

No. 627,398.

Patented June 20, 1899.

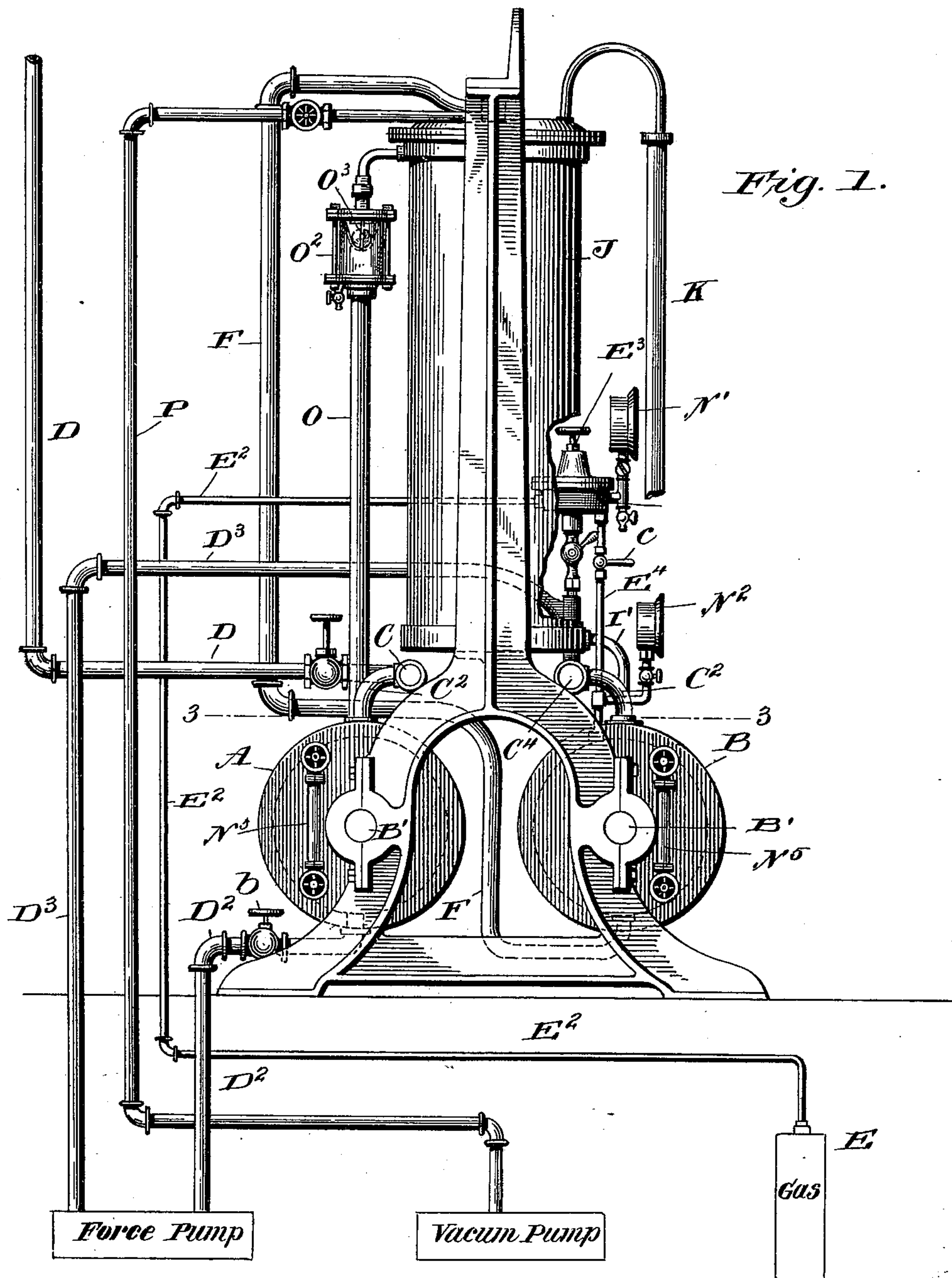
C. S. DOLLEY, M. O. REHFUSS & J. HUNT.

METHOD OF TREATING LIQUIDS.

(Application filed Apr. 3, 1897. Renewed Nov. 15, 1898.)

(No Model.)

4 Sheets—Sheet 1.



Witnesses:

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By Franklin H. Hough Atty.

