Aug. 4, 1942. G. DEN BESTEN ET AL 2,291,884

DRAFT REGULATING DEVICE

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Fig. 1.

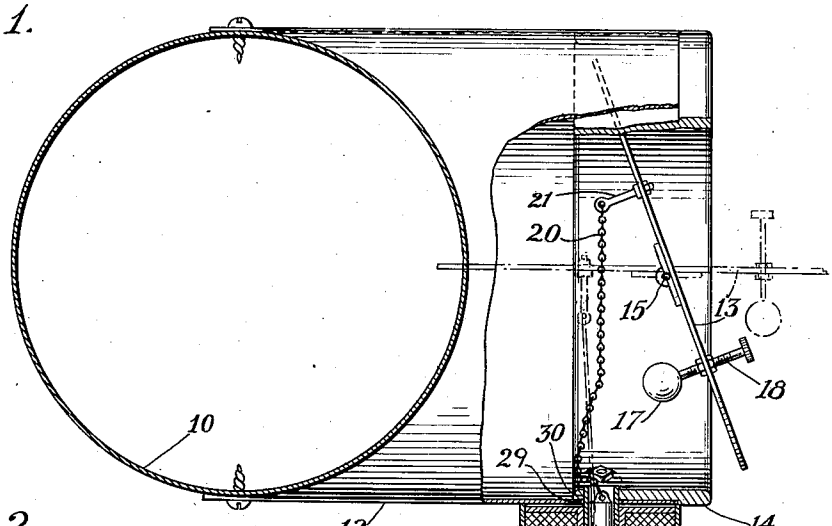


Fig. 2.

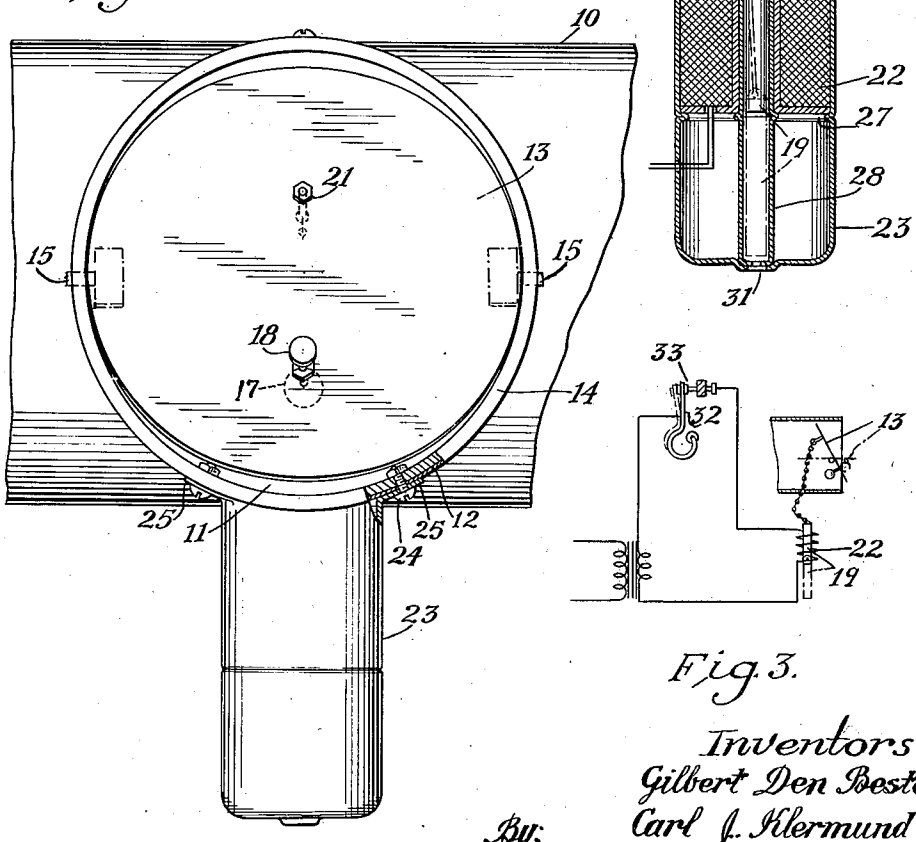


Fig. 3.

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DRAFT REGULATING DEVICE

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2 Claims. (Cl. 236—45)

This invention relates to improvements in that class of devices known as draft governors or regulators and more particularly concerns such regulators for furnace flues.

