

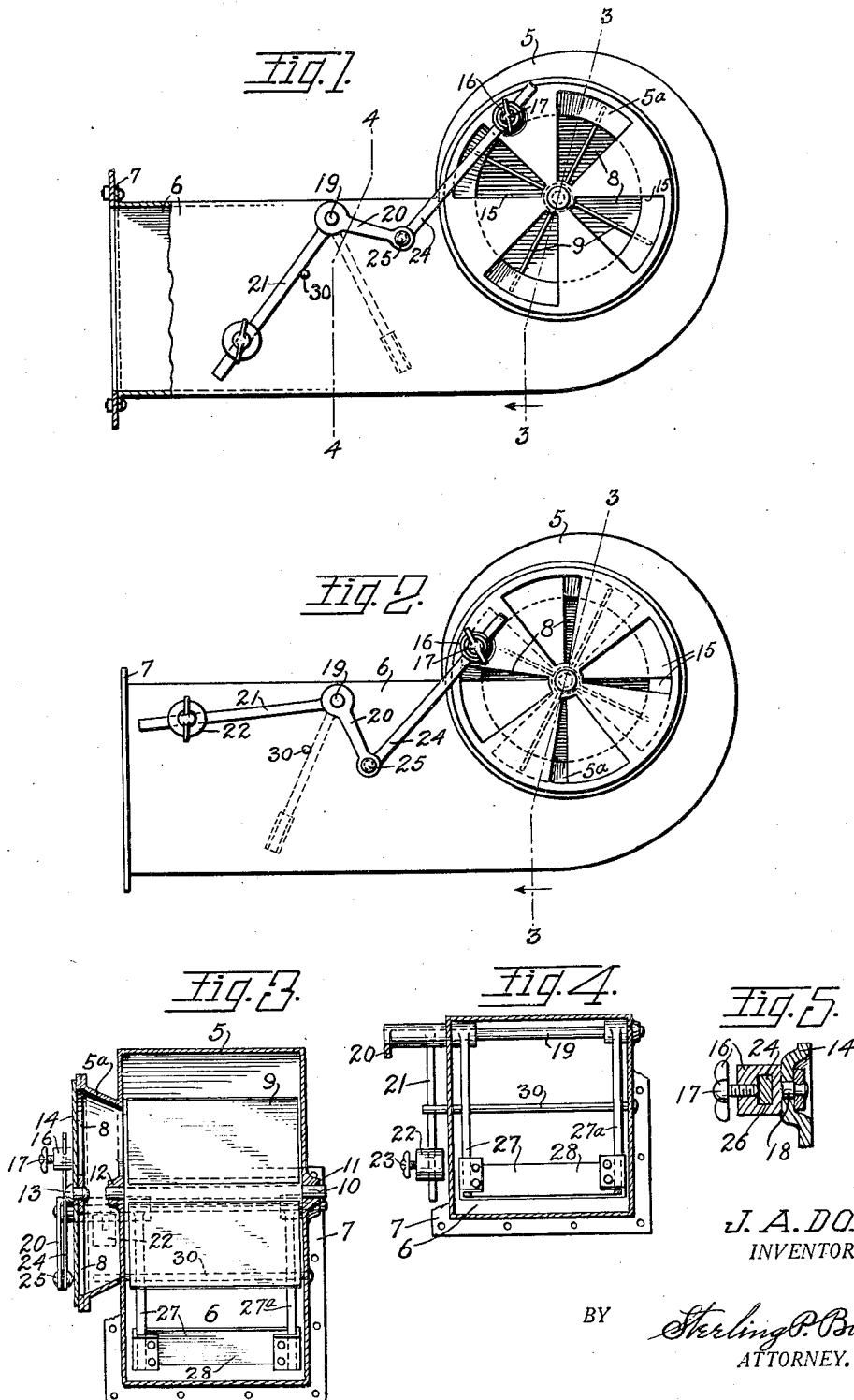
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AUTOMATIC AIR DRAFT REGULATOR

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AUTOMATIC AIR-DRAFT REGULATOR

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3 Claims. (Cl. 230-114)

This invention relates to air-draft regulators, and especially to an improved automatic air-draft regulator.

One object of this invention is to provide a thoroughly practical, effective and reliable air-draft regulator which overcomes resistance against the air-draft by increasing the volume and force of the air-draft, and which automatically decreases the volume and force of the air-draft when said resistance is decreased.

A further object is to provide a device of this kind which is particularly useful in regulating the forced draft from a fan through a fuel-bed in a grate or stoker, thus assuring sufficient air in the fuel-bed to obtain proper combustion, while avoiding excessive draft when the fuel-bed is thin or excessively pervious, and while the fan operates at constant speed; thereby to produce and maintain the maximum amount of heat from the fuel, while maintaining a relatively even or constant temperature over the fuel-bed.