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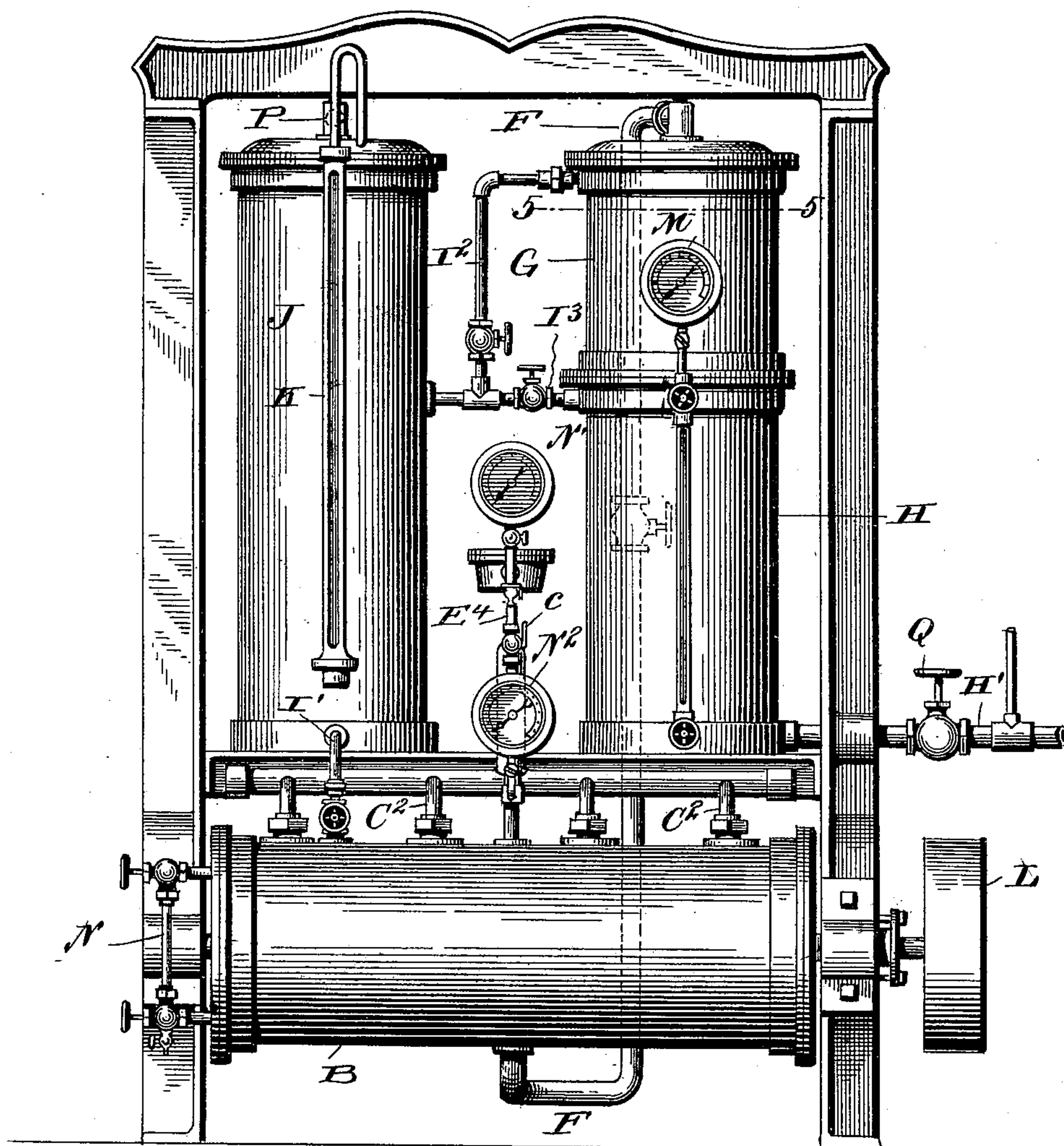
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Fig. 2.



