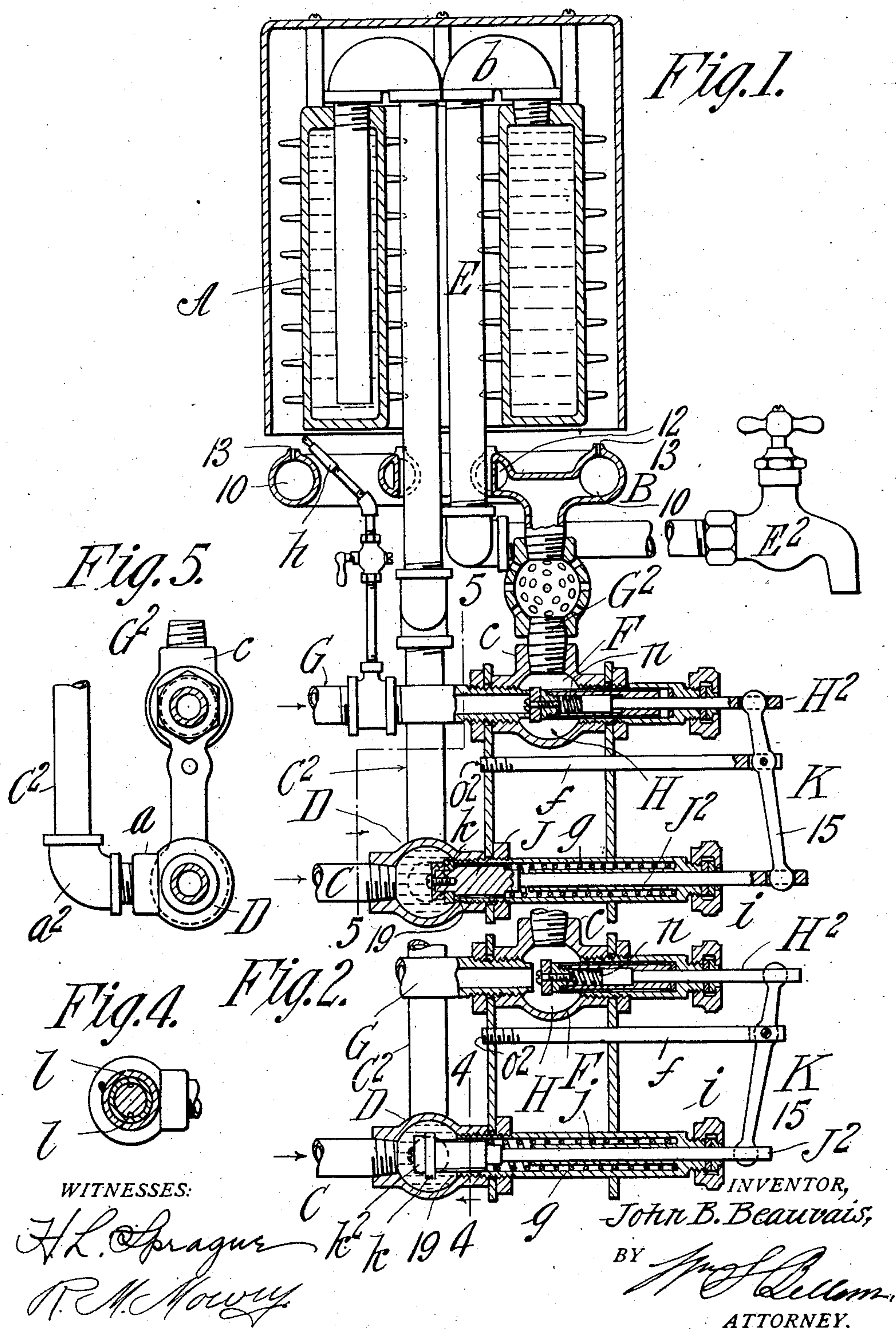


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APPLICATION FILED DEC. 8, 1909.

994,563.

Patented June 6, 1911.

