No. 883,283. PATENTED MAR. 31, 1908.

F. H. BROWN.

COMBUSTION AND DAMPER REGULATOR FOR FURNACES.

APPLICATION FILED APR. 25, 1907.

2 SHEETS—SHEET 1.

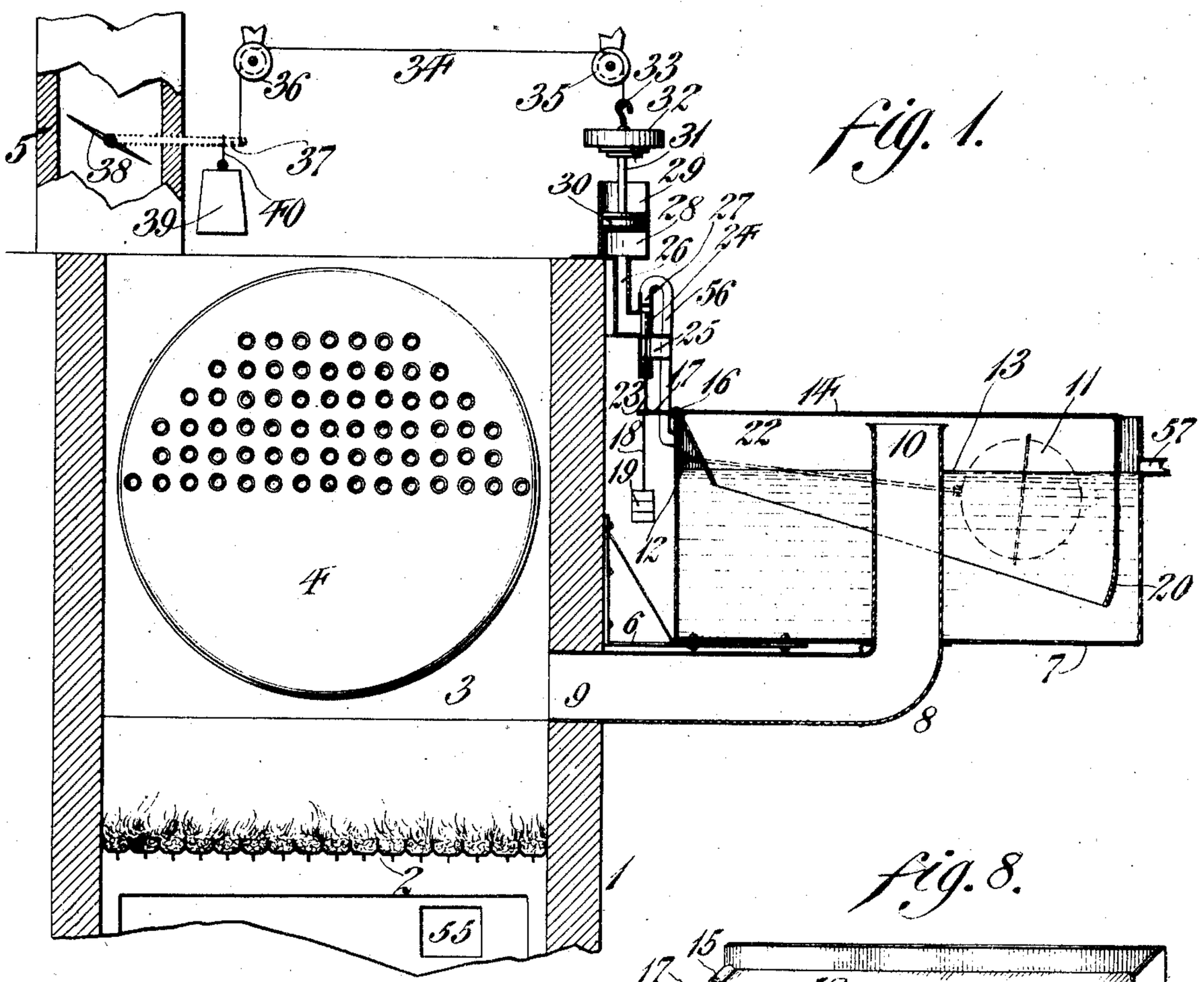

fig. 1.

