

No. 770,893.

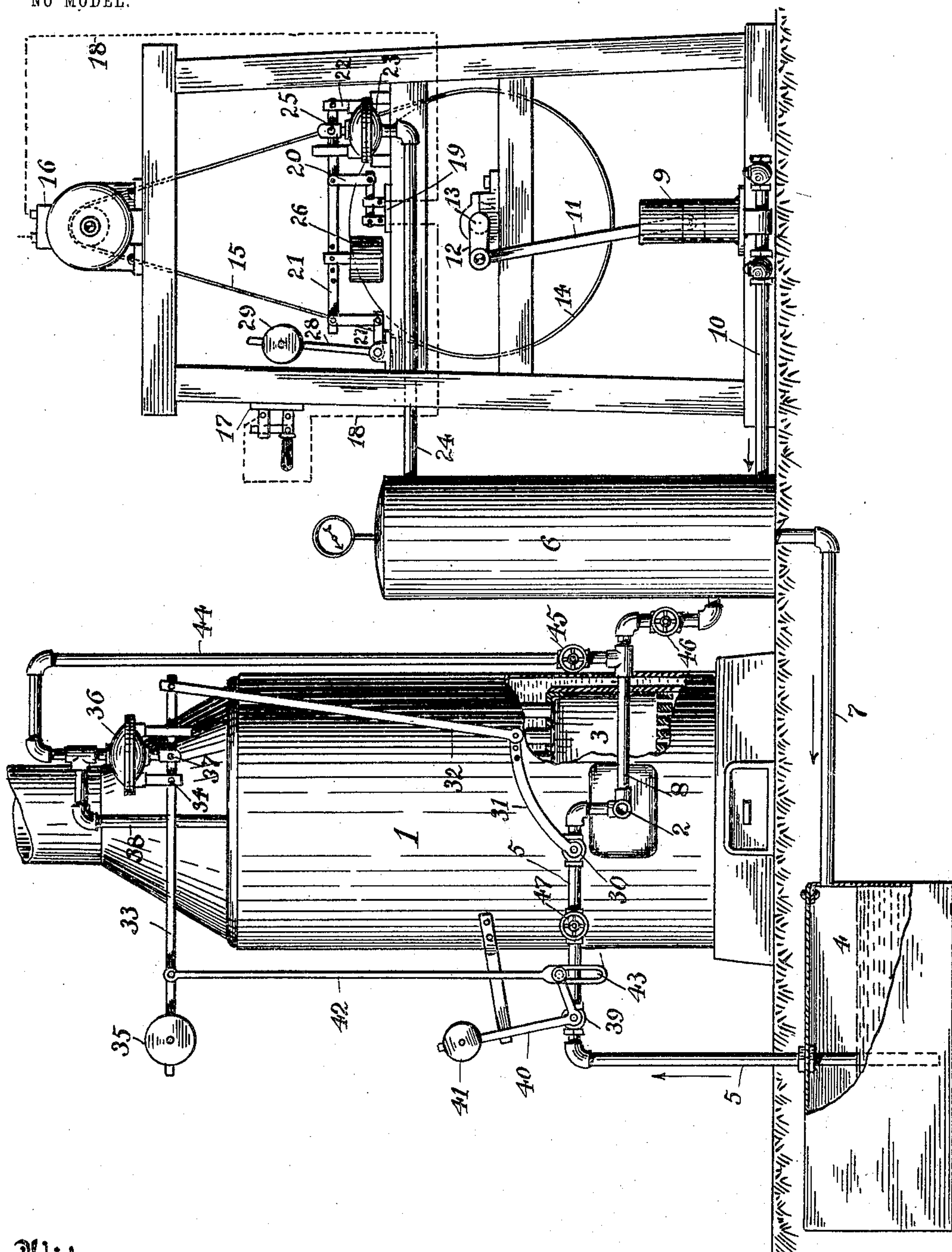
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AUTOMATIC REGULATOR FOR STEAM GENERATORS.

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NO MODEL.



Witnesses.

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AUTOMATIC REGULATOR FOR STEAM-GENERATORS.

SPECIFICATION forming part of Letters Patent No. 770,893, dated September 27, 1904.

Application filed May 4, 1904. Serial No. 206,326. (No model.)

