Feb. 25, 1947. W. H. CARSTEN 2,416,468

THERMOSTATIC DAMPER

Filed Jan. 18, 1944

Fig. 1

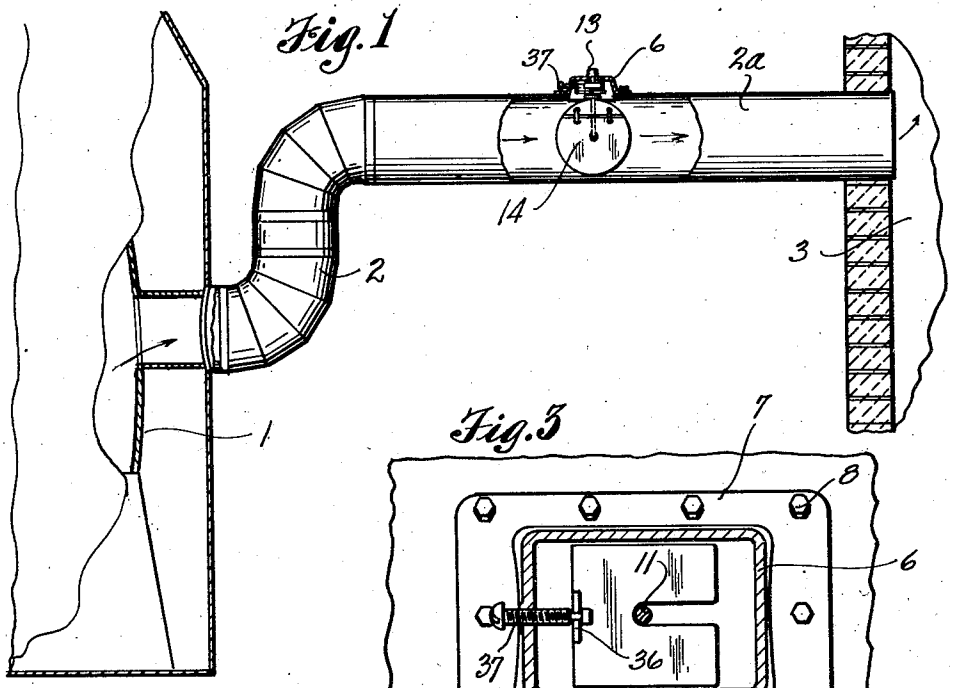


Fig. 3

Fig. 2

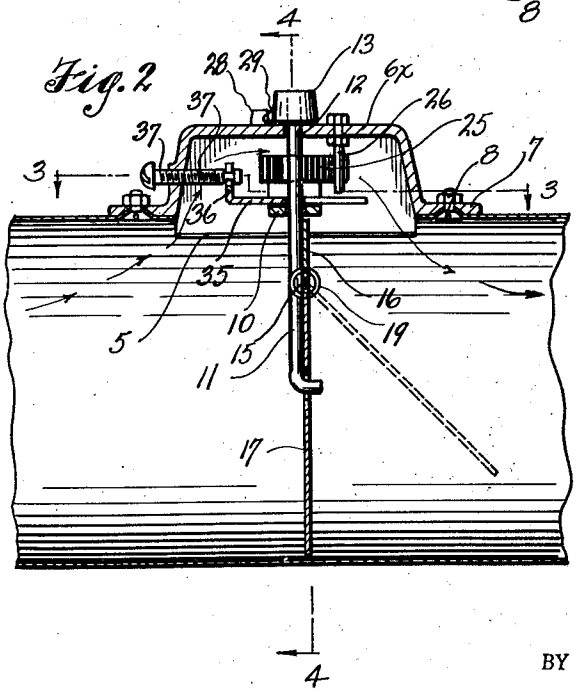
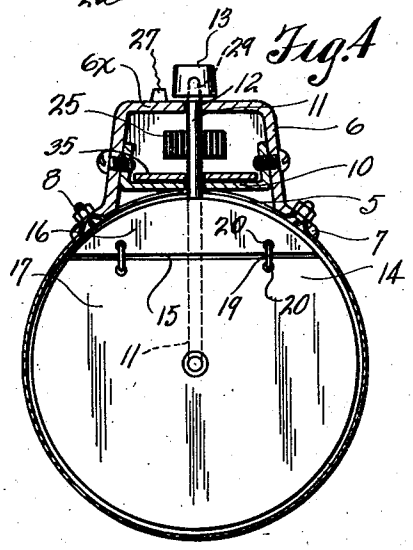


Fig. 4



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THERMOSTATIC DAMPER

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4 Claims. (Cl. 236—93)

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This invention relates to automatic dampers, and it has reference more particularly to dampers designed especially for installation in the stack connections of domestic furnaces using the present-day types of oil burners as the heat supplying units; it being the principal object of the invention to provide a damper mechanism including a damper plate that is disposed in the stack connection and with which a thermostatic element is associated to automatically adjust the plate from an open position to a closed position upon a certain predetermined degree of heat being reached, thus to conserve heat by preventing its wasting by flow up the stack.

