Nov. 26, 1940. H. E. HANDLEY 2,222,663

DRAFT CONTROL

Filed Nov. 7, 1938

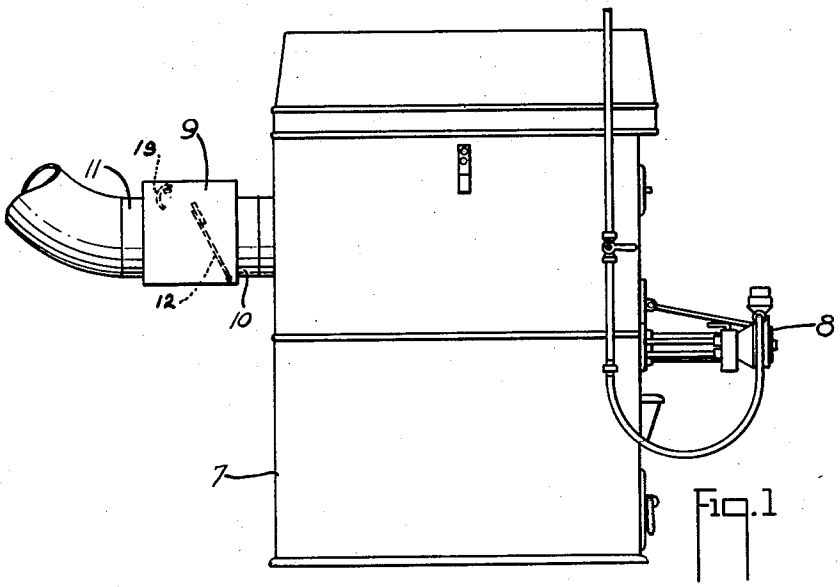


Fig. 1

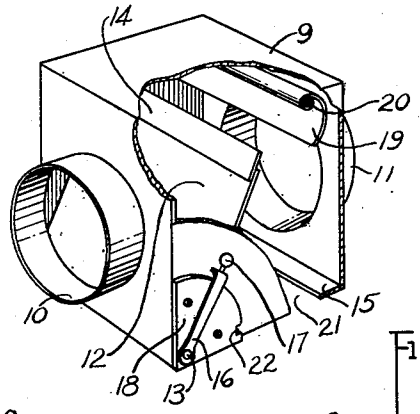


Fig. 2

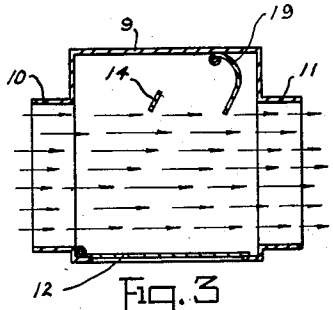


Fig. 3

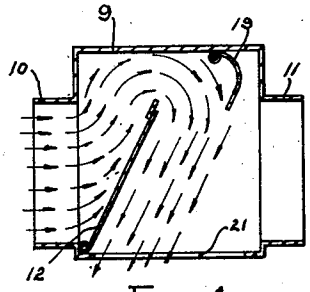


Fig. 4

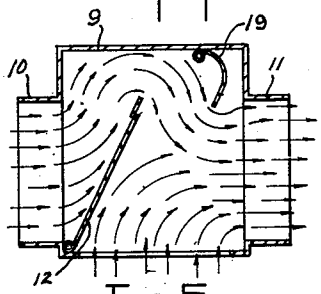


Fig. 5

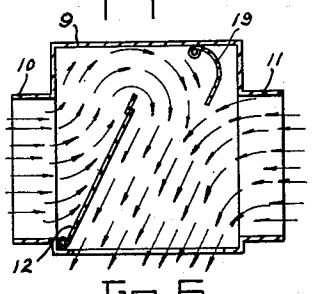


Fig. 6

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Patented Nov. 26, 1940 2,222,663

UNITED STATES PATENT OFFICE

2,222,663

DRAFT CONTROL

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Application November 7, 1938, Serial No. 239,279

4 Claims. (Cl. 126—307)

My invention relates to a device for regulating the draft of flue gases. More particularly it is a draft regulator applicable to furnaces which use either solid or gaseous fuels.

