

No. 653,265.

Patented July 10, 1900.

W. C. SERRELL.
STEAM HEATING APPARATUS.

(Application filed Mar. 9, 1900.)

(No Model.)

Fig. 1.

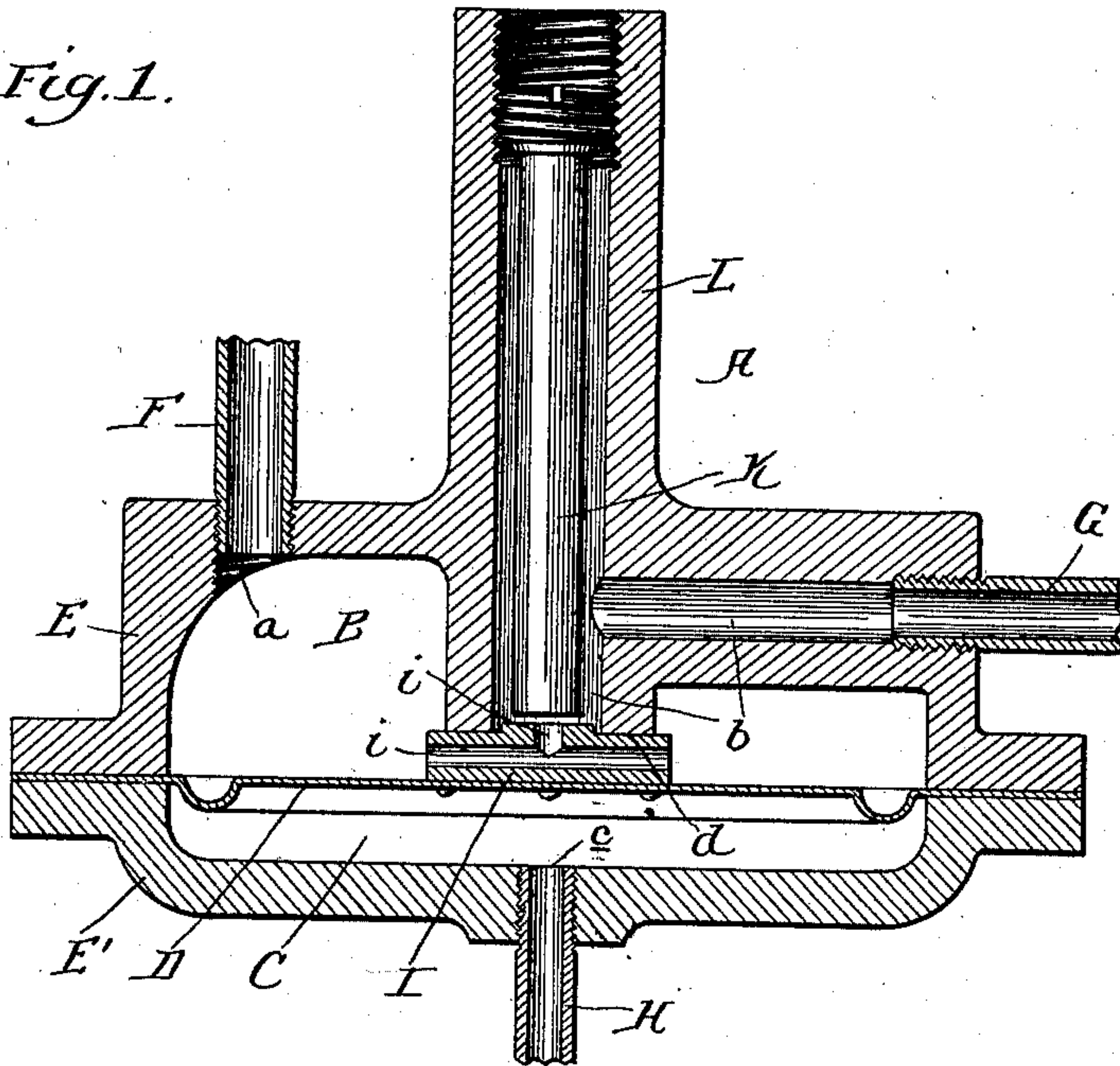


Fig. 2.

