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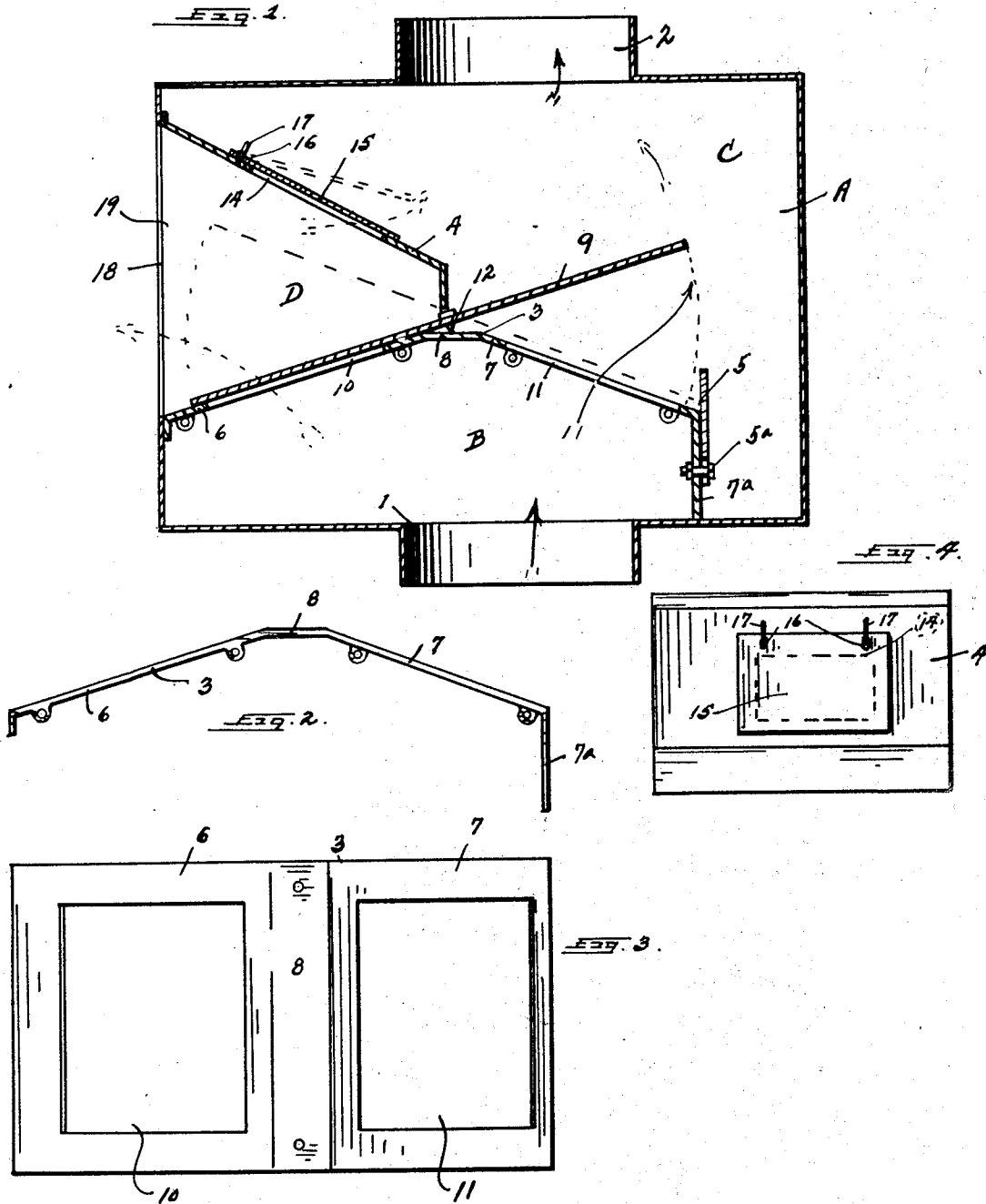
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1,963,073

DRAFT CONTROL

Filed March 14, 1933

4 Sheets-Sheet 1



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June 19, 1934.

