

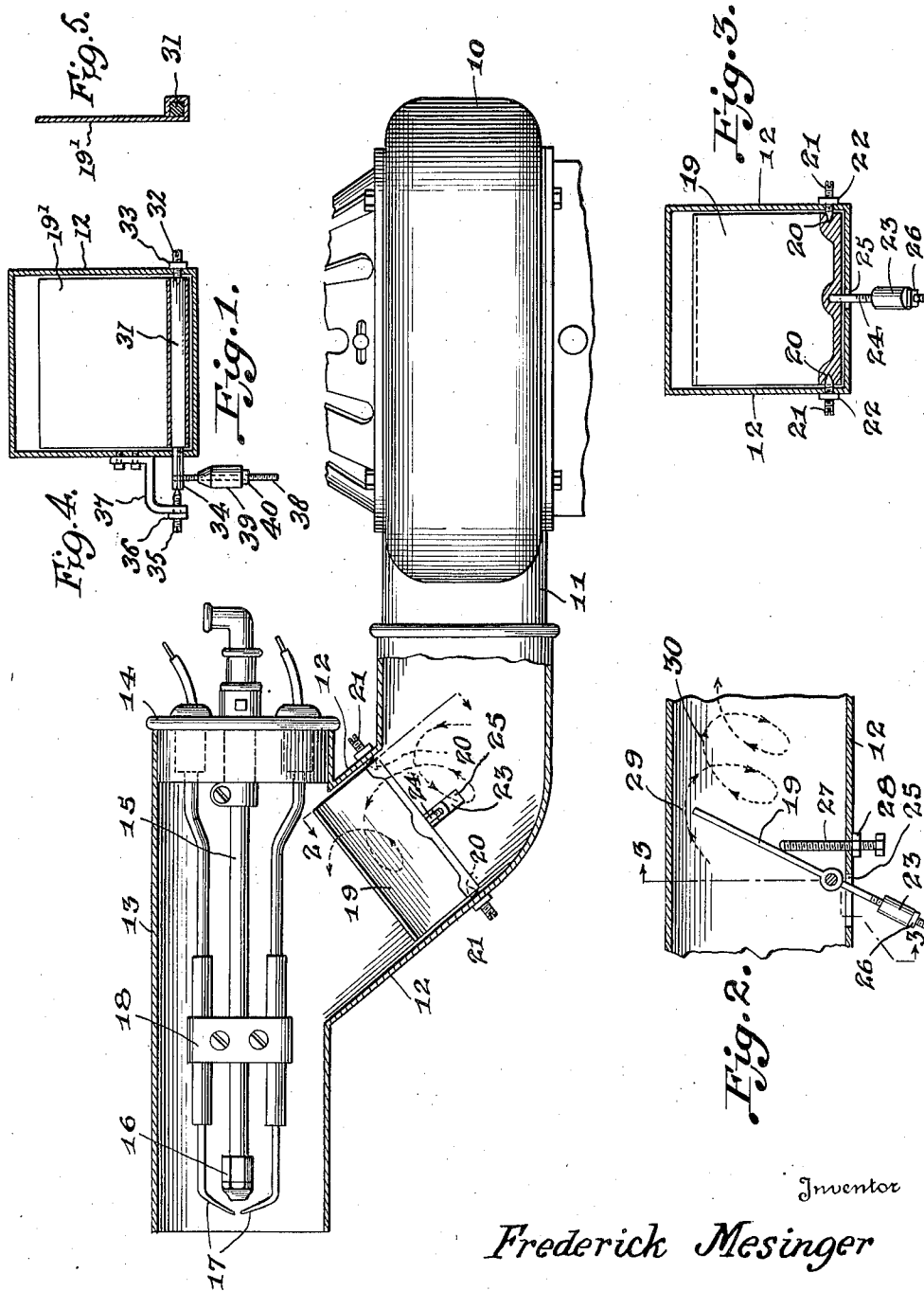
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AUTOMATIC DEFLECTOR AND DRAFT REGULATOR

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AUTOMATIC DEFLECTOR AND DRAFT
REGULATOR

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1 Claim. (Cl. 158—1.5)

The present invention relates to an automatic deflector and draft regulator for use particularly in automatic oil burning devices, and has for an object to provide means for conserving to a large extent the heat in the combustion chamber of the furnace by checking the draft upwardly there-
through when the blower of the burner stops.