2 SHEETS—SHEET 1.

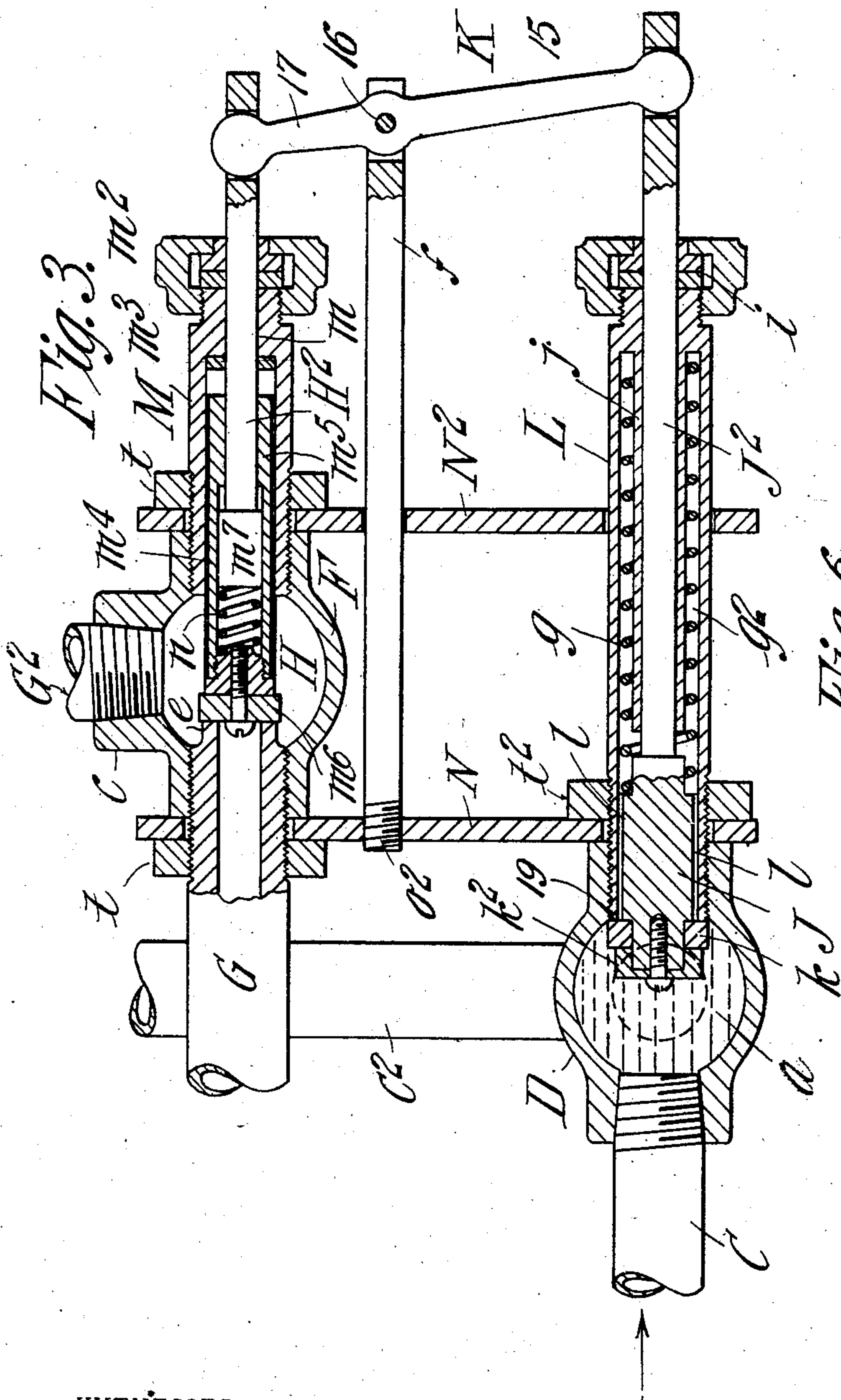


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WATER-HEATING APPARATUS.

994,563.

Specification of Letters Patent.

Patented June 6, 1911.

Application filed December 8, 1909. Serial No. 531,926.

To all whom it may concern:

Be it known that I, JOHN B. BEAUVAIS, a citizen of the United States of America, and resident of Holyoke, in the county of Hampden and State of Massachusetts, have invented certain new and useful Improvements in Water-Heating Apparatuses, of which the following is a full, clear, and exact description.