To all whom it may concern:

Be it known that I, ISAAC THOMPSON DANKS, a citizen of the United States, residing at Fresno, county of Fresno, State of California, have invented certain new and useful Improvements in Automatic Regulators for Steam-Generators; and I do hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to that class of steam-generators especially intended for distributing steam through buildings, and particularly to means for automatically regulating the operation of said generators whereby they may be left unattended with comparative safety.

The object of my invention is to provide simple and effective means for automatically controlling and regulating the supply of the heating medium to the generator.

To this end my invention consists in the novel construction, arrangement, and combination of parts which I shall hereinafter fully describe.

Referring to the accompanying drawing, the figure is an elevation of my apparatus, showing a general assemblage of all the parts.

1 is a boiler of any suitable character in which steam is generated for any purpose—as, for example, for distribution through the heating system of a building.

2 indicates a hydrocarbon-burner of any suitable construction adapted to furnish the heat to the furnace 3 of the generator 1.

4 is a reservoir or tank to contain the liquid hydrocarbon, such as crude oil, to supply the burner 2. The oil is fed to the burner from the tank through a pipe 5.

6 is a tank or reservoir for compressed air. The air serves a double purpose, first, to feed the oil by pressure thereon through a pipe 7, and, second, to supply the burner with the necessary air to form, with the oil, the combustible mixture, said supply being effected through the pipe 8.

To render the heat-supply continuous and automatic and to guard against the consequences of an unexpected stoppage of the initial power, there are three features of regulation, as follows: first, the compression of the

air and its pressure regulation; second, the control of the oil-feed according to the steam-pressure in the generator, and, third, the positive cutting off of the oil-feed in case of a cessation of burner action. These will now be taken up in the order stated.

9 is an air-pump which through a pipe 10 compresses air in the tank 6. The pump is operated by a connecting-rod 11 from a crank 12 on the shaft 13, driven by a pulley 14, which is driven by a belt 15 from the electric motor 16. A switch 17, with suitable circuit-wires 18, starts and stops the motor. In order to shut the current off when the pressure in the tank is too high, I have the cut-out-switch 19 included in the circuit 18. This switch is operated by a link 20, connecting it with a lever 21, which is pivoted at one end to a standard 22. A pressure-regulator of any suitable diaphragm or other type (indicated by 23) receives a pipe 24 from the air-tank 6 and has its diaphragm-stem 25 connected with the lever 21. The weight 26, adjustably mounted on the lever 21, holds the cut-out switch 19 closed and variably controls by its position the pressure required to open said switch and cut off the current. In order to open the switch quickly under an excess of air-pressure, I have connected with the free end of lever 21 a bell-crank 27, which carries the arm 28 with an adjustable weight 29. When the lever 21 is lifted by the air-pressure, it will throw the weight over the center, and the latter will thereby complete the lifting of said lever to suddenly open the switch 19. When the air-pressure falls again, the weight 26 will close the switch 19, and the motor 16 being again started will operate the air-pump.

30 is a valve in the oil-pipe 5 to control the feed of oil to the burner 2. This valve has a handle 31, which is connected by a link 32 with a lever 33, pivoted at 34 and carrying an adjustable weight 35, the normal effect of which is to hold the valve 30 open.

36 is a pressure-regulator, the diaphragm-stem 37 of which is connected with the lever 33.

A pipe 38 from the steam-space of the gen-

erator 1 enters the regulator 36 on the upper side of the diaphragm. When the pressure of steam in the generator rises beyond the limit intended, said pressure will depress the lever 33 and through the link 32 will turn the valve 30 toward a closed position. When the excess of steam-pressure is relieved, the weight 35 will open the valve again. If for any reason the electric power should be stopped for a length of time sufficient to permit the air in tank 6 to be exhausted and thereby stop the burner action, so that its flame is extinguished, it is obvious that upon a resumption of the power and no one in attendance to relight the burner the oil in tank 4 would be forced by the air through the burner and flood the furnace. To provide for this contingency, I have in the oil-feed pipe 5 a cut-out valve 39, which is operated by a bell-crank handle 40, one arm of which carries a weight 41 and the other arm of which is connected by a link 42 with the lever 33. The connection of said link with the valve-handle 40 is by means of an elongated slot 43 at the lower end of the link, which connection gives enough play to the lever 33 to enable it to control the main feed-valve 30, as heretofore described; but when the steam-pressure is entirely gone by the cessation of the burner action under the contingency mentioned the weight 35 will depress the link 42 sufficiently to cause it to close the cut-out valve 39 against any resumption of the oil-feed, and the weight 41 will keep it closed. Under normal operation the weight 41 will hold the valve 39 open. If it be desired to feed steam to the burner, either alone or in conjunction with air, there is a pipe 44 leading from the pipe 38 to the pipe 8, said pipe 44 being controlled by a hand-valve 45. The air-pipe 8 is controlled by a hand-valve 46, and the pipe 5 from the oil-tank to the burner is controlled by a hand-valve 47.

