

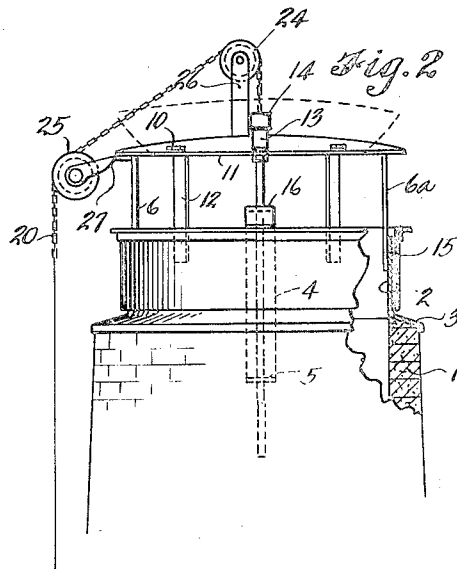
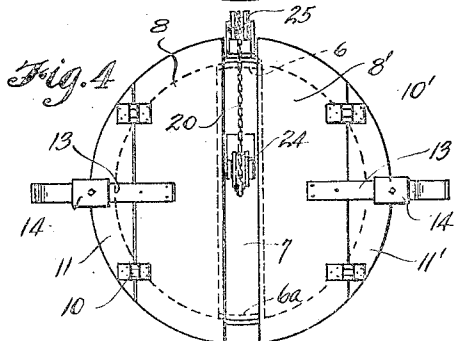
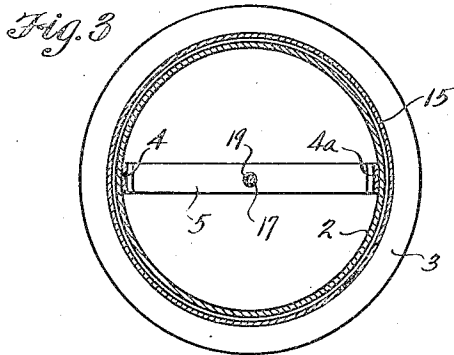
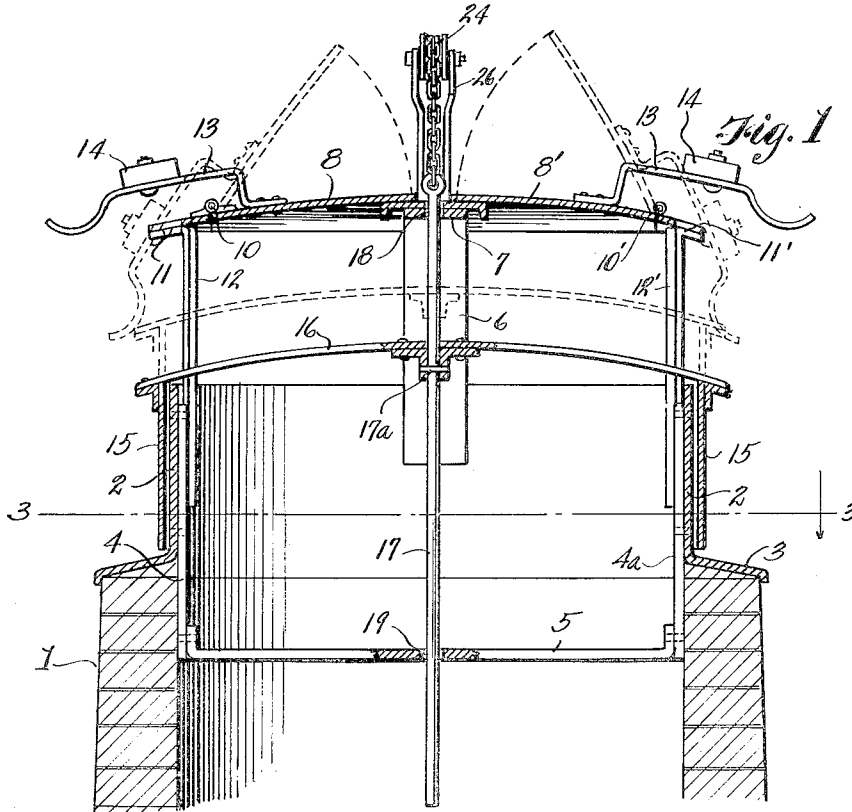
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FURNACE DRAFT CONTROL DEVICE

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FURNACE DRAFT CONTROL DEVICE

Application filed April 23, 1930. Serial No. 446,495.