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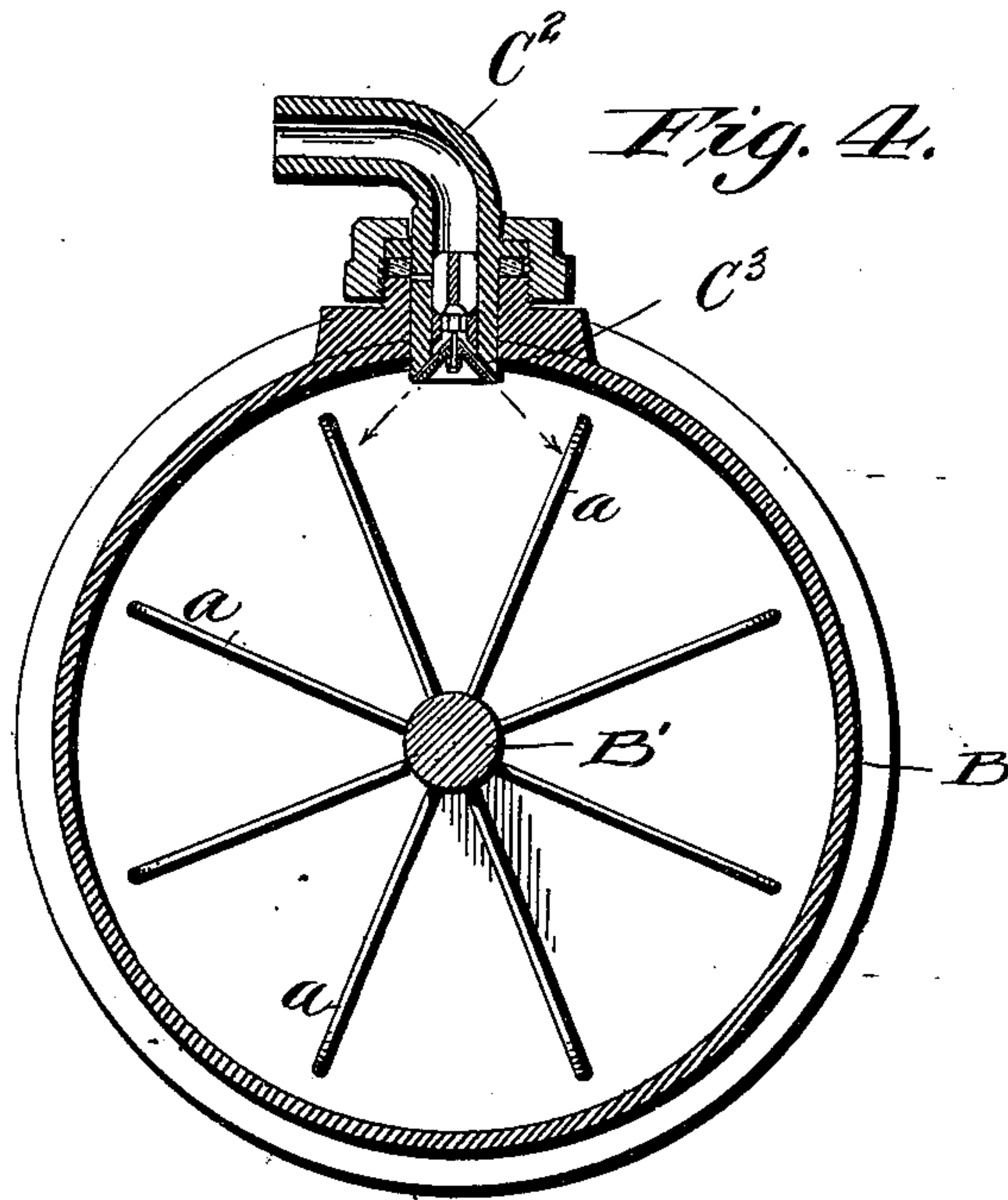
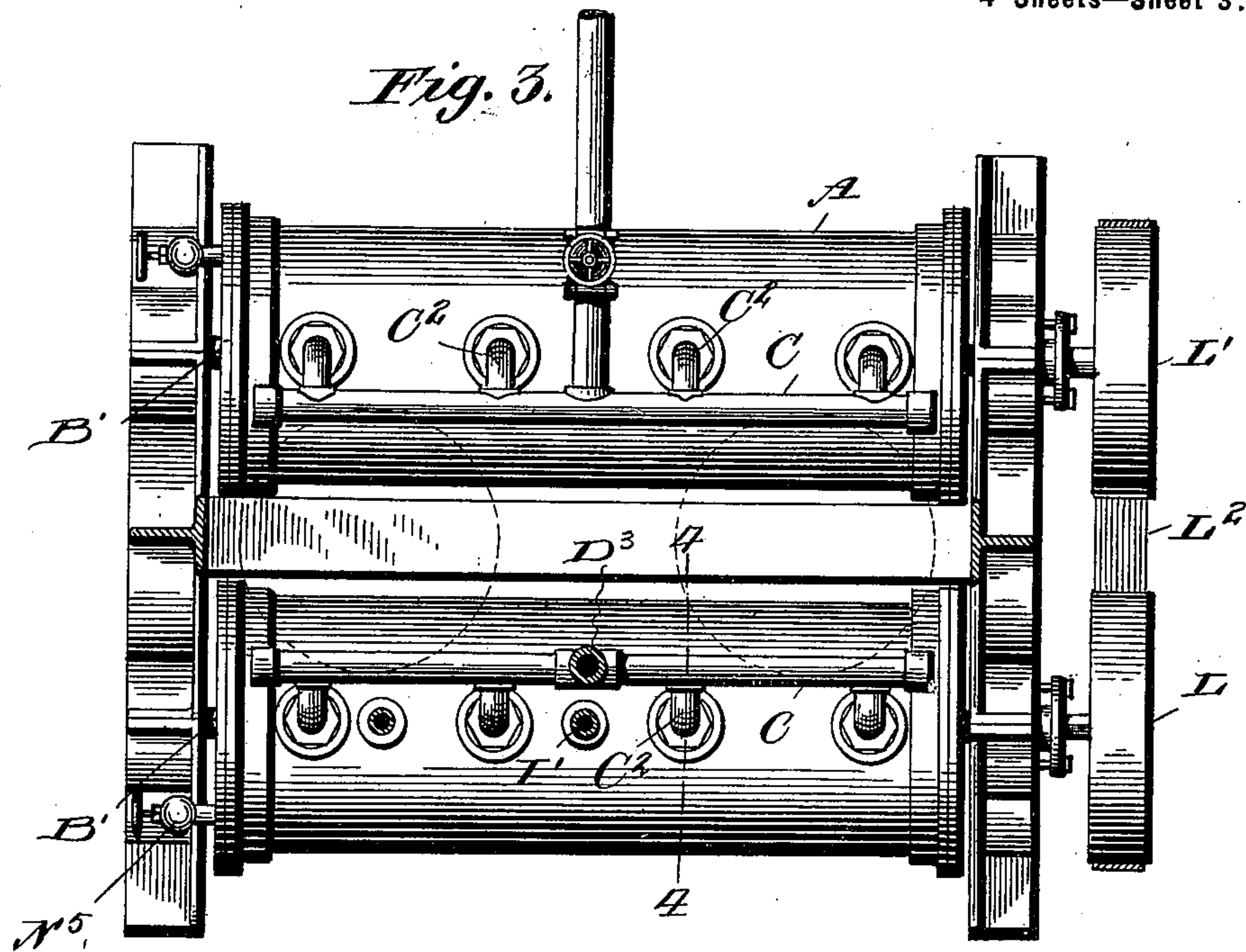
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Fig. 5.

