

No. 682,345.

Patented Sept. 10, 1901.

E. RUUD.

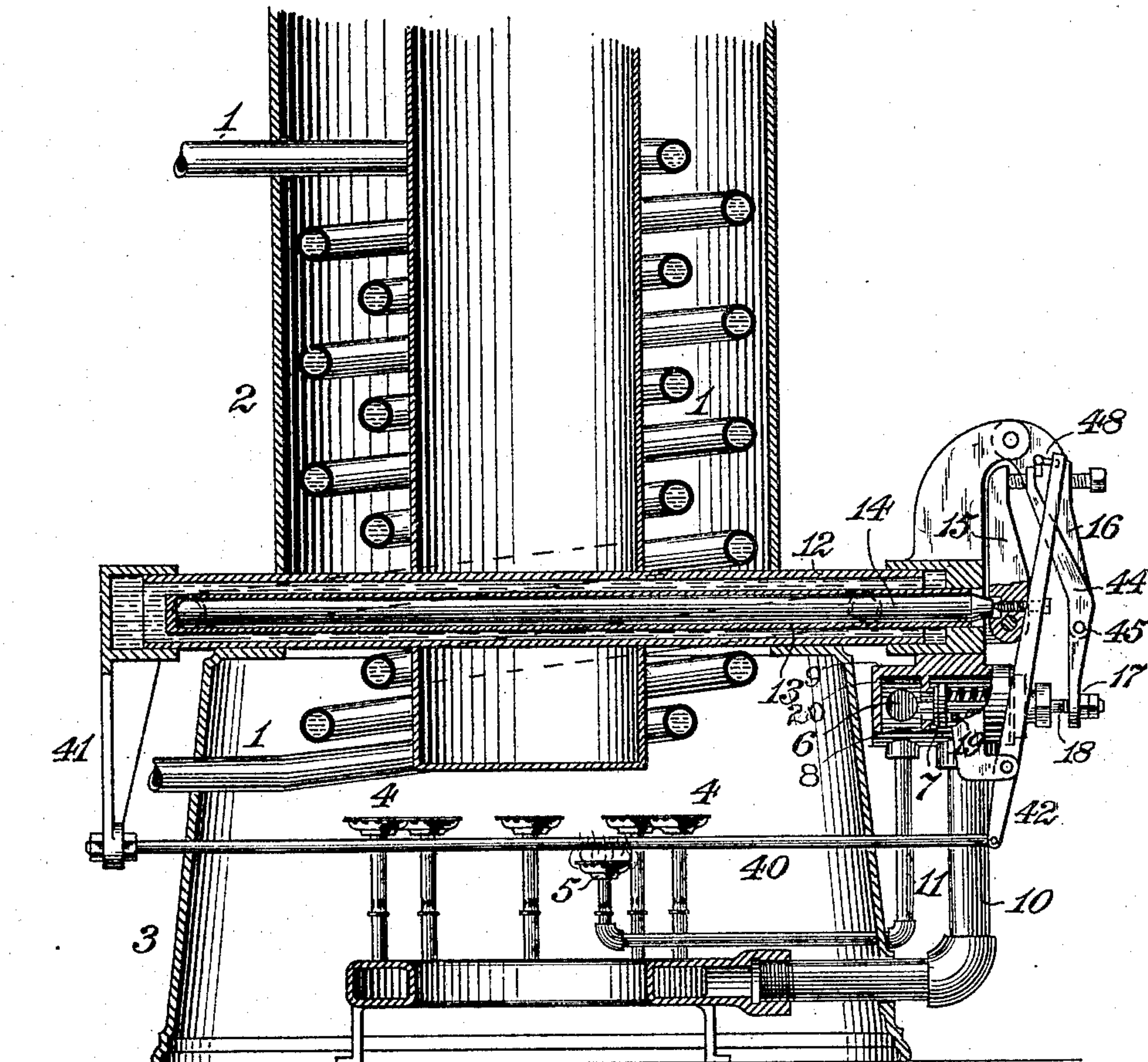
AUTOMATIC CUT-OFF FOR GAS SERVICE PIPES.