Another object of the invention is to provide a deflector of this type which is adjustable so as not only to admit the desired amount or volume of air to the combustion chamber but to also so direct that air that the same will swirl or follow a spiral path to insure the more uniform admixture of the air and fuel in vapor form.

The invention also provides a device which will automatically move into substantially closed position by gravity when the motor of the oil burner stops and which will assume a desired and preadjusted open position under pressure of the air from the blower of the burner as soon as the burner starts operation with the result that when the burner is not in operation the device will substantially cut off flow of air into the furnace and thus conserve the heat of the combustion chamber and save fuel, the natural draft through the combustion chamber maintaining a sufficient flow of air for normal purposes and without too rapid and undue cooling of the walls and adjacent parts of the combustion chamber.

With the foregoing and other objects in view, the invention will be more fully described hereinafter, and will be more particularly pointed out in the claim appended hereto.

In the drawing, wherein like symbols refer to like or corresponding parts throughout the several views,

Figure 1 is a top plan view of a diagrammatic illustration of an oil burner for furnaces, showing certain parts in section and equipped with the automatic deflector of the present invention.

Figure 2 is a fragmentary detail sectional view taken through a portion of the draft pipe on the line 2—2 of Figure 1 showing the draft damper open and showing in dotted lines the twirling or spiral path of the air from the blower.

Figure 3 is a transverse section taken through the same substantially on the line 3—3 of Figure 2.

Figure 4 is a transverse section taken through the conduit, showing a modified construction of the automatic device, and

Figure 5 is a detail longitudinal section taken through the damper plate of Figure 4 and its shaft.

Referring now to the drawing a conventional type of oil burner is shown provided with a blower 10 having an exhaust or outlet pipe section 11 which is connected to the air supply conduit or pipe 12 which is suitably curved to enter one side

of a burner tube or casing 13. The outer end of the burner tube 13 is open and adapted to project into the furnace at a suitable point below or adjacent to the combustion chamber of the furnace. Any suitable operating means may be employed, and in the present instance the burner tube 13 is provided with a plug or cap 14 at its inner end which supports a fuel supply tube 15 extending lengthwise and substantially coaxial within the burner tube and having a delivery nozzle 16 on its outer end adjacent the open end of the burner tube 13. A pair of electrodes 17 is mounted in the burner tube 13 by means of a suitable bracket 18 from the fuel supply tube 15 and are carried rearwardly through the plug 14 to a transformer or the like for producing an ignition spark in the forward end of the burner tube 13 in the usual manner.

The air supply conduit or tube 12 opens into one side of the burner tube and at the inner end portion thereof so that air from the blower 10 is forced against and about the fuel supply tube 15 and is forced forwardly thereabout within the burner tube 13.

The automatic device of the present invention comprises a damper plate 19 of suitable configuration to substantially fill the cross sectional configuration of the conduit or pipe 12. This damper plate 19 is provided at its lower end and at opposite edges with enlarged bearings 20 which open outwardly and receive therein conical bearing screws 21 which are threaded through the opposite sides of the conduit 12 and are secured in adjusted position within the bearings 20 by lock nuts 22. The damper 19 is normally maintained in upright or vertical position by means of a counter-weight 23 which is threaded upon a stem 24 secured to the lower edge portion of the damper plate 19 and which extends freely through a bottom slot 25 provided in the lower wall of the conduit 12. The weight 23 is threaded on the stem 24 and after adjustment is secured in position by a lock nut 26 also threaded upon the rod 24. Deflection or swinging of the damper plate 19 into an open position is restricted by a stop screw 27 which is threaded upwardly through the bottom wall of the conduit 12 and secured in adjusted position by a lock nut 28. Thus the damper plate 19 may be swung open under pressure to a distance determined by the adjustment of the stop screw 27.

Normally, the damper 19 stands in a substantially vertical position and is yieldingly held in such position by the weight 23. When the blower 10 is set in motion, the pressure of the air from the blower through the conduit 12 impinges the stream of air against the damper 19 and the weight 23 is so adjusted as to admit of the desired deflection of the damper plate 19 under the pressure of the air so that the damper plate 19 may

swing into an open position, such as shown in Figure 2. The stop screw 27 is adjusted through the bottom wall of the conduit 12 so as to strike the outer side of the damper plate 19 when the latter is swung into a predetermined open position. This provides a reduced air passage 29 the upper wall of the conduit 12 with the result that the air will accelerate in velocity and at the same time will be given a twirling motion as shown by the arrows and dotted lines 30 in Figure 2. The result of this motion of the air is that the latter will enter the inner end of the burner tube 13 at one side thereof with a twirling or spiral movement which will carry the air more intimately about the fuel supply tube 15 and the electrodes 17 and will better distribute the air throughout the burner tube so that the air when it reaches the outer end of the burner tube and admixes with the sprayed fuel, will more intimately admix therewith and effect a more uniform mixture of the air and fuel.

