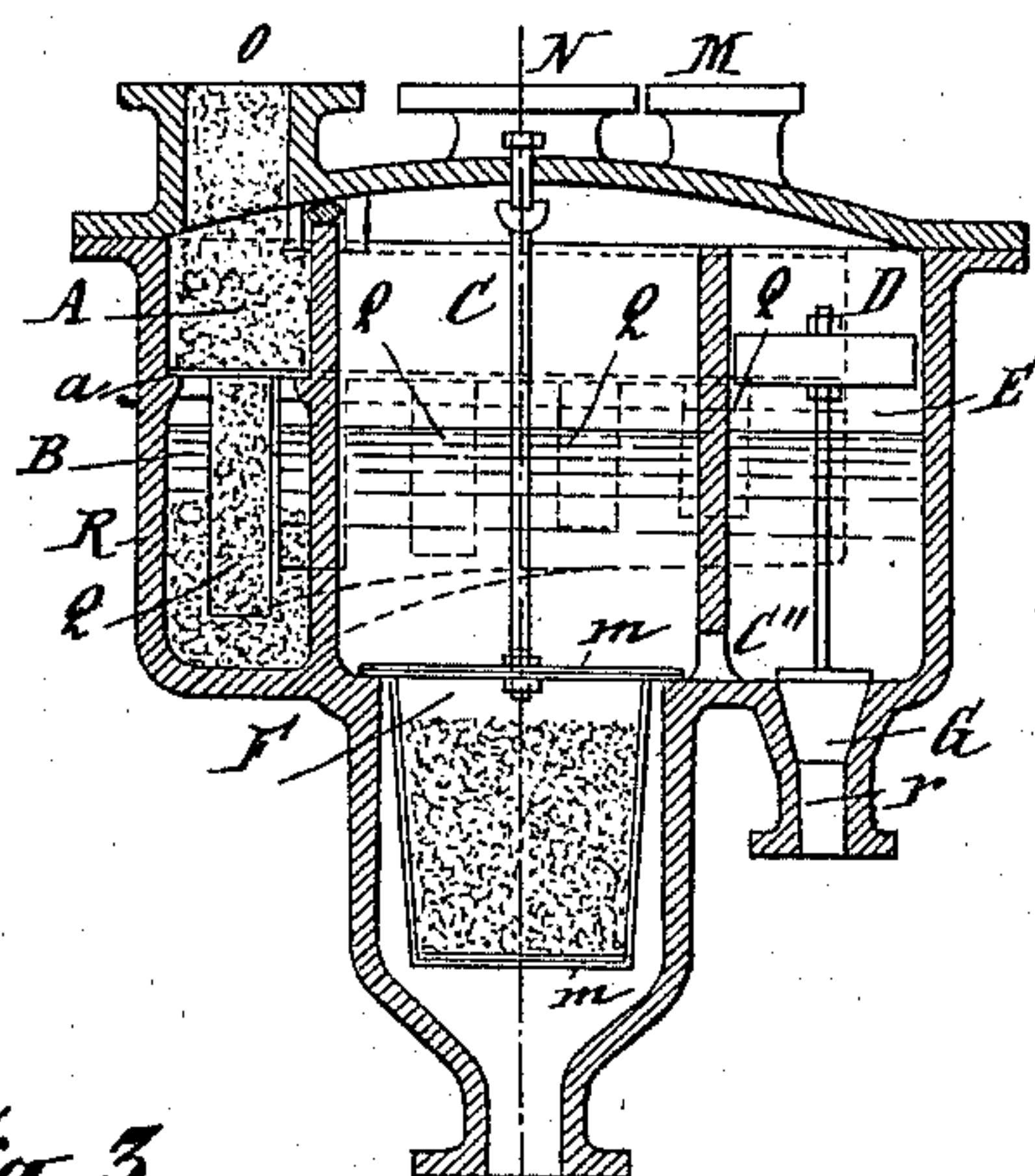


Fig. 3.