(Application filed Feb. 17, 1898.)

(No Model.)

2 Sheets—Sheet 1.

FIG. 1.



WITNESSES:

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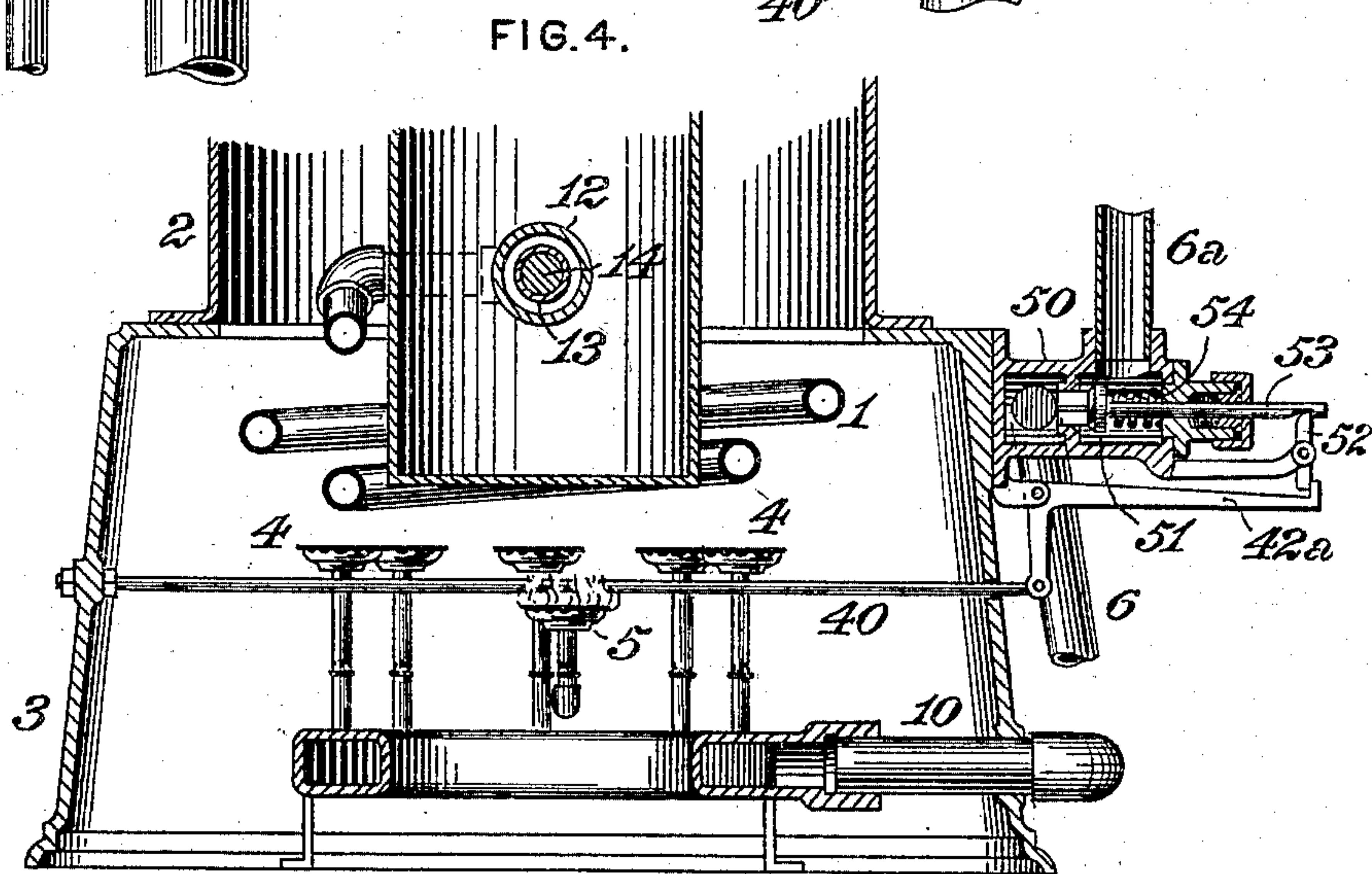
