May 1, 1934. A. C. BRIDGE 1,957,197

EQUIPOISE DAMPER FOR FURNACES

Filed July 11, 1932

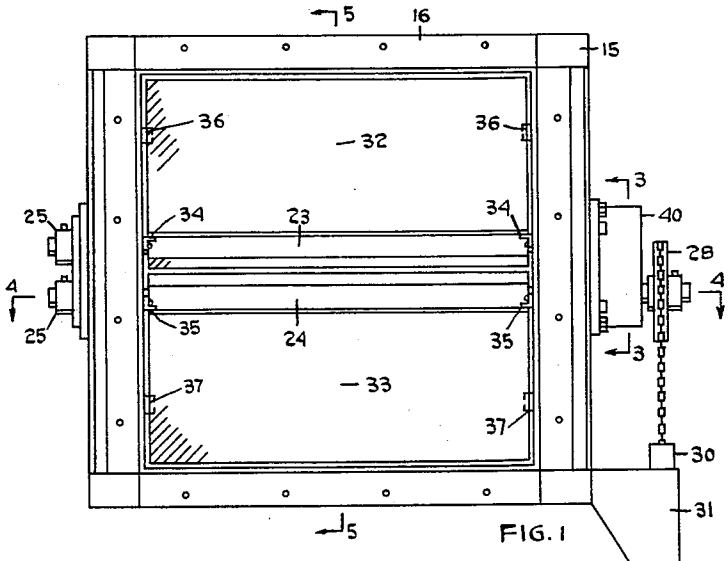


FIG. 1

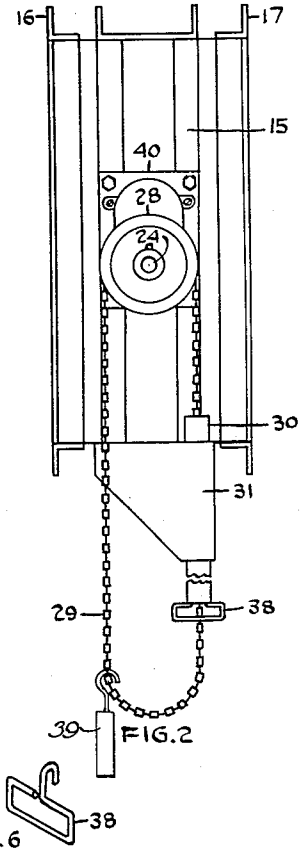


FIG. 2

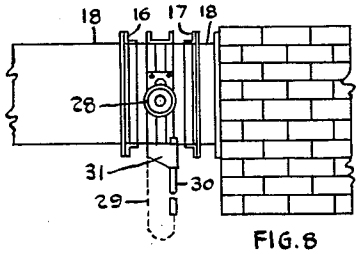


FIG. 8

FIG. 6

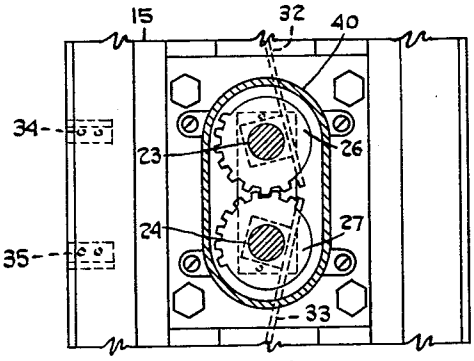


FIG. 3

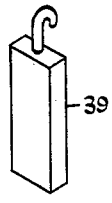


FIG. 7

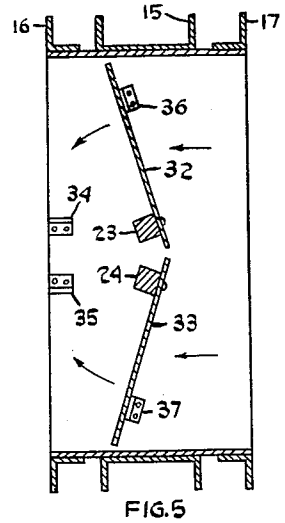


FIG. 5

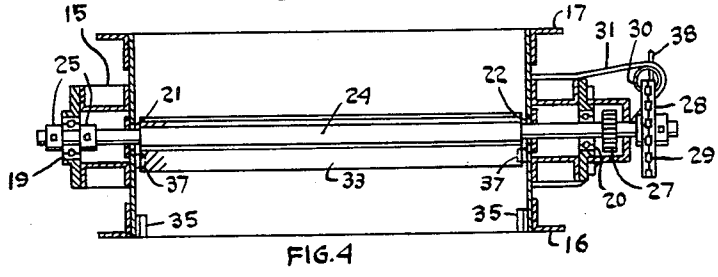


FIG. 4

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EQUIPOISE DAMPER FOR FURNACES