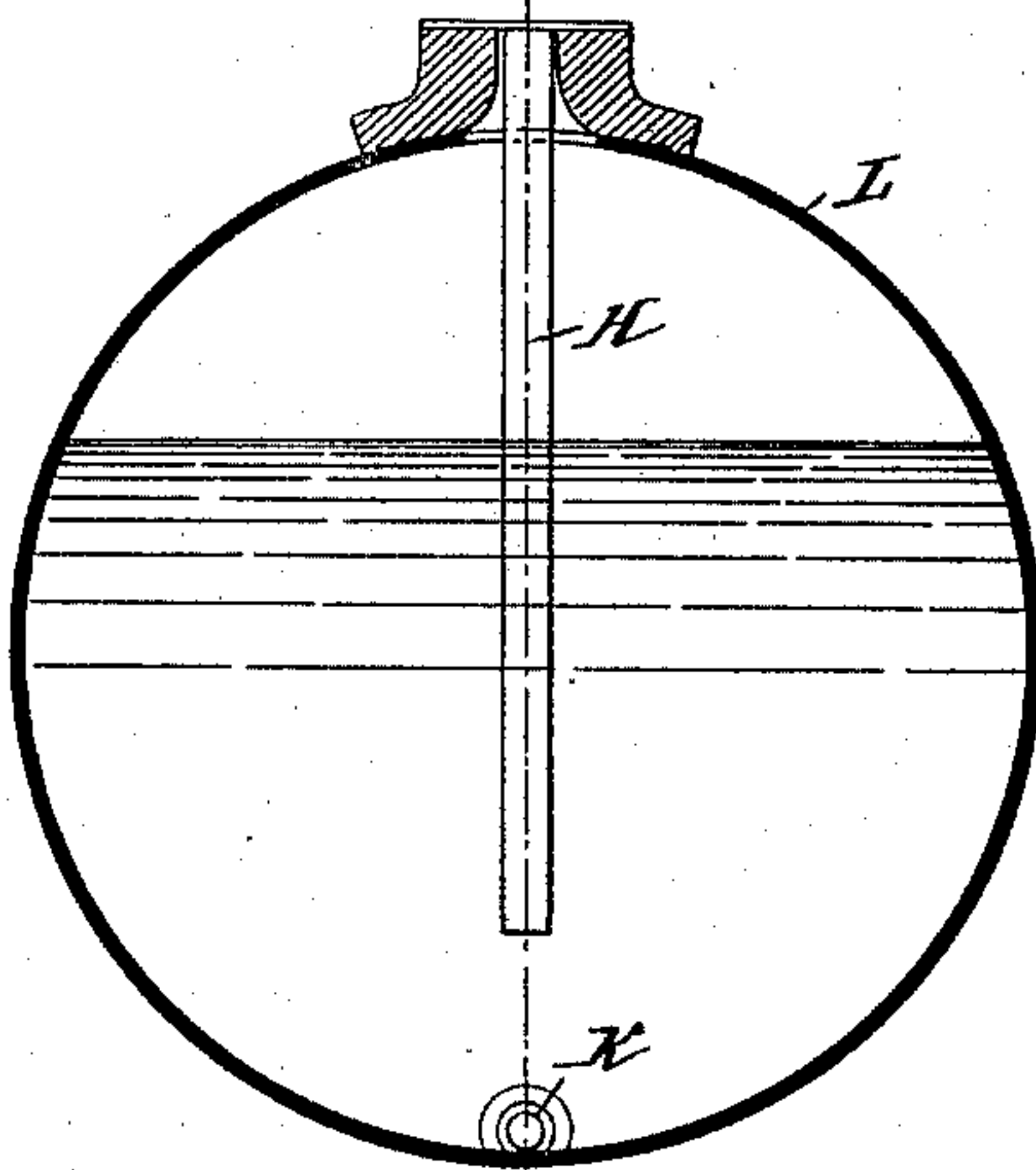