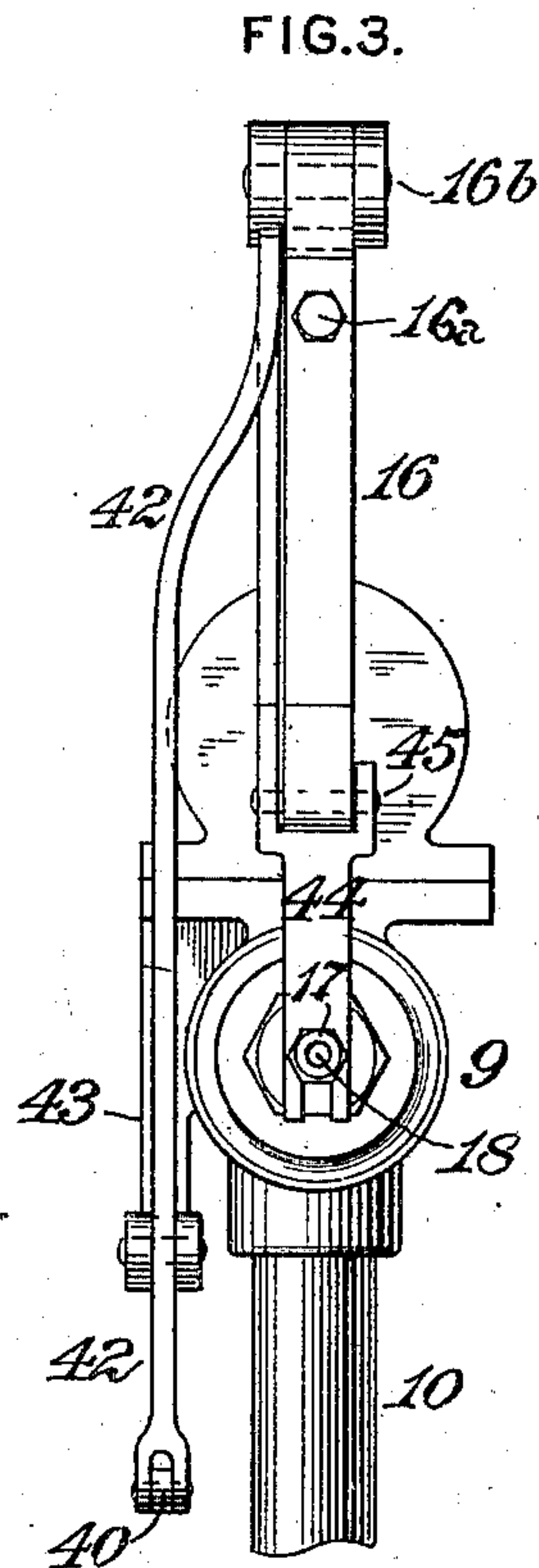
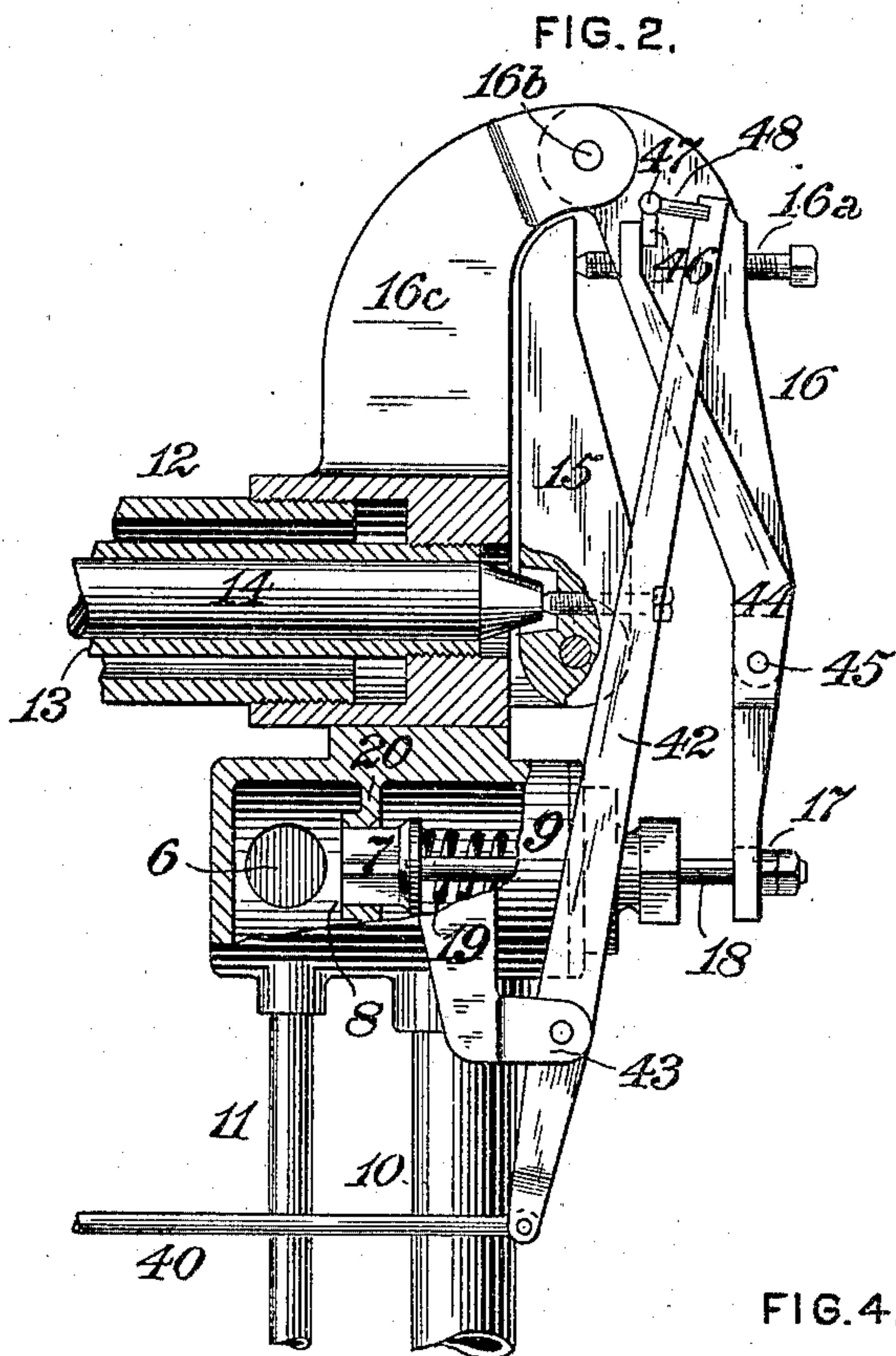
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2 Sheets—Sheet 2.



