

No. 610,343.

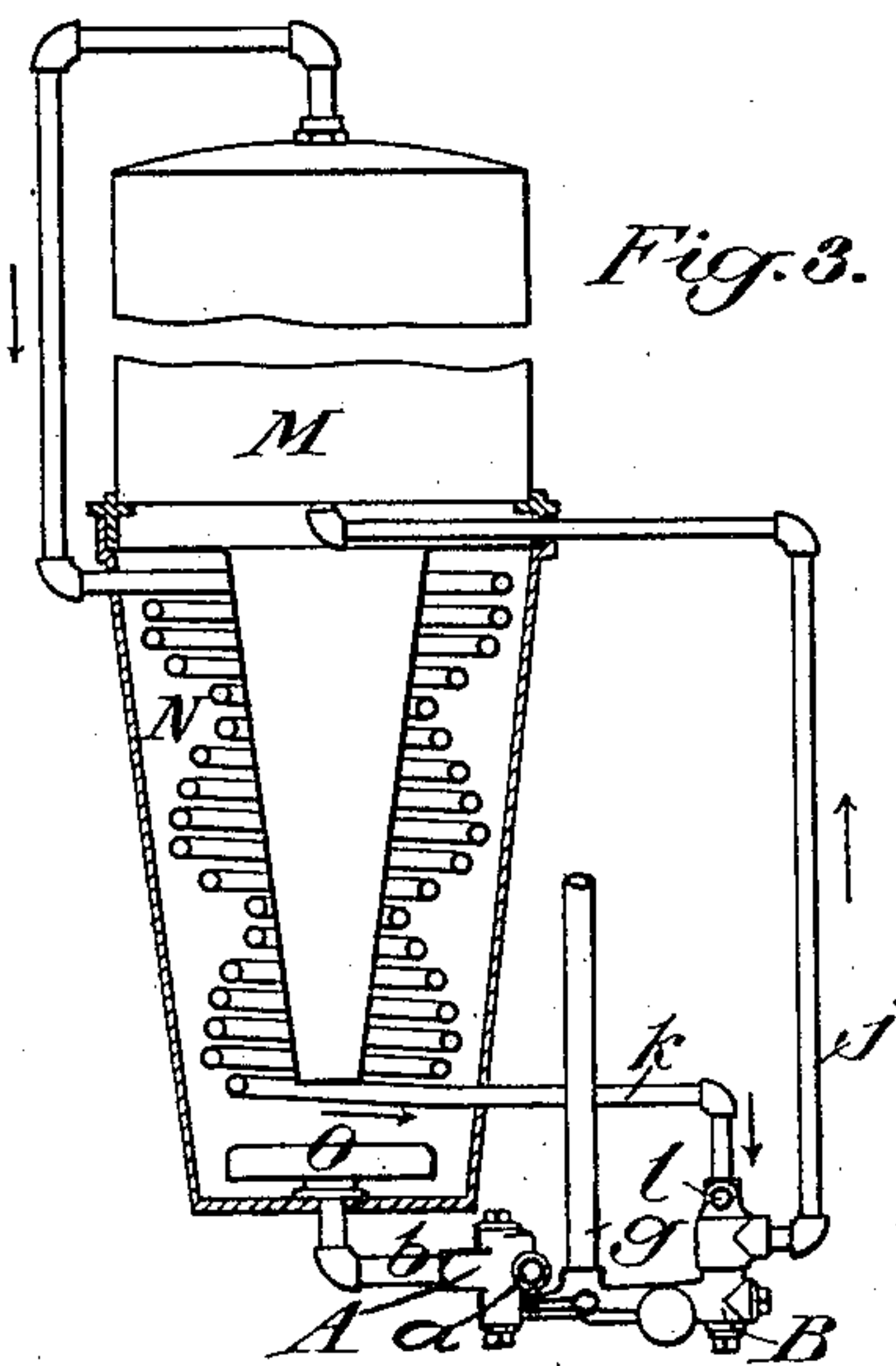