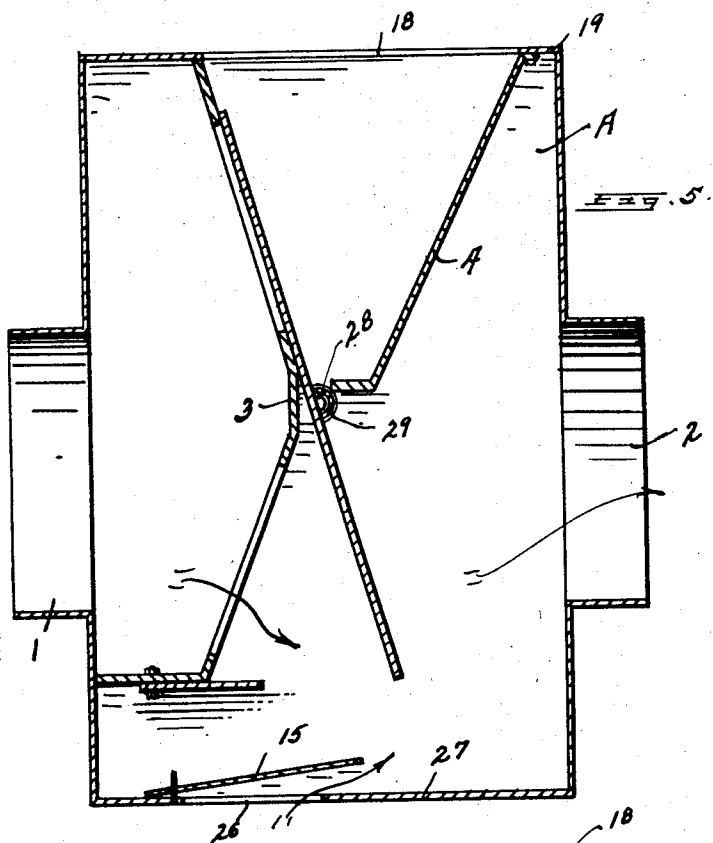
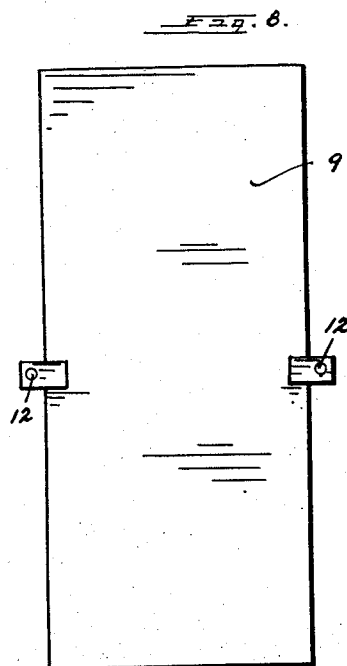
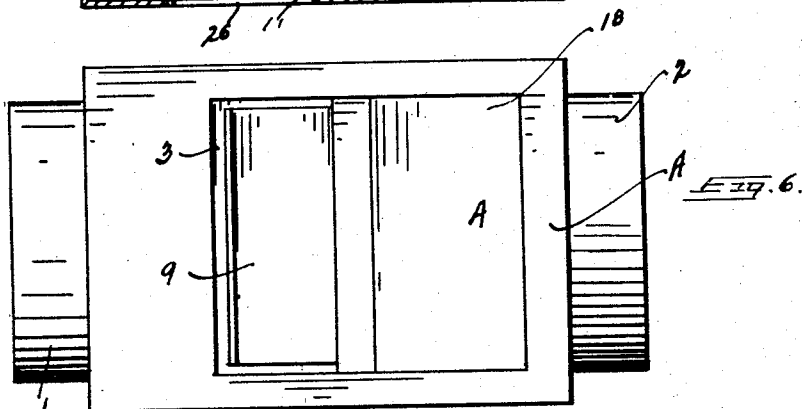
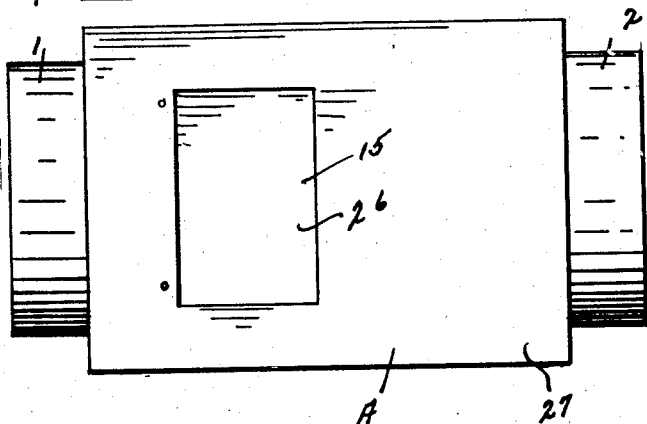
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4 Sheets-Sheet 2



