

No. 687,148.

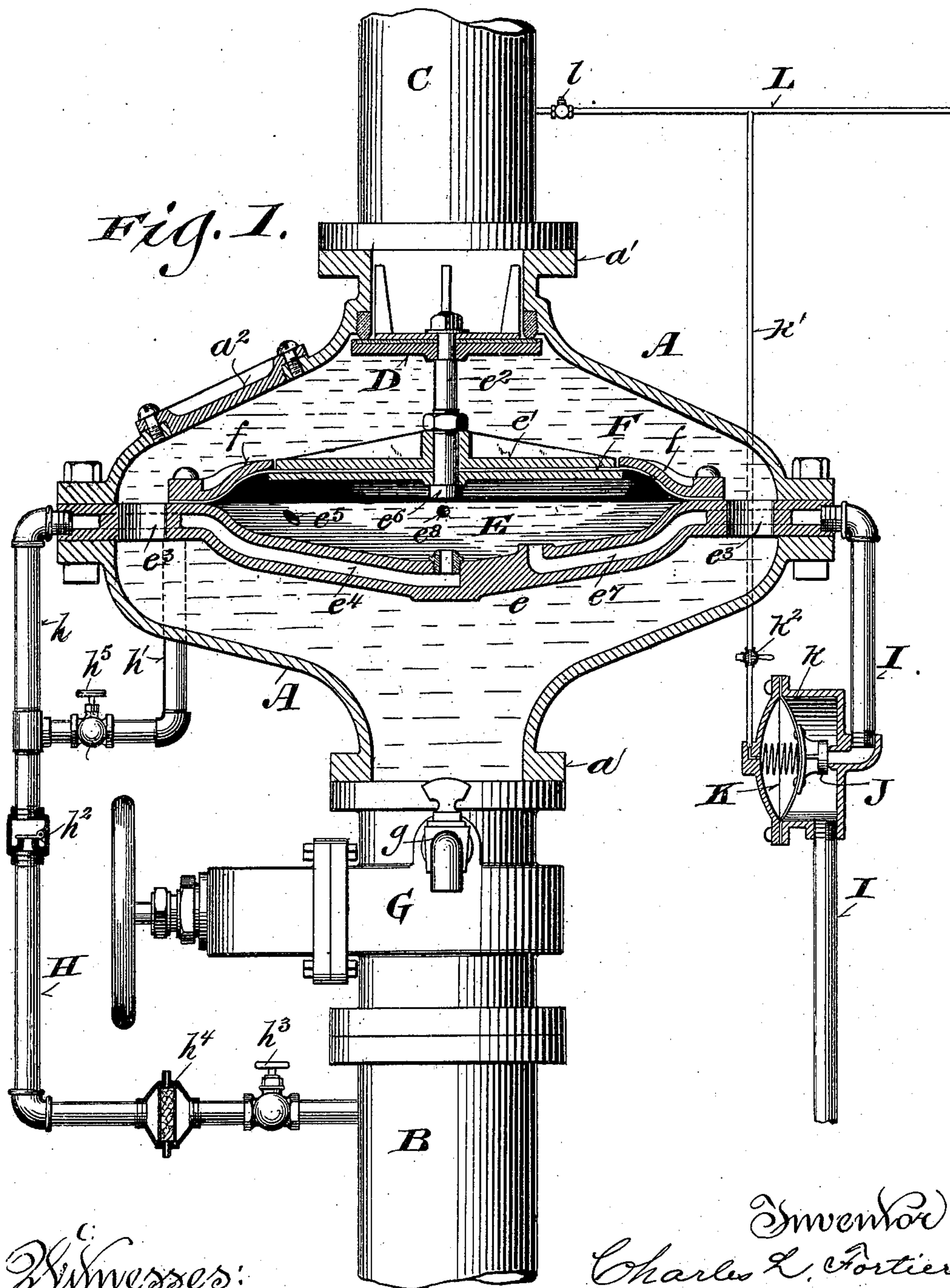
Patented Nov. 19, 1901.

C. L. FORTIER.
AUTOMATIC VALVE.

(Application filed Feb. 14, 1898.)

(No Model.)

3 Sheets—Sheet 1.



Witnesses:
Geo. W. Young,
Chas. L. Goess.

Inventor
Charles L. Fortier,
By *Wm. H. Smith* Attorney.
Wm. H. Smith

No. 687,148.