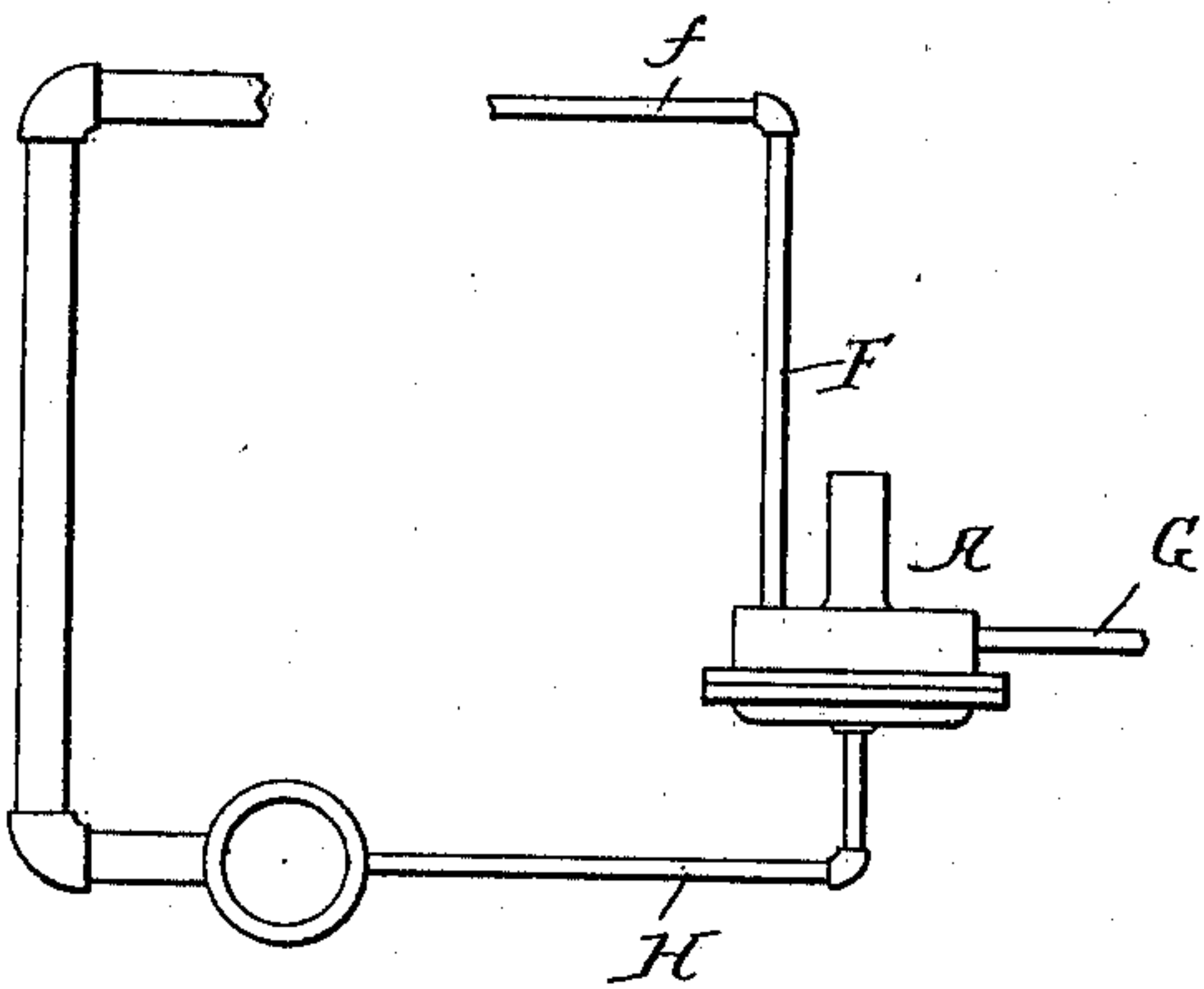