The operation of the device is as follows:
 The motor 16 being started from the switch 17, air is forced by the pump 9 into tank 6. Through pipe 7 the air forces the oil from tank 4 through pipe 5 (the valves 39 and 30 being open) to the burner 2. At the same time the air passes through pipe 8 to the burner. The mixture being ignited at the burner, steam is generated in boiler 1, from which it is distributed to its destinations. If the air-pressure in tank 6 rises above the requirements, the motor 16 will be cut out by the switch 19. When the pressure is reduced to the limit set, the motor will be thrown in again by the switch 19. If the steam-pressure in the generator rises above the limit, the valve 30 will be operated to reduce the supply of oil to the burner, thereby reducing the heat. When the steam-pressure lowers, the weight 35 will open the valve 30 again. If the steam-pressure is reduced to nothing by the extinguishment of the flame at the

burner, the cut-out valve 39 will be closed against an unintended resumption of oil-feed. Thus the whole device can be safely left to its own automatic regulation.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In combination with a steam-generator and a hydrocarbon-burner fitted thereto, a source of oil-fuel having a feed connection with the burner, a source of elastic fluid under pressure having a communication with the burner, and also a second communication with the source of oil-fuel to feed said fuel to the burner, and means dependent on the pressure of the elastic fluid in its source for controlling the supply thereto comprising an air-pump, an electric motor and connections for driving the pump, a cut-out switch for the motor, a pressure-regulator communicating with the source of compressed fluid and connections from said regulator to operate said switch.

2. In combination with a steam-generator and a hydrocarbon-burner fitted thereto, a source of oil-fuel having a feed connection with the burner, a source of elastic fluid under pressure having a communication with the burner, and also a second communication with the source of oil-fuel to feed said fuel to the burner, and means dependent on the pressure of the elastic fluid in its source for controlling the supply thereto comprising an air-pump, an electric motor and connections for driving the pump, a cut-out switch for the motor, a pressure-regulator communicating with the source of compressed fluid and connections from said regulator to operate said switch, a valve controlling the oil-feed connection, and means dependent on the steam-pressure in the generator for controlling said valve.

3. In combination with a steam-generator and a hydrocarbon-burner fitted thereto, a source of oil-fuel having a feed connection with the burner, a source of elastic fluid under pressure having a communication with the burner and also a second communication with the source of oil-fuel to feed said fuel to the burner, a cut-off valve in the oil-feed connection and means dependent upon the absence of steam-pressure in the generator for closing said valve to shut off the oil-feed.

4. In combination with a steam-generator and a hydrocarbon-burner fitted thereto, a source of oil-fuel having a feed connection with the burner, a source of elastic fluid under pressure having a communication with the burner and also a second communication with the source of oil-fuel to feed said fuel to the burner, a valve controlling the oil-feed connection, means dependent on the steam-pressure in the generator for controlling said valve, a second valve in the oil-feed connection and means dependent upon the absence of steam-pressure in the generator for closing said valve to shut off the oil-feed.

5. In combination with a steam-generator and a hydrocarbon-burner fitted thereto, a source of oil-fuel having a feed connection with the burner, a valve controlling said connection, a second valve for cutting off the feed in said connection, and the means for operating said valves consisting of the pressure-regulator having a communication with the steam-space in the generator, the pivoted weighted lever operated by said regulator, the link con-

necting said lever with the controlling-valve, and the slotted link connecting the lever with the cut-off valve substantially as described.

In witness whereof I have hereunto set my hand.

ISAAC THOMPSON DANKS.

Witnesses:

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