It is well known, of course, that substantial fuel savings can be effected by diminishing the escape of unconsumed fuel up the smoke pipe or flue. An important advance in obtaining the necessary control over the flue gases for this purpose resides in the barometric flue draft controllers and regulators now widely used. These devices are sensitively responsive to permit air to pass into the flue in proportion to the variable conditions of pressure differential between the flue gases and the outer atmosphere, thus checking the draft and holding back the unconsumed fuel and improving the combustion efficiency of the furnace. Such regulators, however, are effective only during firing or heat demand periods and other draft regulating devices such as check dampers, limit controls, etc., must be provided to control the draft after the call for heat has been met.

An object of the present invention is to avoid the requirement for draft controlling devices in addition to the barometric draft regulating devices, by making the barometric devices serve not only as such during the firing or heat demand periods but also to check the draft in the intervals between such periods.

Another object is to provide a dual purpose draft regulating device of this kind wherein the barometrically responsive means thereof is mounted to be normally active for barometric action but is controlled to move automatically to a fixed check draft position after the call for heat has been met.

A further object is to provide novel electric operating means for controlling the draft regulating device to operate either barometrically or as the draft checking means.

An additional object is to provide a novel electrically controlled draft regulating device which can be conveniently operated in electrical circuit with temperature responsive means or with the combustion controlling apparatus of the heating system.

Other objects and advantages will become apparent in the following description and from the accompanying drawing in which:

Figure 1 is a side elevational view, partly in section, of a device embodying the features of the invention.

Fig. 2 is a front elevational view of the device, partly broken away and in section.

Fig. 3 is a diagrammatic view of an exemplary electrical operating circuit for the device.

While the invention is susceptible of various modifications and alternative constructions, we have shown in the drawing and will herein describe in detail a preferred practical embodiment, but it is to be understood that we do not thereby intend to limit the invention to the specific form of damper or the control therefor illustrated, but intend to cover all modifications and alternative constructions falling within the spirit and scope of the invention as expressed in the appended claims.

The draft regulating device with which the present invention is concerned is of the type known in the trade as a "barometric damper" and operates on the principle of controlling furnace flue draft by admitting air into the flue pipe. It includes means defining an opening or air inlet into the flue pipe and means such as an adjustably balanced, eccentrically pivoted damper plate which normally tends to assume a substantially closing relation to the mouth of the inlet but may swing open responsive to suitable pressure thereagainst. Thus, when the intensity of the flue draft increases beyond a predetermined point the resultant lowering of pressure in the flue invites a draft-throttling influx of air through the inlet, the damper plate being swung open proportionate to the force of the induced air pressure.

In the exemplary form of barometric draft regulator shown in the drawing, 10 designates a flue pipe or flue pipe section through which the products of combustion or flue gases are conveyed from the furnace (not shown) to atmosphere directly or through a chimney. Air, to restrain the flow of flue gases, may pass into the pipe flue 10 through an opening 11 therein which, in the present instance, is defined by a short tubular inlet 12 secured in any suitable manner to the flue pipe. Within the inlet 12 is mounted barometric control means, here in the form of a damper plate 13 which is freely pivoted on an eccentric axis within a collar 14 by means of suitable coaxial pins 15. The collar is mounted in the mouth of the inlet 12 in such a manner that it may be rotatably adjusted during installation to bring the axis of the pins 15 into a true horizontal plane regardless of the angle of the flue pipe 10.

The barometric control plate 13 is adapted to permit some draft to be generated in the flue pipe 10, but when the pressure differential varies beyond a predetermined point, the pressure of the atmosphere will cause the plate to swing open proportionately and allow a corresponding inrush of air through the inlet 12 into the flue pipe to act as a check upon the draft. To this end the control plate 13 is maintained in a given sensitive balance by a weight 17 to govern the air pressure required to swing the plate and also to hold the plate normally in a tilted or slightly open position which facilitates opening thereof under the influence of inflowing air. This

weight is located on the lighter side of the damper plate and may be mounted by means of an adjustment screw 18 by which it can be adjusted to secure optimum results. Such adjustment will remain permanent under the particular operating conditions of the associated heating system for which it is made and the control plate will then continue to operate automatically to regulate the draft.