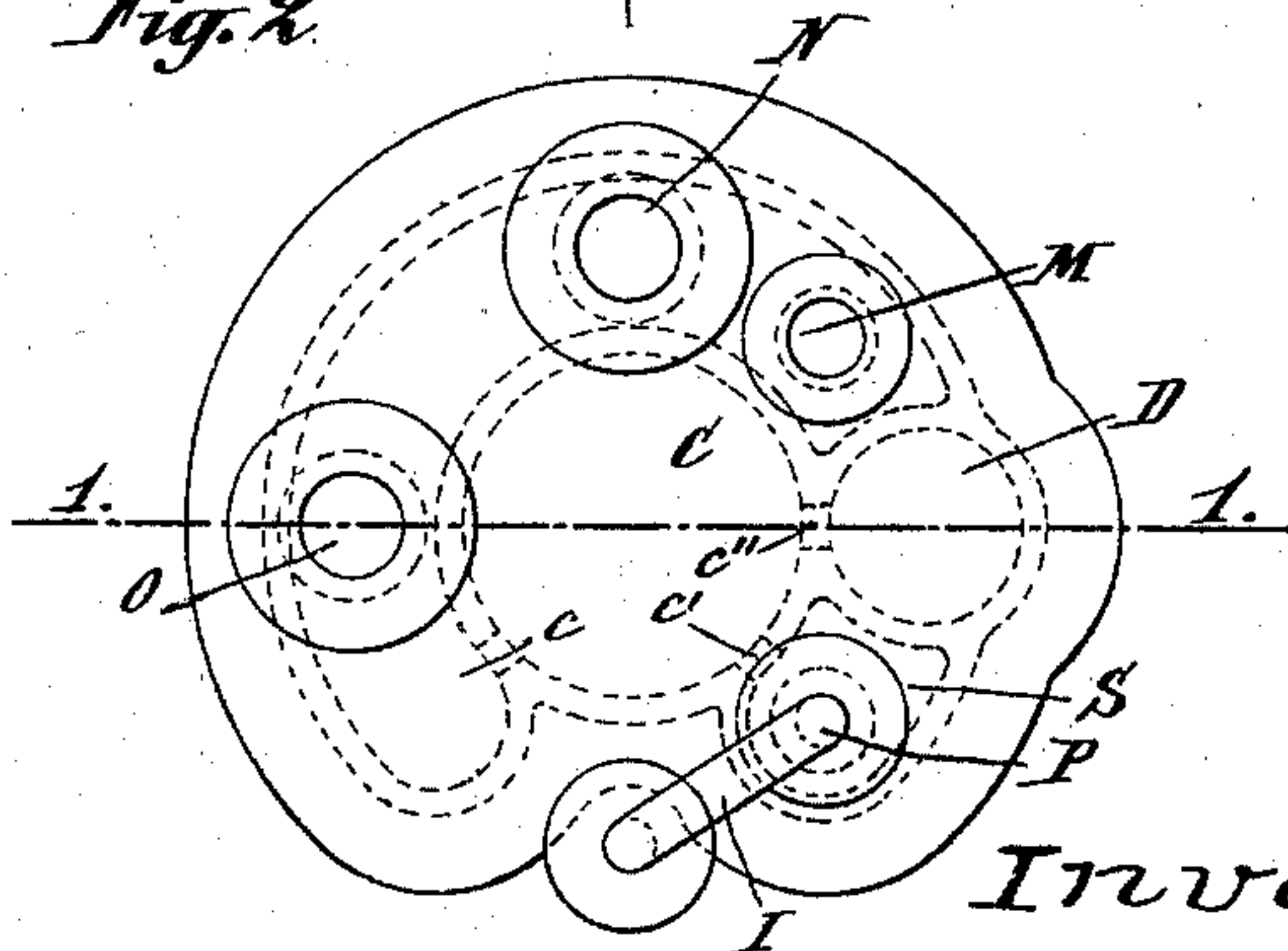