This invention relates to improvements in draft control means for furnaces, and it has reference in particular to a device for that purpose which is located at the upper, or discharge end of the furnace stack.

It is the principal object of the present invention to provide a draft control device which is an improvement upon the device described in my application for patent Serial No. 575,993, filed in the United States Patent Office on July 19, 1922, and whereby an operator may control, or regulate to a very exact degree, the volume of air passing through the furnace to thereby obtain perfect combustion, and the greatest possible degree of efficiency from the furnace; also to make possible the control in velocity of the gases of combustion passing through the furnace so that there shall be sufficient time for the boiler or other surfaces heated to absorb the maximum amount of heat possible before the hot gases pass into the stack.

Another object of the invention resides in the provision of a device as before set forth, which will not in any way obstruct the free passage of gases through the stack, and which, in the event of a flare back or explosion in the furnace, does not cause the gases to be baffled as when stack dampers or breeching are used.

It is also an object of the invention to provide a device of the above character embodying a manually adjustable section whereby the size of the outlet at the top of the stack may be accurately controlled, and to provide in connection therewith, hinged closure sections which will yield readily to any added pressure and thus serve automatically after the fashion of a safety valve.

Other objects of the invention reside in the various details of construction and in the combination of parts, and in their mode of operation, as will hereinafter be described.

In accomplishing these and other objects, I have provided the improved details of construction, the preferred forms of which are illustrated in the accompanying drawing, wherein—

Fig. 1 is a vertical section of the upper end of a stack to which a furnace draft control

device, embodied by the present invention, is applied.

Fig. 2 is a side elevation of the same, a part being broken away for better illustration.

Fig. 3 is a horizontal, cross section taken on the line 3—3 in Fig. 1.

Fig. 4 is a top view of the device as applied to the upper end of a stack.

Referring more in detail to the drawing—

1 designates what may be the upper end of a stack, such as is provided for carrying off the smoke and gases of combustion from a furnace; the stack here being shown to be of circular cross section, but it is to be understood that the present device is applicable to stacks that are rectangular, or any other cross sectional shape.

Fitted upon the upper end of the stack is a frame structure comprising a cylindrical upper or body portion 2 which forms a continuation of the stack passage, and which is provided at its lower end with an annular, outwardly directed flange 3 which rests upon and is suitably sealed or attached to the upper end of the stack. Fixed to the inside of the cylindrical frame 2, at diametrically opposite points, and depending downwardly within the stack to equal extent, are bars 4 and 4a, and joining the lower ends of these bars and extending diametrically of the stack is a narrow cross bar 5. Also fixed to the cylindrical portion 2, and in a plane, which is at a right angle to the vertical plane of the cross bar 5, is a yoke-like member comprising upright leg portions 6 and 6a, which are fixed to the cylinder 2 at opposite sides thereof, and which are joined across the upper ends by an upwardly crowned bar 7 which is disposed somewhat above the top edge, or outlet end of the cylindrical body portion 2.

Supported, in spaced relation, above the upper end of the cylindrical frame 2 is a circular cover, or dome, consisting of a pair of complementary half sections 8 and 8'. These are hingedly attached, as at 10 and 10', to open upwardly and outwardly from closed position toward open position, as indicated in dotted lines in Figure 1. These sections are supported at their outer, or hinged edges, respectively, from supporting plates 11 and

11', which in turn are rigidly supported through the medium of legs 12 and 12' from the upper edge of the frame member 2. When the two hinged sections are closed, 5 their adjacent free edges rest upon the cross bar 7 of the yoke and these hinged sections, together with the plates 11—11', and the cross bar 7 of the yoke, form a cover or dome directly above the stack outlet. Each of the 10 hinged sections has a bracket 13 fixed thereto which extends above and outwardly across the hinge line, and counterweights 14 are fixed thereon which substantially balance the sections to effect a very easy swinging operation. The weights are so adjusted, how- 15 ever, that the sections will move from open to closed positions of their own accord, but their upward movement is easily accomplished.

