July 25, 1939. L. MONNEY 2,167,307

DRAFT REGULATOR FOR COMBUSTION APPARATUS

Filed Jan. 7, 1938

Fig. 1

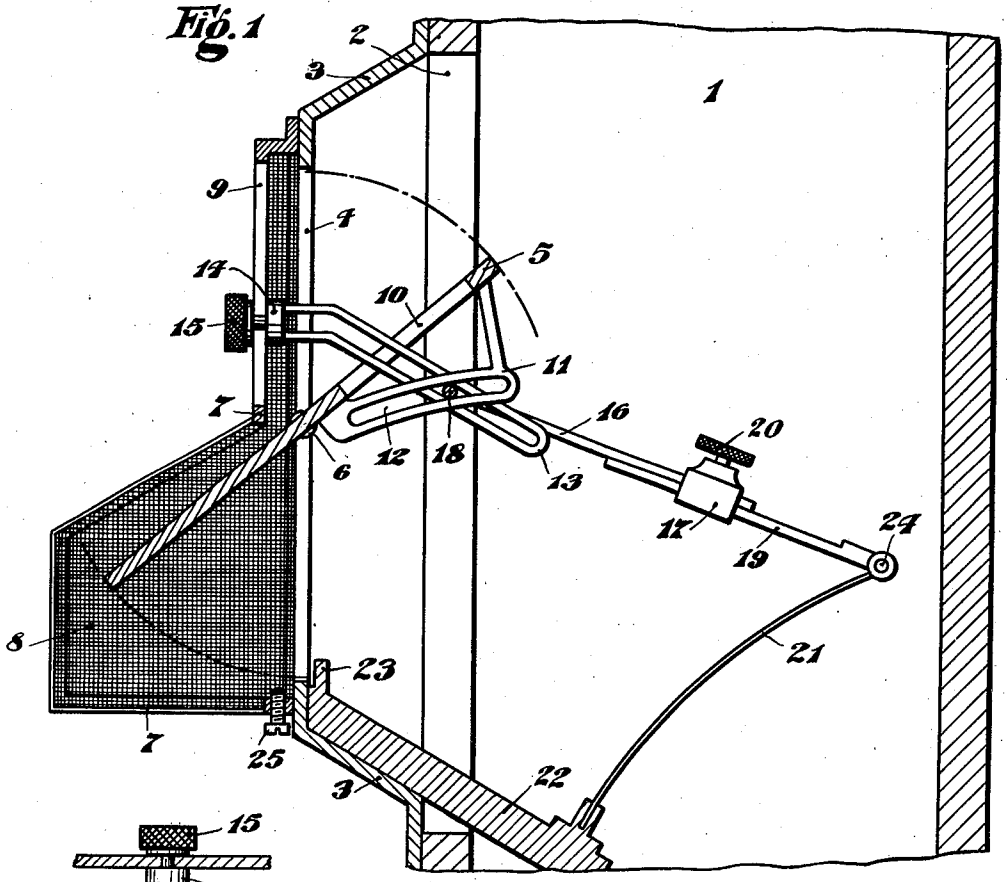



Fig. 2

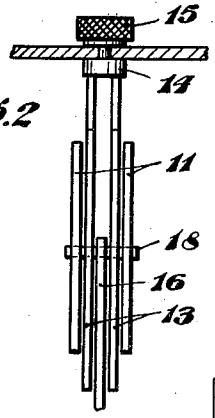
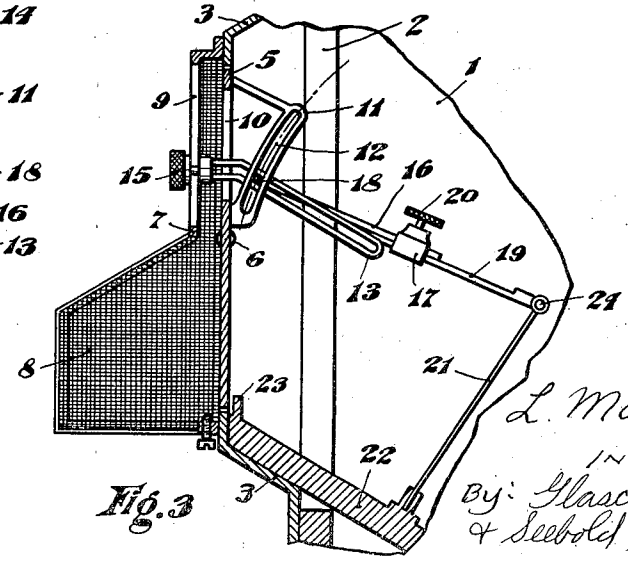