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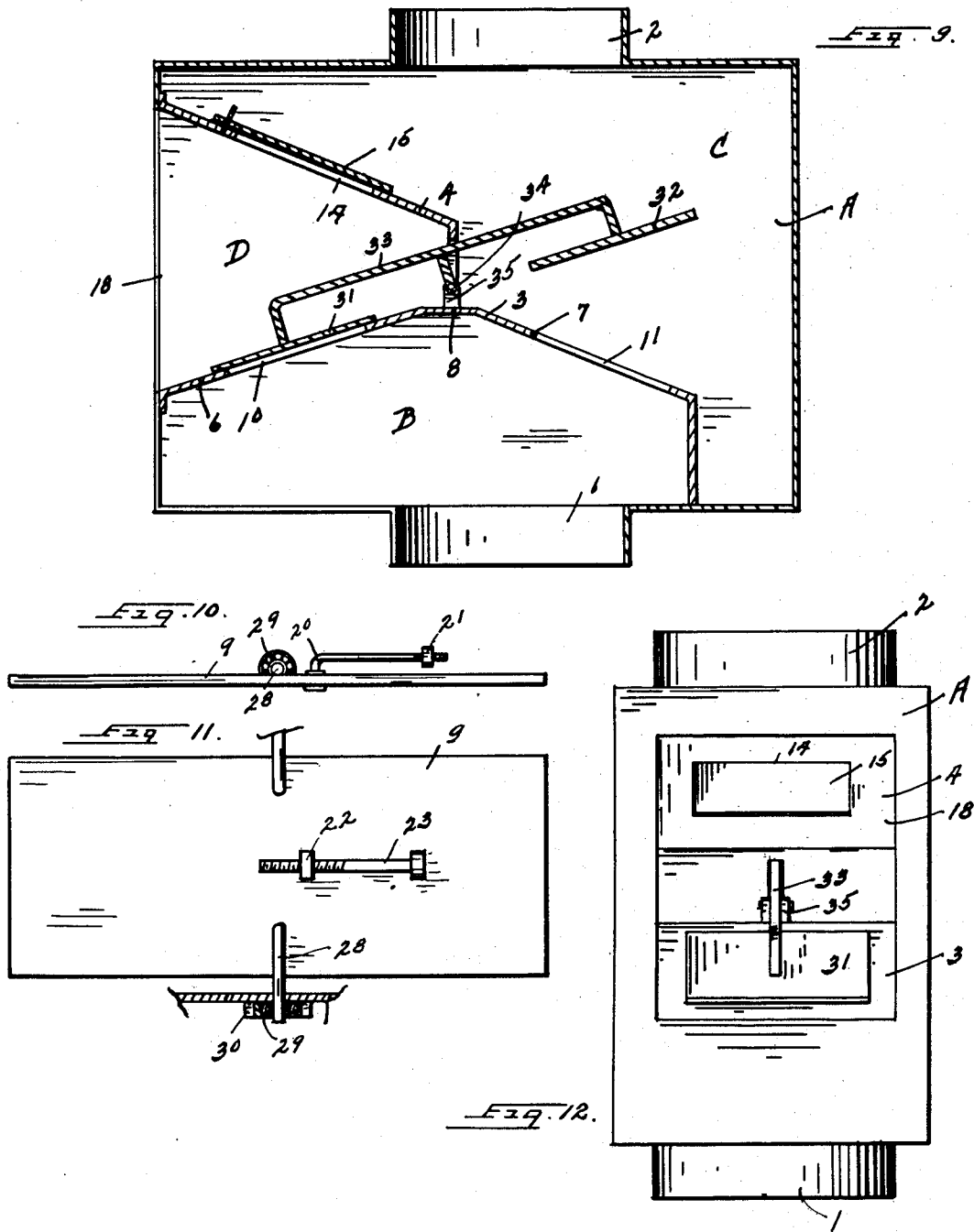
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DRAFT CONTROL