Alexander Charles Bridge, Montreal, Quebec, Canada

Application July 11, 1932, Serial No. 621,763

4 Claims. (Cl. 126—285)

The invention relates to equipoise dampers for furnaces, as described in the present specification and illustrated in the accompanying drawing that forms part of the same.

The invention consists essentially in the balance effecting mechanism in gravity hung cooperating damper plates, as pointed out in the claims for novelty following a description in detail of the preferable construction of this mechanism.

The objects of the invention are to insure a vent through the flue and chimney of the surcharged gases resulting in an explosion, this being particularly efficacious in boilers and furnaces using pulverized fuel, which is becoming more and more every year a chosen fuel for large boiler equipments both in stationary and marine work; to balance the damper plates with great precision, so that the slightest increase beyond the regular pressures within the furnace will immediately affect the position of the plates, thus not only affording a wide and free opening for the exploded gases, but taking care of the tendency to explode in the way of reducing the rapidly generated pressures in their initial stage and often taking care of minor explosions that under the usual conditions build up the pressures within the firebox to an alarming extent; to set the gravity hung damper in a properly adjusted position for the local conditions under which it is used, that is to say, for natural draft and forced draft and for the particular kind of forced draft applied, also with particular reference to the exhaust or draft structures; to insure economy in the consumption of fuel as well as efficiency in the generation of steam and naturally throughout the several objects to save the destruction of brick wall casings, retaining walls or arches; and generally to provide in stationary and marine engineering, furnace plants that will prove as immune as it is possible to make them of the effects of explosions of overcharged gases.

In the drawing, Figure 1 is a rear elevational view of the damper construction.

Figure 2 is a side elevational view of the damper construction.

Figure 3 is an enlarged sectional detail of the coacting gear mechanism, on the line 3—3 in Figure 1.

Figure 4 is a cross sectional view of the mechanism on the line 4—4 in Figure 1.

Figure 5 is a vertical sectional view on the line 5—5 in Figure 1.

Figure 6 is a perspective detail of the operating hook handle.

Figure 7 is a detail of the removable and adjustable counterweight.

Figure 8 is a reduced view showing the connection of the device to the furnace.

Like numerals of reference indicate corresponding parts in the various figures.

Referring to the drawing, the damper frame indicated by the numeral 15 is preferably square in shape having the flanges 16 and 17 and forming an insert in the breeching 18 of which it forms an intermediate part in the passage to the flue from the furnace.

The bearings 19 on the one side and 20 on the other side are preferably of ball type and are rigidly secured to the frame 15, the shaft orifices 21 and 22 being made through the wall of the frame on either side respectively.

The shafts 23 and 24 are shown as of the squared type having their end portions of circular shape in cross section, extending into and through the bearings 19 and 20 and held therein by the collars 25.

The coacting gears 26 and 27, which may be quadrants, are fixedly mounted on the projecting shaft ends from the one side of the frame and the sprocket wheel 28 is fixedly mounted on one of said projecting shaft ends. The endless chain 29 hangs from the sprocket wheel 28 for operating the plates, passing through the pipe 30 which is fixedly secured in the bracket 31 projecting outwardly from the frame 15 and terminating within easy reach of the furnace attendant.

The damper plates or blades 32 and 33 are rigidly secured adjacent to their inner edges to the shafts 23 and 24 and together form a loose closure for the vent through the breeching, flue or other tubular smoke passage, said plates folding downwardly and upwardly respectively to the stops 34 and 35 in the opening movement and upwardly and downwardly to the stops 36 and 37 in the closing movement. Thus in the open position, the damper plates or blades will not only open from the middle to the edge in each instance, and leave a free passage, but will part in the middle, so as to all intents and purposes to leave a completely free opening to the flue, which is an important feature, as in the case of explosions, any obstruction is liable to produce dangerous back eddies, and thus back pressures, not desirable in delicately balanced damper plates or blades, where so much depends on the quick and steady egress of gases.