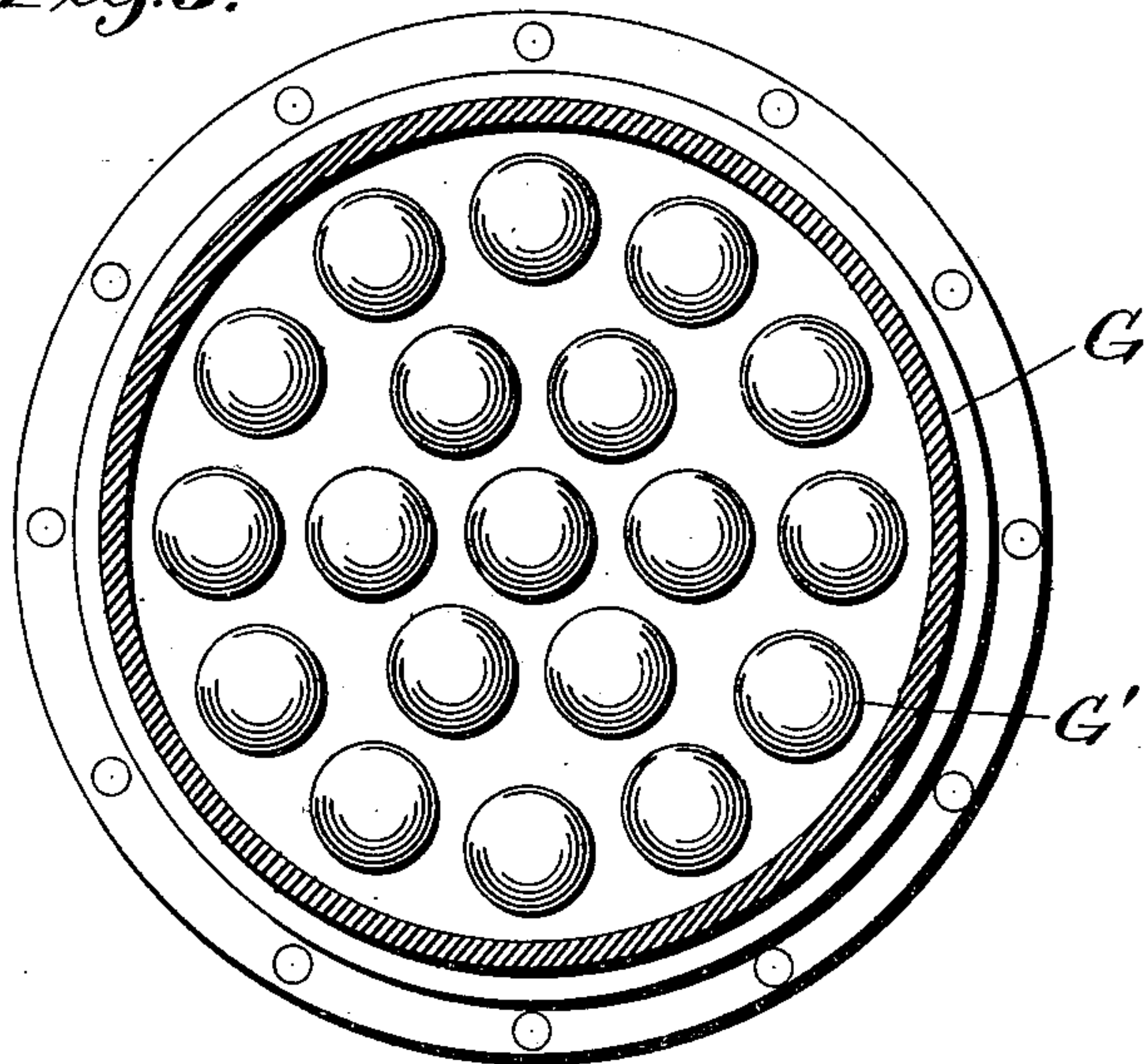


Fig. 6.

