

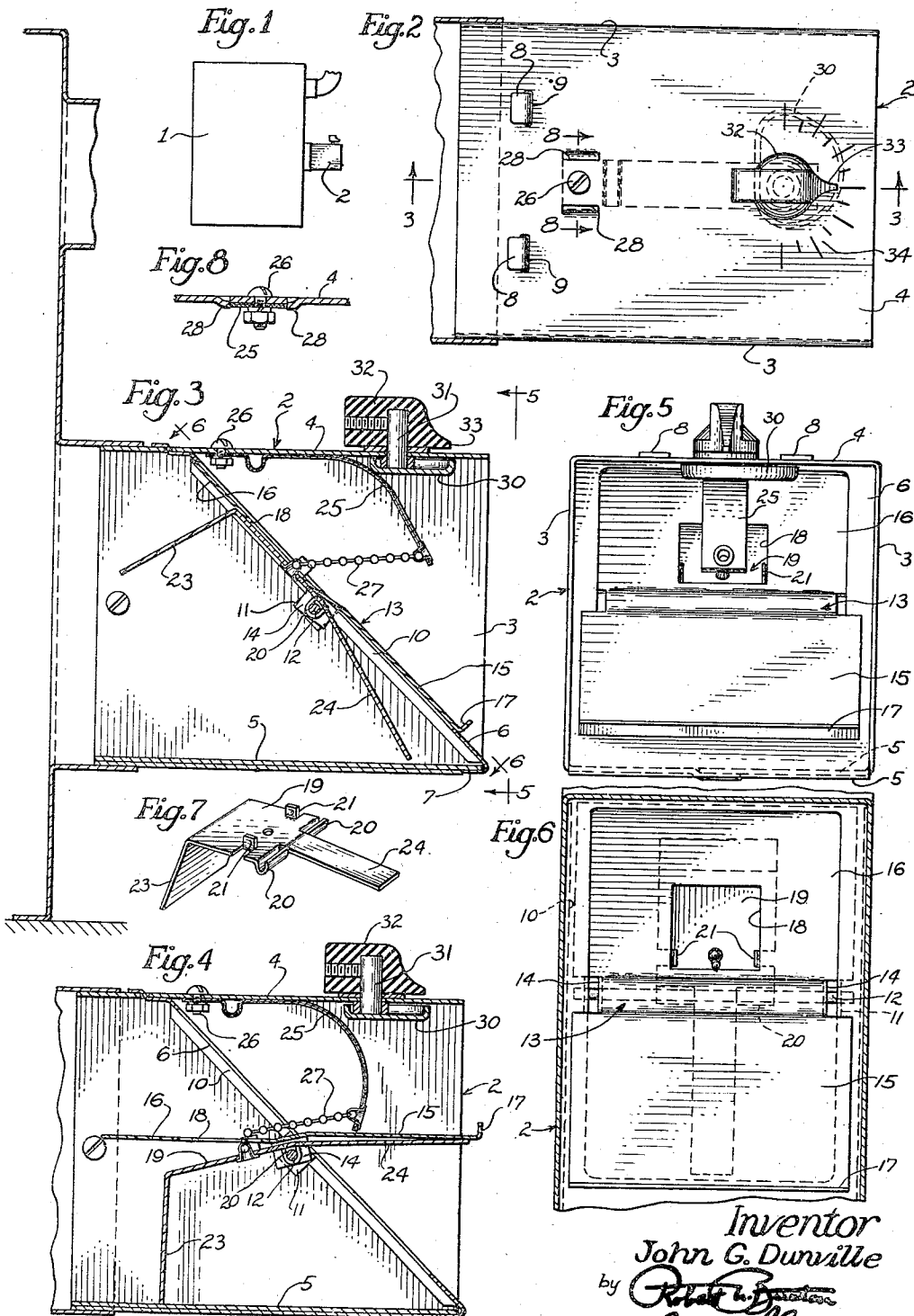
March 16, 1948.

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2,437,878

THERMOSTATIC DAMPER CONTROL

Filed June 7, 1943



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UNITED STATES PATENT OFFICE

2,437,878

THERMOSTATIC DAMPER CONTROL

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Application June 7, 1943, Serial No. 489,894

4 Claims. (Cl. 236—93)

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This invention relates to means for automatically controlling the air supply for combustion in a stove, furnace or the like, such means being designed to vary the air supply in response to changes of temperature of the air entering the supply duct. Such control is particularly adapted for use on small stoves or heaters which are used to heat the air in the room in which they are located, since in such cases the air supplied for combustion is a part of the air which is being heated by the stove.

One object of the invention is to provide an improved and novel air control mechanism adapted to respond to changes in temperature of the air supply which it controls.