WITNESSES:

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UNITED STATES PATENT OFFICE.

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AUTOMATIC CUT-OFF FOR GAS-SERVICE PIPES.

SPECIFICATION forming part of Letters Patent No. 682,345, dated September 10, 1901.

Application filed February 17, 1898. Serial No. 670,655. (No model.)

To all whom it may concern:

Be it known that I, EDWIN RUUD, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a certain new and useful Improvement in Automatic Cut-Offs for Gas-Service Pipes, of which improvement the following is a specification.

My invention relates more particularly to water-heating apparatus in which the supply of heating medium is regulated and controlled by a thermostat or thermal regulating device, instances of which are exemplified in Letters Patent of the United States Nos. 443,997, 460,513, and 610,281, granted and issued to me under dates of December 30, 1890, September 29, 1891, and September 6, 1898, respectively. It is, however, equally applicable, without variation of its operative principle or modification of its essential structural features, to other constructions of thermally-regulated gas heating apparatus.

The object of my invention is to provide means whereby the supply of gas to a burner or burners in a gas heating apparatus controlled by a thermostat may be automatically cut off upon the extinguishment of flame at a burner, as may happen by accident, carelessness, or temporary cessation of gas-supply, and thereby to effectually prevent the liability to serious accidents and damage resultant upon the escape of a substantial volume of gas from a burner or burners.

The improvement claimed is hereinafter fully set forth.