Another object is to provide an improved draft regulator at the minimum cost of production and installation, and which occupies relatively little floor-space when installed, also, which can be installed without making any costly or radical change in the furnace to which it can be attached by an unskilled mechanic of ordinary ability.

Other objects and important features are pointed out or implied in the following details of description, in connection with the accompanying drawing in which:

Fig. 1 is a side elevation of the device having its parts in the position for admitting the maximum amount of air into the fan-casing, as when the resistance is excessive at the outlet of the air-duct.

Fig. 2 is a view similar to Fig. 1 but the parts being in the position for approximately closing the damper or air-inlet regulator, as when the resistance at the outlet end of the air-duct is slight.

Fig. 3 is a cross sectional view taken along the lines 3-3 of Figs. 1 and 2, the parts being in the position as in Fig. 2.

Fig. 4 is a cross sectional view taken along the line 4-4 of Fig. 1.

Fig. 5 is an enlarged sectional detail view of the pivotal adjusting assembly.

Referring to the drawing in detail, in which similar reference numerals correspond to similar parts in the several views, the invention is described in detail as follows:

The main body of the device constitutes a

unitary hollow member which comprises a fan-casing 5 and an air-duct 6, the latter being provided with a securing flange 7, or other appropriate means for securing it to a furnace or other apparatus to which it is to supply a forced air-draft for any needed purpose, for instance, regulating combustion of fuel on a grate or stoker. Of course this air-duct 6 is open throughout its length, and communicates with the interior of the fan-casing and with the outer air, or with an air-space under a furnace. The fan casing communicates with the outer air through a circular series of air-inlets 8 that are separated by imperforate parts arranged within a flared outer part or funnel-like annulus 5a forming the main inlet air-passage whose inner end is in close proximity to a fan-rotor 9 which may be of any appropriate type and which includes an axle 10 that is journaled in the opposite sides of the fan-casing, on roller bearings, or in other appropriate bearings, at 11 and 12. A bearing 13 is concentric with the series of air-inlets 8 and carries a circular shutter 14 having openings 15 therethrough of the same size and shape as the air-inlets 8, these inlets or openings being separated by imperforate parts or closure elements which are movable into and out of position for closing the air-inlets by rotary motion of the shutter. This shutter and the air-inlets constitute the damper referred to in the foregoing. A clamp 16, preferably including a winged screw 17, is pivoted at 18 and constitutes a part of the means to operate the shutter.

An axle or rock-shaft 19 is journaled in the upper part of the air-duct 6 and extends horizontally therethrough and parallel to the shaft 10 of the fan-rotor. This rock-shaft has two arms 20 and 21 united therewith, the shutter-actuating arm 20 being outside of the air-duct, and the weighted arm 21 preferably being outside and having a weight 22 adjustably secured thereon by means of a clamp-screw 23, these arms preferably being at an obtuse angle to one another, as shown, the arm 21 being pendent in Fig. 1, but substantially or approximately horizontal in Fig. 2 and in normal or intermediate position, and the arm 20 being downwardly inclined towards the link 24 that is pivoted thereto at 25 and adjustably engaged with the pivotally mounted clamp 16. The link 24 is slidable through an opening 26 when the screw 17 is loose, but held in each of its adjusted positions by the screw when the latter is tightened against the link. By this adjusting means, the shutter is adjustable relative to its operating device while

the latter's movements are restricted to certain limits by a stop-member such as presently described.

Within the air-duct an air-pressed member or vane 27 is secured to the rock-shaft 19. This vane is preferably of the 3-piece type shown, viz., composed of two arms 27a and a plate 28 secured together by any appropriate means, an opening or large air-passage being provided therethrough, over the plate 28, so the air-draft can pass the vane while exerting a pressure against the plate and thereby causing the rock-shaft 19, arm 20 and link 24 to cooperate with the clamp 16 for moving the shutter on its pivot and thereby closing or partly closing the air-inlets, the movement of the shutter being commensurate with the force of the air-draft against the plate 28 and the consequent movement of the vane from the extreme rearward (rightward) position to the extreme forward (leftward) position. From the foregoing, it is seen that the parts 19, 20, 21, 22, 24, 16, 17 and 18 combine to constitute an operating device that includes pivots that are adjustable towards and from one another and that are respectively engaged with the shutter and with the actuating arm of this operating device, so that the shutter can be moved to various limits while the limits of the operating device are fixed by the stop-member presently described.

As an effective and economical means of stopping the parts at both extreme positions, a rod or stop member 30 extends laterally through and beyond the air-duct 6 and fixed thereto, against lateral movement, at such position that the arms 27 are stopped thereby when they have reached their intended extreme forward positions and when the shutter is at the adjusted closing or near-closing position. Whether the shutter is entirely or only partly closed, when the arms 27 are against the rod 30, depends on the adjustment of the link 24 in the clamp 16.