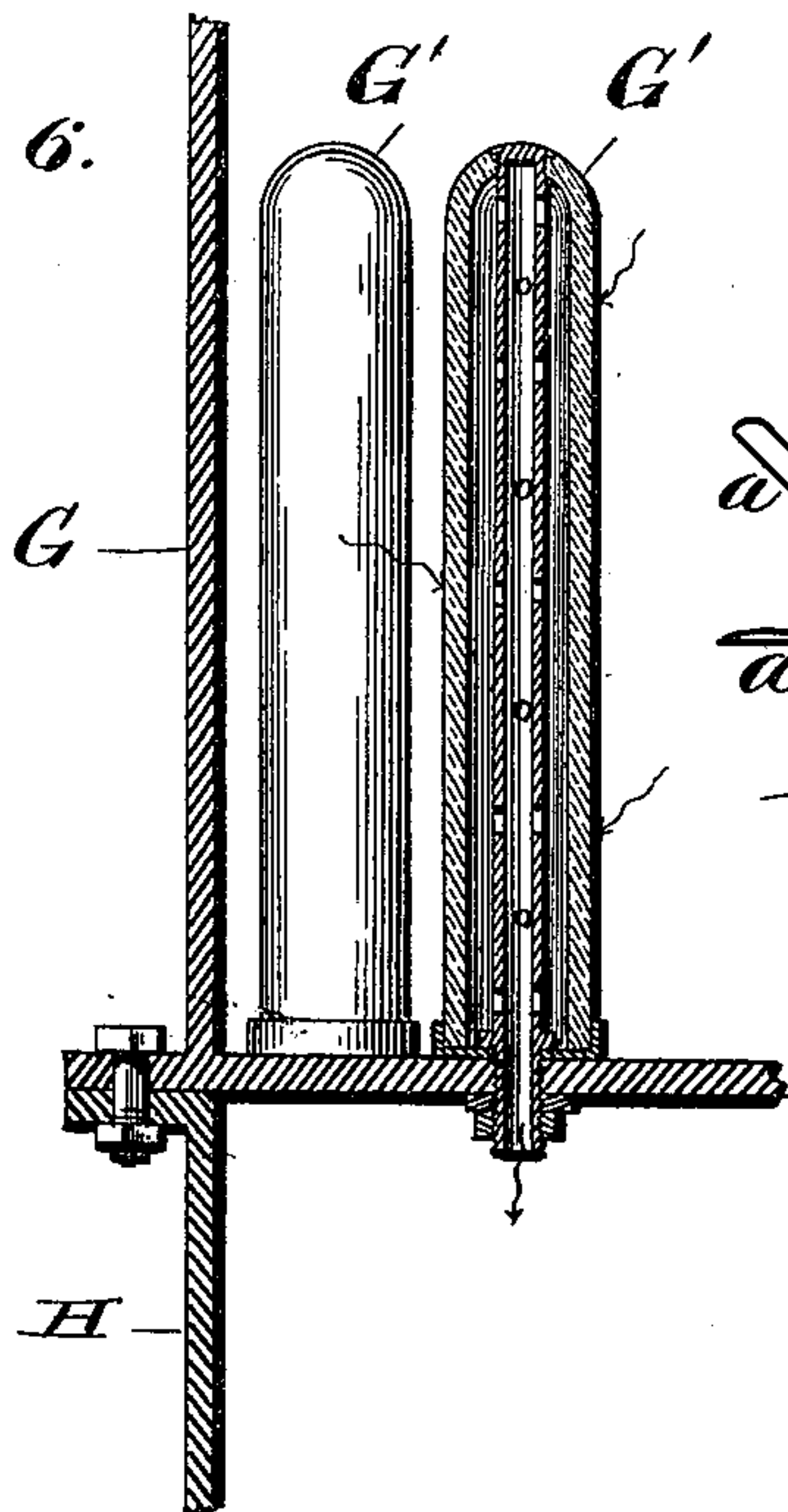
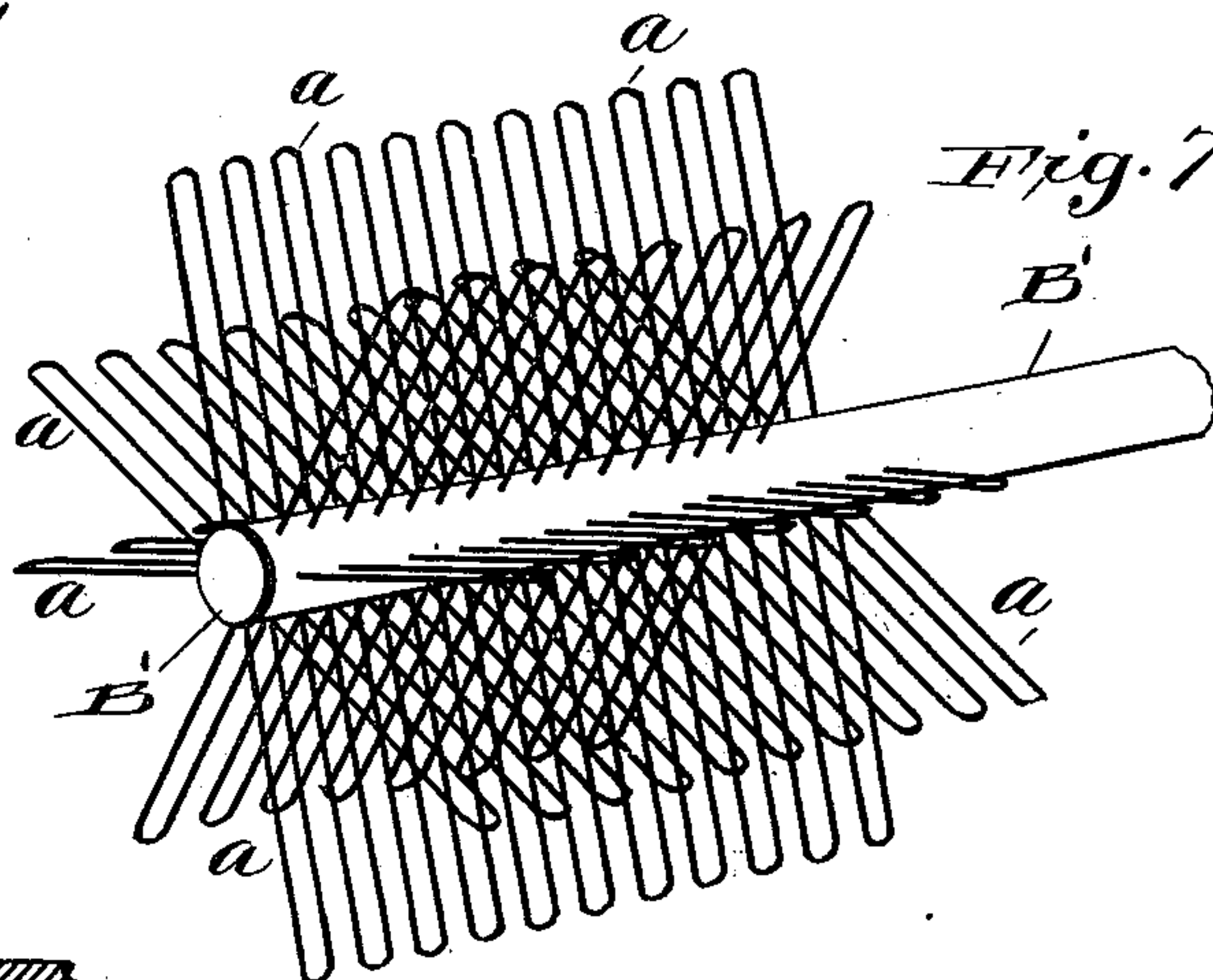


