Dec. 2, 1941. R. C. SABINS 2,264,590

DAMPER CONSTRUCTION

Filed May 13, 1940

Fig. 1

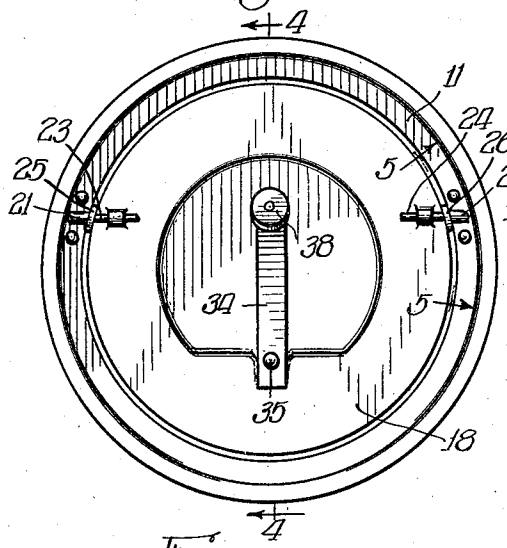


Fig. 2

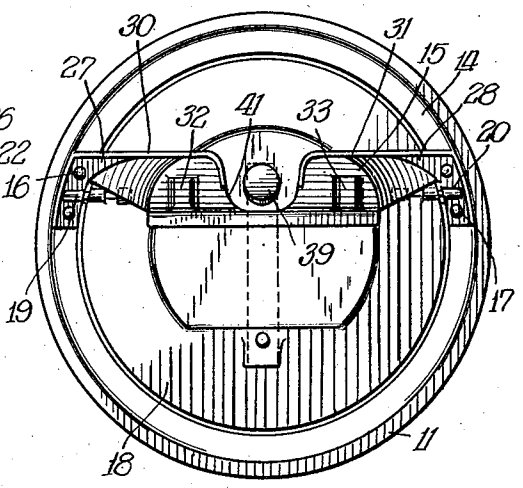


Fig. 3

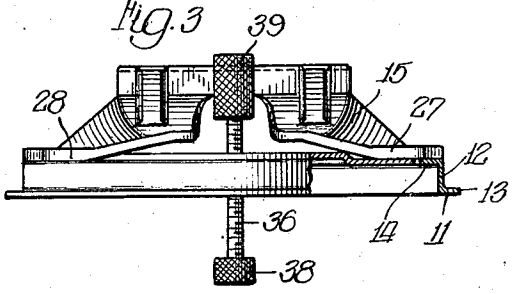


Fig. 4

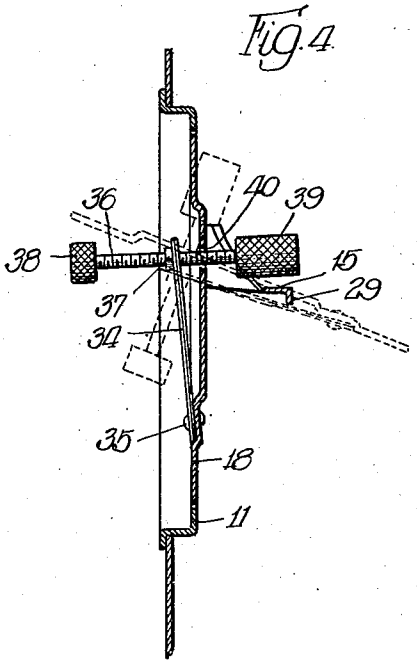
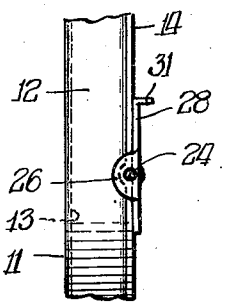


Fig. 5



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Patented Dec. 2, 1941 2,264,590

UNITED STATES PATENT OFFICE

2,264,590

DAMPER CONSTRUCTION

Rolland C. Sabins, Wisconsin Rapids, Wis.

Application May 13, 1940, Serial No. 334,721

6 Claims. (Cl. 236—45)

This invention relates to a new and improved damper construction and more particularly to a rigidly constructed damper support with a damper freely movable therein.

My invention is especially adapted for application to dampers of the type used in flues or stoves to control draft by permitting greater or less influx of air into the flue or stove chamber. With greater amounts of air flowing through the damper the effective draft on the burner or fire pot is reduced while when the damper is closed the effective draft is increased.

While the present invention may be used in connection with dampers having manually adjustable damper weights, it is particularly applicable for use with thermostatically controlled dampers of the type shown in my copending application Serial No. 256,448 filed February 13, 1939.

