

J. M. DOUGHERTY & H. C. TABLER.
 REGULATING APPARATUS.
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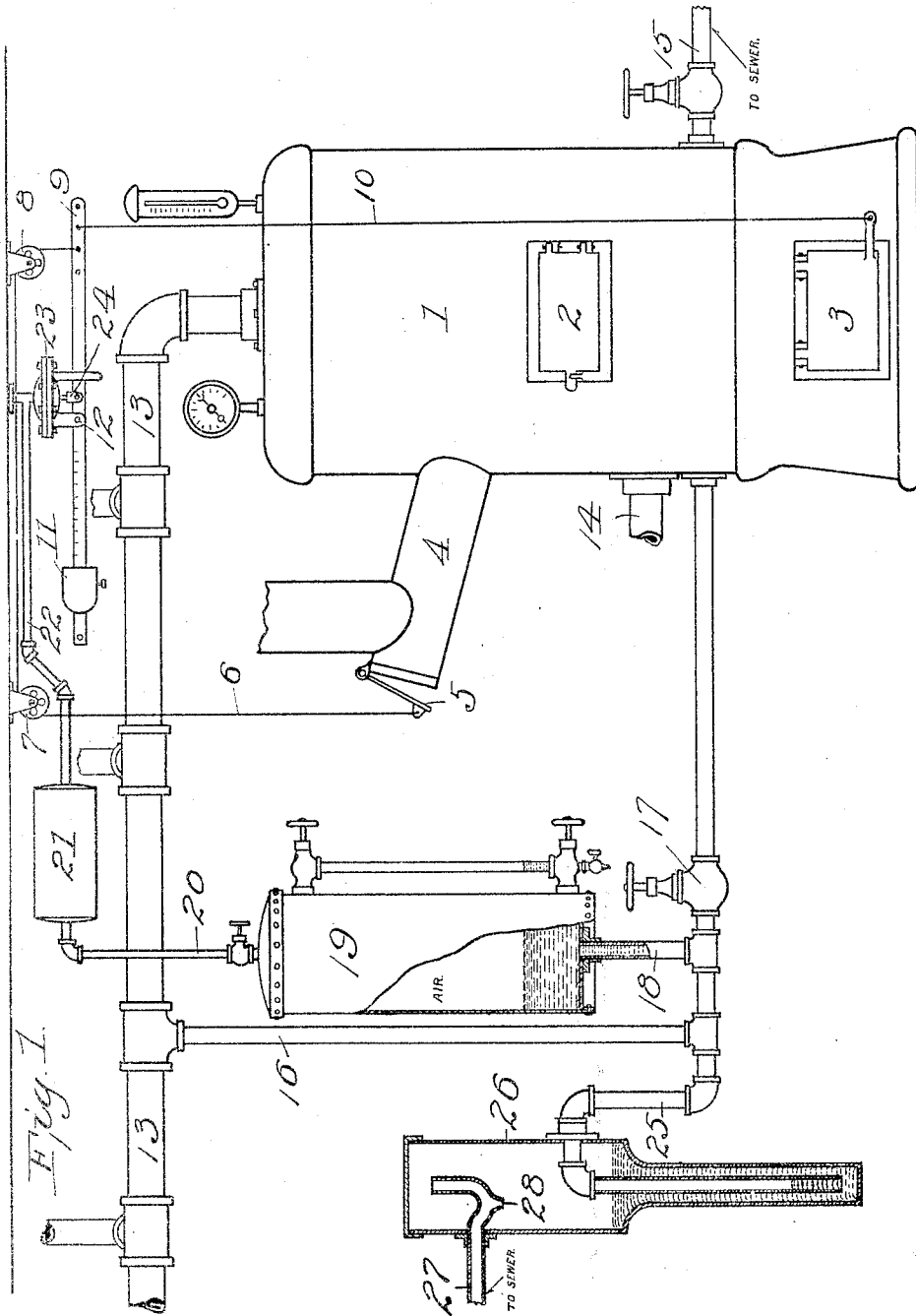


Fig. 1.