Fig. 7.



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UNITED STATES PATENT OFFICE.

CHARLES S. DOLLEY, MARTIN O. REHFUSS, AND JAMES HUNT, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNORS TO THE UNIVERSAL FOOD AND LIQUID IMPROVING COMPANY, OF SAME PLACE.

METHOD OF TREATING LIQUIDS.

SPECIFICATION forming part of Letters Patent No. 627,398, dated June 20, 1899.

Application filed April 3, 1897. Renewed November 15, 1898. Serial No. 696,568. (No model.)

To all whom it may concern:

Be it known that we, CHARLES S. DOLLEY, MARTIN O. REHFUSS, and JAMES HUNT, citizens of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Methods of Treating Liquids; and we 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 the letters of reference marked thereon, which form a part of this specification.

This invention relates to certain new and useful improvements in apparatus for and processes of treating liquids, and the apparatus described is intended especially for use in removing the air from the liquid and afterward charging the same with any suitable gas which will tend to preserve or improve the same. It at the same time gives life to the liquid.

The essential object of the present invention resides in the provision of an apparatus consisting of cylinders or compartments adapted to contain the water or other liquid to be treated and in combination therewith of agitating mechanisms contained within the chambers or cylinders, whereby the liquid in entering the compartments will be thoroughly agitated, so as to effectually break up the liquid and permit of a thorough exhaustion of the air from the body of the liquid, which result has been found to be impossible in case the liquid is not thoroughly agitated simultaneously with the exhaustion of the air.