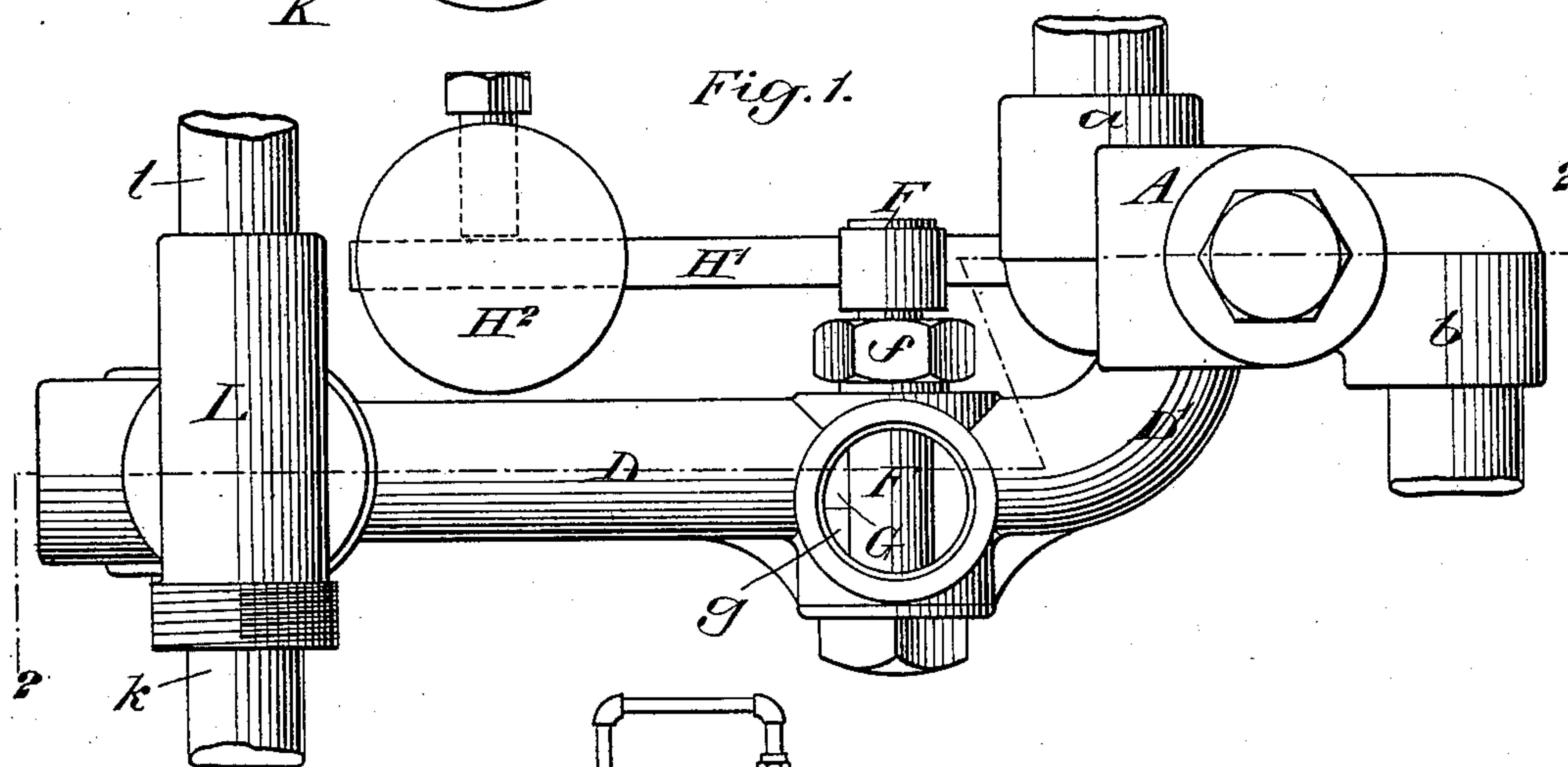