Dampers of this general type must be mounted so as to swing freely on their pivots so as to vary the effective damper opening upon slight changes in draft or temperature conditions. Where the damper is mounted in a damper frame made of light sheet metal there is a tendency for the damper frame to be forced out of round upon its insertion in the flue or stove openings. Also in use the damper frame may become distorted due to warping of the supporting structure upon repeated heating and cooling in use. Such warping or distortion of the damper frame may move the damper pivots out of alignment or cause a binding action by taking up the necessary clearances between the frame and the damper. These actions may result in binding the damper so that it does not operate properly or it may be locked and fail to function at all.

It is an object of the present invention to provide a damper construction in which the damper frame is rigidly braced to prevent distortion.

It is a further object to provide bracing of such a character that it forms a portion of the hinge support structure and facilitates assembly of the apparatus.

It is also an object to provide spacing means in combination with the bracing so that the damper is definitely located relative to the frame and properly spaced therefrom.

It is another object to provide bracing means which also acts as stop means for limiting movement of the damper vane in either direction and which does not substantially obstruct the effective damper opening.

It is an additional object to provide a construction which is simple in design and composed of but few parts, whereby it is adapted for commercial production and use.

Other and further objects will appear as the description proceeds.

I have shown a preferred embodiment of my invention in the accompanying drawing, in which—

Figure 1 is a face view of the damper construction as seen from the outside;

Figure 2 is a view similar to Figure 1 but showing the damper construction as seen from the inside of the stove or flue with which it is associated;

Figure 3 is a view of the construction of Figure 1 as seen from above, parts being broken away to show the construction more clearly;

Figure 4 is a vertical section taken on line 4—4 of Figure 1; and

Figure 5 is a fragmentary section taken on line 5—5 of Figure 1.

In the drawing, the damper frame 11 is shown as comprising a cylindrical flange 12 adapted to seat in a flue opening or in a circular opening in a stove construction. The damper frame is provided with a flat outer flange 13 adapted to seat against the supporting structure to limit its inward movement relative thereto. It is further provided with an inwardly located inturned flat flange 14 which closes a portion of the flue opening and also serves as a support for the brace member and damper hinge construction. The brace member 15 is shown as a unitary member formed of pressed steel extending transversely across the opening in the damper frame, and with its ends riveted at 16 and 17 to the flange 14 of the frame.

The brace member 15 is shown in plan view in Figure 3 and in section in Figure 4. This member extends rearwardly behind the damper vane 18 at approximately the line of the bearing supporting the vane for pivoted movement. The member 15 is provided with the depressed portions 19 and 20 which are opposite similar depressed portions 21 and 22 formed in the flange 14 of the damper frame 11. These opposed depressed portions serve as bearings for the pivot members 23 and 24 which are secured to the damper vane 18 and extend into the bearings. The brace member 15 is also provided with inturned ears 25 and 26 which pass inwardly opposite the bearings and are provided with perforations in alignment with the bearings. The ears 25 and 26 serve also as spacing elements to keep the damper vane 18 located concentrically in the opening in the damper frame 11. This main-

tains the damper in proper relationship so that it does not bind or have its edges engaging the edges of the opening at any point.

As shown in Figures 2 and 3, the brace member 15 is provided with portions 27 and 28 which engage the inner face of the damper slightly above the pivot when the damper is in vertical position. They prevent the damper from swinging in such a direction that the top of the damper moves inwardly, with the bottom of the damper moving outwardly. As shown in Figure 4, the member is also provided with a downturned flange 29 which is adapted to engage the rear face of the lower portion of the damper when that portion swings inwardly to limit such inward movement of the damper. The brace member 15 is provided with inturned edge flanges 30 and 31 and with the corrugated portions 32 and 33 to assist in making the member more rigid.

The damper vane 18 has a bi-metallic strip 34 secured thereto by rivet 35, this strip being located on the outer face of the damper. The weight rod 36 is threaded through the upper end of the strip 34 and is provided with a lock nut 37 to maintain it in adjusted position. The rod 36 carries the knurled adjusting knob 38 and the weight 39. The rod 36 extends through an opening 40 in the damper 18 and the weight 39 is located inwardly of the damper. As is shown in the drawing, especially Figure 2, the brace member 15 is provided with an intermediate U-shaped cutaway portion 41 to permit this location of the weight 39 and to permit it to move freely without engaging the cross brace.

The cross brace is important in that it provides a rigid supporting structure for the swinging damper. This prevents the damper frame from being distorted or pressed out of round in its installation or during use, which distortion would tend to bind the damper or render it entirely inoperative. The cross member also provides pivoted bearings for the damper which are permanently aligned and permit free operation. In addition, the cross brace is provided with inturned ears having perforations which serve as supplemental bearings, while the ears, themselves, have the important function of maintaining proper spacing of the damper in its supporting frame. This proper spacing prevents binding between the edges of the damper and the frame.