In the accompanying drawings, Figure 1 is a view, partly in vertical central section and partly in elevation, illustrating an application of my invention to a water-heater; Fig. 2, a view, partly in side elevation and partly in section and on an enlarged scale, of the embodiment of my invention illustrated in Fig. 1; Fig. 3, a front view, on the same scale, of the same; and Fig. 4, a view, partly in vertical central section and partly in elevation, illustrating an application of my invention to a water-heater in which an independent cut-off valve is employed.

My invention is herein shown as applied to a water-heating apparatus which is substantially similar to that set forth in Letters Patent No. 610,281 aforesaid, and which is not, therefore, in and of itself claimed as of my present invention. The water-receptacle of said apparatus is in the form of a coil of pipe

1, having a cold-water-inlet pipe and a hot-water-outlet pipe, which are not shown, connected to its opposite ends. The coil, which is surrounded by a suitable casing 2, supported on a base or stand 3, is heated by a series of main gas-burners 4, which are ignited by the flame of an auxiliary lighting or "pilot" burner 5, and gas is supplied to all of said burners by a service-pipe 6.

Referring first to the construction shown in Figs. 1, 2, and 3, the supply of gas to the main burners only is controlled by a supply-valve 7 of the lift or puppet type, seating over a port 8 in a transverse partition 20, formed in a valve-casing 9, from which an inlet-pipe 10 leads to the several main burners 4. An independent inlet-pipe 11 leads from a port or passage in the supply-valve casing 9 on the inlet side of the supply-valve to the pilot-burner 5. The total or partial opening and closure of the gas-supply valve 7 is regulated so as to supply a greater or less quantity of gas to or to entirely cut off gas from the main burners 4 by a thermostat or thermal regulating device located in position to be subjected to the heat of said burners, and in the instance shown consisting of an outer tube 12, forming part of the circuit for water through the coil, an inner tube 13, formed of metal having a comparatively high coefficient of expansion and fixed at one end, and a rod 14, which is formed of less expandible metal than the tube 13 and which projects at one end outside of the tubes 12 and 13. The projecting end of the rod 14 bears (through a system of levers, as presently to be described) against a nut 17, which is adjustable upon the stem 18 of the gas-supply valve 7, and a spring 19 bears on the supply-valve with a constant tendency to bring it to and hold it upon its seat, such tendency being counteracted by the contraction of the tube 13 under reduction of temperature, which, acting through the rod 14 and the lever system upon which said rod bears, moves the gas-supply valve 7 to a greater or less extent from its seat. The specific form or construction of the thermostat is not, however, of the essence of my invention, and the same is equally applicable in connection with other thermal regulating mechanisms which act to control the supply of heating medium to burners by effecting movements of a supply-valve.

Water-heating apparatus of the general character of that above described is not in and of itself claimed as of my present invention, the essential feature of which consists
 5 in mechanism actuated by a supplemental thermostat subjected to the heat of the pilot-burner, by means of which the supply of gas from the service-pipe either to the main
 10 burners alone or to both the main burners and the pilot-burner is automatically cut off upon the extinguishment of the flame at the pilot-burner, thereby obviating the liability to accident from the continued escape of gas at the burners which would otherwise take
 15 place.