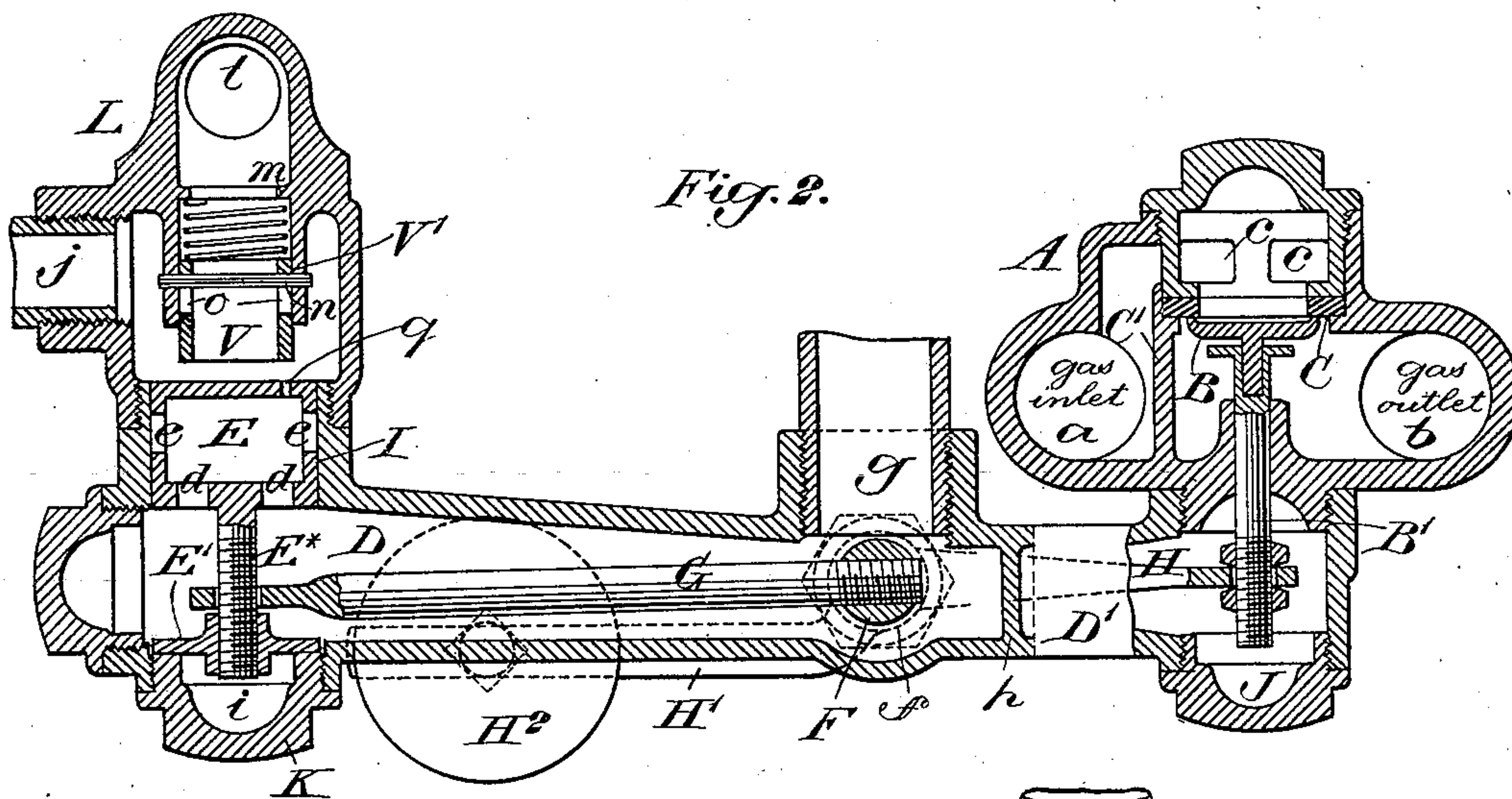
Patented Sept. 6, 1898.