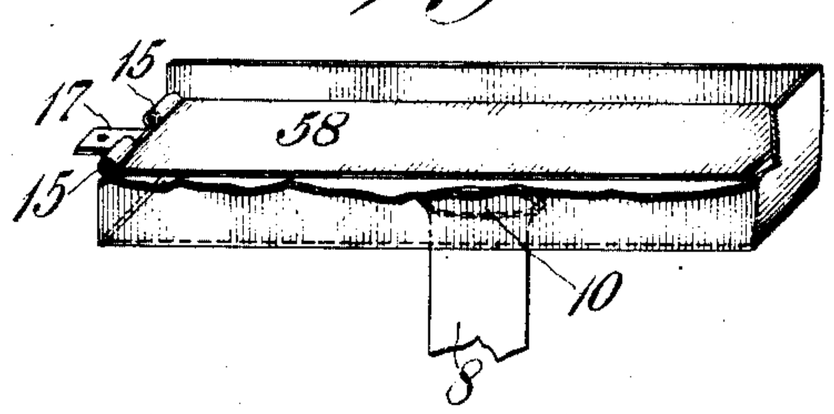

fig. 8.

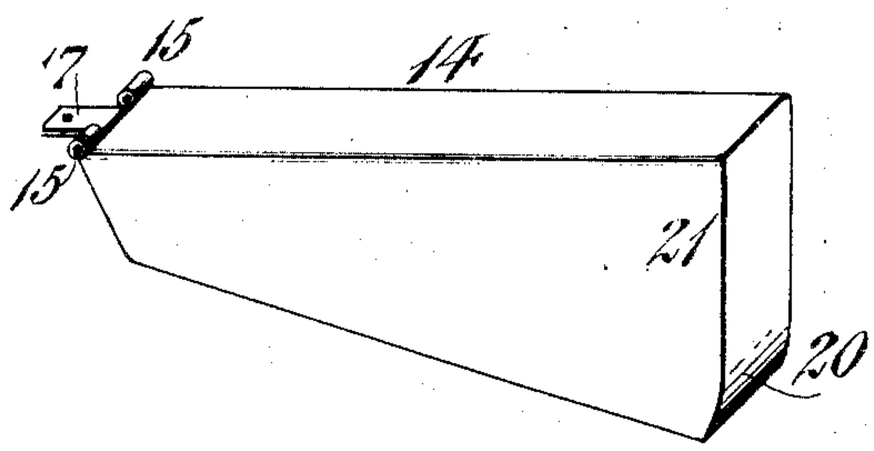

fig. 2.