The construction is particularly adapted for use in connection with a thermostatically controlled damper of the type shown. Such dampers may be accurately balanced by proper adjustment of the weight and must be freely movable in their bearings when the counterbalance weight is moved by the thermostatic support under the influence of changes in temperature. The bi-metallic strip 34 is of such a character that when the strip becomes heated it tends to curve to the right, as shown in Figure 4, the strip thus moving in toward the body of the damper 18. This serves to move the weight 39 to the right, increasing its effective lever arm which holds the upper portion of the damper 18 against the stop portions 27 and 28 of the cross brace member. This greater effect of the weight 39 requires a greater draft within the flue or stove in order that the damper may be swung toward the open or dotted line position shown in Figure 4.

It will be understood that Figure 4 shows the extreme limit of opening movement and that in normal use and operation the damper may only fluctuate slightly from the vertical. With the damper closed or nearly closed, the amount of air coming in past the damper is reduced and this serves to increase the effective draft upon the stove itself. Where the draft control is used upon oil burners, increased effective draft is necessary to take care of increased combustion in the stove. The amount of combustion in a stove using an oil burner is controlled by adjustment of the oil feed valve. The damper itself is a secondary control serving to vary air admitted to provide proper draft for the amount of fuel to be burned. This is taken care of automatically in the damper provided with the thermostatic control, since increased heat swings the thermostatic element 34 in such manner as to tend to close the damper or maintain it nearer the closed position.

When the thermostatic damper is used in connection with stoves or heaters burning solid fuel, the damper may be the primary control since the fuel feed is ordinarily not continuously controlled when burning such fuel. In this case the thermostatic element 34 may be installed facing in the opposite direction, since the draft requirements are the opposite of those with an oil burner. With a solid fuel burner it is normally desirable to increase the draft when the fire is low, in order to increase the amount of combustion. Thus it is desirable with such stoves to increase the draft when the thermostatic element becomes cold and to reduce the draft when the thermostatic element becomes hot. It will be understood that the damper may be designed and applied to any type of stove or heater using any kind of fuel.

The location of the thermostatic strip 34 outside of the flue has important advantages. It prevents corrosion of the strip by the flue gases and prevents it from becoming coated with an insulating layer of soot. It has the additional valuable feature of permitting the control to be partly responsive to the temperature of the surrounding air rather than solely responsive to the flue gases. This is particularly important where the damper is applied to a stove serving partly or wholly for space heating purposes. While the cross brace shown is particularly advantageous in connection with a thermostatically controlled damper, it may be used with dampers provided merely with manually adjustable weights or counterbalances and will insure proper operation of such dampers free from binding caused by distortion or by engagement of the vane with portions of the supporting structure.

While I have shown one preferred form of my invention, this is to be understood to be illustrative only as it is capable of change to meet differing conditions and requirements and I contemplate such modifications as come within the spirit and scope of the appended claims.

What is claimed is:

1. In a damper construction, a damper frame, an elongated brace member extending transversely of the frame and with its ends secured thereto, and a damper pivotally supported in the frame and brace assembly, the brace member extending parallel to the pivotal axis of the damper having stop portions extending upon opposite sides of the damper pivot to limit movement of the damper in either direction.

2. In a damper construction, a damper frame having an opening therein, an elongated brace member extending across an intermediate portion of the frame opening and having its ends

secured to the frame, a damper pivotally mounted in the frame and brace assembly within the frame opening, and inturned ears on the brace member extending into the frame opening at the periphery of said damper between the edge of the damper and the damper frame to space the damper in said opening.

3. In a damper construction, a damper frame having an opening therein, a brace member extending across the frame opening and having its ends secured to the frame, a damper pivotally mounted in the frame and brace assembly within the frame opening, and inturned ears on the brace member extending into the frame opening at the periphery of said damper to space the damper in said opening, the ears being perforated and the damper having pivot members extending through said perforations.

4. In a damper construction, a damper frame having an opening therein, a brace member extending transversely of the frame and having its ends secured to the frame, the brace ends and frame having opposed depressed portions forming bearings, and a damper fitted in the frame opening and having pivot members fitting in said bearings.

5. In a damper construction, a damper frame having an opening therein, a brace member extending transversely of the frame and having its ends secured to the frame, the brace ends and frame having opposed depressed portions forming bearings, and a damper fitted in the frame opening and having pivot members fitting in said bearings, the brace member having stop portions to be engaged by the damper to limit damper movement in either direction.

6. In a damper construction, a damper frame having an opening therein, a brace member extending transversely of the frame and having its ends secured to the frame, the brace ends and frame having opposed depressed portions forming bearings, the brace member having inturned ears extending within the frame opening, said ears having perforations aligned with the bearings, and a damper fitted in the frame opening between the ears and having pivot members extending through the perforations and fitting in said bearings.

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