Fig. 2.



Inventor:

Jean Demoulin

By

[Signature]

his Attorneys.

Witnesses:

E. B. Bolton

Old Munk

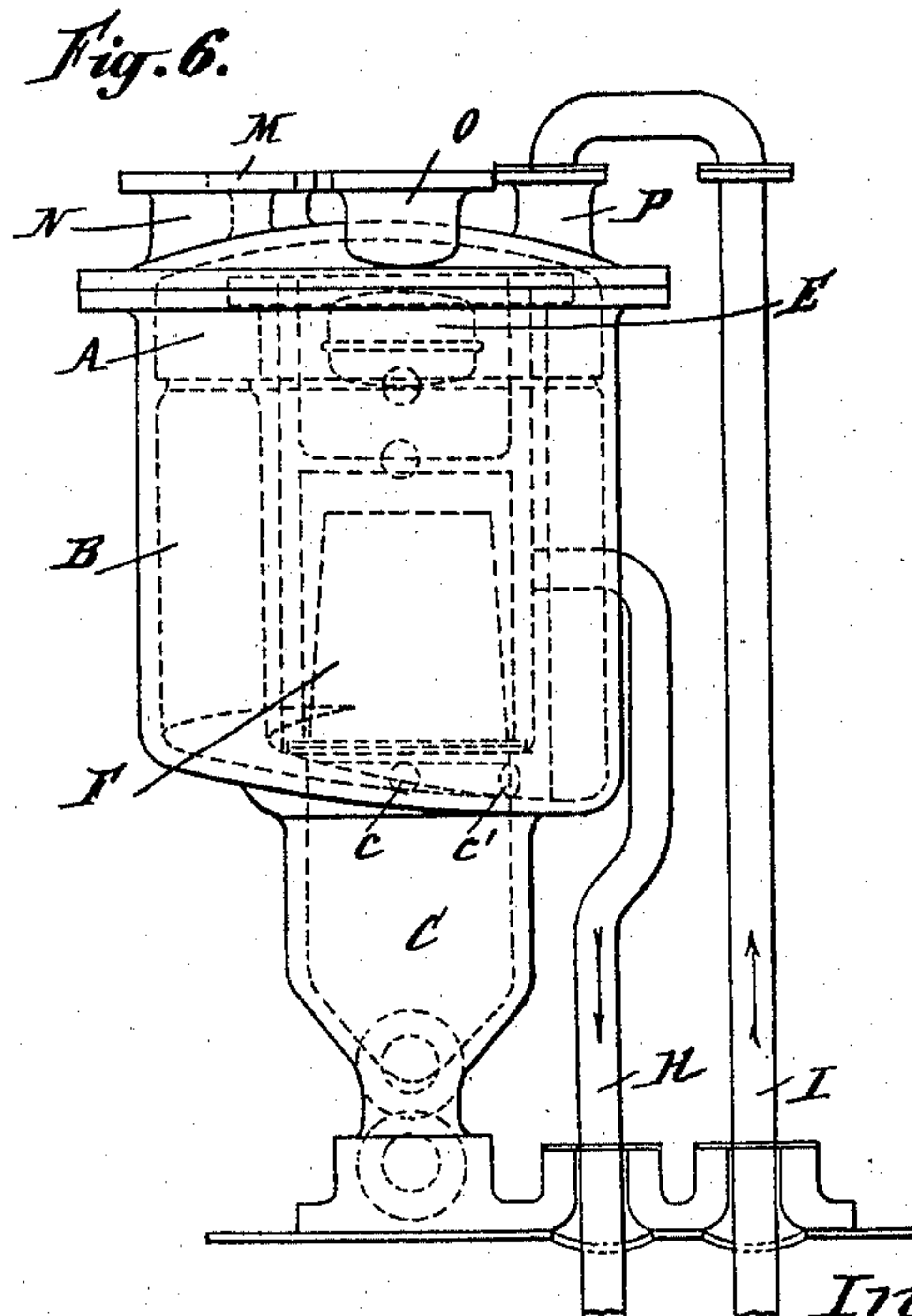