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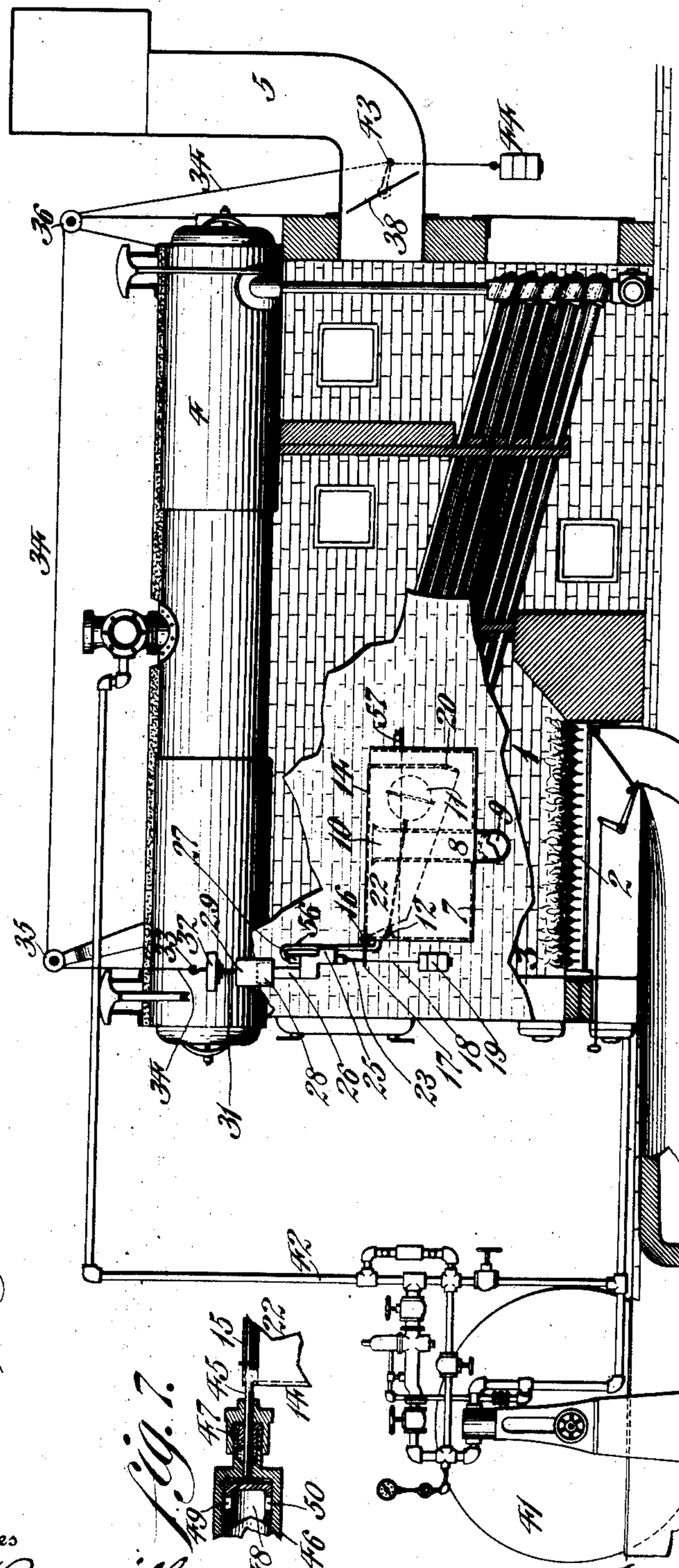

Fig. 3.

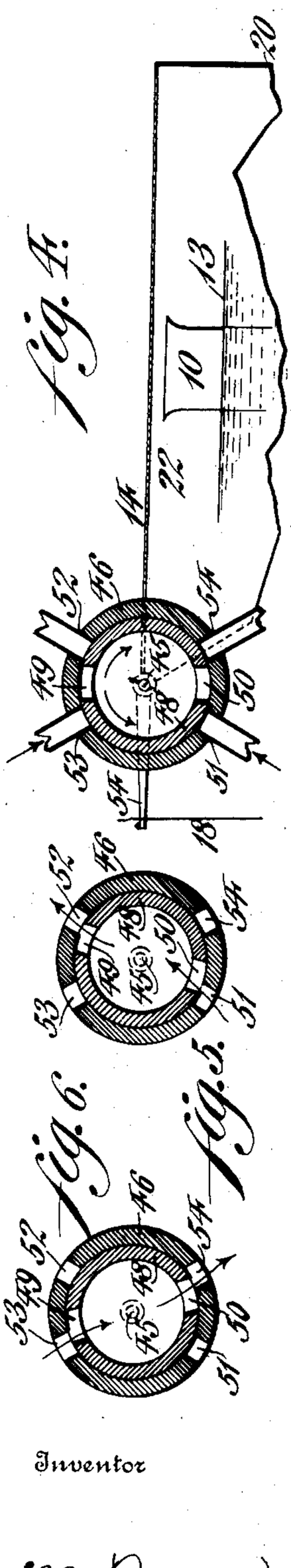

Fig. 4.