The invention has for a further object the combination, with the liquid-receptacles provided with agitators, as described, of apparatus in connection with the said receptacles whereby the liquid treated is supplied to one of the said receptacles in the form of a fine spray and of apparatus whereby the air may be exhausted from the liquid-receptacles, and the liquid after having been thoroughly exhausted of the air contained therein is caused to pass in the form of a spray into a second

receptacle provided with agitating means wherein the liquid, previously exhausted of the air, is charged with carbonic-acid gas or other suitable gaseous body, from which it is conveyed to a filter-chamber and thence to a hermetically-sealed storage-chamber provided with suitable outlet-pipes leading to the bottling machinery.

Further objects of the invention reside in the provision, in connection with the chambers, spraying and agitating devices, filter-chambers, &c., above referred to, of certain indicating-gages, reducing-valve, &c., whereby the amount of air contained within the receptacles and the pressure of the gas supplied to the liquid will be indicated at all times.

To these ends and to such others as the invention may pertain, the same consists in the novel construction and in the peculiar arrangement, combination, and adaptation of the parts, all as more fully hereinafter described, shown in the accompanying drawings, and then specifically defined in the appended claims.

The apparatus used in the treatment of liquids in accordance with our invention is clearly illustrated in the accompanying drawings, which, with the letters of reference indicated thereon, form a part of this specification, like letters of reference indicating the same parts throughout the several views, and in which drawings—

Figure 1 is an end view of the apparatus complete, showing the connections with the force-pump, vacuum-pump, and gas-receptacle. Fig. 2 is a front view of the apparatus. Fig. 3 is a horizontal section upon line 3 3 of Fig. 1. Fig. 4 is a vertical section through one of the horizontal cylinders upon the line 4 4 of Fig. 3. Fig. 5 is a horizontal section of the filter-chamber, the same being taken upon line 5 5 of Fig. 2. Fig. 6 is an enlarged detail, partly in section, showing the form and arrangement of the filters contained in the filter-chamber; and Fig. 7 is an enlarged detail in perspective of one of the agitator-shafts, which will hereinafter be more particularly referred to.

Reference now being had to the details of the drawings by letter, A and B represent two horizontally-disposed cylinders which are hermetically sealed and are provided with horizontal shafts B' B', which shafts extend longitudinally through the cylinders and are provided with agitating-arms *a*, said arms consisting of wire connected with the shaft and radiating from the shaft in the form of wire loops, as clearly shown in Fig. 7 of the drawings. These loops may be arranged in any desired number of rows, the rows being alternating, as shown.

The cylinders A and B and the pipe connections whereby liquid is supplied to the cylinders being in every respect alike, a description of one will suffice for both. Referring, then, to the cylinder A, it will be observed that there is provided a horizontal pipe C, which extends longitudinally of the cylinder and slightly above the same, the said pipe being provided at intervals with short curved pipes C², which pipes connect the distributing-pipe C with the interior of the cylinder, the said pipes C² being provided at the point at which they enter the cylinder with spraying devices C³, which may be of any approved construction adapted to the purpose. Leading to the cylinder A from any source of supply is a pipe D, which connects with the distributing-pipe C, above referred to, whence the liquid is supplied to the cylinder through the branch pipes C². The said cylinder A is also provided with an outlet-pipe D², leading to a force-pump, which latter may be placed at any convenient point—as, for instance, in the basement of the building. Leading from the said force-pump is a pipe D³, which connects with the distributing-pipe C⁴, which, as in the case of cylinder A, is provided with branch pipes C², through which the liquid is supplied to the cylinder B.

E is a gas-receptacle which is provided with an outlet-pipe E², said pipe E² leading to the distributing-pipe C⁴, but having interposed in its course a reducing-valve E³, whereby the degree of pressure of gas may be at all times regulated. A supplemental gas-pipe E⁴ is, however, provided, through which the gas may be allowed to enter the cylinder B direct instead of passing through the distributing-pipe C⁴, which will be found desirable at any time to permit the gas to enter the cylinder in greater quantities than would be the case were it supplied in admixture with the liquid. Leading from the lower portion of the cylinder B is a pipe F, which connects with the upper end of the filter-chamber G. The said filter-chamber G consists of a hermetically-sealed chamber which in the present instance is found to be of cylindrical form. Arranged within the said chamber is a series of filters G', which communicate at their lower ends with a hermetically-sealed chamber H, directly beneath the filter-chamber. The filters employed may be of any of the porous materials which are adapted to the purpose,

and in order to secure the best effects they should be of substantially the form which I have shown in the drawings.

The chamber H is intended as a storage-receptacle for the liquid after it has been treated and is in readiness to be supplied to the bottling-machinery through the outlet-pipe H'.

J is a vacuum-chamber which has connection with the cylinder B, as shown at I', and also connects by means of the pipes l² and l³ with the filter-chamber G and storage-chamber H, as shown.