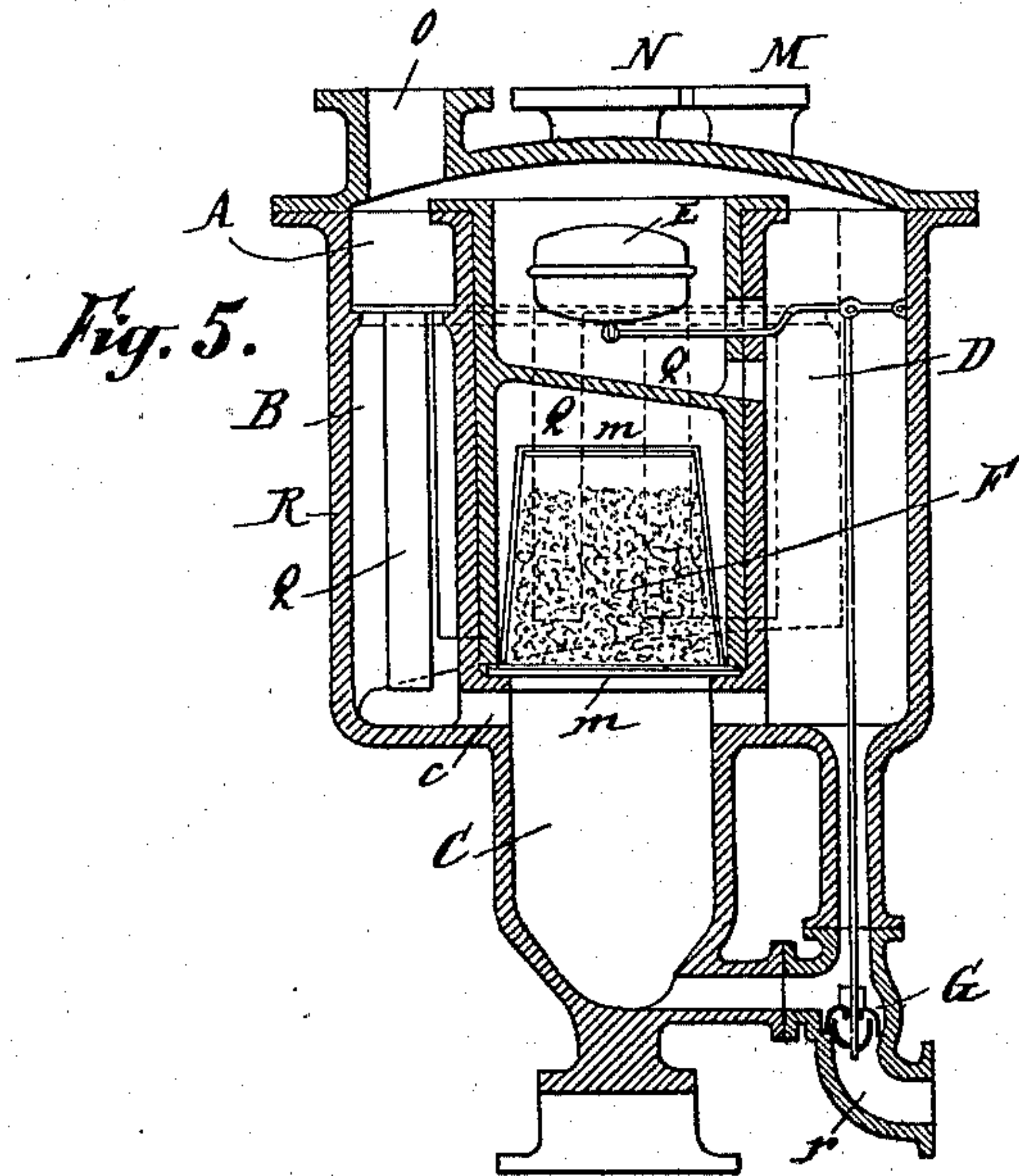
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3 Sheets—Sheet 3.