In the practice of my invention, referring first to Figs. 1, 2, and 3, the rod 14 of the thermostat bears, as in prior constructions,
 20 on a lever 15, which is pivoted in bearings adjacent to the projecting end of the rod, and the lever 15 bears in turn near its free end on a lever 16, which is pivoted by a pin
 25 16^b to a bracket 16^c, secured to the outer end of the tube 12. The bearing-face of the lever 16 is preferably, as shown, the point of an adjustable bolt 16^a, engaging a screw-thread in said lever and adapted to be moved toward
 30 and from the lever 15, as desired. In the constructions heretofore employed the free end of the outer lever 16 was caused to bear directly against a nut 17, which is adjustable longitudinally on the stem 18 of the gas-supply valve 7, and the contraction of the inner
 35 tube 13 of the thermostatic mechanism under reduction of temperature effected through the rod 14 and levers 15 16, outward movement of the valve-stem, and consequent movement of the supply-valve 7 away from its seat, the
 40 valve being correspondingly moved toward its seat in the expansion of the tube 13 under increase of temperature by its closing-spring 19. Under my present invention the relation of the thermostat to the supply-valve, the transmission of the movement of the thermostat-rod to the valve-stem through an interposed
 45 lever system, and the action of the closing-spring in opposite direction to the movements of the thermostat-rod correspond in each case with the same features of prior constructions,
 50 as above described, but are supplemented by means for automatically shutting off the supply of gas to the main burners or to the main burners and the pilot-burner, as the case may be, upon and as a necessary result of the
 55 extinguishment of the flame of the main burners and the pilot-burner. To this end I provide a supplemental thermostat, consisting of a rod 40, of metal possessing a comparatively high coefficient of expansion, one end of which is
 60 fixed and the other connected to a tripping mechanism for effecting the closure of either the main supply-valve 7 or a supplemental and independent cut-off valve 51, accordingly as the apparatus is designed to shut off the supply to the main burners only or to both the
 65 main burners and the pilot-burner. In the construction shown in Figs. 1, 2, and 3, by

which the first of these functions is accomplished, one end of the supplemental thermostat 40 is rigidly connected to a bracket 41,
 70 which is preferably, as shown, secured to the end of the outer tube 12 of the main thermostat opposite to that from which the rod 14 projects. The opposite end of the supplemental thermostat 40 is pivotally connected
 75 to one end of a tripping-lever 42, which is pivoted between its ends to a bracket or support 43. The lever 16 does not abut directly against a bearing on the supply-valve stem 18, as in the prior constructions, its connection therewith being effected by means of a
 80 lever 44, which is pivoted by a pin 45 to the free end of the lever 16 and bears at one end against a nut 17, which is adjustable on the supply-valve stem 18. The opposite end of
 85 the lever 44 abuts against an arm 46 on a trigger-shaft 47, journaled in the lever 16 a short distance from the pivot-pin 16^b thereof. The shaft 47 carries an arm or trigger 48, which engages a notch or recess in the tripping-lever 42 adjacent to the end thereof opposite that to which the supplemental thermostat is connected.
 90

It will be seen that the members of the lever system and the supply-valve stem are
 95 normally maintained in the relation shown in the drawings by the opposing pressures of the thermostat-rod 14 and the closing-spring 19 and that so long as the trigger 48 is maintained in engagement with the tripping-lever
 100 42 the levers 16 and 44 will move coincidently in either direction and act in substantially the same manner and with practically the same effect as if rigidly connected or, as in prior constructions, a single lever. When,
 105 however, the trigger is released from the notch or recess of the tripping-lever, the resistance which previously existed to the action of the closing-spring 19 is removed, and said spring thereupon seats the gas-supply
 110 valve 7 and cuts off the supply of gas to the main burners 4. The lever 44 is swung upon its pivot 45 by the movement of the valve-stem 18 in the closing of the valve and in turn swings the trigger-shaft 47 sufficiently
 115 to clear the arm 46. The release of the trigger 48 from its normal engagement with the tripping-lever 42 is effected by the contraction of the supplemental thermostat 40, which is necessarily resultant upon the extinguish-
 120 ment of the flame at the pilot-burner, and the parts cannot be restored to their normal operative positions until the pilot-burner is relighted and the supplemental thermostat expanded sufficiently to permit the trigger
 125 to be reengaged with the tripping-lever.

It will be obvious that various modifications in the structure of the intermediate mechanism through which the supplemental thermostat effects the closure of the supply-
 130 valve may be made by mechanics skilled in the art to which my invention relates without departure from its essential features or operative principle, and I do not, therefore,

limit myself to the specific tripping mechanism which is herein described and shown.