Fig. 6.

Fig. 5.

Fig. 7.

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COMBUSTION AND DAMPER REGULATOR FOR FURNACES.

No. 883,283. Specification of Letters Patent. Patented March 31, 1908.

Application filed April 25, 1907. Serial No. 370,160.

To all whom it may concern:

Be it known that I, FRANCIS H. BROWN, a citizen of the United States, residing in the city and county of Philadelphia, State of Pennsylvania, have invented a new and useful Combustion and Damper Regulator for Furnaces, of which the following is a specification.

My present invention comprises a novel and useful construction of combustion and damper regulator which is adapted to be employed in connection with any conventional or desired type of furnace, whereby the passage of the products of combustion from a furnace may be automatically controlled.

One of the main objects of my present invention is to regulate the combustion of fuel in a furnace in such a manner that the combustion will be effected under substantially uniform conditions, which latter are dependent upon the pressure of gases in the combustion chamber exerted against a movable member which is maintained in a balanced position by means of an adjustable counterbalance on one side of the fulcrum and the pressure against said member on the other side of the fulcrum of a fluid under a constant pressure, such as for example, atmospheric air.

It further consists of a novel construction of pivoted member or swinging hood which is connected with the damper in such a manner that when this hood or member is raised or lowered, the damper is opened or closed, since a conduit opening beneath said hood and communicating with the interior of the furnace is provided, in order that any variation in the pressure of the gases in the furnace will cause a corresponding variation in the position of the hood or pivoted member.

My invention further consists of a novel construction of a movable hood or open box-shaped member, which is pivoted in such a manner that when in its normal or balanced position, the lower end thereof extends into the fluid in the tank, whereby the hood is water sealed and the pressure of the furnace gases will be exerted between the top of the hood and the fluid in the tank to cause said hood to be raised or lowered, depending upon the variation of pressure in the furnace, it being understood that in my preferred construction the pivoted member is maintained in its normal position by means of a suitable adjustable counter-weight and the pressure of the atmospheric air acting against the member.

It further consists of a novel construction of pivoted member which is provided with an adjustable counterbalance whereby the pivoted member is normally maintained in a substantially horizontal position.

It further consists of a novel construction and correlation of a motor, valve mechanism and counterbalanced pivoted member, whereby the valve mechanism is actuated by a very slight movement of the pivoted member.

It further consists of other novel features of construction, all as will be hereinafter fully set forth.

For the purpose of illustrating my invention, I have shown the forms thereof at present preferred by me, since these embodiments best illustrate the principle of the invention and give satisfactory and reliable results in practice, although it is to be understood that the various instrumentalities of which my invention consists can be variously arranged and organized and that my invention is not limited to the precise arrangement and organization of these instrumentalities as herein shown.

Figure 1 represents a sectional elevation of a furnace having a combustion and damper regulating mechanism, embodying my invention, connected therewith. Fig. 2 represents a perspective view showing in detached position one form of pivoted member which may be employed. Fig. 3 represents a side elevation of a furnace having a combustion and damper regulating mechanism connected therewith, certain of the parts being shown in a different relation from that seen in Fig. 1, for the sake of clearness of illustration. Fig. 4 represents a sectional elevation of a portion of the device in which the valve controlled by the pivoted member is shown as a rotary valve. Figs. 5 and 6 represent sectional views of the valve mechanism in different positions. Fig. 7 represents a sectional view of a portion of the device showing more clearly the manner in which the pivoted member operates the rotary valve. Fig. 8 represents a perspective view showing a modified form of tank partly broken away and the pivoted member in assembled position therein.

Similar numerals of reference indicate corresponding parts in the figures.

Referring to the drawings:—1 designates a furnace provided with a source of heat 2, above which is located a combustion chamber 3 in which may be supported, if desired, a boiler 4 of any suitable or conventional type.