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4 Sheets-Sheet 3



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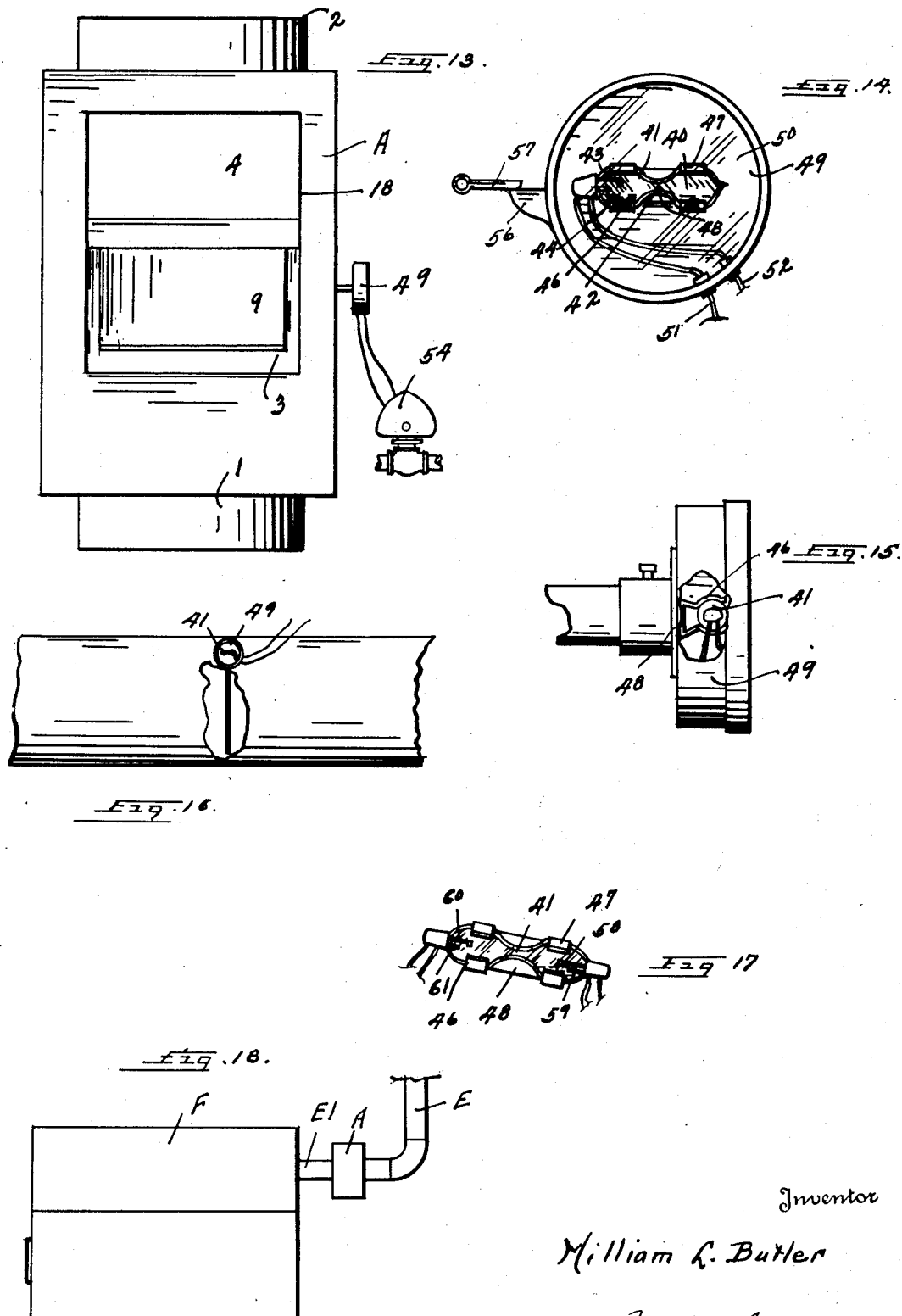
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DRAFT CONTROL

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4 Sheets-Sheet 4



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DRAFT CONTROL

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4 Claims. (Cl. 236—45)

My invention relates to draft control devices, and means for controlling the same and has for its object to provide a self acting draft control set in the flue pipe and actuated primarily by the flue draft, but also actuated by back draft and lack of draft.