Because of the necessary adjustment of the barometric control plate 13 to remain more or less closed during the development of draft in the flue pipe up to a certain point, it follows that in the interim between firing or heat demand periods an excess flue draft will be permitted so that there is an unduly rapid consumption of the fuel or at least a wasteful dissipation of heat up the flue. Instead of relying upon auxiliary flue control devices for avoiding such waste as has been the practice heretofore, the present invention contemplates the adaptation of the barometric control means to serve also as a check draft device during the interim periods. Accordingly, the same mechanism which during firing or heat demand periods serves as a barometric draft regulator will serve during the interim periods to check the draft.

Herein the barometric damper plate 13 is controlled to be moved to check draft position after firing or heat demand periods and is automatically released to return to its normal barometrically operative position when heat is again demanded. To this end, the damper plate 13 has connected thereto, on the opposite side of the pivotal axis thereof from the balancing weight 17, selectively operable means such as an elongated pendant counterweight 19. As shown, a chain 20 connects the counterweight 19 to a suitable attachment stud 21 on the damper plate. This counterweight normally acts to draw the damper plate 13 to completely open or horizontal position as shown in broken outline in Fig. 1 wherein air may pass freely through the inlet 12 to check the draft in the flue 10.

When the device is to operate as a barometric draft regulator, the counterweight 19 is lifted to release the damper plate 13 which will then, under the influence of the balancing weight 17, return to its barometric position to swing freely on its pivots 15. This lifting of the counterweight is effected herein by means of an electrically operated actuator such as a solenoid 22 within the field of which the counterweight 19 is suspended. Accordingly, the counterweight 19 is preferably constructed of a suitable ferrous, magnetically sensitive material and the relationship of the solenoid and weight is such that the latter may depend substantially below but still within the active field of the solenoid. Upon energization of the solenoid the counterweight 19 will be drawn up to the center of the magnetic field whereby to release the damper plate.

As shown, the solenoid may conveniently be housed within a casing 23 which is suitably secured to the inlet 12 by means of stove bolts 24 passing through attachment ears 25 at the upper end of the casing. The position of the solenoid within the casing may be maintained by any suitable means such as a crimp 27.

To guide the counterweight 19 in its up and down movements, it is slidably received within a tube 28 which passes axially through the solenoid 22 and projects at its upper end through suitable coaxial apertures 29 and 30 in the wall of the inlet 12 and the collar 14, respectively. At its lower end, the tube is open and may register with a vent opening 31 in the casing 23.

The solenoid 22 is preferably connected in an electrical circuit which will cause it to be energized automatically to raise the counterweight 19 and release the damper plate 13 for barometric operation whenever heat is called for and deenergized to drop the counterweight after the demand for heat has been met. Accordingly, the solenoid 22 may be connected in a circuit including a control thermostat 32 which will close a switch 33 when the temperature of the room to be heated falls below a predetermined minimum. This thermostatically controlled circuit may, of course, also control any preferred form of automatic fuel control means such as an oil or gas burner or an automatic stoker. On the other hand, the solenoid may, if desired, be connected in a circuit controlled directly by the operations of the fuel control means to be energized only when the latter is actuated.

From the foregoing it will be apparent that the present invention provides novel means for adapting a barometric draft regulating device for check draft operation. The new control means, it will be clear, may be utilized with various forms of draft devices, being readily adaptable to existing devices or to incorporation in the devices when they are built, and is of simple, compact and inexpensive construction.

We claim as our invention:

1. A draft controlling device of the character described comprising, in combination, means defining a flow passage, a damper for controlling flow through said passage, an elongated pendant weight of magnetically responsive metal connected at its top with said damper normally to hold the latter in one position, and a solenoid located to permit passage of said weight therethrough below the magnetic field of the solenoid and into a normal position wherein said weight will respond to energization of said solenoid to be drawn upwardly into the magnetic field thereof and thereby release said damper for movement into another position.

2. A draft controlling device of the character described, comprising, in combination, a tubular draft-checking air inlet for association with a furnace flue pipe to project substantially to one side of the flue pipe, a damper plate pivotally mounted in the mouth of said inlet and sensitively balanced for barometric operation to admit air through said inlet in adjusted proportion to pressure reduction within said flue induced by flue gas draft therethrough, whereby to retard excessive flue draft and avoid the heat loss caused thereby, a pendant weight hanging below said inlet and flexibly connected at its top with said damper plate in a manner normally to pull the latter into check-draft position wherein air may pass freely through said inlet, and a solenoid providing a vertical passage therethrough for said weight and supported by said inlet, said weight being responsive to energization of said solenoid to move upwardly into a position to release said damper plate for free barometric operation.

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