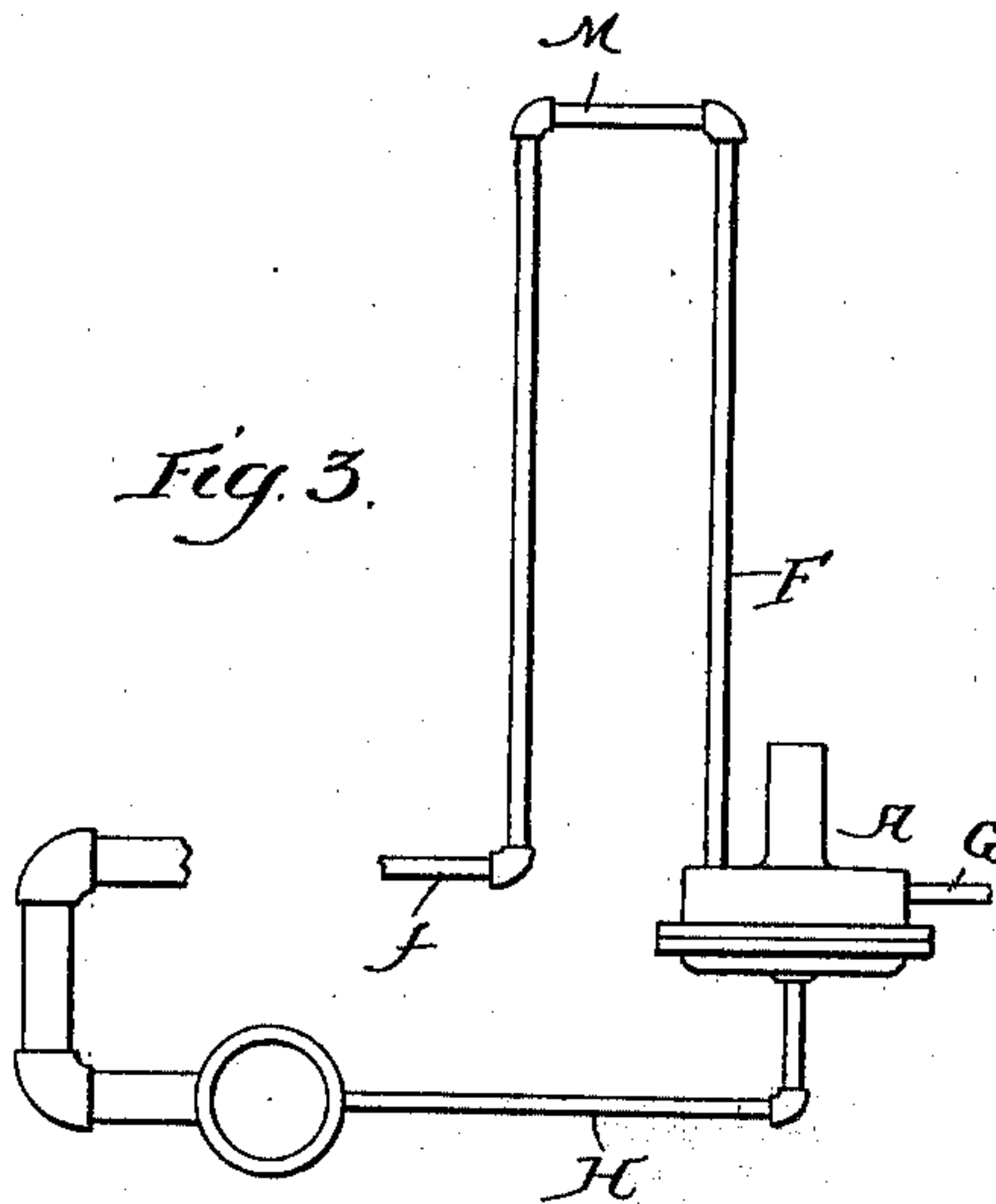