A further object is to provide a draft control device having a pivoted control plate mounted at the juncture of the walls of three chambers, one of which chambers is in connection with the flue pipe from the furnace, one of which is in connection with the flue leading to the stack and the last, open to the atmosphere surrounding the furnace.

A still further object is to provide a draft controlled plate of such weight as to be lifted only by draft, greater than that desired for complete combustion in the fire box of the furnace.

A still further object is to provide a control in connection with the draft controls which will throw the current switch, wall motor, electric shut off valves, draft controls and blowers connected with the furnace so that there will be no fire should the flue become clogged, or complete lack of draft exist for a predetermined period of time.

A still further object is to provide an adjustable damper for adjusting the size of the orifice leading from the furnace side of the device into the flue chamber side.

A still further object is to provide a safety device for use on furnaces to protect the flame of the burner, or the pilot light and prevent any danger of production of carbon monoxide gas.

These and other objects I accomplish with the devices shown in the accompanying drawings in which similar numerals and letters of reference indicate like parts throughout the several views and as described in the specification forming a part of this application and pointed out in the appended claims.

In the drawings in which I have shown the best and most preferred manner of building my invention,

Figure 1 is a vertical section through the horizontal type of draft control showing arrows to indicate the direct flue draft and dotted lines and arrows to show the operation of the control plate and direction of air currents.

Figure 2 is a side elevation of the partition casting in which the ports of the control are formed.

Figure 3 is a plan view of Figure 2.

Figure 4 is an end view of the partition dividing the space above the control into two chambers.

Figure 5 is a vertical section of the vertical type of control.

Figure 6 is a plan view of Figure 5.

Figure 7 is an inverted plan view of Figure 5.

Figure 8 is a plan view of the draft control plate.

Figure 9 is a vertical section of a horizontal type of draft control, showing a modified form of making the pivoted control portion of the device.

Figure 10 is a side elevation of one of the control plates showing the mounting bearing on the opposite side and one method of balancing the plate.

Figure 11 is a plan view of one of the control plates showing another form of counter balance and showing one of the support bearings mounted outside the outer casing of the entire device, parts sectioned, and other parts cut away.

Figure 12 is an end view of Figure 9.

Figure 13 is an end view of one of the devices showing the throw out control.

Figure 14 is a face view of the control used to shut down the fire should the flue become clogged.

Figure 15 is a side elevation of the device shown as though mounted on the shaft carrying the control plate.

Figure 16 is a side elevation of a common pipe with a floating plate mounted therein to shut down the fire should the flue become clogged.

Figure 17 is a plan view of a double contact type of mercury tube.

Figure 18 is a diagrammatic view of a furnace and flue with my device used therein.

In the drawings I have shown the device as made of a rectangular casing A, mounted in the furnace flue E by removing a section of pipe and securing the flue pipe E1 of the furnace F to the inlet pipe 1 of the casing A and outlet pipe 2 of the casing to the flue E.

The interior of the casing A is divided into three chambers the chamber B being termed the furnace chamber, the chamber C being termed the flue chamber, and the chamber D termed the atmospheric chamber of the casing. The partition 3 divides the lower portion of the casing to form the furnace chamber B, and the partition 4 divides the upper portion of the casing above the partition 3 into the two chambers C and D. The partition 3 is formed with two faces 6 and 7, each sloping outwardly and downwardly from a medial horizontal portion 8, at an angle thereto. The face 6 is secured to the end of the casing A and the face 7 is turned down at 7a to the bottom of the casing A. Ports 10 and 11 are formed

through the faces 6 and 7 respectively of the partition and a closure valve 9 is pivotally supported by pivots 12 on the top side of the portion 8 of the partition 3, so spaced from the horizontal portion that the valve will close either of said ports, depending upon the direction of draft through the casing A, or lack of draft therethrough. The valve will close one port at the same time opening the other port.