J. S. COE.

MEANS FOR AUTOMATICALLY CONTROLLING SUPPLY OF GAS AND WATER, &c.

(Application filed Jan. 4, 1898.)

(No Model.)



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UNITED STATES PATENT OFFICE.

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MEANS FOR AUTOMATICALLY CONTROLLING SUPPLY OF GAS AND WATER, &c.

SPECIFICATION forming part of Letters Patent No. 610,343, dated September 6, 1898.

Application filed January 4, 1898. Serial No. 665,557. (No model.)

To all whom it may concern:

Be it known that I, JOHN S. COE, a citizen of the United States of America, and a resident of Paterson, in the county of Passaic and State of New Jersey, have invented a new and useful Improvement in Means for Automatically Controlling the Supply of Gas and Water to Gas-Heated Water-Heaters, of which the following is a specification.

10 This invention is especially designed for gas-heated water-heating apparatus—a house-boiler, for example—from which hot water is drawn from time to time; and its object is to automatically and simultaneously supply
15 cold water to the boiler or water-heater and gas to a burner for heating the water while hot-water is being drawn off and to automatically and simultaneously shut off such supply of cold water and cut off or restrict
20 such supply of gas while there is no such drawing off.

The improvement consists in certain combinations, hereinafter described and claimed, for accomplishing this object.

25 Figure 1 represents a plan of water and gas supply valves and means for automatically controlling the same embodying my invention. Fig. 2 represents a vertical section in the line 2 2 of Fig. 1. Fig. 3 is an elevation,
30 partly in section, of a gas-heated house-boiler and a water-heating coil in connection therewith having my invention applied to the gas-burner.

Similar letters of reference designate corresponding parts in all the figures.

Referring first to Figs. 1 and 2, A is a valve-box containing the gas-supply valve B and the seat C therefor. This valve has in it a partition C', on one side of which is the gas-inlet *a* and on the other side of which is the
40 valve-seat C and the gas-outlet *b*. The valve-seat C is represented as a ring of soft metal, against which the valve B, which is of the puppet-kind, closes upward. Above the valve-seat and partition *a* there are in the box ports
45 *c*, through which, when the valve is open, the gas passes from the inlet to the outlet. The valve-stem is attached to a spindle B', which works with an easy but close fit through an
50 opening in the bottom of the valve-box, which

is made thick enough for the said opening to constitute a guide to the said stem.

D is what may be termed the "water-conduit," which may be of any suitable form to contain the water-supply valve E, as well as
55 the fulcrum F and one arm G of the lever G H, which connects the said valve E with the gas-supply valve B, the box A of which is mounted upon a hollow bracket D', forming a part of the same casting with the conduit D. The
60 said conduit has a water-inlet *g*, at which the service-pipe which supplies the water is to be connected. The water-supply valve E is of hollow-piston form and works in a cylindrical seat I, which projects upward from the conduit D at the outlet from said conduit. The
65 said valve has apertures *d* in its bottom, which are always open, and has ports *e e* in its sides, which are closed by the sides of the cylindrical seat I while they remain therein, but
70 are open when the valve rises high enough to bring them above the seat. The upper end of the said valve is closed, except that it has a small orifice *q* to serve as a vent, as hereinafter described.

75 The fulcrum of the lever G H consists of an arbor which works in bearings in the sides of the conduit D, one of said bearings being a stuffing-box *f*, through which the said arbor projects outward to carry that arm H of the
80 lever which is connected with the stem of the valve B, the said arm H passing freely and without the need of fit through an opening in the hollow bracket D'. The interior of the conduit D is shut off from the bracket D' by
85 a cross-partition *h* in the casting, as shown in Fig. 2, and were it not for the desirability of inclosing and protecting the connection of the lever with the gas-valve the said bracket might be entirely open to the air. The connection
90 above mentioned is protected by a screw-plug J, (see Fig. 2,) on the removal of which the said connection may be adjusted. The water-supply valve E has attached to the lower end of its stem E* a balancing-disk E',
95 which has an area about equal to that of the valve E itself and which may seat itself on a seat provided in the conduit D, with a cavity *i* below it. The said seat is represented as formed on the upper end of a screw-plug
100

K, which screws into an opening in the bottom of the conduit, and the cavity *i* is also formed in this screw-plug.