Patented Nov. 19, 1901.

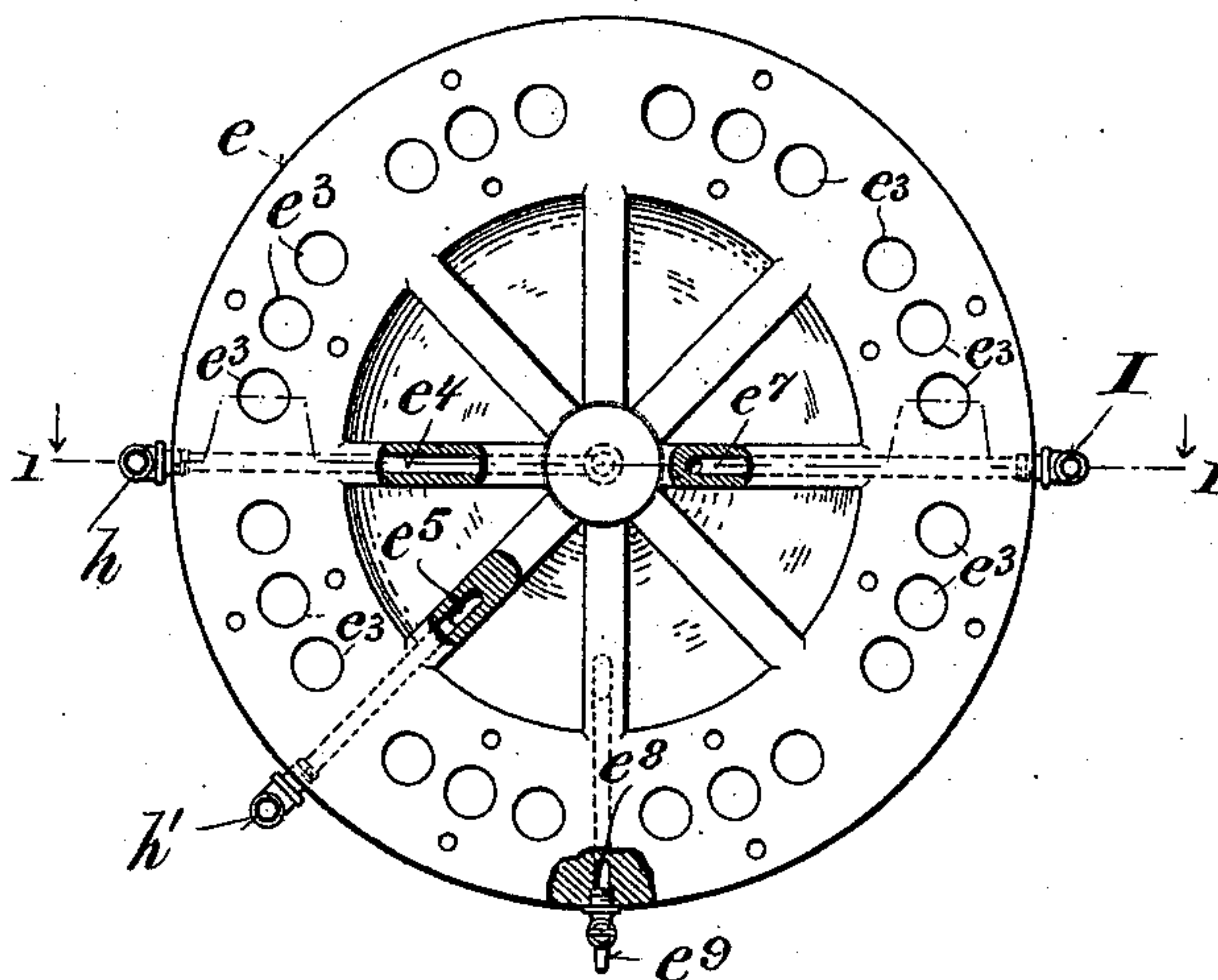
C. L. FORTIER.
AUTOMATIC VALVE.

(Application filed Feb. 14, 1898.)

(No Model.)

3 Sheets—Sheet 2.

Fig. 2.



Witnesses:

Geo W Young,

Chas. L. Goss.

Inventor:

Charles L. Fortier

By *Wm. H. Smith & Co.*

Attorneys.

No. 687,148.