Explanatory to the invention, it will here be mentioned, in brief, that when an oil burner of any of those types now used in domestic heating plates or furnaces, is first set into operation in a cold furnace, it is necessary for insuring complete combustion of fuel, that there be a good draft through the combustion chamber and to the stack. However, after the cold furnace has been brought up to satisfactory operating heat, it is desirable from the standpoint of fuel economy that the stack connection be restricted against the strong updraft, thus to prevent a great percentage of the heat from escaping up the chimney.

Furthermore, it may be said that while it is desirable from a safety standpoint, on starting up a cold furnace, to keep the stack damper or draft open, it can, with safety, be closed after the furnace is up to normal working temperature.

In view of the foregoing, it has been the main object of this invention to provide an automatic damper mechanism that may be applied to a stack connection between a furnace combustion chamber and chimney that will operate under control of temperature of gases flowing to the chimney, to close the passage in the stack connection against unrestricted outflow of the hot gases just as soon as this can be done with safety.

It is also an object of the invention to provide a damper mechanism of an automatic character to be applied to the stack connection in such manner as to provide for a controlled by-passing of gases past the damper to the stack while the damper is in closed position.

Still further objects of the invention reside in the provision of auxiliary damper means for regulating the by-passing of gases past the closed damper to best suit any particular draft condition of the stack connection in which the damper may be placed.

Still further objects of the invention reside in

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the details of construction and combination of parts as will hereinafter be fully described.

In accomplishing these and other objects of the invention, I have provided the improved details of construction, the preferred forms of which are illustrated in the accompanying drawings, wherein—

Fig. 1 is an elevation, showing a part of a furnace and its stack connection to which a damper mechanism embodied by the present invention has been applied; a part of the stack being broken away for better showing of the damper plate.

Fig. 2 is an enlarged, sectional detail of a portion of the stack connection, illustrating the application of the damper mechanism thereto, and showing the damper plate in its fully closed position.

Fig. 3 is a horizontal section through the damper mechanism on the line 3—3 in Fig. 2, showing the auxiliary damper plate and its adjusting means.

Fig. 4 is a vertical cross section on line 4—4 in Fig. 2.

Referring more in detail to the drawings—

1 designates a portion of a furnace which may be any one of the ordinary types used for domestic heating purposes, having a stack connection 2 leading from the furnace fire box or combustion chamber, to a stack or chimney such as has been indicated at 3. In that horizontal portion of the stack connection, here designated by numeral 2*a*, a damper mechanism, embodying the present invention, has been applied.

It will be understood that in the normal operation of a furnace, there will be a draft of hot gases and air flowing from the furnace to the stack as indicated by the arrows in Fig. 1. Furthermore, the strength of this draft depends upon certain variable conditions that results in quite a variation in the degree of draft in different furnaces, and it is for this reason that the auxiliary damper plate has been incorporated in the present device. This presently will be more fully explained.

Referring more particularly to Fig. 2, which shows a part of the stack connection 2 and damper mechanism in vertical section on the central longitudinal line of the connecting pipe, it is to be observed that there is a rectangular opening 5 of substantial proportions, formed in the top wall of the pipe 2, over which a closed, damper supporting housing 6 is applied. The housing is of an inverted dish-like form and is formed with a flange 7 about its periphery that is shaped to conform to the curvature of the stack connection

along the end and side edges of the opening 5, as will be understood by reference to Figs. 2 and 3, and this flange is secured in a close, gas-tight joint to the pipe by a plurality of screw bolts 8 extended through the pipe wall and flange.

Referring to the device as shown in Fig. 2, it will be understood that the housing 6 has a flat top wall 6x outset substantially from the pipe opening, and thus the housing serves as a by-pass chamber whereby outflowing gases will be by-passed from one side of the damper to the other when the damper is closed, as will be understood by reference to the line of arrows in Fig. 2.

Fixed in the housing and extending horizontally and transversely thereacross close to the opening 5, as shown in Fig. 3, is a bar 10, and extending vertically and rotatably through a hole in the bar is a damper plate supporting and adjusting shaft 11. The upper end of the shaft 11 extends rotatably through an opening 12 in the top wall 6x of the housing, and at its upper end is equipped with a knob 13.