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Witnesses:
C. B. Bolton
O. Munk

Inventor:
Jean Demoulin
By Reuass & R
his Attorneys.

UNITED STATES PATENT OFFICE.

JEAN DEMOULIN, OF LIEGE, BELGIUM.

APPARATUS FOR PURIFYING WATER.

SPECIFICATION forming part of Letters Patent No. 589,937, dated September 14, 1897.

Application filed February 23, 1897. Serial No. 624,648. (No model.) Patented in Belgium August 19, 1895, No. 117,089; in France February 18, 1896, No. 254,061; in England March 2, 1896, No. 4,723, and in Germany March 2, 1896, No. 90,737.

To all whom it may concern:

Be it known that I, JEAN DEMOULIN, a subject of the King of Belgium, residing at Liege, in the Kingdom of Belgium, have invented certain new and useful Apparatus for Purifying Water, of which the following is a specification.

This invention has been patented to me in Belgium August 19, 1895, No. 117,089; with patents for improvement dated April 18, 1896, No. 120,937, and August 10, 1896, No. 122,973; in France February 18, 1896, No. 254,061, and certificate of addition August 10, 1896, No. 254,061; in England March 2, 1896, No. 4,723, and in Germany March 2, 1896, No. 90,737.

To prevent the formation of mud and sediment in tanks under pressure it has heretofore been customary to pass the water first through filters. This, however, is insufficient and does not prevent the final formation of mud and deposits in the tank, thus necessitating speedy cleaning to get rid of the sediment. In order to remedy this, I have devised a new process of continuous and automatic exhaustion of the mud and sediment forming in the tanks containing the water under pressure after they have been fed with filtered hot water. The process consists in keeping the water in the tank, with the impurities it contains, in continuous circulation through a filter, which serves also for the preliminary filtering of the water. This filter is on the traverse of the water-feeding supply and the circulating water in the tank. It becomes the general receptacle for the impurities in the feed-water and that in the tank, and when the filter has become obstructed the cleaning of the filter and exhaustion of the mud can be effected automatically by utilizing the water under pressure in the tank itself.

The example illustrated in the drawings shows the application of my process and of the apparatus in connection with a steam-boiler for the purpose of preventing sediments in the boiler and bringing about automatic cleansing of the apparatus. However, as will be easily understood from the explanations above, I give this application merely as one example, and the invention can be applied

to other situations without departing from the spirit of my invention.

The accompanying drawings represent the apparatus which I use for the practical realization of my process, and will facilitate the comprehension of my process.

Figures 1 and 2 show the apparatus respectively in raised and ground plan. Fig. 3 shows a section of the apparatus on the line 1 1, Fig. 2. Fig. 4 shows a section on line 2 2, Fig. 1. Figs. 5 and 6 show, respectively, in vertical section and in raised plan a slight variation of the above apparatus.

A receiver R above the tank or on a boiler L is divided internally, as shown in Figs. 3 and 4, forming six compartments A B C D F S or receivers, which communicate with each other. Receiver A constitutes a steam-chamber, into which the steam arrives by the necks N O, Figs. 1, 2, and 3, and communicates with receiver B by pipes Q, Figs. 1 and 3, which are fitted into the partition *a*, Fig. 3. Receiver B receives the feeding-water of the boiler through pipe M. The water reaching chamber B is brought to ebullition by the steam issuing from the pipes Q, Fig. 3, and enters into receiver C by the opening *c*, Fig. 4, in the lower part of chamber B, the bottom of which is screw-shaped or tapering in order to facilitate the elimination of salts and impurities which might form in the boiling which the water undergoes in this receiver.

The boiling water flows out from receiver B on the level of a filter F, which consists of a receiver containing gravel. This filter is provided in its upper and lower parts with a wire-gauze *m*, which is strengthened by perforated sheet iron.

In order to reach the boiler L through pipe H, Fig. 3, the water flows through the filter F, which holds back the mud and other impurities that it contained. On the other hand the mud which might yet form in the boiler is constantly sucked into pipe I, Fig. 1, by means of pump-sucker J and one or more collectors K at the bottom of the boiler and at such places where mud might accumulate. These collectors are provided with a large number of openings O, which create incessant currents in the water of the boiler and thus

prevent the formation of any deposit. The mud and water thus sucked up are conducted by pipe I and neck P to the bottom of receiver S, which communicates with receiver C at the level of the filter by an opening *c'*. The impurities collect there, while the water returns to the boiler by pipe H after having been drained of its sediments.

