

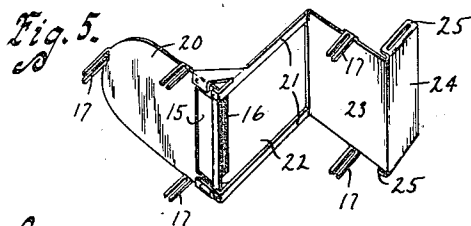
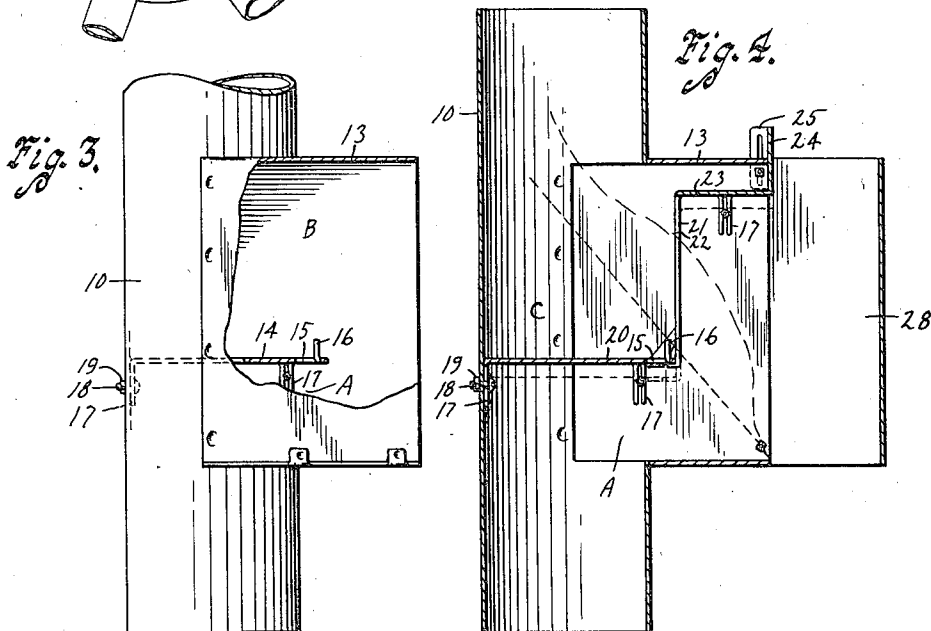
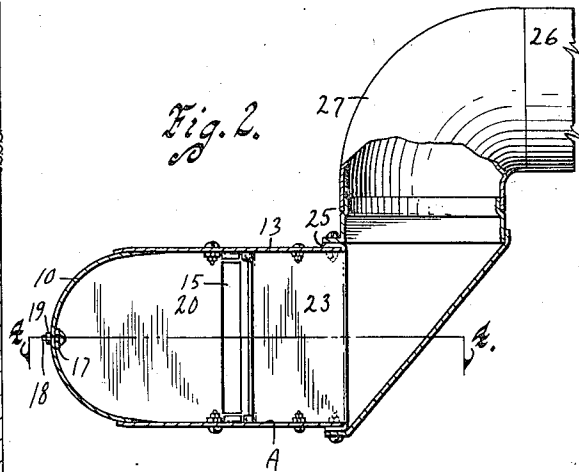
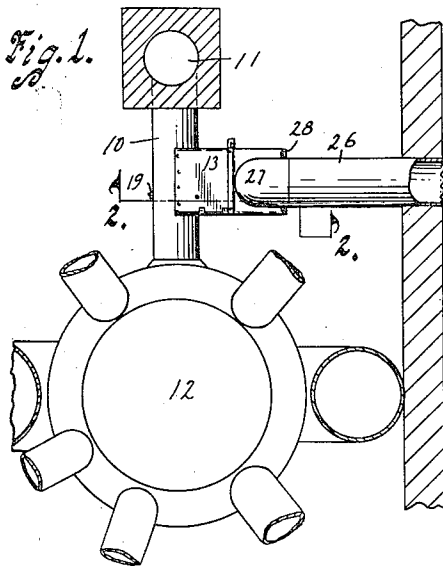
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2,017,562

COMBUSTION CONTROLLER

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UNITED STATES PATENT OFFICE

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COMBUSTION CONTROLLER

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9 Claims. (Cl. 126—307)

My invention relates to a combustion controller adapted to be interposed preferably in the flue pipe of a furnace or other heating plant having a means of combustion.

5 It is generally the object of my invention to provide such a combustion controller which permits the furnace to vent at its own pressure differential and avoids all wastes which ordinarily result from chimney draft.

10 It is my purpose to accomplish this object by interposing in the flue pipe what may be called a T, comprising a section of pipe forming all or part of the flue pipe and a box-like member projecting therefrom and open to atmosphere in
15 either of the manners hereinafter more particularly described.