Fig. 3




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## DRAFT REGULATOR FOR COMBUSTION APPARATUS

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Application January 7, 1938, Serial No. 183,879
In Switzerland November 15, 1937

4 Claims. (Cl. 236—93)

This invention relates to draft regulators for combustion apparatus of the type in which a flue gas conduit is provided with an opening for admitting air into the flue.

It is an object of the invention to provide a simple and reliable thermostatically actuated shutter device for controlling the admission of air through the opening in the flue in accordance with the temperature of the gases passing through the flue.

A further object of the invention is the provision of a manually operable adjusting device for varying the rate of movement of the shutter under the action of a thermostat, so as to increase or decrease the admission of air in the flue independently of the thermostat when the rate of combustion is desired to be changed.

These and other objects will be apparent from the following description when considered in connection with the accompanying drawing in which,

Figure 1 is an axial vertical section of a preferred form of draft regulator according to the invention, as applied to a flue gas conduit or chimney of a furnace for domestic heating purposes.

Figure 2 is a plan view of a detail part of the device.

Figure 3 is a vertical section showing the shutter in closed position.

A flue gas conduit or chimney 1 of a furnace, not shown, is provided with a lateral opening 2. A frame 3 is fixed to the wall of the chimney 1 along the edges of the opening 2 and projects forwardly of the opening. The frame 3 is provided with an opening 4 within which is mounted a shutter 5 capable of tilting about lateral journals 6 the axis of which passes approximately through the center of gravity of the shutter 5. A support 7 is secured to the frame 3 and carries a wire netting 8 which covers the entire opening 4 to protect the shutter 5 against being touched. The upper part of the support 7 is provided with a vertical slot 9. The shutter 5 is provided with a slot 10 which, when the shutter is closed, extends parallel to the slot 9.

On both sides of the slot 10, the shutter 5 carries a bracket 11 provided with a circularly curved slot 12 extending parallel to the slot 10 of the shutter. Two slotted guide bars 13, carried by a sliding bolt 14 traverse the slot 10 of the shutter and pass between the two brackets 11. The bolt 14 can be locked by a nut 15 at different positions along the slot 9. The guide bars 13 are so directed that in any position of the shutter 5 and of the slide 14 they intersect the slots 12 of the brackets 11. A rod 16 has one end engaged in a sleeve 17, while its other end carries a pin 18 which penetrates through all four slots 12 and 13. A second rod 19 is also engaged in the sleeve 17 and a clamping screw 20 locks the two rods 16 and 19 in the sleeve 17 which permits to vary the total length of the two rods. The rod 19 is rotatably connected to one end of a flat blade 21 of heat responsive material, the curvature of which depends on the temperature in the chimney 1. The other end of the blade 21 is fixed to an arm 22 carried by the frame 3.