Fixed to the looser end portion of the shaft 11, which extends to the center line of pipe 2, is a circular damper plate 14. As shown in Fig. 3, the damper plate is horizontally divided along the joint 15 shown in Fig. 4, and it comprises an upper segmental portion 16, which is fixed rigidly to the shaft 11 and a relatively large lower portion 17 which is hingedly suspended from the upper portion. The hinge connections here shown comprise wire loops 19 passed through perforations 20 in the adjacent edges of the parts 16 and 17. The lower portion may swing from the full line position in which it is shown in Fig. 2, toward and beyond the dotted line position; that is, it may swing outwardly or to open position in the direction of flow of gases in the pipe 2.

Fixed within the housing 6 is a thermostatic bi-metal strip 25 in the form of a helical coil which at one end is fixed to a post 26 depending from the housing top wall, and at its other end is fixed to the shaft 11; this bi-metal strip operating under the influence of temperature changes to rotate the shaft. The extent of rotation of the shaft 11 in opposite directions is determined by lugs 27 and 28 on the top wall, against which stops a projecting lug 29 on the knob 13 will engage. The lugs 27 and 28 are so placed as to permit the damper plate to be turned through an angle of 90°, thus to move from its closed position to its open position.

With the device applied to the stack as shown in Fig. 1, it will be understood that when the damper is in open position, as it is there shown, gases flowing to the stack will pass in the direction indicated by the arrows and will go directly past the damper plate. Some gases, however, will flow through the housing 6, thus coming in direct contact with the bi-metal strip 25. When the heat of the flowing gases acts on the bi-metal strip to raise its temperature sufficiently, it will effect rotation of the damper control shaft 11, and turn the damper plate to closed position, in which it has been shown in full lines in Fig. 2. When in fully closed position, the lug or extension 29 on the knob 13 contacts with the stop 28 to limit it against further turning. Thus, so long as the heat is maintained in the furnace, the damper will be retained in this closed position. However, when heat is discontinued, the bi-metal strip will cool, and will operate to gradually adjust the damper plate to its open position, so that when the fire is again started, there will be no restriction to the draft and the necessary flow of air to insure against explosions and to give complete combustion will be provided.

Referring now more particularly to Figs. 2 and 4, it is noted that there is an auxiliary, slide damper 35 provided within the housing 6 to regulate the flow of gases passing through the housing over the damper plate when it is in closed position. This damper 35 is in the form of a flat plate which rests flatly upon the cross bar 10 between the side walls of the housing. At one end, the plate has an upturned flange 36 to which the inner end of an adjusting screw 37 is rotatably fixed. The screw is threaded through an end wall of the housing and at its outer end has a head to which a screw driver may be applied to turn the screw thus to adjust the damper plate. This plate 35, forming the auxiliary damper, is used to regulate the area of the passage between the bar 10 and the end wall of the housing at one side of the damper 14 so that the by-passing of gases may be more or less restricted to best suit the particular furnace to which the automatic damper device is to be applied. This adjustment of the plate 35 is made after installation of the damper device, and one or more trial uses, so that the closing of the damper 14 may be effected at any desired stack temperature or after any definite predetermined time interval.

The hinging of the lower portion of the damper 14 insures that there can be a rapid escaping of gas in the event of an explosion taking place in the furnace, and in such case, the damper will swing to the open position indicated in dotted lines in Fig. 2.

If the damper mechanism is to be used in a vertical stack connection, then the end of rod 11 that is extended below the fixed section of the damper plate, operates to support the hinged section against swinging down to open position.

Such dampers are adapted to various uses other than described, and it is not the intent that the description shall in any way limit the use of the device or restrict the scope of the appended claims.

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

1. A pipe connection between a furnace combustion chamber and a stack, having a side wall opening of substantial length therein, a housing fitted to the outside of the pipe and overlying the said side wall opening and having a chamber therein that is open to the pipe through the said wall opening, a rod rotatably mounted in the housing and extended centrally through the pipe wall opening and into the pipe in a diametric direction, a damper plate fixed to the rod in the pipe passage and adapted to be moved by rotative adjustment of the rod between open and closed positions in the pipe, a thermostatic element located in the housing chamber and operatively connected with the rod for its actuation, and operable incident to a change of temperature in the housing from a cold furnace to a hot furnace condition to move the damper plate from open position, at which gases are permitted to flow freely through the pipe, to a closed position at which it diverts the pipe gases through the housing chamber, and an auxiliary damper in the housing manually adjustable to more or less restrict the flow of gases through the chamber.

2. A device as recited in claim 1, wherein the auxiliary damper comprises a slidably adjustable plate.

3. A device as recited in claim 1 wherein the

damper comprises a slidably adjustable plate and wherein the means for its adjustment is accessible from the outside of the housing for manual manipulation.

4. A device as recited in claim 1 wherein the pipe damper plate comprises a hinged section and a supporting section therefor that is fixed to the rod and wherein the hinge section is retained against swinging in one direction by the rod and is free to swing in the opposite direction under pressure of flowing gases in the pipe.

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