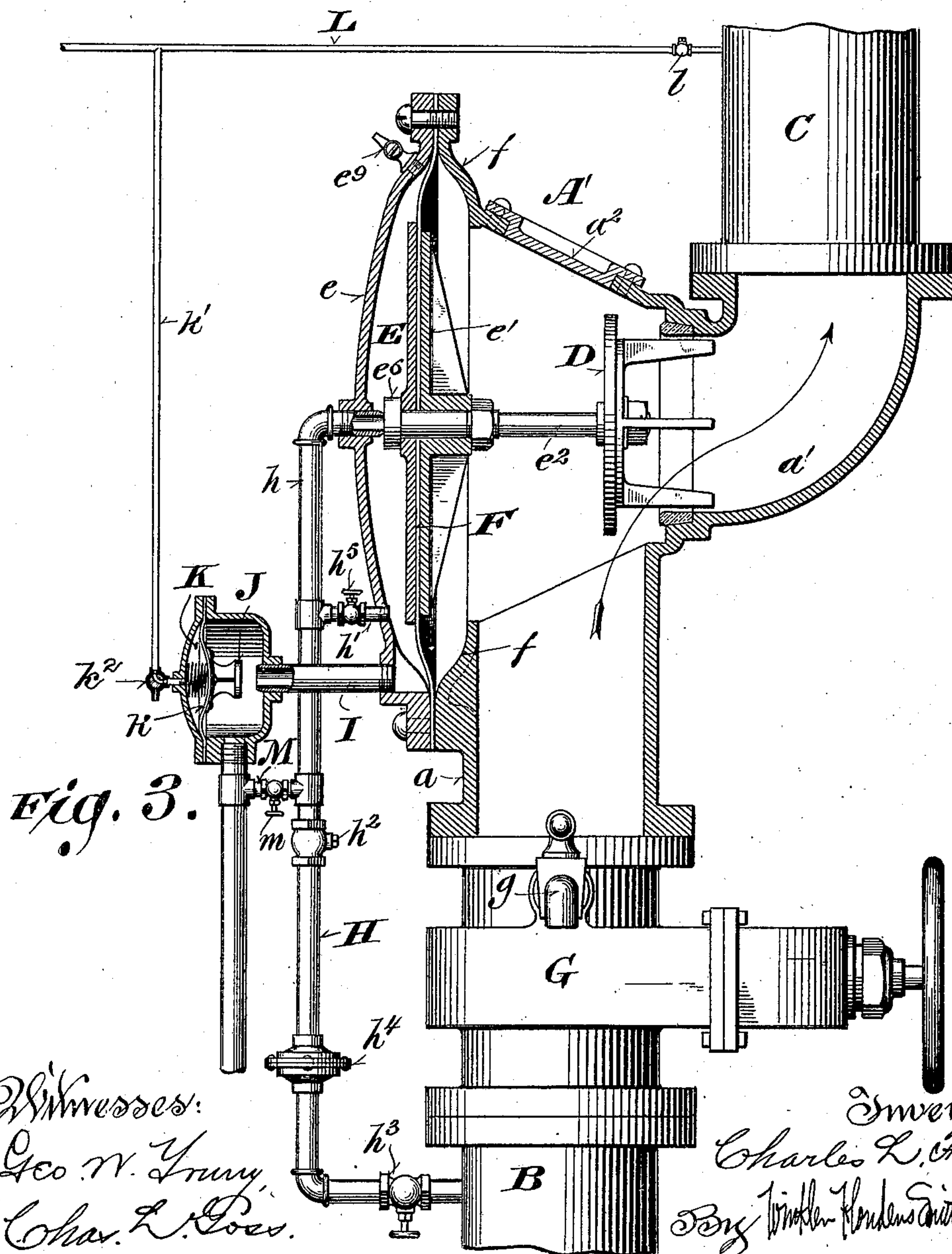
Patented Nov. 19, 1901.

C. L. FORTIER.
AUTOMATIC VALVE.


(Application filed Feb. 14, 1898.)

(No Model.)

3 Sheets—Sheet 3.



Wives:
Geo. W. Young.
Chas. L. Ross.

 Inventor:
Charles L. Fortier,
By Wm. H. Rensselaer & Co. Attys.
New York.

UNITED STATES PATENT OFFICE.

CHARLES L. FORTIER, OF MILWAUKEE, WISCONSIN, ASSIGNOR TO GEORGE KNOWLES, OF MILWAUKEE, WISCONSIN.