Fig. 3.



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UNITED STATES PATENT OFFICE.

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STEAM HEATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 653,265, dated July 10, 1900.

Application filed March 9, 1900. Serial No. 8,005. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM C. SERRELL, of the city and county of Philadelphia, State of Pennsylvania, have invented an Improvement in Steam Heating Apparatus, of which the following is a specification.

My invention relates to steam heating apparatus; and it consists of certain improvements which are fully set forth in the following specification and are shown in the accompanying drawings.

In many steam-heating systems, especially where there are material variations in the amount of condensation produced in any part of the apparatus, particularly in paper and cloth drying machines, difficulty is experienced in draining such portions of the system of the excess of water of condensation which is produced. If the normal thoroughfare is made sufficiently large to rapidly discharge the excessive condensation, it will be so large that under normal conditions large volumes of steam will escape and be wasted.

It is one of the objects of my invention to enable the normal accumulations of air and water of condensation to be properly discharged without waste of steam and to automatically increase the thoroughfare for the discharge of material excesses in the volume of water produced.

My invention may be applied either to a pressure system or to one in which a partial vacuum or lower pressure is maintained in the returns.

In carrying out my invention I employ a trap connected with the return and with the drip from the part to be drained, in combination with a valve-piece having a small valve passage-way opening into the return for the discharge of water and air under normal conditions and controlled by a pressure-motor under the control of the pressure in the system, which enables the valve-piece to be opened automatically to a greater extent upon any excessive accumulation of water of condensation in the trap, the normal pressure which acts in the motor to maintain the valve-piece upon its seat being unbalanced by the hydrostatic head of the excess of condensation. By means of a regulating-piece, which

may be a thermostatic expanding piece, if desired, the size of the thoroughfare to the return-outlet afforded by the small valve passage-way in the motor-controlled valve-piece may be regulated to suit the normal rate of discharge.

In the drawings, Figure 1 is a vertical sectional view of a valve or trap embodying my invention, and Figs. 2 and 3 are diagrammatic views illustrating the connections of the trap or valve.

A is the trap, connected with the drip F from the part of the system to be drained and with the return G.

I is the valve-piece, which controls the return-outlet *b* and is provided with a small passage-way *i*, opening into the return for the discharge of water of condensation and air at normal rates.

D is the pressure-motor, which controls the valve-piece I and is in turn controlled by the pressure in the system through the pipe H, connected therewith.

In the particular construction shown the trap A consists of an outer casing having an internal chamber which is divided into two compartments B C by the internal flexible or movable diaphragm or partition D, which constitutes the pressure-motor.

In practice the body of the trap A is preferably formed of two flanged parts E E', bolted together, with the edge of the diaphragm D clamped between their flanges.

The compartment B is provided with an inlet *a*, which communicates with a drip or bleeder F, and with an outlet *b*, which communicates with the return-pipe G and is formed with a seat *d*.

The compartment C is provided with an inlet *c*, which communicates with a branch H from any part of the steam-supply.

The valve-piece I is carried by the diaphragm D and adapted to fit upon the seat *d* of the discharge-outlet *b*. The valve-piece I is provided with a passage-way *i*, which, as shown, consists of a transverse passage-way extending through the piece I and opening through the top at the center.

K is an adjustable controlling piece or plug arranged immediately above the valve pas-

sage-way *i* and adapted to be adjusted to or from it to regulate the size of the thoroughfare. As shown, this adjustable controlling-piece consists of a plug threaded at its upper
5 end and carried in an internally-threaded tubular extension L of the trap member E.

In installing the trap it is preferably connected with the pipe F at a lower level than the drip-point *f*, from which the water of condensation is to be discharged; but when this
10 is not possible from the construction of the building or location of the apparatus it may be connected by a \cap M, as shown in Fig. 2, for the purpose of giving sufficient fall in the bleeder F. The pressure in the chamber C
15 through the pipe H is substantially the same as the normal pressure in the chamber B through the pipe F, and the valve-piece I is held lightly upon the seat *d* by the diaphragm D. The regulating-plug K is adjusted to afford
20 sufficient opening through the passage-way *i* for the desired thoroughfare to the outlet *b* for the escape of the water of condensation under normal conditions. Should there
25 occur, however, for any reason an excessive condensation in the part of the system drained by the drip F, the water will fill the chamber B and drip F and the diaphragm D will be depressed under the extra pressure due to the
30 hydrostatic head afforded by the pipe F, thus moving the valve-piece I away from the plug K and seat *d* and affording a thoroughfare of greatly-increased area for the discharge of the accumulation of water. When this excess
35 has passed off and normal pressure is restored, the valve-piece I will again close in its seat *d* and the normal thoroughfare will be resumed.

The return G may be connected with an exhausting apparatus to create a lower pressure
40 or partial vacuum in the return and a constant suction upon the outlet to draw off the water of condensation and the air more rapidly. With such a system the trap or valve
45 device is of special benefit, because it enables a minimum thoroughfare to be employed for withdrawing the air and water of condensation without material waste of steam, while enabling the thoroughfare to be enlarged automatically whenever an excess of condensation
50 accumulates.

The regulating-plug K may consist of a thermostatic expanding piece of any suitable material, either metal or composition, and
55 when such a thermostatic piece is used there will be practically no waste of steam whatever, even through the small normal thoroughfare provided by the adjustment of the plug relatively to the valve-piece I, as the thermostatic expanding piece will elongate when
60 subjected to steam and close automatically upon the piece I.

Since the pressure normally maintained in the chambers B and C is the same as the pressure
65 throughout the system generally, any variation in pressure throughout the system will not in any way affect the operation of

the trap, which remains equally operative under all of the varying conditions under which
70 the general system is operating.

The details of construction which have been shown may be varied without departing from the invention.