An adjustable damper plate 5 is secured to the portion 7a of the partition 3 by bolts 5a and the damper is provided with a slot therein to allow for adjustment.

A draft relief port 14 is provided through the partition 4 and is closed normally by a plate valve 15 resting thereover. The plate valve is provided with two spaced apart slots 16 adjacent the ends thereof through which positioning rods 17 are passed. The rods 17 are secured through the partition 4 and are merely to hold the valve plate 15 in position over the port but at no time hindering or dampening the action of the valve. This valve is mounted in this manner to allow excess draft to act upon the valve and open it to relieve the excess suction from the flue preventing or hindering correct combustion in the furnace fire box. The end 19 of the casing A is cut away to provide an air inlet and vent port 18. The only portion being cut away being that portion between the ends of the two partitions 3 and 4 as each partition has one end terminating against the end 19. The partitions 3 and 4 are provided with lugs on the edges thereof by which they are secured in the casing A.

The control valve 9, may be so mounted as to normally hold the port 11 closed and still be draft responsive.

In Figures 10 and 11 different types of counter balances are shown. The type shown in Figure 10 being made by inserting a bolt 20 through the valve 9, bending the bolt down to parallel with the valve and then screwing a weighted nut 21 up or down the lower end of the bolt. In Figure 11 I pass an eye bolt 22 through the valve 9 and then through the threaded eye thereof, I screw a bolt 23 with the head of the bolt the adjusting weight and the bolt may be screwed to perfect adjustment of the valve 9. Other forms of balancing the valve may be used, such as grinding off one end thereof or adding solder or other weight to the end as necessary. In Figure 5 I have shown the vertical type of device in which the casing A is divided into three chambers. In this device the plate valve 15 is mounted on the bottom end 27 of the casing A with the port 26 through the end 27. The partition 4 has no opening therein but merely divides the chamber above or to one side of the partition 3. In this figure I have also shown the mounting of the valve 9 as formed of extended shafts 28 on each side thereof with the shafts set in roller bearings 29, which roller bearings may be secured to the inner wall of the casing A or if desired the shafts 28 may be extended through the wall of the casing A and the bearing mounted in suitable bracket 30 on the outside of the casing.

In Figure 9 I have shown the same type of casing, partitions, and ports, as that shown in Figure 1, but have formed the closure valves as made of valve plates 31 and 32 mounted from a bar 33, which bar 33 is pivotally secured in the medial portion or shaft 34 carried by bearings 35.

In Figures 13 and 15, I have shown a method of automatically turning the fire on or off in the furnace by attaching a specially shaped mer-

cury tube to the end of the pivot shaft of the valve 9. The mercury tube 40 is formed of a glass tube 41 having each end closed and having the medial portion drawn in to form a small orifice 42, with fixed contact posts 43 and 44 carried through one end, said contacts to be used to complete an electrical circuit when the mercury has all passed into that end of the tube to complete the contact between the posts 43 and 44 to complete the electrical circuit. The tube is supported by brackets 46 and 47 formed on a support 48 and the support is carried in a cylindrical protection frame 49 with a glass cover 50 thereover. Wires 51 and 52 lead from the contacts 43 and 44 to an electric shut off valve 54 or to a wall motor or other similar device. The motor or valve shuts off the flow of fuel into the furnace.

This device is so constructed as to provide means for shutting off the fire when the flue becomes clogged. The particular shape of the mercury tube allows for normal movement of the valve 9 without actuating the tube enough to flow sufficient mercury through the orifice to make the contact, but should the flue become clogged, the lack of draft will close the valve 9 and when held in this position a predetermined period of time, the mercury will flow through the orifice and the contact between the points 43 and 44 will be made thereby shutting off the current.

In Figure 16, I have shown the use of this device as operated on a floating vane in any flue so that should the flue become clogged the draft therethrough will cease and the mercury tube will be actuated, shutting off the fire, by the contact formed.