It should be understood that the purpose of the weight 22 is to combine with the arm 21 for turning the rock-shaft back to normal, at which time the air-inlets are wide open, and the second important function of the rod 30 is to prevent the shutter from being moved far enough to partly close the air-inlets when they should be at the normal wide-open position. A second function of the weight 22 is to resist the movement of the vane more and more as the force of the air-draft increases or tends to increase, so that the shutter is held practically stationary, at the desired adjustment, for a given resistance of the fuel-bed or other obstruction. The resistance afforded by the weight 22 is in proportion to its adjustment along the arm 21, because of the changes of leverage, as appears to be obvious.

In contradistinction to previously known devices for a similar purpose, this device is a complete unit without separate parts to be connected or disconnected in preparing to secure the device to the furnace or other apparatus to be served thereby.

While this invention is very specifically described and shown herein and in the drawing, there is no intention to limit the invention or its protection to these exact details of construction, combination or application, for the invention is susceptible of numerous changes within the scope of the inventive ideas, as implied and claimed.

What I claim as my invention is:

1. In an automatic draft-regulating device, the combination of a unitary hollow member comprising a fan-casing and an air-duct in immediate open communication with one another, a fan-

rotor journaled in said fan-casing and operable to force air through said air-duct, said fan-casing having an air-inlet therein, a rotary shutter pivotally connected to said fan-casing in axial alignment with the fan-rotor and operable across said air-inlet for varying the flow of air into the fan-casing through said air-inlet, a rock-shaft journaled in said air-duct and having thereon an air-actuated vane and a weighted arm and shutter-actuating arm, said air-actuated vane being within the air-duct, said weighted arm being secured to said rock-shaft and disposed substantially horizontally and outside of the air-duct and having a weight mounted for adjusting movement thereon towards and from the rock-shaft for turning the latter with varying degrees of force, and a link pivotally connected to said rock-shaft and to said shutter for turning the latter towards its closing position and thereby varying the rate of flow of air through said air-inlet, the said link and rock-shaft and arm and adjustable weight being mutually cooperative for turning said shutter towards its opening position against pressure of the air from said fan-rotor, the said vane having its major air-engaging part remote from said rock-shaft so as to provide an air-passage through the vane and so that the said air-engaging part is located for maximum efficiency with respect to transmitting the force of the air-draft to the rock-shaft and thence to the said shutter, and a rod secured in a wall of said air-duct and extending inward and outward therefrom and located between said weighted arm and shutter-actuated arm in a proper relation to arrest the forward motion of the vane and the rearward motion of the weighted arm.

2. In an automatic air-draft regulating device, the combination of a unitary hollow member comprising a fan-casing and an air-duct in open communication with one another, a fan-rotor journaled in said fan-casing and operable to force air through said air-duct, said fan-casing having an air-inlet therein, a shutter movably connected to said fan-casing and being operable across said air-inlet for varying the flow of air into the fan-casing through said air-inlet, a rock-shaft journaled in said air-duct and having thereon an air-actuated vane and a weighted arm and a shutter-actuating arm, said air-actuated vane being within the air-duct, said weighted arm being united with said rock-shaft and normally in approximately horizontal position outside of the air-duct and being operable for imparting rotary movement to the rock-shaft, a link pivotally connected to said rock-shaft and to said shutter and operable for turning the shutter towards its closing position and thereby varying the rate of flow of air through said air-inlet, the said link and rock-shaft and arm and weight being mutually cooperative for turning said shutter towards its opening position against pressure of the air from said fan-rotor, and a stop member secured to a wall of the air-duct and extending inward and outward therefrom and located between said weighted arm and shutter-actuating arm in a proper relation to arrest the forward motion of the vane and the rearward motion of the weighted arm.

3. In an automatic draft-regulating device, the combination of a unitary hollow member comprising a fan-casing and an air-duct in open communication with one another; a fan-rotor journaled in said fan-casing and being operable to force air through said air-duct; said fan-casing having an air-inlet therein; a shutter movably

secured to said fan-casing and being operable across said air-inlet for varying the flow of air into the fan-casing through said air-inlet; an operating device including a rock-shaft journaled 5 in said air-duct, an air-actuated vane united with the rock-shaft and depending therefrom within the air-duct, a normally approximately horizontal weighted arm united with said rock-shaft and extending forward therefrom outside of the air-duct, an actuating arm united with the rock- 10 shaft and disposed at an obtuse angle to said weighted arm and located outside of said air-duct, and a link provided with pivots adjustable toward and from one another, one of said pivots being connected to said actuating arm and the other pivot being connected to said shutter; and a stop- 5 member fixed on said air-duct in an effective position for being met by said operating device and thereby limiting the operating movements of the latter under influence of its weighted arm and its air-actuated vane. 10

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