AUTOMATIC VALVE.

SPECIFICATION forming part of Letters Patent No. 687,148, dated November 19, 1901.

Application filed February 14, 1898. Serial No. 670,160. (No model.)

To all whom it may concern:

Be it known that I, CHARLES L. FORTIER, a citizen of the United States, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Automatic Valves, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

My invention relates particularly to valves designed to control the admission of water to "dry-pipe" fire-extinguishing systems. Its main object is to provide an automatic valve for this purpose simple and durable in construction and reliable in operation.

It consists of certain novel features in the construction and arrangement of the component parts of the valve and of its connections, as hereinafter particularly described, and pointed out in the claims.

In the accompanying drawings like letters designate the same or similar parts in the several figures.

Figure 1 is a partial side elevation and vertical medial section on the line 1 1, Fig. 2, of one form of valve and its connections embodying my invention. Fig. 2 is an inverted plan view, on a reduced scale, of the expansion-chamber for operating the main valve; and Fig. 3 is a view similar to Fig. 1 of a modified form and arrangement of the valve and its connections.

Referring to Figs. 1 and 2, A designates the valve-case, which is formed with supply and service connections a a' , in line with each other, for the attachment of the supply and service pipes B and C, the water-supply pipe B leading into the lower side and the service or dry pipe C leading out of the upper part of the valve-case. By this arrangement of the supply and service connections they are brought into line with each other. D is the main valve, which normally closes the service-port of the valve-chamber, and E is an expansion-chamber, formed in the present instance of a fixed plate or part e and a movable plate or part e' , which is connected with the plate e by a flexible diaphragm F and with the valve D by a stem e^2 . The diaphragm F is supported at the limit of its upward movement and prevented from being burst or overstrained by a

ring f , placed over it around the plate e' and attached at or near its outer edge to the plate e . The opening in the ring f is but slightly larger than the plate e' , and it is concaved on the under side or bent upwardly toward its inner edge, so as to constitute in effect an extension of the plate e' when the diaphragm is distended. The plate e is extended outside of the diaphragm F and ring f and is clamped between the two parts of which the case A is composed. Between the outer edge of the diaphragm and the ring and the valve-case said plate e is formed, as shown both in Figs. 1 and 2, with a circular series of holes e^3 , which allow the water to pass freely from the lower part into the upper part of the valve-chamber. The supply pipe or connection is provided with a gate-valve G for manually shutting off the supply of water to the valve-case A and with a waste-cock g above the gate-valve for draining the valve-case and service-pipe before the main valve D is closed. The fixed plate e of the expansion-chamber is formed with radial inlet-passages e^4 and e^5 , to the outer ends of which are attached the branches h h' of a pipe H, leading out of the supply-pipe B below the gate-valve G. The pipe H is provided with a check-valve h^2 , closing toward the supply-pipe B, a cut-off valve h^3 , and a filter h^4 . The filter prevents impurities contained in the water from entering the expansion-chamber and clogging or obstructing it or its connections. The cut-off valve h^3 serves to shut off the water from the expansion-chamber for inspecting or repairing the same, and the check-valve h^2 prevents the opening of the main valve D in case the water supply or pressure in the pipe B fails or is interrupted. The passage e^4 opens into the expansion-chamber opposite a valve e^6 , formed on the end of the valve-stem e^2 or attached to the movable part of the expansion-chamber, so as to close the opening from said passage into the expansion-chamber when the main valve D is opened. The branch h' of pipe H, connecting with the passage e^5 , is provided with a cut-off valve h^5 . The pipe H, with its branches h and h' and the passages e^4 and e^5 , forms a by-pass around the gate-valve G between the supply-pipe B and the expansion-chamber E. The plate e is