10 This invention relates to a water heating apparatus principally for household use and having the capability of expeditiously providing an ample supply of suitably hot water in the heater without the requirement of the ordinary cumbersome upright hot water tank as at present very commonly employed.

15 The invention relates to an apparatus in which are comprised a water heater and a gas burner therefor, means for supplying the heater with water and means for withdrawing the heated water therefrom for use, and automatic means operative by the high pressure in the heater and one of the water conduits therefor (as established when no 25 water is being drawn off from the heater) for shutting off the flow of gas to the gas burner, but reversely operative when the water pressure is lowered,—by reason of a person drawing the water off from the heater,— 30 to establish the flow of gas to the burner, in conjunction with which latter is an always burning pilot light. And by the provisions included in this apparatus, the gas burner will only be ignited for the flow of gas at 35 times when water is being drawn off, it being understood that the heating of the water in the heater up to the desirably high temperature may be accomplished at times when water is being withdrawn as rapidly 40 as the withdrawal takes place.

45 The principal object of the invention is to render the automatic apparatus for controlling the gas supply most sensitive, reliable and efficient in operation. And another object is to provide an automatic controlling apparatus which is of extremely simple and inexpensive construction and susceptible of connections in its relations with the water conduit connected with the heater and with 50 the gas supply pipe and a branch thereof leading to the burner so as to be practically universal as to its capability for connection, irrespective of the relative positions of the gas supply pipe and heater connecting water 55 conduit.

The invention is fully described in con-

junction with the accompanying drawings and set forth in the claim.

In the drawings:—Figure 1 is substantially a central vertical sectional view 60 through the entire water heating apparatus; Fig. 2 is a sectional view through the automatic controlling devices, similar to that represented in Fig. 1, but showing the parts in reversed relations, that is to say:—the gas 65 valve is indicated as opened, as occasioned by an understood lowering of the water pressure to which the piston is subjected. Fig. 3 is a view on a much larger scale, of the automatic controlling device in which the 70 parts are in the same relative positions as indicated in Fig. 1, that is the gas valve being closed. Fig. 4 is a cross sectional view in detail on line 4—4, Fig. 2. Figs. 5 and 6 are cross sectional views, but showing different 75 relations which the yoke bar connected portions of the apparatus may have one to another.

Similar characters of reference indicate corresponding parts in all of the views. 80

In the drawings, A represents a water heater which advantageously may comprise a heater body of annular form such as illustrated and described in the Letters Patent of the United States granted to me Nov. 17, 85 1908, No. 904,297. This heater body A is the only receptacle for hot water necessarily comprised in the apparatus,—and is not to be understood as an auxiliary to the usually employed hot water kitchen tank. 90

B represents a gas burner under the heater body which may be of any suitable form, the same being here represented as comprising inner and outer annular gas chambers 10 and 12 with nipples or jets 13 upwardly 95 extending and for directing the flame made by the gas issuing therethrough in proper heating relations to the heater body.

C represents a water supply pipe understood as coming from the city water main 100 and having a location under the heater in a horizontal line. The end of the water supply pipe C has a screw engagement with a chambered casing section or coupling D which has a transverse connection limb α , 105 at right angles to the line of the supply pipe C, and to which, by an elbow connection α^2 a pipe C² extends to connection for supplying water into the annular heater body A, an upright portion of this pipe C² 110 extending upwardly through the central opening in the heater body and by return

bent connection has its entrance into the heater body through the top thereof. The pipe E has connection by return bent coupling *b* with the top of the heater body, a portion of the pipe extending vertically down within the central space in the heater body and is thence continued in any proper direction away from the heater as to a sink or bath tub; and it has one or more draw-off faucets E^2 as represented in Fig. 1.

G represents the gas supply pipe shown as arranged horizontally and parallel with the water supply pipe C, its extremity being screw connected into the coupling section F made in the form of a chambered casing somewhat similar to the one D from a transversely projecting limb *c* of which extends the screw connected pipe section G^2 , which has gas supplying connection with the burner. The end portion *e* of the gas supply pipe G protrudes slightly within the chambered coupling section F and forms the seat against which the gas valve H closes.