Attached to the cylindrical upward projection at the outlet of the conduit D, containing or forming the cylindrical seat for the water-supply valve E, there is a box L, containing a movable annular seat V for the head of the valve E, the said seat also constituting a valve to the orifice *q* in the valve E, as will be hereinafter explained. In the box L there are three openings for pipe connections, one of said openings to communicate by a pipe *j* with that part of the boiler or heating apparatus where the cold or supply water enters, another of said openings to communicate through a pipe *k* with that part of the boiler or heating apparatus whence the hot water is to be taken, and the third of said openings to communicate through a pipe *l* with the cock or valve whence the heated water is to be drawn. I will explain these communications with reference to the example shown in Fig. 3, which shows an ordinary house-boiler M, from which cold water introduced at the bottom by the pipe *j* passes off at the top to the top of a heating-coil N, heated by a gas-burner O, and after passing downward through the coil passes through the pipe *k*, to be drawn off through the pipe *l*, the pipes *k l* being always in free communication with each other.

The movable valve-seat V for the head of the valve E consists of a ring or short hollow cylinder and works in a cylindrical guide V', provided within the box L, the said guide being open at the bottom to the lower part of the said box and to the pipe *j* and being open at the top to the pipes *k l*. Above the said seat V a coil-spring is applied between it and a shoulder *m*, formed within the box above the guide V', the said spring exerting a constant downward pressure upon the said seat; but to prevent the said spring from depressing the said seat below a certain point there is provided a stop, represented as a pin *n*, which passes through the said seat and its guide V', slots *o* being provided in the seat where the pin passes through to permit a certain amount of movement of the latter.

The connection of the arm H of the lever G H with the gas-supply valve is represented as positive, being made by two nuts on a screw-thread on the valve-stem, one nut above and the other below the said arm H. The connection between the lever-arm G and the water-supply valve E is represented as providing for lost motion between the valve and the said arm, the said arm having an eye through which the valve-stem E* passes in such manner that the valve may move up and down some distance independently of the lever-arm. The lever is provided with a third arm H' outside the water-box, and this arm carries an adjustable counterbalance H to counterbalance the gas-supply valve, with a slight tendency to close the said valve.

The disk E' of the water-supply valve E is so adjusted on the stem E* by being screwed thereon that while the said disk is seated, as shown in Fig. 2, the said valve E has its ports closed some distance below the top of its cylindrical seat I and the lever G is a little way clear of the hub of the disk E'.

The operation of the apparatus is as follows: So long as there is no water drawn off at *l* the parts all remain in the condition shown in Fig. 2 in the drawings, the water-supply valve being closed and supported by its balancing-disk E' resting on its seat, and the gas-supply valve being also closed, while the opening remains between the head of the water-supply valve E and the lower edge of its movable seat V, and so would permit, if necessary, free circulation through the pipes *j* and *k* and through the boiler and heating-coil; but when the drawing off at *l* commences, although the water-pressure is equal on the under side of the water-supply valve and the upper side of its disk E', the draft of the water from above the valve E is sufficient to start the said valve and just raise the disk E' from its seat. The water from the conduit D then flowing under the disk the equilibrium of pressure between the valve and disk is destroyed and the pressure of the water acting on the under side of the valve quickly raises it high enough to bring its ports *e e* above the cylindrical seat I and open them to allow free passage of cold water to and through the outlet *j*, leading to the boiler or heating apparatus, to replace the hot water drawn off; but before this opening of the valve E takes place the head of the said valve comes into contact with the seat V, which is thus made to close the passage through the latter and so shut off the cold water from the pipes *k* and *l* and prevent it from mixing with the hot water which is being drawn. This valve E in moving as above described brings the hub of the disk E' into operation on the lever G H and so produces the opening of the gas-supply valve. When the drawing of the hot water ceases and the valve E ceases to be influenced by the draft, the weight of the valve E, lever-arm G, and disk E', assisted by the counterbalance H, causes the said valve to descend and close the ports *e e* and shut off the cold-water supply, the movement of the lever at the same time closing the gas-supply valve.