5 designates a smoke stack leading from the combustion chamber 3.

6 designates a bracket which is adapted to support a tank or container 7 into which extends a conduit 8, one end of which communicates at 9 with the combustion chamber 3, the opposite end 10 thereof terminating within the tank or receiver 7.

11 designates a float pivoted at a suitable point as 12 and adapted to maintain the liquid 13 in the tank 7 at a constant level, although in some instances this float may be dispensed with.

14 designates a movable member provided with hinges 15 whereby the same may be pivoted at 16 to a fixed point, such as the tank 7, said member 14 having secured thereto an extension 17 to which latter is secured, by means of a cord 18, an adjustable weight or counterbalance 19. In the present instance I have shown the member 14 as being in the form of an open box or hood, the lower end of which is deflected at one end, as seen at 20, in order to permit a greater relative movement of the hood 14 with respect to the tank 7. The member 14 in the present instance has polygonal shaped sides 21, so that when the parts are in normal position the member is water sealed and a chamber 22 is formed into which the gases from the combustion chamber 3 may freely pass.

23 designates a valve stem pivoted to the end of the member 17 and provided with a valve head 24 which controls the passage of fluid under pressure from the inlet 25 to the passage 26 and which also controls the discharge of fluid from the passage 26 through the outlet 27, thence through the pipe 56 into the tank 7 which latter is provided with a suitable overflow pipe 57. The passage 26 communicates with the chamber 28 in the water motor casing 29, in which is located a piston 30, to the stem 31 of which is adjustably secured a weight 32.

33 designates a hook to which the stem 31 is operatively connected, said hook having secured thereto one end of a cord or chain 34, which latter passes over the pulleys 35 and 36 which are supported in any suitable manner. The opposite end of the cord 34 is secured to a rod 37, on the inner end of which is mounted a damper 38, said rod 37 being suitably journaled in the stack 5.

39 designates a weight or counterbalance having secured thereto a cord 40 which is connected with the shaft 37.

In the embodiment seen in Fig. 1 I have shown a conduit 55 opening beneath the grate in order that the furnace may be operated under a regulated forced draft.

In the embodiment seen in Fig. 3 I have shown more in detail means connected with the boiler for producing a regulated forced draft in the furnace, such means comprising a fan or other blowing mechanism 41, which is connected by means of the steam pipe 42 with the boiler 4, the mechanism for controlling the damper in the smoke stack or pipe 5 being precisely the same and correlated in the same manner with the exception that in this embodiment, I have shown the damper having a link 43 fastened thereto to which a counterweight 44 is secured in a slightly different manner from that seen in Fig. 1.

In Figs. 4 to 7 inclusive, I have shown a different type of valve which is actuated by the pivoted member 14. In this embodiment of valve mechanism, the pivoted member 14 has fixed thereto in any suitable manner, a spindle 45 journaled in a casing 46, a suitable stuffing box 47 being provided in order to form a fluid tight connection. The spindle 45 is secured to a hollow valve 48, which closely engages the internal wall of the casing 46. The valve 48 is provided with the ports 49 and 50. The casing 46 is provided with the inlet ports 51 and 52, and the outlet ports 53 and 54, it being understood that the inlet port 51 is connected in any suitable manner with a fluid supply. The spindle 45 has extending therefrom, an arm 54, to which a suitable counter-weight (not shown) is secured. The conduit 10 is shown as terminating within or beneath the pivoted member 14.