J represents a piston having a location in the water conduit connected with the heater, the same being movably operative in one direction by the high pressure of the water in such conduit, and having a stem J^2 with which is engaged the long arm 15 of a lever K which is pivotally connected at 16 on the fulcrum member *f*, the short arm 17 of said lever having an engagement with the stem H^2 of the gas valve H so that at times when no water is being drawn from the heater and a pressure equal to the maximum of the water supply is maintained against the piston J, the same will be forced against the spring *g* with the result of swinging the lever K for the exertion of a multiplied power on the stem H^2 for insuring a closing of the valve H against the seat *e* whereby the flow of gas to the burner B will be terminated. And from the construction thus far in a general way described, it will be understood that so soon as water is drawn off through the faucet E^2 to result in a lowering of the pressure of the water in the heater and in the conduits C, D and C^2 , the spring will be effective for forcing the piston in a direction opposite the pressure of the water, causing, through the lever K, the opening of the gas valve so that the gas then permitted to flow to the burner will be ignited by the pilot light *h* and cause the heating of the water in the heater body A, which, I may state, due to the efficiency of the apparatus as perfected by me, will take place with such rapidity as to cause, even if the faucet is left open for an indefinite time, the heating of all water passing into and out from the heater as fast as such entrance and egress takes place.

There is considerable in the nature of

detailed construction comprised in this apparatus which has been found highly desirable, if not absolutely necessary, for the attainment of its high degree of efficiency; and the various structural components of the automatic controlling devices will be now set forth.

The chambered casing or coupling section D with which the water supply pipe C is connected, has a tubular casing L in extension thereof, there being an annular seat 19 constituted by the end of the tubular part L, which screw engages into the casing section D and terminates at the side of the chamber in the part D opposite the entrance of the water supply pipe C. The said tubular casing L is provided at its outer end portion with a stuffing box *i* through which the piston stem J plays, and the part L is constructed internally with the elongated guiding hub *j* for the piston stem J, the opening in such elongated hub being extended through the otherwise closed outer end of the tubular casing at and about which the stuffing box is connected. And between the elongated guiding hub and the outer wall of the tubular extension L is an annular chamber or space g^2 which endwise opens toward the piston J, its opposite end being closed and forming a seat for one end of the spiral spring *g*, the other end of such spring engaging the shouldered right hand end of the piston. The piston is provided with the flange-like enlargement *k* constituted by a ring of compressible material and held in place by a screw confined retainer k^2 , and said part *k* constitutes a valve which under the high pressure against the piston has a closing relation against the seat 19 and prevents a leakage of water which otherwise might ooze through the stuffing box through which the piston stem J plays. The spring in the manner of its application shown is prevented by the elongated hub *j* from binding or cramping, and interfering with the sensitiveness of action of the piston stem J^2 .

In order that water which may leak by the piston J when the same is in its left hand position may not become trapped to form an impediment to the freest possible action of the piston, one or more longitudinal grooves *l* are provided along the sides of the piston and extend from end to end thereof, as particularly shown in Figs. 3 and 4.

The chambered casing or coupling member F appurtenant to the gas valve has a tubular casing M screw connected therewith and somewhat similar to the one L, the same having a contracted valve stem opening *m* at its outer end portion provided at which is a stuffing box m^2 , having an internal valve seating shoulder at m^3 provided, preferably, with a section of packing material.

The gas valve, as best shown in Fig. 3, is

constructed in the form of a cylindrical body movably guided in the bore of the tubular casing M, and having a longitudinal chamber m^4 therein with a contracted passage m^5 leading to the end of the valve body opposite its end provided with the compressible valve seat member m^6 .

The stem H^2 which extends through the stuffing box to the contracted passage m of the tubular casing M and through the contracted aperture in the valve body, has a cylindrical enlargement m^7 at its inner edge which is movably guided in the longitudinal chamber m^4 in the valve body; and a spring n is in compression between the enlarged end of the valve stem and the closing end wall of the said chamber toward the seating end of the valve.

It will be understood that the parts are so adjusted that in the movement of the piston under high pressure toward the right, it will, before having its valve constituting portion k come to the seat 19, force the gas valve seating portion m^6 to its seat e ; and then in order that the seated gas valve and its stem may constitute no impediment to the firm seating of the part k on the piston, the gas valve stem may, through the force imparted by the lever K, yield under the further compression of the spring n .