Enclosing the body portion 2 is a cylindrical sleeve or collar 15 which may be raised 20 and lowered thereon to fully open or to close the annular open space between the dome and the top edge of the frame 2. This sleeve is suspended by a bar 16 which is fixed diametrically thereof across its upper end. A 25 supporting shaft 17 extends vertically and centrally through the cross bar 16 and is fixed thereto, as at 17a, and it is slidably guided in vertically aligned apertures 18 and 30 19 in the cross bar 7 of the yoke and the lower frame cross bar 5, respectively. The sleeve 15 is raised or lowered by means of a suspending chain or cable 20, which is fixed to the upper end of the shaft 17 and which 35 passes over pulleys 24 and 25 supported from the yoke by brackets 26 and 27, respectively, and then extends downwardly along the stack and may be connected with any suitable mechanism, not herein shown, whereby the 40 operator of the furnace may cause the sleeve to be raised or lowered as he desires.

Assuming the device to be so constructed, its operation would be as follows: When the furnace is operating at full draft, the collar, 45 or sleeve 15 rests upon the flange 3 of the frame structure and its upper edge is then substantially even with the top edge of the frame cylinder 2 thereby providing a maximum opening between the dome or cover. 50 The hinged sections of the dome normally, by reason of their weight, will be retained in closed position, as shown in Figure 1. If it is desired to somewhat retard the draft, the operator, through the medium of the 55 connecting cable 20, raises the collar thereby closing, to the desired extent, the opening that is provided between the upper edge of the collar and the dome; it being readily apparent that the draft is dependent on the 60 size of the outlet through which the gases escape. In case there should for any reason be any sudden increase of pressure in the stack, the hinged sections of the dome will open upwardly by reason thereof to relieve 65 this pressure and will then close of their

own accord when the pressure subsides. By this provision, flare backs are prevented and the draft of the entire furnace is controlled in the most satisfactory manner. Any 70 change in pressure in the stack which may be due to varying wind velocity or sudden changes in gas pressures are quickly compensated for or automatically relieved with the result of an economy of fuel and a great 75 saving of labor. Should, for any cause, the hinged sections of the dome remain open, they may be closed by raising the collar upwardly in such manner as to contact with the downwardly curved ends of the supporting brackets for the counterweights; this 80 provision being made in order that wind or weather can not operate to retain them open.

Devices of this character have been found to be very desirable for high stacks where the natural draft is hard to control, as it 85 affords a manual means for controlling the varying conditions incident to changes in weather, fuel, and requirements for any particular purpose.

Having thus described my invention, what I claim as new therein and desire to secure by Letters-Patent, is: 90

1. In combination with a furnace stack, a draft control applied to the discharge end of the stack and comprising a cover member 95 spaced above the discharge end of the stack, an adjustable means between the stack end and cover for varying the area of the outlet; said cover comprising upwardly yieldable sections adapted to be moved to open position by pressure of gases delivered from the 100 stack.

2. The combination with a furnace stack, of a draft control device applied to the discharge end of the stack, and comprising a 105 closure member supported above the end of the stack and providing an outlet between the stack end and the cover; said cover comprising normally closed, upwardly yieldable sections, and a closure member manually adjustable between the cover and the stack end to regulate the outlet area. 110

3. The combination with a furnace stack, of a draft control device applied to the upper end of the stack and comprising a 115 frame member serving as a continuation of the stack passage, a cover member supported from the frame member in spaced relation above the latter and providing an annular discharge space between it and the cover; 120 said cover comprising upwardly opening opposite side sections adapted to close of their own weight and provided with counterbalancing means, and a sleeve associated with the frame member to be moved upward- 125 ly or downwardly to vary the outlet area between the frame and the cover, and manually operable means for adjusting the sleeve.

4. The combination with a furnace stack, of a draft control device applied to the upper 130

end of the stack and comprising a frame structure including a cylindrical body having a supporting flange whereby it is mounted on the stack end as a continuation of the stack passage, a cross bar supported from the frame within the stack, a cover member disposed in spaced relation above the upper end of the frame and supported by a plurality of legs from the cylindrical body; said cover comprising a pair of upwardly opening sections normally in closed position, counterweights for said sections, a sleeve enclosing the cylindrical body portion of the frame, a supporting shaft for the sleeve, guide pulleys mounted on the frame, a cable extended over the pulleys and attached to the shaft to support the sleeve and whereby it may be adjusted vertically to regulate the area of the outlet between the stack and the cover.

Signed at Tacoma, Wash. this seventeenth day of March 1930.

ALBERT D. ARPER.