The operation of the construction seen in Figs. 1 to 3 inclusive, is as follows:—The gases in the combustion chamber 3 have at all times free access to the chamber 22. As the pressure of the gases in the combustion chamber 3 increases owing to the increased volume of the products of combustion in said chamber, the pivoted member 14 will be moved upwardly and thus cause the end of the member 17 to be depressed and the valve 24 will permit the fluid to pass from the chamber 28 through the passage 26 and thence through the discharge outlet 27 into the tank 7. As the fluid pressure beneath the piston 30 is relieved, said piston will descend and owing to the provision of the cord 34 and the manner in which it is connected to the rod 37, said rod will be rotated and the damper 38 will be partially opened. When the pressure of the gases in the combustion chamber 3 decreases, the pressure in the chamber 22 against the member 14 will decrease and the member 14 will be lowered, thereby causing the valve head 24 to move upwardly and permit the motive fluid to pass through the inlet 25 and passage 26 into the chamber 28, thus causing the piston 30 to raise and thereby causing the damper 38 to

close. It will thus be seen that in my novel construction of regulating mechanism, the passage of the gases to the smoke stack will be automatically varied depending upon the pressure of the gases within the combustion chamber 3.

In the embodiment of valve mechanism seen in Figs. 4 to 7 inclusive, it will be apparent that when the pivoted member 14 is permitted to swing downwardly, owing to the decreasing pressure in the furnace gases, the valve 48 will be rotated in such a manner that the port 51 will communicate with the port 50, as indicated in Fig. 5, and the port 49 will communicate with the port 52, which latter is in communication with the passage 26 leading to the water motor, so that live motive fluid may pass thereto and raise the piston 30, thereby partially opening the damper 38. When the pressure in the furnace increases, the pivoted member 14 will be raised, thus causing the valve 48 to be partially rotated in a reverse direction, so that as indicated in Fig. 6, the water contained within the chamber 28 of the motor may pass therefrom, through the port 53, ports 49 and 50 in the valve and thence through the port 54. It is unnecessary, however, in all cases to employ a water seal for the pivoted member and in the embodiment shown in Fig. 8 I have shown a tank similar to the tank 7 seen in Figs. 1 and 3, except that I have shown the movable member as pivoted within the tank and the tank as having no liquid therein. In this embodiment it will be apparent that the pivoted member 58 is shown as comprising a single plate without any depending sides and this plate, as will be readily understood, is acted upon on one side by the constant pressure, such as atmospheric pressure and on its under side by the pressure of the furnace gases.

It will now be apparent that in all the embodiments of my invention I employ a pivoted member which is provided with an adjustable counter-weight, whereby the same is normally maintained in horizontal position and that on one side of this pivoted member there is always a constant pressure, in the present instance atmospheric pressure, and on the other side a variable pressure depending upon the pressure of the furnace gases.

In so far as I am aware I am the first in the art to employ in a device of the character hereinbefore described, a pivoted member counterbalanced in such a manner that it is normally maintained in a substantially horizontal position, said member being operatively connected with the damper in order that any movement of the pivoted member will cause a corresponding movement of the damper in the smoke stack and it is to be understood that in my claims these features are to be interpreted with corresponding scope.

I am aware that it has heretofore been proposed to employ a pivoted member which is maintained in a vertical position due to gravity and its own weight. My present invention differentiates from such a construction in that it is normally maintained in a substantially horizontal position and is provided with an adjustable counterbalance and the pressure against one side of the pivoted member is always constant owing to the manner in which said member is pivoted and counterbalanced.

The pressure against a member pivoted in a vertical position varies in accordance with the amount of movement given thereto, it being apparent that as such a member moves towards a horizontal position, it would have its own weight to contend with, which tends to cause it to return to its vertical position so that a member so pivoted and not provided with a counterbalance is acted upon in one direction by a variable pressure which varies in proportion to the amount of movement given to such member due to the variation in pressure of the furnace gases.

It will of course be apparent that if the discharge pipe 56 communicates with the upper portion of the tank 7 and the tank 7 is provided with an overflow pipe 57, that the float 11 may be dispensed with since under such conditions a constant level will be maintained in the tank 7. I have deemed it unnecessary to show in the present instance the manner in which the float 11 controls the inlet of fluid to the tank 7, since the same is old in the art and forms, *per se*, no part of my present invention.