The member f constituting the fulcrum for the intermediately pivoted lever K is comprised in a rod o supported by the yoke bars N, N^2 which unite the tubular casing L appurtenant to the water piston to the appliances appurtenant to the gas valve; and this rod which passes loosely through one of the bars N^2 has a screw thread engagement, as indicated at o^2 with the other bar N, so that by disconnecting the ends of the lever from the stems H^2 and J and turning the rod o , the fulcrum point may be adjusted either to the right or left and thereby insure a regulation in the extent to which the gas valve may be opened, and a consequent regulation of the supply of gas which the automatic apparatus may insure that the burner will seasonably have; and the making of the lever K with a longer arm actuated by the water piston stem and operating the gas valve through its shorter arm, renders the automatic apparatus much more sensitive and reliable in its action even in cases where the available water pressure is not as high as might, under ordinary circumstances, be desired.

The yoke bars N, N^2 have circular apertures whereby they have embracing relations, the one about the portion of the gas supply pipe at its junction with the coupling member F, and the other about the tubular extension M adjacent the other end of the coupling section; and these bars moreover have apertures at their opposite ends whereby they embrace, the one an intermediate

portion of the tubular casing extension L and the other the screw threaded portion of said tubular casing extension adjacent its engagement with the right hand end of the coupling section or chambered casing D. These yoke bars N and N^2 , therefore, constitute tie members which while always retaining the part L to insure always the same spaced relations to the axis of the gas supply pipe and gas valve stem renders it possible that the tubular casing extension L and the chambered coupling piece D may be revolvably swung so as to permit of connections of the supply pipes whether the same are one vertically over the other, as indicated in all of the views excepting Fig. 6 or they are arranged in a horizontal plane as indicated in Fig. 6, or in any oblique plane. and to give stability of the parts when in their coupled connections, the lock or jam nuts t and t^2 are provided, this t screw engaging on the externally threaded gas supply pipe and the tubular extension m and to be set up against the adjacent portions of the yoke bars clamping them against the opposite ends of the coupling member F while the jam nut t^2 screw engages on the external threads of the tubular casing extension L to bind the adjacent apertured end portion of the yoke bar N against the right hand end of the part D, which as before stated is a coupling section and chambered casing.

Instead of the manner of connection of the gas valve stem H^2 body of the gas valve H for the lost motion of the parts against and with the reaction of the interposed spring, this form of connection might be made in respect of the water piston J^2 , but the means for the relative movement as between the gas valve and the water piston to take place yieldingly after the gas valve has become seated and to permit the water piston valve member to absolutely seat, may be elsewhere and otherwise provided in the connections between the piston and gas valve.

I claim:—

In an apparatus of the character described, a water heater and a gas burner therefor, a water supply pipe, a chambered casing connected to the water supply pipe and having a tubular extension opposite the point of connection of said water supply pipe and in alinement therewith, a piston having a location in the chambered casing and provided with a stem extending through and endwise beyond the side tubular extension and having a spring in said tubular extension reacting against the piston in a direction the reverse of that of the water pressure, and a pipe connecting said chambered casing with the water heater, a gas pipe, a chambered coupling member screw connected with the extremity of the gas pipe

and having a tubular extension screw connected therewith opposite the connection of the gas pipe and in alinement therewith, a gas valve and a stem therefor guided in the
5 second named tubular extension, yoke bars having apertures at their opposite end portions and having embracing relations with the tubular extension of the water pipe connecting chambered casing and with the gas
10 supply pipe and the tubular extension in line therewith, lock nuts screw engaged on the parts embraced by the apertured extremities of said yoke bars and adapted to be set to detachably confine the bars and
15 parts embraced thereby in fixed relations

and to be loosened to permit relative revoluble movements of one coupling casing section and its tubular extension relatively to the other, a pipe section connecting the coupling member of the gas pipe with the burner, 20 a fulcrum member supported by said yoke bars and a lever intermediately pivoted on said fulcrum member engaging the stems of the piston and the gas valve.

Signed by me at Springfield, Mass., in 25 presence of two subscribing witnesses.

JOHN B. BEAUVAIS.

Witnesses:

WM. S. BELLOWS,

G. R. DRISCOLL.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."