The bimetallic blade 21 is so disposed that its end connected to the rod 19 is bent towards the right hand side in Figure 1 when the temperature rises, so that the effect of such bending is to open the shutter 5 to the represented inclined position. Exterior air is then admitted through the opening 4 and the wire netting 8 with the effect of decreasing the draught in the chimney, so that less air is drawn in through the grate of the furnace. Accordingly, the rate of combustion decreases and the temperature in the chimney falls, so that the blade 21 straightens itself, the upper end thereof moving towards the left and closes the shutter 5. When the shutter is in closed position, its lower end bears against a transversally extending abutment 23. In order to avoid a flexion of the blade 21 when, in closed position of the shutter, the slide 14 is moved along the slot 9, the circularly curved slots 12 of the brackets 11 have their center of curvature situated on the axis 24 of the rotatable connection between the blade 21 and the rod 19. Thus, upon displacement of the slide 12 carrying the guide bars 13, the blade 21 remains immobile, while the rods 16 and 19 simply turn about the axis 24. It will be recognised that when the slide 14 is fixed at a higher position than that represented in Figure 1, the shutter 5 will open less far for the same curvature of the blade 21, while when moving the slide 14 further downwards, the shutter will open more for the same curvature of the blade 21 than in the represented position. The journals 6 of the shutter are so disposed that the shutter is substantially balanced or has a slight tendency to turn in the direction of its opening movement. In this latter case a portion of the excess weight of the upper part of the shutter is supported by the guide bars 13, and the flexion of the blade 21 will practically not be influenced by the weight of the shutter, so that the temperature of the flue gases alone will determine the amount of flexion of the blade,

and the effect of the inertia of the moving shutter can be neglected, since the variations of the rate of combustion and accordingly the variations of the temperature and the movements of the shutter are slow.

A screw **25** is screwed into the frame **7** and serves to lock the shutter **5** in closed position, for example during the transport or during mounting of the shutter, in order to prevent any movement of the shutter which could deteriorate the bimetallic blade **21**. The shape of the guide bars **13** could be otherwise than represented in the drawing, for example they could extend in horizontal direction or be more inclined than those shown. The direction of these guide bars also determines the amount of opening of the shutter for any given curvature of blade **21**.

I claim:

1. In combination with the flue of a combustion apparatus having an opening for admitting air, a pivotally mounted shutter for controlling the admission of air through said opening, a thermostat subjected to the temperature of the gases passing through the flue, a slotted member carried by the shutter, a rod having one end connected to the thermostat and the other end engaging the slot in said member, and manually operable means for moving the slot engaging end of said rod along said slot to vary the rate of movement of said shutter under the action of the thermostat.

2. In combination with the flue of a combustion apparatus having an opening for admitting air, a pivotally mounted shutter for controlling the admission of air through said opening, a thermostat subjected to the temperature of the gases passing through the flue, a slotted member carried by the shutter, a rod having one end connected to the thermostat and the other end engaging said slotted member of the shutter, a fixed guide member exteriorly of said opening in the flue, and manually operable means movable along said guide member for moving the end of said rod engaging said slotted member along the slot therein to vary the rate of movement of the shutter under the action of the thermostat.

3. In combination with the flue of a combustion apparatus having an opening for admitting air, a pivotally mounted shutter for controlling the admission of air through said opening, a thermostatic blade subjected to the temperature of the gases passing through the flue, a bracket carried by said shutter and provided with a circularly curved slot, a rod having one end rotatably connected to said thermostatic blade and the other end engaged in said slot of the bracket carried by the shutter, a fixed guide member exteriorly of said opening in the flue, and manually operable means movable along said guide member and operatively connected to the end of said rod engaging said curved slot for moving said end along the slot to vary the rate of movement of the shutter under the action of the thermostatic blade, the center of curvature of said slot, when the shutter is in closed position and the thermostatic blade not subjected to heat, being situated on the axis of the rotatable connection between said rod and the blade.

4. In combination with the flue of a combustion apparatus having an opening for admitting air, a pivotally mounted shutter for controlling the admission of air through said opening, a thermostatic blade disposed within the flue, a slotted member carried by the shutter, a rod having one end rotatably connected to the thermostatic blade and the other end engaging said slotted member, a fixed guide member exteriorly of said opening in the flue, a manually operable slide movable along said guide member, and a slotted arm carried by the slide and engaging the end of said rod engaged in said slotted member of the shutter, whereby upon moving said slide along said fixed guide member said end of the rod being moved relative to said slotted member to vary the rate of movement of the shutter under the action of the thermostatic blade.

LOUIS MONNEY.