In order that the condition of the vacuum within the chamber J may at all times be indicated, we provide in connection therewith a manometer K, which will at all times indicate the vacuum within said chamber. In order that the shafts within the cylinders A and B may be rotated synchronously, the said shafts are extended at one end of the cylinders for a short distance and at their ends are provided with pulleys L and L', around both of which is passed a single belt L².

Suitable gages M N' N² are provided at suitable points and serve to indicate at all times the pressure of liquid or gas during the operation of the machinery. The gage M serves to indicate the pressure within the storage-chamber H.

The gages N and N⁵ indicate the amount of liquid within the cylinders A and B, respectively. The gage N' indicates the gas-pressure coming from the gas-supply and the gage N² the pressure within cylinders B and G. These gages are combination vacuum and pressure gages and indicate the exhaustion of air from the various cylinders before commencing operations.

Leading from the cylinder A is a pipe O, which has direct connection with the vacuum-chamber J at its upper end, and interposed within this pipe connection is a glass cylinder O², within which is placed a ball O³, which ball is seated within a concaved opening formed in the upper end of the cylinder and serves to obstruct the passage, as will be more fully hereinafter described.

Suitable valves are located at various points throughout the system in connection with the pipes for use in controlling the operation of the machinery.

The operation of the machinery is as follows: The valves in the various pipes and their connections are first opened and through the means of the vacuum-pump the air is exhausted from the entire machinery through the pipe P, leading to the upper end of the vacuum-chamber J. The air having been thus exhausted, the water or other liquid to be treated is supplied to the distributing-pipe C. Thence through said pipes it passes through the spray-nozzles C³ and enters the cylinder A in the form of a fine mist. The liquid is again broken up or agitated by the agitating-arms *a*, carried by the shaft B'. The liquid having thus been thoroughly agitated within

the vacuum-chamber A is permitted by opening the valve *b* to pass through the pipe *D*² to the force-pump, by means of which pump it is forced through the pipe *D*³ into the distributing-pipe *C*⁴, whence it is distributed through the spraying device contained in the outlets of the pipes *C*², connected with the distributing-pipe *C*⁴, into the cylinder *B*¹, where it meets with the action of the agitating-arms connected with shaft *B*¹, extending through said cylinder. At the point at which the liquid enters the pipe *C*⁴ it is brought into contact with the gas, which is supplied through the pipe *E*² from a suitable source of gas-supply *E*, the gas mingling with the liquid as it enters the distributing-pipe *C*⁴. In order to regulate the pressure of the gas at the point at which it mingles with the liquid, the reducing-valve *E*³ is provided, and as at times it may be found desirable to admit the gas directly into the cylinder *B* without passing the same, in connection with the liquid, through the spray-nozzles in the pipes *C*² an independent pipe *E*⁴ is provided, which connects directly with the interior of the cylinder *B*. The liquid under treatment having thus been thoroughly charged with gas within the chamber *B* passes through the pipe *F* into the upper end of the filter-chamber *G*, whence it passes through the filters *G*¹ contained within the said chamber and enters the storage cylinder or chamber *H*, where it is in readiness for being transmitted to the bottling machinery by opening the valve *Q* in the pipe *H*¹. In order to prevent the possibility of liquid being conveyed into the vacuum-chamber *J* at any time during this operation of the machine, the glass chamber *O*³ is provided. This chamber is provided with a ball *O*³, which is adapted when thrown upward to be seated within a seat provided therefor in the upper end of the chamber. It will be seen that if

at any time the liquid should be carried upward from the cylinder *A* the ball *O*³ will be floated within the chamber, and in case the liquid rises to the top of the said chamber the ball will be seated and connection with the vacuum-chamber will thus be stopped and the liquid will be prevented from entering the said chamber.

Having thus described our invention, what we claim to be new, and desire to secure by Letters Patent, is—

1. In an apparatus of the character described, two hermetically-sealed chambers, each being provided with spraying devices and agitators as described, means for supplying liquid to said chambers, and means for intermingling gas with the liquid while entering the second chamber, a filter-chamber, a storage-chamber adapted to receive the filtered liquid, a vacuum-chamber, having connections with the hermetically-sealed agitating-chambers, and with the filter-chamber and connections, whereby the air may be exhausted simultaneously from the several chambers, substantially as described and for the purpose specified.

2. The vacuum-chamber *J*, the agitating-chamber *A* the pipe *O*, connecting the vacuum-chamber with the agitating-chamber, and an automatically-operated valve interposed within said pipe connection, whereby the liquid is prevented from passing into the vacuum-chamber substantially as described and for the purpose specified.

In testimony whereof we affix our signatures in presence of two witnesses.

CHARLES S. DOLLEY.
MARTIN O. REHFUSS.
JAMES HUNT.

Witnesses:

WM. J. MERRILL,
CHAS. H. BANNARD.