I also provide a baffle plate having novel features of construction and arrangement herein-
after more fully set forth.

20 Another object is to provide such a baffle plate with means for adjustably installing it for controlling the size of the passage to the box-like structure from the flue pipe.

25 Still another object is to provide in such a baffle a slot and deflecting flange, by means of which it will positively and instantaneously inject the hot gases into the chimney draft at the start of the burning cycle of the furnace.

30 Still a further object is to provide an outdoor air pipe, which may be used for supplying air to the box-like structure for accomplishing certain purposes hereinafter referred to.

35 With these and other objects in view, my invention consists in the construction, arrangement and combination of the various parts of my combustion controller, whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in my claims, and illustrated in the accompanying drawing, in which:

40 Figure 1 is a top or plan view of a furnace equipped with a combustion controller embodying my invention, the parts being broken away and parts being shown in section.

45 Figure 2 is a detailed, sectional view taken in the line 2—2 of Figure 1.

Figure 3 is a top or plan view of the combustion controller with a non-adjustable baffle in fixed position, parts being shown in section and parts being broken away.

50 Figure 4 is a horizontal, sectional view taken on the line 4—4 of Figure 2, and also shows the position of the complete adjustable baffle shown in Figure 5; and

55 Figure 5 is a perspective view of the baffle plate and parts associated therewith adapted for adjustable mounting.

60 It is highly desirable that a furnace should be permitted to vent substantially at its own internal pressure differential. It is readily seen, however, that where a furnace can not vent of its

own pressure differential, there are various undesirable results. For example, when there is strong draft up the flue from the furnace drawing out hot gases, there are high stack losses. If excessive amounts of air are drawn into the
5 furnace, the layer of unburned excess air will insulate the internal heating surfaces of the furnace. Combustion is not perfect and much of the possible heat is not realized. Likewise if there is back draft from the stack or chimney, com-
10 bustion in the furnace is smothered and may become dangerous and even explosive.

By venting the furnace at its own pressure differential, there is avoided that variety of combustion conditions and consequent imperfect
15 combustion, which otherwise results from varying wind and outside atmospheric conditions.

For securing the desirable results hereinbefore mentioned, I provide a flue pipe or section of
20 flue pipe indicated at 10. This communicates at one end with the stack 11 and at the other end with the furnace 12 at a height above the furnace predetermined to provide desired atmospheric draft on the furnace to insure its proper
25 venting.

A substantially rectangular box-like structure 13 communicates with the pipe section 10 and extends laterally therefrom, forming as it were the leg of a T.

This box-like structure is either open at its
30 end farthest from the pipe section 10 as shown in Figure 3, or partly open as shown in Figures 2 and 4. By means of the baffle 14 sitting entirely across the area of the pipe section 10, I stop the direct pull of the chimney draft on the fur-
35 nace. By like means I prevent the back draft from the chimney reaching the furnace. The baffle plate 14 is solid its full area, except for the vertical slot 15 near its free edge. The baffle plate 14 may be fixed or preferably may be made
40 adjustable.

I shall first describe it as it operates wherever fixed and will then refer to the means by which it may be made adjustable and to the reasons for
45 so making it adjustable.

With such a structure, any excessive draft through the chimney will draw air from the furnace room, but the draft will not be imposed with full force on the furnace itself. This has the advantages already referred to.

50 In order to secure other advantages, I provide the slot 15, near the free edge of the plate 14 and terminating near the top and near the bottom thereof. This slot is ordinarily preferably about one inch wide, and its inner edge is preferably
55 about one-half inch outside the line of the pipe section 10.

At the outer edge of the slot 15, the vertical flange 16 extends from the plate 14 into the area B of the box 13.

Of course, it will be understood that in larger installations, the width of the slot may be somewhat greater.

I have indicated in Figure 3 at A, the passage 5 from the intake end of the flue into the box 13 and at B the passage from the box 13 into the outlet end of the pipe section 10. The area of the opening A should preferably bear a definite relation to the B. t. u. input capacity of the furnace. I preferably provide one square inch of 10 area of opening A for each 5000 of B. t. u. input capacity.

Because the B. t. u. input of the furnace may vary, it may be desirable to make the baffle 14 15 adjustable. The box 13 is of certain dimensions for using the baffle 14 in a fixed position and is of other dimensions if the adjustable baffle shown in Figure 5 is used. In Figure 3, I have shown the baffle 14 provided with the slotted flanges 17. 20 Suitable bolts 18 and nuts 19 may be used for locking these flanges to the pipe section 10 and the box 13. Upon loosening the nuts, it is possible to adjust the baffle plate as may be desired.