The impurities arising from the boiling of the feed-water and the continually-circulating boiler-water form a sediment after some time, which obstructs the filter F and stops the water-flow to the boiler. On account of the obstruction of the filter the water-mark rises in the mud-drum D, which communicates with it through the opening *c''*, Fig. 4. This mud-cock D is provided with a float E, bearing on a valve G, which closes the outlet-port *r*. When the water-mark in D reaches the float E, it rises and the valve G uncovers the opening *r*. At that moment a vacuum occurs in the apparatus, with the result that the water in the boiler rises through pipe H and flows through the filter. This rush of water pushes the gravel in the filter against the wire-gauze *m*, cleans the filter completely, and still contributes to the exhaustion of the mud deposits on the wire-gauze *m*, which escape with the water through opening *r*. When the water-mark sinks again in the mud-cock D, the float resumes its normal position, the valve G closes the exhaustion-port *r*, and the feeding of the boiler as well as the simultaneous filtration of the water in the boiler are resumed automatically.

In Figs. 5 and 6 the position of the filter is modified in the following manner: The filter F is here arranged above receiver C and lies in an inverted position from that which it occupies in the apparatus shown in Figs. 1 and 4. In this arrangement the feed-water leaving receiver B and the water brought up by suction meet at the bottom of the cone of receiver C, which is closed at its base. These waters rise into the filter, flow through it, and return to the boiler or tank, whichever it may be, through pipe H. The deposits are exhausted through the valve G, in combination with float E, the necessary depression is brought about in the same manner as before, and the water of the boiler or tank effects the cleansing of the filter.

Accordingly my new process allows not only the feeding of a boiler or tank by means of filtered hot water, but it supplements this action by creating a continuous circulation of the water in the tank. In addition the water is freed of all impurities and lime salts which might form in the tank itself. Finally the mud and sediment are exhausted automatically, owing to the employment of a draft of water under pressure derived from the tank, so that the apparatus used for the execution

of my process and the tank proper are constantly maintained in a perfect state of cleanliness.

As the apparatus which I use is comparatively light and not cumbersome, it can easily be adapted on any system of tank.

In some cases an economical reduction could be made by omitting the part of the invention relating to the automatic cleansing of the filter. In that case only the application of the principle of continuous filtration would be considered, while the cleansing would take place, as before, through the action of the water's rising into the apparatus when a mud-cock is opened, such mud-cock taking the place of the automatic one.

I claim—

1. In combination in an apparatus for purifying water, a steam-chamber having steam-inlets thereto, a water-chamber beneath the same with openings between, a feed-water inlet to the lower chamber, a receiving-chamber in communication with the water-chamber, an outlet-pipe and a filter interposed between the receiving-chamber and the outlet, substantially as described.

2. In combination with a steam-boiler a receiving-chamber and a filter having a pipe connection extending below the water-level in the boiler, a feed-water inlet and the sediment-chamber in communication with the receiving-chamber, a float within said sediment-chamber and a valve connected with and operated by said float to permit the water in the boiler to rise through said filter, substantially as described.

3. In combination with a boiler a receiving-chamber C, a feed-water inlet, a steam-chamber above the water-chamber having steam-inlets, a receiver S a pipe I leading from the bottom of the boiler to said receiver S, an opening between said receiver S and the receiving-chamber C, a filter between the receiving-chamber C and the boiler, and a discharge for the sediment, substantially as described.

4. In combination with a central receiving-chamber C, a water-chamber partially encircling the same having an inclined bottom, a steam-chamber above the water-chamber separated by a partition but having openings between the two chambers, a feed-water pipe to the chamber B, a sediment-chamber D having a float and valve and a mud-drum S having a pipe connection P to the boiler, substantially as described.

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

JEAN DEMOULIN.

Witnesses:

CHAS. DULLYÉ,
JOHN GROSS.