In Figure 14 I have shown the outer casing as carrying a lug 56 on one side thereof, said lug to be actuated by a lever arm 57 carried on the end of the pivot lever of the valve 9 providing different means for actuating the mercury tube. It is also possible to mount the tube directly on the end of the shaft eliminating the casing, but the preferred methods are herein shown.

In Figure 17 I have shown a type of mercury tube in which double contacts 58, 59, 60 and 61 are carried in the mercury tube, one pair in each end, so that the throw of the tube will complete a circuit at the same time breaking another circuit. This type must be used where wall motors are used to shut off the fuel to the furnace.

This device is used to prevent carbon monoxide gas poisoning and to prevent excessive moisture from collecting in the furnace room at the same time it will act as an indicator to the furnace operator that there is something wrong with his flue.

The operation of my invention is as follows:

Under normal conditions when the fire is off the valve 9 remains in the closed position with the valve 9 closing the port 11. This is to prevent drawing of cold air through the furnace if off or just the pilot light burning. When the furnace is turned on the gases actuate the valve, opening the port 11, at which time the draft from the flue will completely open the valve, closing off the port 10. Should a neutral condition occur the valve 9 will again close the port 11, opening the port 10, allowing the gases to enter the atmosphere through the open end of the casing A. The opening of the port 10 opens an area equal to or greater than the area of the inlet pipe 1. Normal draft conditions will open the valve 9 from the port 11 and hold it in the open position.

Excessive draft will hold the valve 9 open from the port 11 at the same time raising the plate 15 from the port 14 commensurately with the amount of excess draft condition. This is to
 5 relieve excessive draft through the port 11 and in the combustion chamber of the furnace.

As the draft varies the position of the valve plate 15 varies therewith and should the draft drop the valve 15 closes. Should a back draft
 10 occur, the valve 15 will be seated and the valve 9 will instantly close the port 11, opening the port 10 and allowing the gases to escape into the atmosphere, without the back draft affecting the fire or combustion conditions in the combustion
 15 chamber of the furnace fire box.

When a low draft condition occurs, the valve 15 is in closed position giving full benefit of all the draft through the flue.

Having thus described my invention I desire to
 20 secure by Letters Patent and claim:

1. In a draft control device the combination of a casing; partitions in said casing dividing it into three chambers; a port leading from one chamber to the atmosphere; an inlet pipe into
 25 one chamber and an outlet pipe into the last chamber; a pivoted control valve mounted in the space between the partitions adapted to close or open a port through one of said partitions at the same time opening or closing a port in the
 30 other side of said partition to direct air currents through one of said ports or gases therefrom into the atmosphere through the atmospheric chamber, or to direct gases through the other of said ports and into the outlet pipe to the flue; and a
 35 draft responsive plate carried in said casing to open when the suction from the flue reaches a predetermined velocity.

2. In a device of the class described the combination of a casing; partitions dividing the casing into three separate chambers with one of said chambers open to the atmosphere; a valve
 80 mounted to control a port from one of said chambers into the open chamber or into the other chamber, depending upon suction or pressure in the last mentioned chamber; and pipes to connect the other two chambers with the furnace and flue.
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3. In a device of the class described the combination of a chamber divided into three chambers one of which is in connection with the furnace, one with the flue, and one with the atmosphere; a valve mounted to control the suction
 90 from the furnace chamber into the flue chamber or to direct gases from the furnace chamber out through the atmospheric chamber; and a valve in the flue chamber actuated by increased suction therein.
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4. In a device of the class described the combination of a furnace; a pipe leading therefrom; a draft control casing mounted onto said pipe; a flue pipe attached to said casing and to the draft flue; partitions in said casing to divide the
 100 casing into three chambers, one open to the atmosphere surrounding the furnace, one open to the furnace pipe and the last open to the flue draft pipe; a valve to control ports through one partition in said casing to direct gases from the
 105 furnace pipe into either the atmospheric chamber or the chamber leading into the flue depending upon the draft, lack of draft, or back draft, in said flue; and a valve to be opened by excess draft through the flue to hold the draft in the
 110 furnace constant.

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