In Figure 4, I have shown a baffle plate 20 25 similar to the baffle plate 14, having connected parts as shown in Figure 5. Extending from the outer edge of the plate 20 and at right angles thereto in the general direction of the outlet end of the pipe section 10 is a plate section 21 having an 30 opening 22 of proper size for the pipe section with which it is to be used. Extending at right angles from the plate section 21 toward the outer or open end of the box 13 is a plate 23 of proper size to reduce the length dimension of the box 35 13 and terminating in a plate 24 extending again in the general direction of the outlet end of the pipe section and adapted to close the unused length of the box 13 adjacent the outer edge thereof, as best shown in Figure 4.

The plate section 23 has a slotted flange 17 40 similar to those already described, adapted to be similarly secured to the box 13. The plate section 24 has at its top and bottom slotted flanges 25 adapted to be secured to the box 13 in the 45 manner already explained.

The baffle plate structure just described is shown in perspective in Figure 5.

It will be seen that it can be adjusted to regulate the size of the passage A without in any way 50 changing the operative size of the passage B, because the area of that passage is determined by the area of the opening 22.

In Figures 1 and 2, I have shown the pipe 26 55 connected with the outside atmosphere and extending toward the box 13 and having a downturned elbow 27 just above the open end of the box 13. An inclined baffle plate 28 is arranged at the lower end of the elbow 27 to deflect air from the elbow 27 into the box 13 and to deflect gases 60 out of the box 13 into the elbow 27.

There is thus provided a passage between the elbow 27 and the box 13, which is closed on its under side but open at the front and rear.

I shall now refer more particularly to the functions and advantages of the structure heretofore 65 described.

It will be seen that this structure permits the furnace to vent at substantially its own pressure differential. For example, when the fire is started, 70 as when a gas burner is turned on, if there is no chimney draft or there exists a back pressure from the chimney, the furnace may vent to the basement through the openings at the front and rear in the passage from the box 13 to the pipe 26, 75 or if there is no back pressure through the pipe

26, the furnace may vent through that pipe.

Any such discharge of furnace gases will continue only for a short time and until there is chimney draft. Discharge into the basement will do no harm because of the perfect combustion 5 of the fuel being used. Harmful flue products due to imperfect combustion occur ordinarily only when there is too much chimney back pressure.

With the combustion controller, it will be seen 10 from what has already been said that chimney back pressure can not cause imperfect combustion because, due to the baffle 14, it does not affect the intake end of the pipe section 10 or the furnace proper. 15

If there is strong draft upwardly through the chimney, it will still not result in imperfect combustion, due to the baffle 14.

Thus assuming that the furnace is being started and that there is a strong chimney draft, approximately what happens is as follows: 20

There is a strong draft of air through the box 13. The air may come from the basement through the open end of the box or from the pipe 26. 25

When a strong chimney draft exists, the effect of a strong cold air stream into the chimney has its disadvantage which is apparent at the time the burner starts after a period of inoperation. During the period of inoperation the air stream 30 entering the pipe section 10 of the chimney will have a definite stream line velocity with its resultant surface tension. Ordinarily as the burner starts and the initial of the gases reach the opening A (Figure 3), they are held back by the 35 surface tension until sufficient pressure is built up in the furnace to break the surface tension of the cold air stream to permit the joining of the hot gases into the cold air stream.

I claim that by the use of the slot 15 and 40 flange 16, I have eliminated the above conditions because of the following cycle of events as described.

The flange 16 being in the flow of the cold air stream maintains a negative pressure on the 45 chimney side of the slot 15. As the hot gases strike the baffle 20 in Figure 4 and turn to atmosphere through the opening A, they pass the slot 15, and a portion is drawn through the slot 15 at high velocity. After passing through 50 the slot 15, their velocity is retarded, and they expand into the area of the negative pressure indicated by C (Figure 4) where they build up sufficient pressure to move the current of cold air from the straight dotted line position shown in 55 Figure 4 to the curved dotted line position shown in that figure, whereupon the remainder of the gases from the furnace flow freely around the outer edge of the baffle plate 14 or 20.

The openings at the side edges of the baffle plate 28 are for a twofold purpose. They permit venting hot gases to the basement during starting, if there is no chimney draft or too much pressure on the outside opening of the pipe 26. When the pressure on the outside opening of the pipe 65 26 is negative, they allow air to be drawn into the chimney from the basement temporarily.

If the ordinary practice is followed of providing no definite supply of air to satisfy the normal circulation of air up the chimney at all times, 70 a negative pressure is created throughout the building, causing pronounced cold draft conditions and great increase of infiltration losses.

By the use of the pipe 26, there is provided a definite controlled supply of air from the outside, 75

thereby eliminating the chimney's draw on the heated basement air and insuring the maintenance of a positive pressure throughout the building, great reduction of infiltration losses and cold draft conditions.