It will now be apparent from the foregoing that I have devised a novel and useful construction of combustion and damper regulator, which embodies the features of advantage enumerated as desirable in the statement of invention and the above description and while I have in the present instance shown and described those embodiments thereof which have been found in practice to give satisfactory and reliable results, it is to be understood that they are susceptible of modification in various particulars without departing from the spirit and scope of my invention or sacrificing any of its advantages.

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

1. In a device of the character described, the combination with a furnace, of a damper controlling the discharge of gases therefrom, a pivoted member operatively connected with said damper, and an adjustable counterbalance for said member, said member being normally maintained in a substantially horizontal position, and being actuated in one direction by a constant pressure and in the other direction by the pressure of the furnace gases.

2. In a device of the character described, the combination with a furnace of a container, a member pivoted therein and normally maintained in a substantially horizontal position, an adjustable counterbalance for said member, a damper operatively connected with said member and controlling discharge of gases from said furnace, said member having on one side thereof a constant pressure and said member being acted upon on the other side thereof by the pressure of the furnace gases.

3. In a device of the character described, the combination with a furnace of a container, a member pivoted therein and normally maintained in a horizontal position, a counterbalance for said member, means for varying the weight of said counterbalance, and a damper controlling discharge of gases from said furnace and to which said member is operatively connected, said member being acted upon in one direction by a constant pressure and in the opposite direction by the pressure of the furnace gases.

4. In a device of the character described, the combination with a furnace having a combustion chamber, of a container communicating therewith, a member pivoted in said container and normally maintained in substantially a horizontal position, an adjustable counterbalance for said member, a valve mechanism actuated by said member, a motor controlled by said valve mechanism, and a damper controlled by said motor and controlling discharge of gases from said furnace, said member being acted upon in one direction by a constant pressure and in the opposite direction by the pressure of the furnace gases.

5. In a device of the character described, the combination with a furnace having a combustion chamber, of a container in communication therewith, a member pivoted in said container and normally maintained in substantially a horizontal position, an adjustable counterbalance for said member, a valve mechanism actuated by said member, a motor controlled by said valve mechanism, said motor discharging into said container, the latter having an overflow therefrom, and a damper controlled by said motor and controlling discharge of gases from said furnace.

6. In a device of the character described, the combination with a furnace having a combustion chamber, of a container having an open side, a conduit communicating with said chamber and said container, a member pivoted in said container and forming a movable closure for said open side, an adjustable counterweight adapted to maintain said member normally in substantially a horizontal plane, a damper for controlling discharge of gases from said furnace, and means intermediate said damper and said member and actuated by the latter for regulating said damper.

7. In a device of the character described, the combination with a furnace having a combustion chamber therein, and means for automatically regulating the draft for combustion, a container having an open side and communicating with said combustion chamber, a member pivoted in said container adapted to close said open side, an adjustable counterbalance for said member, a valve mechanism actuated by said member, a motor actuated by said valve mechanism, and a damper controlled by said motor and controlling discharge of gases from said furnace, said member being acted upon in one direction by constant pressure and in the opposite direction by the pressure of the furnace gases.

8. In a device of the character described, the combination with a furnace having a combustion chamber and means for controlling the draft for combustion, of a fluid container communicating with said combustion chamber, a member pivoted in said container and having depending sides extending into the fluid therein, an adjustable counterbalance for said member, the latter being maintained normally in substantially a horizontal position, a damper operatively connected with said member and controlling discharge of gases from said furnace, and means for maintaining the fluid in said container at a constant level.

9. In a device of the character described, the combination with a furnace having a combustion chamber and means for controlling the draft for combustion, of a fluid container communicating with said combustion chamber and having an overflow port, a member having depending sides pivoted in said container, an adjustable counterbalance for said member, a valve mechanism actuated by said member, a motor actuated by said valve mechanism and discharging into said container, and a damper actuated by said motor and controlling discharge of gases from said furnace, said member being acted upon in one direction by constant pressure and in the opposite direction by the pressure of the furnace gases.

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