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UNITED STATES PATENT OFFICE.

JOHN M. DOUGHERTY AND HARRY C. TABLER, OF ST. LOUIS, MISSOURI.

REGULATING APPARATUS.

957,601.

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To all whom it may concern:

Be it known that we, JOHN M. DOUGHERTY and HARRY C. TABLER, citizens of the United States, residing at St. Louis, Missouri, have invented a certain new and useful Improvement in Regulating Apparatus, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which the figure is a side elevational view, partly in section, of our improved regulating apparatus.

This invention relates to a new and useful improvement in regulating apparatus designed particularly for controlling the drafts of furnaces, the apparatus being operated by compressed gases whose pressure is dependent upon the temperature of the heating medium sent out from the furnace. It is obvious, as will be seen from the further description of our invention, that our improved regulating apparatus is useful in connection with the control of valves or devices other than the dampers of furnaces.

In the drawings, 1 indicates the furnace, which is provided with the usual firing door 2 and the ash-pit door 3, the latter of which controls the draft to the furnace.

4 is a pipe for conducting the products of combustion to the chimney, said pipe being provided with a door 5 which is designed, when open, to admit cold air into the pipe whereby the draft is reduced, and when closed to increase the draft, in effect, by permitting the supply of gases drawn into the chimney to be drawn wholly from above the fire-pit in the furnace.

A cable 6 is connected to the door 5 and passes over pulley 7 and 8 to lever 9. A cable 10 connects lever 9 to the door 3. When the end of lever 9, to which these cables are connected, is lowered, the door 3 is closed and the door 5 opened, which results in not only shutting off the supply of oxygen to the fire-pot, but also in admitting cold air into the chimney so as to reduce the cold draft thereof. When lever 9 is raised, door 3 is opened to admit oxygen to support combustion of the fuel in the fire-pot and the door 5 is closed to increase the draft of the chimney. Lever 9 is counter-balanced by a weight 11, said lever being fulcrumed at 12 to a suitable fixed support. The hot water which is heated in the fur-

nace is sent out to the radiators in the building through a distributing pipe 13 leading from the top of the boiler, the water, after radiating its heat, returning through pipe 14, which communicates to the lower portion of the boiler.

15 indicates a clean-out pipe leading from the bottom of the boiler to the sewer for well-understood purposes.

16 is a pipe leading from the hot water pipe back to the lower or cold water side of the boiler, said pipe being provided with a valve 17 and a branch pipe 18 leading into a tank or chamber 19. This tank 19 may be provided with the usual water gage for well-understood purposes. From the upper end of the tank leads a pipe 20 communicating with a reservoir 21, said reservoir connected by pipe 22 to chamber above the diaphragm 23, said diaphragm being connected by suitable plunger 24 to the lever 9. Instead of communicating with the chamber above the diaphragm, pipe 22 can lead into a bellows or piston chamber, whereby the pressure admitted into said chamber, like the pressure admitted above the diaphragm, will cause the movable wall of the chamber to operate the part or element connected thereto. The pipe 16 has another branch 25 leading into what is known as a trap, constituting a safety device for relieving the system of excess pressure. This trap comprises a casing 26 having a reduced lower end into which the pipe 25 extends, said reduced lower end being filled with mercury, which constitutes a column, the height of which, on account of the hydrostatic pressure exerted, controlling the pressure in pipe 25. When the pressure in pipe 25 exceeds the hydrostatic pressure of column in mercury, then pipe 25 relieves itself by blowing through the column of mercury and out through a discharge pipe 27 leading from the upper end of casing 26 to the sewer. The inner end of pipe 27 is in the form of a modified gooseneck trap, the upper end being open and the lower portion of the gooseneck terminating in a feet 28, through which mercury, which may splash into the upper open end of pipe 27, may find its way back into the chamber 26.