The hook handle 38 is caught into a link and

stops further shutting movement at the desired point, while the hook weight 39 hangs on the other side to adjust the damper to the draft conditions, which means that in a forced draft there will have to be a slight weight to add to the closing weight of the damper construction without affecting its safety properties in respect to explosions.

The gear box 40 closes the coacting gears and the operating shaft projects outwardly beyond this gear box for the operating sprocket and chain.

In the operation of this invention, the damper plates or blades are precisely balanced, so that the gravity hung feature will be in evidence constantly. Therefore on opening these plates or blades the top plate will balance the bottom plate in any desired position. The extent to which the dampers are open may be maintained irrespective of other conditions by the handle hook 38 which is simply hooked into one of the links, and in the event of any disturbance of the balance, the hook weight may be hooked on to the other side of the chain. The handle hook of course engages the bottom of the tube.

There is one disturbance of the balance that may occur and that is the draft conditions, either through chimneys or through forced draft, and in marine work through the funnels of steam ships, and this can be taken care of by the weight of the correct size, just to keep the balance correct, and not to heavily weight the plates to their closed position, for in explosions or in any increase of pressure within the firebox these plates must act, as it is very much better to ward off the explosions than to be in any danger therefrom, though in this construction of damper, minor explosions and even comparatively large explosions will be made negligible and the force of the explosion lost in the flue and chimney.

What I claim is:—

1. An equipoise damper for furnaces comprising a breeching connected to the furnace flue, a damper casing inserted within the breeching and having end shaft orifices and bearings, shafts journalled in said bearings and situated one above the other, and transverse to the flue pipe, a pair of damper leaves having their inner edge portions secured to said shafts and effecting partial closures and installed in said breeching, stops holding said leaves away from the breeching walls, stops holding said leaves in their open position, and a gear and chain operating mechanism gearing said shafts together and having a detachable member forming a weight to counterbalance the force exerted on the damper leaves by the normal flow of gases in the flue.

2. An equipoise damper for furnaces comprising a breeching connected to the furnace flue, a damper casing inserted within the breeching and having end shaft orifices and bearings, shafts centrally squared and journalled in said bearings, and situated one above the other and transverse to the flue, a pair of damper leaves having their inner edge portions secured to said shaft and leaving a space permanently therebetween, stops confining the movement of said leaves between horizontal and inclined positions, a gear and chain operating mechanism gearing said shafts together, and a weighted hook attachable to the chain to counterbalance the force exerted on the damper leaves by the normal flow of gases in the flue.

3. An equipoise damper for furnaces comprising a breeching connected to the furnace flue pipe, a damper casing inserted within the breeching and having ball bearings and shaft orifices, shafts journalled in said bearings and situated one above the other and transverse to the flue, a pair of damper leaves pivoted on said shafts transverse to the flue pipe and effecting partial closures and installed in said breeching, a pair of stops arresting the movements of said leaves adjacent to the walls of said breeching and leaving a free opening thereacross in addition to a central opening therebetween, coacting gears on said shafts, an operating chain and wheel for said gears, and a weighted hook attachable to the chain to counterbalance the force exerted on the damper leaves by the normal flow of gases in the flue.

4. An equipoise damper for furnaces comprising a breeching connected to the furnace flue pipe, a damper casing inserted within the breeching and having end shaft orifices and bearings, driving operating shafts journalled in the bearings of said casing and situated one above the other and transverse to the flue pipe, a pair of damper leaves pivoted on said shafts and spaced from one another and from the wall of the breeching in their dampening positions, stops maintaining the spacings in both open and closed positions, coacting gears mounted on said shafts, a chain and sprocket mechanism connected to the lowermost gear, and a weighted hook engaging said chain to counterbalance the force exerted on the damper leaves by the normal flow of gases in the flue.

ALEXANDER CHARLES BRIDGE.