Another object of the invention is to provide an air supply damper having a pilot damper associated therewith and thermostatic means connected to actuate the pilot damper in a direction for closing it in response to rise of temperature or permitting it to open in response to a drop in temperature, the same thermostatic means having a lost motion connection with the main damper which permits the latter to open in response to a further drop in temperature. It is also an object of the invention to provide an air supply duct with a main damper and pilot damper therein together with thermostatic control means for said dampers all designed for economical construction and efficient operation. Other objects and advantages of the invention will appear from the following description taken in connection with the drawings in which:

Fig. 1 is a diagrammatic side elevation representing a stove with an air supply duct embodying this invention applied thereto.

Fig. 2 is a top plan view of the air supply duct itself shown on a larger scale.

Fig. 3 is a vertical sectional view taken as indicated at line 3—3 on Fig. 2 and showing one wall of the stove and the air supply duct connected thereto, together with air control dampers in the duct and thermostatic means for actuating them, said dampers being shown in closed position.

Fig. 4 is a vertical sectional view similar to Fig. 3, but omitting the wall of the stove and showing the dampers at fully open position.

Fig. 5 is an end elevation taken as indicated at line 5—5 on Fig. 3.

Fig. 6 is a transverse section looking directly at the face of the dampers and their supporting frame and is taken as indicated at line 6—6 on Fig. 3.

Fig. 7 is a detail perspective view of the pilot damper alone.

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Fig. 8 is a detail sectional view taken as indicated at line 8—8 on Fig. 2.

While there is shown and described herein certain specific structure embodying the invention, it will be manifest to those skilled in the art that various modifications and re-arrangements of the parts may be made without departing from the spirit and scope of the invention, and that the same is not limited to the particular form herein disclosed, except in so far as indicated by the appended claims.

The stove 1 shown in Fig. 1 may be any conventional form of stove or heater in which air is employed to support combustion, and the structure which is the subject of this invention is included within the air supply duct 2 which is shown projecting from one side of the stove 1 in Fig. 1. Preferably, and for convenience of construction, the duct 2 is of rectangular cross-section as seen in Fig. 5, having side walls 3, 3, a top wall 4 and a bottom wall 5. Obliquely secured within this rectangular tube 2 is a sheet metal frame 6 having a flange 7 hooked around the front edge of the lower wall 5 of the air duct and having tongues or lugs 8, 8 which extend through slots 9, 9 in the top wall 4 and are bent down flatly against said wall to hold the frame in position. Said frame may also have lateral stiffening flanges 10 which fit snugly against the side walls 3 and which may be soldered or welded thereto if desired, though this is not of essential significance.

The lateral portions of the frame 6 provide lugs 11, 11 which are bent at right angles to the inclined plane of the frame and which support a pivot rod 12. A main damper plate 13 is formed with lugs 14 which are journaled on the pivot rod 12 and said damper plate includes a lower section 15 which in closed position rests against the outer face of the frame 6 as seen in Fig. 3, while the upper portion 16 of the damper fits snugly against the rear face of the frame 6 as also seen in Fig. 3. The lower edge of the section 15 includes a flange 17 which serves to stiffen this portion of the damper and also gives it a definite preponderance of weight over the upper portion 16 so that the main damper is initially biased by gravity to the closed position in which it is shown in Fig. 3.

The upper section 16 of the main damper includes an aperture 18 which is seen in Fig. 6 as a substantially square opening and a pilot damper 19 formed with U-shaped lugs 20 and fits over portions of the pivot rod 12, thus forming a pivotal mounting which is coaxial with the pivotal

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mounting of the main damper 13. Guide lugs 21, 21 project through the opening 18 adjacent its lateral margins to maintain the pilot damper 19 in proper relation to said opening. At the upper edge of the pilot damper portion which closes the opening 18 said pilot damper has a part 23 which extends angularly from the said portion and performs as a counterweight to bias the pilot damper by gravity to open position. Such open position is determined and limited by an arm 24 extending from the pilot damper below its pivot axis so as to swing against the rear or inner face of the main damper portion 15 when the pilot damper 19 swings away from the opening 18. The weight of the part 23 is sufficient to overbalance the marginal preponderance of weight mentioned above in section 15 of the main damper so that when the pilot damper swings open and the arm 24 engages the lower part 15 of the main damper both parts rotate about the pivot 12 until the portion 23 of the pilot damper strikes the bottom wall 5 of the air duct. Thus both dampers are normally biased by gravity to open position.