When solid fuel is burned, such as wood or coal, a supply of air must be furnished to facilitate combustion. The simplest and most common method is to create a draft by enclosing the products of combustion in a flue and passing them out through a chimney. The flue being substantially closed, the difference in density between the hot gases and atmospheric air will create a draft giving the desired current of air at the point of combustion.

However, when burning a fluid fuel such as coal gas or natural gas, the air is already supplied. The gas and air are mixed outside the furnace and are under pressure when delivered to the point of combustion. Thus, not only is outside air not required, but the fuel is already at a pressure above atmosphere. Therefore, when gas is burned in a solid fuel furnace, substantial and material changes must be made in the flue and chimney system.

An example of such fuel application is the burning in a home coal furnace of gas during the temporary cold spells of fall and spring. In order that such products of combustion be used efficiently, a different arrangement of flues must be used from those used for solid fuel combustion. In addition, a control device must be provided which may be operated by an inexperienced person who has no knowledge of draft principles.

My device comprises a box set in the flue leading from the furnace. The bottom of this box consists of a plate hinged at the edge where the incoming flue gases enter. This plate may be pivoted on one edge and tends to cut off the incoming flue gases when so moved. A stop limits the upward pivotal movement and is so positioned as to give approximately the proper flue area to the gases in relation to the amount of gas burned.

The objects of my invention are several: To provide a simple and easily operated draft regulator for fluid fuels that will not interfere with the combustion of solid fuels; to provide a device that will properly regulate furnace draft when burning fluid fuels; to provide a device that will avoid the danger of chimney down drafts blowing out the gas flame of pilot and burner; and to provide a simple, efficient and cheap construction to carry out the above objects.

Other objects and features of the invention have to do with details of construction and operation as will be more fully brought out in the following description and claims.

In the drawing:

Fig. 1 illustrates a common home furnace of the solid fuel type with the auxiliary heater attached and the draft diverter placed in the flue to the chimney.

Fig. 2 is a cut-away perspective view of the invention showing the interior construction.

Fig. 3 is a side view in section showing the invention during solid fuel combustion.

Fig. 4 shows the device in position for fluid fuel combustion, the arrows indicating the path of the gases in the absence of chimney drafts.

Fig. 5 shows the path of the gas combustion products when there is an up draft in the chimney.

Fig. 6 shows the path of the gas combustion products when there is a down draft in the chimney.

In Fig. 1 the usual solid fuel type of home furnace is generally indicated at 7. A readily positioned gas burner for use in temporary cold spells when it is not desirable to go to the trouble of building a solid fuel fire, is indicated at 8. This burner is shown and described in detail in my copending application, Serial No. 221,469. The draft diverter is generally indicated by a box 9, placed in the flue to the chimney where it is readily accessible.

Referring to Fig. 2, in the ends of the box 9 are a flue opening 10 for the incoming furnace gases and a flue opening 11 to the chimney. A rotatable diverter plate 12 is hinged at a lower edge of the box 9 by rod 13 which is attached to the diverter plate 12 and which passes through the vertical side walls of box 9. A stop 14, fastened to the vertical opposite sides of the box 9 serves to limit the upward pivoting of the diverter plate 12. A bottom strip 15 serves to limit the downward movement of plate 12. A lever 16 is rigidly attached to the rod 13 and retains a spring pin 17 which acts in notches 22 of the quarter circle plate 18 to hold the diverter plate 12 in its two positions. The quarter circle plate 18 is fastened by suitable means to one side of the box 9.

At the top of the box 9 is hinged a curved gas damper 19 which is mounted by means of a rod 20 passing through opposite sides of the box. It is so placed as not to obstruct the flow of gases during solid fuel combustion as shown in Fig. 3. This accounts for the box 9 extending above the normal flue height. This damper 19 may be

rotated toward or away from the stop 14 to obtain exact flue openings during gas combustion. After its original adjustment, this gas damper may be permanently fixed or held in position by suitable means (not shown), such as thumb screws pinching the damper against the side of the box.