In general, my structure avoids varying combustion conditions which might occur due to varying wind and atmospheric conditions. Or putting it another way, my construction insures uniform proper combustion conditions regardless of varying conditions of wind and atmosphere.

It will be understood that the device may be employed if desired with fixed or adjustable baffle plate and without the intake pipe 26, the elbow and the inclined plate 28.

It will, of course, be obvious from the foregoing description that changes may be made in the details of the construction and arrangement of the parts of my improved combustion controller structure, and it is my intention to cover by my claims any modifications in structure or use of mechanical equivalents, which may be reasonably included within their scope and include the invention made.

I claim as my invention:

1. In a device of the kind described, a pipe section, a box projecting laterally therefrom open at its end farthest from the pipe and a baffle plate forming a partition in the pipe and projecting into the box and having adjacent its free end a slot extending substantially across it.

2. In a device of the kind described, a pipe section, a box projecting laterally therefrom open at its end farthest from the pipe and a baffle plate forming a partition in the pipe and projecting into the box and having adjacent its free end a slot extending substantially across it, said plate having a flange projecting from the outer edge of said slot in the general direction of the outlet end of the pipe section and at right angles to the plate.

3. In a device of the kind described, a pipe section, a box projecting laterally therefrom open at its end farthest from the pipe, and a baffle plate forming a partition in the pipe and projecting into the box and having adjacent its free end a slot extending substantially across it, and means for mounting said plate for adjustment lengthwise of the pipe section.

4. In a device of the kind described, a pipe section, a box projecting laterally therefrom open at its end farthest from the pipe and a baffle plate forming a partition in the pipe and projecting into the box and having adjacent its free end a slot extending substantially across it, said plate having a flange projecting from the outer edge of said slot in the general direction of the outlet of the pipe section and at right angles to the plate, and means for mounting the plate for adjustment lengthwise of the pipe section.

5. In a device of the kind described, a pipe section, a box projecting laterally therefrom open at its end farthest from the pipe and a baffle plate forming a partition in the pipe and projecting into the box and having adjacent its free end a slot extending substantially across it, said plate having a flange projecting from the outer edge of said slot in the general direction of the outlet of the pipe section and at right angles to the plate, a pipe adapted to be connected to atmosphere and having an end adjacent the open end of said box, and an inclined baffle plate extending across the open end of the box and the open end

of said last-mentioned pipe for deflecting air currents between said second pipe and the box.

6. In a device of the kind described, a pipe section, a box communicating therewith and extending laterally therefrom, open at its outer end, a baffle plate extending transversely across the pipe and projecting into the box and having at its outer end a plate section projecting at right angles to the baffle plate in the general direction of the discharge end of the pipe and having a defined opening of prescribed area and terminating in an outwardly projecting plate, and then terminating in a plate extending at right angles to said last-mentioned plate and in the general direction of the discharge end of the pipe, said baffle plate having near its outer end a slot extending substantially across it.

7. In a device of the kind described, a pipe section, a box communicating therewith and extending laterally therefrom, open at its outer end, a baffle plate extending transversely across the pipe and projecting into the box and having at its outer end a plate section projecting at right angles to the baffle plate in the general direction of the discharge end of the pipe and having a defined opening of prescribed area and terminating in an outwardly projecting plate, and then terminating in a plate extending at right angles to said last-mentioned plate and in the general direction of the discharge end of the pipe, said baffle plate having near its outer end a slot extending substantially across it, and means for mounting said baffle plate structure for adjustment lengthwise of said pipe section.

8. In a device of the kind described, a pipe section, a box communicating therewith and extending laterally therefrom, open at its outer end, a baffle plate extending transversely across the pipe and projecting into the box and having at its outer end a plate section projecting at right angles to the baffle plate in the general direction of the discharge end of the pipe and having a defined opening of prescribed area and terminating in a plate extending at right angles to said last-mentioned plate and in the general direction of the discharge end of the pipe, said baffle plate having near its outer end a slot extending substantially across it, and a flange at the outer edge of the slot extending away from the baffle plate at right angles thereto toward the discharge end of the pipe section.

9. In a device of the kind described, a pipe section, a box communicating therewith and extending laterally therefrom, open at its outer end, a baffle plate extending transversely across the pipe and projecting into the box and having at its outer end a plate section projecting at right angles to the baffle plate in the general direction of the discharge end of the pipe and having a defined opening of prescribed area and terminating in an outwardly projecting plate, and then terminating in a plate extending at right angles to said last-mentioned plate and in the general direction of the discharge end of the pipe, said baffle plate having near its outer end a slot extending substantially across it, and a flange at the outer edge of the slot extending away from the baffle plate at right angles thereto toward the discharge end of the pipe section, and means for mounting said baffle plate structure for adjustment lengthwise of said pipe section.

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