The thermostatic device shown in the drawings consists of a bimetallic bar or strip 25 having one end secured flatly against the under surface of the top wall 4 as by a bolt 26 and having its free end curved downwardly therefrom and connected by a flexible chain 27 to the pilot damper 19, as seen in Figs. 3 and 4. Figure 4 indicates approximately the form of the curved end portion of the thermostat 25 when cold and it may be understood that the two metallic components of the member 25 are so arranged that as its temperature increases its curvature tends to diminish, carrying the free end of the part 25 outwardly toward the outer end of the air duct 2 and away from the pivot axis of the dampers so that a pull is thus introduced through the chain 27 which first acts to swing the pilot damper 19 upward; this allows the main damper to tilt from its horizontal open position toward its inclined closed position, and finally the chain pulls the pilot damper into closed position against the inner face of the part 16, covering its aperture 18.

The curvature of the thermostatic member 25 may be somewhat modified so as to alter the position of its free end for a particular temperature by providing an adjustable stop with which a portion of the member 25 will engage as it changes form from one limit to the other. Such a stop is shown in the drawings as an eccentric disc 30 having a pivot shaft 31 journaled in the top wall 4 of the air duct 2 with a handle 32 secured to the shaft outside the duct and including a pointer 33 which may be arranged to traverse an arcuate scale 34 on the top wall 4 when the handle 32 is rotatively adjusted. It will be evident that such adjustment will determine the position of the free end of the arm 25 in accordance with the radius of the particular portion of the eccentric disc 30 which is presented for engagement with the intermediate portion of said arm 25 so that the thermostat may thus be caused to swing the dampers to full closed position at any chosen temperature within a limited range.

To insure that such adjustment of the eccentric disc 30 will not frictionally force the bimetallic element 25 laterally out of position and that said element shall be maintained positively in its proper relation to the other parts of the mechanism, the end portion of the element through which the securing bolt 26 extends is confined laterally by a pair of integral lugs 28 formed in the top wall 4 by slitting the wall and bending

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down the material at the slits as indicated in Fig. 8. Also as a convenient feature of construction, it may be noted that the U-shaped lugs 20, 20 engaging the pivot rod 12 require no special retaining means to hold them to the rod, since the chain 27 is constantly under tension exerted by the curved bimetallic thermostat arm 25 at all positions of its range of action and thus serves to hold the pilot damper on the rod 12.

I claim:

1. In combination with a stove or the like, an air supply duct therefor, a pivotally mounted main damper for said duct initially biased to closed position, said main damper having an aperture, a pilot damper pivoted coaxially with the main damper and dimensioned to close said aperture, biasing means urging the pilot damper toward open position relative to said aperture, temperature responsive means connected to said pilot damper holding it closed at a predetermined temperature and operative to release it from closed position in response to a drop in temperature, and a lost motion connection through which the pilot damper then acts to bias the main damper toward open position in response to a further drop in temperature.

2. In combination with a horizontally extending air supply duct for a stove or the like, a main damper in the duct inclined at closed position therein and pivoted at a horizontal axis intermediate its upper and lower edges on which it swings into a substantially horizontal position when fully opened, said damper having an aperture positioned above its pivot axis, a pilot damper dimensioned to close said aperture and pivotally supported at an axis below the aperture, said pilot damper being gravitationally biased to open position and having an arm which extends below the pivot axis of the main damper and engages the lower portion of said main damper when the pilot damper falls open, thereby biasing said main damper toward its open horizontal position, and temperature responsive means mounted in the duct and subject to the temperature of air entering said duct, together with a flexible tie connecting the pilot damper to said means operative to hold said pilot damper closed at a predetermined temperature and to release it from closed position in response to a drop in temperature, said arm of the pilot damper engaging the main damper and swinging it toward open position in response to movement of the temperature responsive means occasioned by a further drop in temperature.

3. In combination with a room heating stove or the like, a draft intake housing having a stove-communicating side and a room-communicating side, a pivoted primary valve for closing said housing normally biased to draft-closed position, a secondary valve pivoted coaxially with said primary valve and normally biased to draft-open position, means under the control of said secondary valve for engaging said primary valve to cause the latter to move to draft-open position, and temperature responsive means secured to the room side of said housing for operating said secondary valve and through it said primary valve for moving both of said valves to draft-closed position.

4. A draft regulating apparatus for room heating devices or the like comprising, a rectangular housing member having a horizontal supporting pivot transversely thereof intermediate its extremities which communicate with said device and

with a room atmosphere, a primary draft control valve carried by said supporting pivot and normally weighted to assume its draft-closed position and having therein a reduced-area aperture, a secondary valve also supported on said pivot and weighted to normally assume its draft-open position having a portion alined to cover said area aperture and a portion for engaging said primary valve to move the latter member to its draft-open position, a thermostatic control element secured to said housing member on the room atmosphere side of said primary and secondary valves, and a flexible member connecting said secondary valve with a thermostatic element for moving said secondary valve and through it said primary valve to draft-closing positions.

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