The bottom of the box 9 is open as at 21 except when the diverter plate 12 is in its lowermost position.

In operation, the diverter plate 12 rests on the bottom edge 15 during solid fuel combustion, allowing a free sweep of the box by the flue gases as in Fig. 3. When a temporary or unseasonal cold spell occurs while the furnace is cold, the gas burner 8 may be inserted in the furnace box and lighted. Regulation of the flue is accomplished by rotating plate 12 to the stop 14 and holding it there by stop pin 17 acting in a notch of quarter circle plate 18.

With the diverter plate 12 in the position shown in Fig. 2, there are several possible flue conditions which may exist. For example, if the conditions are such that no air is moving in the chimney, the harmless combustion products will be discharged into the furnace room as shown by the flow arrows of Fig. 4. If there is an up draft in the chimney, the combustion products will be carried up the chimney but the full force of the chimney draft will not be exerted on the furnace since air will also be drawn into the chimney from the furnace room through the opening 21 in the bottom of the box 9. This draft condition is shown in Fig. 5. In case of a down draft in the chimney, the combustion products from the furnace and the air from the chimney will enter the furnace room as shown in Fig. 6.

It will thus be seen that the chimney draft will not affect the gas burner in the furnace under any conditions. On a gusty day it may be that each of the conditions shown in Figs. 4, 5 and 6 may exist at one time or another but in each case the by-pass opening 21 to the furnace room in cooperation with the diverter plates will result in a steady draft in the furnace. With this arrangement the danger of the gas flame being blown out or pulled out is eliminated and in addition, the most efficient burning conditions are constantly maintained in the furnace.

What I claim is:

1. A furnace draft control unit adapted for use with a furnace having a chimney flue and convertible to solid fuel firing or to combustible fluid firing, said unit comprising a housing having inlet and outlet openings connected into the chimney flue, a passageway between said inlet and outlets substantially equal in area to that of said chimney flue, and an atmospheric opening in a wall of said housing, a diverter plate in said housing movable to one position to close said atmospheric opening and movable to a second position to open said atmospheric opening and to block said passageway, a dome portion in said housing on a side opposed to said atmospheric opening and freely open to said passageway between said inlet and outlet, whereby said diverter plate in its second position will direct combustion products from said inlet to said dome, and a deflector member in said dome for directing said combustion products toward said atmospheric opening.

2. A furnace draft control unit adapted for use with a furnace having a chimney flue and convertible to solid fuel firing or to combustible fluid firing, comprising a housing having inlet and outlet openings with a free passage therebetween and having a third atmospheric opening, said inlet and outlet openings being adapted to be connected between spaced openings in said chimney flue to form a part thereof, and a draft diverter plate mounted in said housing, said plate being movable to one fixed position to close said atmospheric opening for solid fuel firing and being movable to another fixed position for gas firing to open said atmospheric opening and to partially block the otherwise free passage between said inlet and outlet whereby draft conditions on the chimney side of said chimney flue cannot effect the draft in said furnace.

3. A furnace draft control unit adapted for use with a furnace convertible to solid fuel firing or to combustible fluid firing comprising a housing having an opening at each end and at one side, said end openings being connected by a free, relatively straight passage and being adapted to be connected in a chimney flue, and a draft diverter plate mounted in said housing, movable to one fixed position to close said side opening for solid fuel firing and movable to another fixed position for gas firing to open said side opening and to partially block the passage between said end openings.

4. A device for the conversion of a home coal furnace to a gas burning furnace, said device comprising a box set in the flue to the chimney, a plate in said box movable to one position to form the bottom of the box, and movable to a second position to partially obstruct the inlet of said box and to create an opening in the chimney flue, and a damper in the top of said box, said damper being adjustable with relation to the obstructing position of the bottom plate, to create an exact size flue opening.

HAROLD E. HANDLEY.