The operation of our improved regulating apparatus is as follows: Assuming that the height of the column of mercury in the casing 26 is fixed for a predetermined pressure above which the system will "blow off" and that fire is started under the boiler 1. The

valve 17 is closed before water is admitted to the system, to charge the tank manually or to force the air in the upper part of the boiler down through the circulation pipe 16 and up into the tank 19 and reservoir 21 so as to trap as much air as possible. After this the valve 17 is opened, which will permit the water to flow into the lower portion of tank 19, acting to compress the fluid in said tank. As the water becomes heated, the gases therein expand and as the system is closed, that is, there is no open expansion tank at the top of the system, as is common in the so-called open systems, the expanding gases act to displace the water, and its only room for expansion is in the tank 19. As the water becomes heated, it therefore rises in tank 19, as the gases in the water expand and the pressure of the gases trapped in tank 19 will act upon the diaphragm 23, causing it to exert its pressure on lever 9 so as to depress the end of said lever to which the cables 6 and 10 are connected. This lowering of lever 9 will close the door 3 and open the door 5, which will result in shutting the drafts, making a "cooler" fire. By adjusting the weight 11 along the opposite end of lever 9, which opposite end is preferably provided with a scale, the point at which lever 9 will be operated by a diaphragm can be regulated to a nicety. The device is thus rendered responsive to different temperatures required according to the position of weight 11. Of course, cables 6 and 10 may be shortened or lengthened as occasion requires, if desired. The mercury trap which operates as a safety device, will, in the event of the water in the system becoming too hot, "blow off" and relieve the system. Should there be a leakage around the diaphragm so as to permit the escape of the gases trapped in the tank 19, the rise of the water in tank 19 will indicate that fact through the water gage. Reservoir 21 increases the capacity of tank 19 and also serves as a collecting chamber for any moisture or water of condensation accumulating in the pipe 22.

It is obvious that instead of having a diaphragm operating through a lever and cable connections, the doors 5 and 3 could be opened and closed by directly connected pistons operating in chambers in connection with the pressure gases in tank 19.

We believe that we are broadly new in the utilization of variable pressures on fluid-actuated devices in closed systems, said variable pressures being employed for regulating purposes.

We are aware that minor changes in the construction, arrangement and combination

of the several parts of our device can be made and substituted for those herein shown and described without in the least departing from the nature and principle of our invention.

We claim:

1. In a regulating apparatus, the combination with a boiler in a closed heating system, said boiler delivering hot water to an outgoing distributing pipe and receiving cold water from an incoming collecting pipe, a pipe short-circuiting said outgoing and incoming pipes, a chamber connected to said short-circuiting pipe for receiving water at varying degrees and pressures, said water exercising varying pressures upon gases trapped in the upper portion of said chamber, a heat-generating medium for the boiler, and means operated by the trapped gases in said tank for regulating said heat-generating medium.
2. In a regulating apparatus, the combination with a boiler in a closed heating system, said boiler delivering hot water to an outgoing distributing pipe and receiving cold water from an incoming collecting pipe, a pipe short-circuiting said outgoing and incoming pipes, a tank connected to said short-circuiting pipe for receiving water at varying degrees and pressures, said water exercising varying pressures upon gases trapped in the upper portion of said tank, a heat-generating medium for the boiler, means operated by the trapped gases in said tank for regulating said heat-generating medium, and a mercury trap connected to said short-circuiting pipe whereby excess pressures from the system may be relieved.
3. In a regulating apparatus for closed heating systems, the combination with a water heater of a pipe leading from the main distributing pipe of the system to the boiler, a closed chamber connected to said pipe and adapted to receive hot water from the heating system, which water traps and compresses air in the upper portion of the closed chamber, a regulating device connected to the intake, and check draft of the water heater and a translating apparatus connected to said regulating means and actuated by the compressed air trap in the upper portion of the closed chamber.

In testimony whereof, we hereunto affix our signatures in the presence of two witnesses, this 15th day of March, 1909.

JOHN M. DOUGHERTY.
HARRY C. TABLER.

Witnesses:

F. R. CORNWALL,
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