Fig. 4 illustrates a form of my invention in which the supply to both the main burners and the pilot-burner is automatically cut off upon the extinguishment of the flame at the pilot-burner, the essential elements being, as in the instance first described, a supplemental thermostat and a tripping mechanism through which the thermostat effects the closure of a valve controlling the supply to the burners. The gas-service pipe 6 is in this instance led into the casing or chest 50 of an independent or supplemental cut-off valve 51, which controls communication between the service-pipe 6 and a pipe 6^a, leading to the valve-chest (not shown) of a main or ordinary gas-supply valve, from which supply-pipes lead to the main burners 4 and the pilot-burner 5, as in the instance first described, said supply-valve being controlled by a main thermostat 12 13 14 in the ordinary or any other preferred manner. A supplemental thermostat 40, similar to that before described, is located in position to be subjected to the heat of the pilot-burner 5 and is secured at one end to a suitable support, as the base 3 of the heater. The opposite end of the supplemental thermostat 40 is coupled to one arm of a tripping-lever 42^a, which in this case is in the form of a bell-crank, and the other arm of the tripping-lever is provided with a shoulder or projection which bears against one arm of a double-armed lever 52, journaled in a bracket which may be conveniently secured to the valve-chest 50. The opposite arm of the lever 52 engages a notch or recess in the outer portion of the stem 53 of the cut-off valve 51, and so long as the thermostat 40 is expanded by the heat of the pilot-burner the cut-off valve is held open for the passage of gas by the engagement of the levers 42^a and 52 and the valve-stem 53. Upon the extinguishment of the flame at the pilot-burner the resultant contraction of the thermostat draws the tripping-lever 42^a out of engagement with the lever 52, and the cut-off valve 51 is immediately closed or brought to its seat by its closing-spring 54, thereby cutting off the flow of gas from the service-pipe 6 to the chest of the main gas-supply valve, and consequently cutting off the supply of gas to both the main burners and the pilot-burner.

A special feature of advantage in the operation of apparatus embodying my invention is the quickness of its action, due to the prompt contraction of the supplemental thermostat upon the extinguishment of the pilot-burner flame. The supply of gas to the burners is thereby cut off so soon that the escape therefrom in such volume as to be an element of danger is rendered impossible. In the use of the form of the invention in which the supply is cut off from the main burners only the escape from the pilot-burner is ordinarily so small in amount that no injurious result

can be reasonably apprehended on its account.

I claim as my invention and desire to secure by Letters Patent—

1. The combination, substantially as set forth, of a gas-burner, a valve controlling the supply of gas thereto, a spring bearing on said valve with a constant tendency to effect its closure, a thermostat normally subjected to the heat of a gas-burner, means acting in opposite direction to said spring, and a tripping device actuated by said thermostat for releasing said means, thereby permitting the spring to close said valve.

2. The combination, substantially as set forth, of a main gas-burner, an independent or pilot burner, a valve controlling the supply of gas to the main burner, a thermostat normally subjected to the heat of the pilot-burner and unaffected by the main burner, and mechanism, connected with and controlled by said thermostat, for effecting the automatic closure of the valve upon the extinguishment of the flame at the main and pilot burners.

3. The combination, substantially as set forth, of a main gas-burner, an independent or pilot burner, a valve controlling the supply of gas to the main burner, a thermostat normally subjected to the heat of the pilot-burner and unaffected by the main burner, a closing-spring bearing on the valve with a constant tendency to effect its closure, means acting in opposite direction to the closing-spring to hold the valve open, and a tripping device by which said means are automatically released, and the spring caused to close the valve, in and by the contraction of the thermostat resultant upon the extinguishment of the flame at the main and pilot burners.

4. The combination, substantially as set forth, of a main gas-burner, an independent or pilot burner, a valve controlling the supply of gas to the main burner, a thermostat normally subjected to the heat of the main burner, said thermostat being connected with and regulating the movement of said valve, a supplemental thermostat subjected to the heat of the pilot-burner and unaffected by the main burner, and mechanism, connected with and controlled by said supplemental thermostat, for effecting the automatic closure of the valve upon the extinguishment of the flame at the main and pilot burners.

5. The combination of the water-heater the main gas-burners, and the pilot-burner, with automatic mechanism controlled by the temperature of the heater and regulating the supply of gas to the main burners, and automatic cut-off mechanism operative upon extinguishment of the pilot-burner to cut off the flow of gas to the main burners.

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Witnesses:

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