What I claim as new, and desire to secure by Letters Patent, is as follows:

1. A valve or trap for a steam heating apparatus, consisting of an outer casing having an inlet and an outlet and a passage-way between said inlet and outlet, a valve-piece to control the passage-way through said casing,
80 a pressure-motor to control said valve-piece, and an adjustable regulating-piece to control the size of the passage-way afforded by said valve-piece.

2. A valve or trap for a steam heating apparatus, consisting of an outer casing having an inlet and an outlet and a passage-way between said inlet and outlet, a valve-piece to control the passage-way through said casing
85 having a normally-small open passage-way, a pressure-motor to control said valve-piece, and an adjustable regulating-piece to control the size of the passage-way afforded by said valve-piece.

3. A valve or trap for steam heating apparatus, consisting of an outer casing, an internal flexible diaphragm dividing said casing internally into two compartments, one of said
95 compartments having an inlet for water of condensation and a discharge-outlet, and the other compartment a steam-inlet, a valve-piece having a small valve passage-way carried by said diaphragm and located at said discharge-outlet, and a regulating-piece located in said discharge-outlet and adjustable
100 with reference to said valve-piece to control the size of the thoroughfare afforded by said valve passage-way.

4. A valve or trap for steam heating apparatus, consisting of an outer casing, an internal flexible diaphragm dividing said casing internally into two compartments, one of said
110 compartments having an inlet for water of condensation and a discharge-outlet, and the other compartment having a steam-inlet, a valve-piece having a valve passage-way carried by said diaphragm and located at said discharge-outlet, and a thermostatic expanding piece located in said discharge-outlet adjacent to the passage-way in said valve-piece.
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5. A valve or trap for steam heating apparatus, consisting of an outer casing, an internal flexible diaphragm dividing said casing internally into two compartments, one of said
125 compartments having an inlet for water of condensation and a discharge-outlet terminating in a seat *d*, and the other compartment having a pressure-inlet, a valve-piece I carried by said diaphragm, adapted to bear upon the seat *d* of said discharge-outlet and provided with a valve passage-way *i*, and a regulating-plug K adjustable to and from said
130 valve-piece I to regulate the thoroughfare afforded by said valve passage-way *i*.

6. A valve or trap for steam heating apparatus, consisting of an outer casing, an internal flexible diaphragm dividing said casing internally into two compartments, one of said
 5 compartments having an inlet for water of condensation and a discharge-outlet terminating in a seat *d*, and the other compartment having a pressure-inlet, a valve-piece *I* carried by said diaphragm, adapted to bear upon
 10 the seat *d* of said discharge-outlet and provided with a valve passage-way *i*, and a thermostatic regulating-plug *K* of expanding material adjustable to and from said valve-piece *I* to regulate the thoroughfare afforded by said
 15 valve passage-way *i*.

7. In a steam heating apparatus, the combination with a drip or bleeder, of a trap into which said bleeder discharges, a return leading from said trap, a valve-piece to control
 20 the outlet within the trap to said return provided with a valve passage-way open into said return, a regulating-plug adjustable to or from said valve-piece to regulate the normal thoroughfare afforded by said valve passage-
 25 way, and a pressure-motor controlled by the pressure in the system for controlling said valve-piece.

8. In a steam heating apparatus, the combination with a drip or bleeder, of a trap into
 30 which said bleeder discharges, a return leading from said trap, a valve-piece to control the outlet within the trap to said return provided with a valve passage-way open into said

return, a thermostatic regulating-plug composed of expansible material, adjustable to or
 35 from said valve-piece to regulate the normal thoroughfare afforded by said valve passage-way, and a pressure-motor controlled by the pressure in the system for controlling said valve-piece.
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9. In a steam heating apparatus, the combination with a drip or bleeder, of a trap into which said bleeder discharges provided with a thoroughfare, a return leading from said
 45 trap, a valve-piece to control the thoroughfare within the trap to said return provided with a small valve passage-way normally open to said return, and a pressure-motor controlled by the pressure in the system to control said
 50 valve-piece and the size of the thoroughfare to the return.

10. In a steam heating apparatus, the combination of a trap having a permanently-open but variable valve passage-way for the discharge of water of condensation, a movable
 55 valve-piece to control the area of said passage-way controlled by the water of condensation in said trap and a pressure-motor connected with the system and acting on said valve-piece to control its movements.
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In testimony of which invention I have hereunto set my hand.

WILLIAM C. SERRELL.

Witnesses:

R. M. KELLY,
 WM. W. MORGAN.