It is to facilitate the above-described closing movement of the valves E B that the small orifice *q* is provided in the valve E, the said orifice constituting a vent for the passage of the water displaced from below the valve by its descent. It is to prevent the cold water below the valve from passing through this vent and mixing with the hot water above that the said vent is so arranged that it may be closed by the movable seat V while the ports *e e* of the valve E are open, the seat V thus acting as a valve to the vent.

It may be well to state that one object of

the pressure-balancing disk E', attached to the valve E, is to prevent the too sudden opening of the valve when the drawing of hot water takes place, such sudden opening being liable to be followed by a reactionary closing movement, which might produce the shutting off of the gas. Another object of the said disk is to prevent the accidental opening of said valve by the reaction or throb produced by the sudden shutting off of water at any other point in the water system in which this apparatus is placed.

The gas-supply valve B may be so connected with the lever H that when the water is not drawing off it may close entirely or be left very slightly open to keep a small flame at the main burner O. If arranged to close entirely, a pilot-burner may be provided near the main burner O for lighting the gas therefrom when the valve B opens. The small flame from the main burner or that from the pilot-burner need not be sufficient to produce a circulation in the coil, as that is not necessary until the water is drawn at the pipe l. Of course if no such provision is made for keeping an igniting-flame at the main burner the ignition of the gas must be performed by a match at the time of opening the cock in the pipe l.

An apparatus embodying my invention—for example, that shown in Figs. 1 and 2—being connected at g with the cold-water-supply pipe of a house or apartment will not interfere at all with the cold-water supply, but permits the drawing off of the cold water at as many points as may be necessary and will not be interfered with by the drawing off of cold water, and it is this that is an important characteristic of my invention.

What I claim as my invention is—

1. In an apparatus for automatically controlling the supply of water and gas to a gas-heated water-heater, the combination of a gas-burner and a supply-valve therefor, a conduit for the water to be heated, a water-supply valve in said conduit to be operated by the draft of water therethrough, a box communicating with said conduit, and a movable seat in said box for said water-supply valve, said box having besides its communication with the conduit three other openings, viz: one for cold water to the heater, a second for heated water from the heater and a third for the draft of heated water, the first and second openings being controlled by said water-supply valve, and a connection between said water and gas supply valves, substantially as herein described.

2. In an apparatus for automatically con-

trolling the supply of water and gas to a gas-heated water-heater, the combination of a gas-burner and a supply-valve therefor, a conduit for cold water to be heated, a hollow cylindrical valve-seat in the outlet of said conduit, a water-supply valve consisting of a hollow side-ported piston having a closed head and capable of being moved within said seat by the pressure of the water in the conduit, a connection between said water and gas supply valves, a box at said outlet beyond said valve and a movable spring-borne annular valve-seat in said box, said box having, besides its communication with said outlet three other openings, one of which forms a passage for cold water to the heater controlled by the side passages in the valve, a second is an inlet for water from the heater and a third is for the draft of heated water, the head of said water-supply valve operating to close said movable seat and shut off communication between the cold-water conduit and the said second and third openings while the first-mentioned opening is open to the conduit through the side ports of the valve, substantially as herein described.

3. In an apparatus for automatically controlling the supply of water and gas to a gas-heated water-heater, the combination of a gas-burner and a supply-valve therefor, a conduit for cold water to be heated, a hollow cylindrical valve-seat in the outlet of said conduit, a water-supply valve consisting of a hollow side-ported piston having a closed head in which is a small vent and capable of being moved within said seat by the pressure of the water in the conduit, a connection between said water and gas supply valves, a box at said outlet beyond said valve and a movable spring-borne annular valve-seat in said box operating to open and close said vent, said box having, besides its communication with the conduit, three other openings one of which forms a passage for cold water to the heater controlled by the side passages in the valve, a second is an inlet for water from the heater and a third is for the draft of heated water, the head of said water-supply valve operating to close said movable seat and shut off communication between the cold-water conduit and the said second and third openings while the first-mentioned opening is open to the conduit through the side ports of the valve, substantially as herein described.

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