also formed with a radial waste-passage e^7 , as shown in Fig. 1, and a vent-passage e^8 , provided with a valve e^9 outside of the valve-case, as shown in Fig. 2. The vent-passage e^8 opens out of the upper part of the expansion-chamber or of that portion of the expansion-chamber which is formed by the plate e , as shown in Fig. 1. To the outer end of the passage e^7 , which leads out of the lower part of the expansion-chamber, is attached a waste-pipe I, provided with and normally closed by a valve J. This valve is attached to or connected with the diaphragm or movable part k of an expansion-chamber or fluid-pressure motor K. This expansion-chamber is connected by a pipe k' with a pipe L, which connects the service or dry pipe C with a source of compressed air. The pipe L is provided with a check-valve l , which closes away from the service-pipe C, so as to prevent water from entering the pipe L when it is admitted to the pipe C by the opening of valve D. The pipe k' is provided with a three-way valve k^2 , which is adapted to shut off the supply of compressed air to the expansion-chamber K and to release the air contained therein through a waste opening or connection for the purpose of testing the main valve without releasing the compressed air from the service-pipe C. The upper section of the valve-case A is formed with a hand-hole and cover a^2 , which afford easy access to the valve-chamber for manually resetting, inspecting, or repairing the main valve or its connections. This form of my improved valve operates as follows: The valve D being closed, the gate-valve G open, and the other parts of the device in the condition shown in Fig. 1, the main-valve chamber and the supply-pipe B containing water under pressure and the service-pipe C containing air under the usual pressure employed in dry-pipe systems, if a sprinkler-head opens or the air contained in pipe C is otherwise released, reducing the pressure therein, the air contained in the expansion-chamber K will also be released, allowing the valve J to open. When this occurs, the water confined under pressure in the expansion-chamber E will escape therefrom through the passage e^7 and waste-pipe I faster than it can enter through the supply-passage e^4 (the valve h^5 being closed) on account of the larger area of the waste passage or connection. The pressure on the under side of the diaphragm being thus removed or reduced, the pressure on its upper side, which is of greater area than the valve D, will withdraw said valve from its seat, opening the service-port and admitting water to the service or dry pipe C. As the water enters said pipe it will close the check-valve l and be thus prevented from flowing into the pipe L and thence through pipe k' into the expansion-chamber K, so as to prematurely close the waste-valve J. When the water is nearly exhausted from expansion-chamber E and the main valve D is fully opened, the valve e^6 , carried by the

movable part of the expansion-chamber, closes the opening from the supply e^4 into said chamber and stops the further flow of water through the by-pass. The supply of water to the expansion-chamber being thus cut off, further waste is prevented. To close the main valve D, the gate-valve G is first closed and the waste-cock g is then opened, allowing the water contained in the dry pipe to drain therefrom. After the dry pipe has been drained it is supplied with compressed air through the pipe L, the waste-cock g having been closed, and when the requisite pressure is reached the waste-valve J will be closed. The valve h^5 is then opened and water passes from the supply-pipe B through the pipe H, branch h' , and passage e^5 into the expansion-chamber E. The vent-valve e^9 being opened allows any air confined in the expansion-chamber to escape therefrom through the vent-passage e^8 . As soon as the air is completely expelled from the expansion-chamber and water flows from the waste-cock e^9 said cock is closed. As the expansion-chamber is filled the diaphragm F is forced upward and closes the valve D. The gate-valve G is now opened and the valve h^5 is closed, the apparatus being then in condition for the automatic opening of the main valve whenever the occasion therefor occurs, as hereinbefore explained.

Referring to Fig. 3, which shows a modification of the device, the service connection a' opens out of one side of the valve-case A'. The expansion-chamber E is arranged in the opposite side, its fixed plate or part e forming a part of the valve-case, and the valve D and the movable plate or part e' of said expansion-chamber are arranged vertically and are movable horizontally. The supporting-ring f of the diaphragm is in this case formed integrally with the valve-case A', the plate e being screwed or bolted thereto over the diaphragm F. The branch h of the by-pass pipe H opens directly into the expansion-chamber E opposite the valve e^6 . The branch h' also opens directly into said chamber, and the waste-pipe I leads directly from the lower part thereof. The vent-valve e^9 is applied directly to the upper part of said chamber. In other respects the device as shown in Fig. 3 is substantially like that shown in Fig. 1, both in construction and operation.

The pipe H may be connected above the check-valve h^2 with the waste-pipe I below the valve J in either form of valve, as shown in Fig. 3, by a pipe M, provided with a valve m for the purpose of manually releasing the water from the expansion-chamber E and opening the valve D.

To test the apparatus without releasing air from or admitting water to the dry pipe, the gate-valve G is closed and the three-way cock k^2 is turned so as to release the air from expansion-chamber K, whereupon the waste-valve J will be opened, allowing water to escape from the expansion-chamber E and the

main valve D to be opened, as hereinbefore explained, or the main valve may be opened without disturbing the condition of the dry pipe by closing the valve h^3 in pipe H and opening the valve m in pipe M.

Various changes in details of construction and arrangement may be made without affecting the operation of the device and without departing from the principle of my invention—as, for example, in place of the plate e or diaphragm-chamber and the diaphragm F, I may substitute as their obvious equivalents a cylinder and piston, and with the valve shown in Fig. 1 a pipe provided with a valve like or similar to the pipe M and valve m (shown in Fig. 3) may be employed to connect the by-pass pipe H above the check-valve h^2 with the waste-pipe I below the valve J.

I claim—

1. In an automatic valve the combination of a valve-case having supply and service connections, a main valve adapted to close said service connection and to open against the supply-pressure, an expansible chamber having a movable part connected with said main valve and exposed normally on both sides to supply pressure, a valve-controlled by-pass leading from the supply connection independently of said movable part into said expansible chamber, and a cut-off valve for manually closing the supply connection between the main valve and by-pass, substantially as and for the purposes set forth.

2. In an automatic valve the combination with a valve-case having supply and service connections, of a main valve adapted to close said service connection, an expansible chamber having a movable part connected with said valve, two by-pass connections leading from the supply connection into said expansible chamber, one of which is provided with a cut-off valve, and a valve connected with said movable part and adapted to close the other by-pass connection when the main valve is opened, substantially as and for the purposes set forth.

3. In an automatic valve the combination with a valve-case having supply and service connections, of a main valve adapted to close the service connection, an expansible chamber having a movable part connected with said valve, a by-pass leading from said supply connection and having two branches opening into said expansible chamber and provided between the junction of the branches and the supply connection with a check-valve, one of said branches being provided with a cut-off valve, and a valve connected with said movable part and adapted to close the other branch when the main valve is opened, substantially as and for the purposes set forth.

4. In an automatic valve the combination with a valve-case having supply and service connections and a cut-off valve for closing said supply connection, of a main valve adapted to close the service connection, an

expansible chamber having a movable part connected with said valve, two by-pass connections one of which is provided with a cut-off valve leading from the supply connection into said chamber, a valve connected with said movable part and adapted to close the other by-pass connection when the main valve is opened, a waste connection leading out of said chamber, a valve controlling said waste connection, and an expansible chamber communicating with the service connection of the main valve and having a movable part connected with the waste-valve, substantially as and for the purposes set forth.

5. In an automatic valve, the combination with a valve-case having supply and service connections, of a main valve adapted to close the service connection, an expansible chamber having a movable part connected with said valve, a by-pass leading from said supply connection into said chamber, a cut-off valve for manually closing said supply connection between said by-pass and the main valve, a waste-passage leading out of said chamber, a valve controlling said waste-passage, an expansible chamber having a movable part connected with the waste-valve, and a connection between said latter chamber and the service connection of the main valve, provided with a three-way valve for manually closing communication with the service connection and releasing the actuating medium from the expansion-chamber of the waste-valve, substantially as and for the purposes set forth.

6. In an automatic valve, the combination with a valve-case having supply and service connections in line with each other, a valve adapted to close the service connection and to open against the supply-pressure, an expansible chamber inclosed within said case between the supply and service connections and having a movable part connected with said valve and exposed normally on both sides to supply pressure, a by-pass leading independently of said movable part from said supply connection into said chamber, a valve-controlled waste connection leading out of said chamber, and means for automatically opening the same when the pressure in the service connection is released, substantially as and for the purposes set forth.

7. In an automatic valve, the combination with a valve-case having supply and service connections in line with each other and a cut-off valve for manually closing the supply connection, of a main valve adapted to close the service connection, an expansible chamber inclosed within said valve-case between its supply and service connections and having a movable part connected with said valve, two by-pass connections leading from the supply connection of the main valve into said chamber, one of said connections being provided with a cut-off valve, a valve connected with said movable part and adapted to close the other by-pass connection when the main

4
valve is opened, a waste-passage leading out
of said chamber, a valve controlling said pas-
sage, and an expansible chamber communi-
cating with the service connection of the main
5 valve and having a movable part connected
with the waste-valve, substantially as and
for the purposes set forth.

In witness whereof I hereto affix my signa-
ture in presence of two witnesses.

CHARLES L. FORTIER.

Witnesses:

CHAS. L. GOSS,
M. L. EMERY.