As soon as the blower 10 of the burner stops, the air pressure against the damper plate 19 will be reduced and the weight 23 will then automatically return the damper to upright closed position. The result is that the burner tube 13 and the conduit 12 will be practically closed so that there will be no great volume of air circulating upwardly through the furnace from the burner apparatus and consequently the heat of the combustion chamber will be maintained for a relatively long time and the combustion chamber will thus not rapidly cool off. This will effect a considerable saving in fuel as when the burner apparatus is again set in motion it will not require a long time to raise the temperature of the combustion chamber to the point of efficiency, and also there will not be that tendency for the cold or chilled combustion chamber to retard the entrance of the incoming mixture of air and fuel when ignited.

The automatic device has all of the advantages and features of the usual air regulating flap employed in the pipes or conduits 12 and the like and at the same time provides an accurate and automatically operable means for checking the draft upwardly through the combustion chamber and when open under pressure of the air directs the air into spiral or twirling paths for entrance into one side of the burner tube.

It will be noted that this deflector 19 is not actually used as a damper as the amount of air is usually adjusted at the blower housing, the function of the deflector being chiefly to direct the air so as to strike the wall of the firing tube 13 and cause the air to travel in a twirling motion. It will be noted that the deflector is balanced on two conical pointed screws 21 and a counter-balanced weight 23 mounted on the stem or arm 24 which projects through the slot 25 in the bottom of the conduit or tube 12. This adjustable weight 23 counter-balances the damper 19 to keep the latter in a vertical position when the burner does not operate. On the other hand, the weight 23 is so proportioned that the deflector 19 opens sufficiently to admit air required and in a twirling motion for combustion. The screw 27 carried in the bottom of the firing tube or conduit 12 is used for setting the opening of the damper 19 to the required size, as shown

at 29 in Figure 2. After the stop screw 27 and the weight 23 have once been adjusted for a predetermined blower pressure and in view of other considerations of proper amount of air for combustion, the device is wholly automatic.

With reference now to the modification shown in Figure 4, the conduit or pipe 12 is provided therein with a damper plate 19' which is similar to the plate 19 of Figure 3 but which at its lower end is rolled about a non-circular bar 31 which may be rectangular in cross section, as shown in Figure 5, so as to hold the bar 31 from turning relative to the damper plate 19'.

One end of the bar 31 is recessed to provide a bearing for a set screw 32 which is threaded through one side of the conduit 12 near the bottom thereof and held in adjusted position against the end of the bar 31 by a set screw 33. The opposite end of the bar 31 may be reduced and rounded to provide a trunnion or axle 34 which has bearing through the side of the conduit 12 and is recessed at its outer end for receiving the end of a second set screw 35 held adjustably by a lock nut 36 in a bracket 37 which is suitably secured against the adjacent side of the conduit 12, as shown in Figure 4. The trunnion 34 is provided with a radially extending arm 38 which may be disposed in the general plane of the damper plate 19' and which supports thereon a weight 39 adjustably held to the arm 38 by a lock nut 40. Thus, the weight 39 counter-balances the damper plate 19' through the trunnion 34 and the bar 31.

The operation of this modified construction of automatic device is similar to that shown in Figures 1 to 3 and the structure is such that the slot 25 in the bottom of the conduit 12 is eliminated.

It is obvious that various changes and modifications may be made in the details of construction and design of the above specifically described embodiment of this invention without departing from the spirit thereof, such changes and modifications being restricted only by the scope of the following claim.

What is claimed is:—

In combination, a blower, a burner casing, a fuel nozzle disposed axially within the casing and terminating adjacent the forward end thereof, a duct rectangular in transverse section connecting the blower with the burner casing at a point rearward of the forward end of the nozzle and disposed on an obtuse angle to the forward end of the burner casing, a plate disposed in said duct closely adjacent the burner casing, means engaging said plate adjacent one end thereof to pivotally mount said plate in said duct, adjustable weight means carried by said plate and extending outwardly of said duct to gravitatingly maintain said plate at substantially right angles to the length of said duct, the end of said plate opposite from said pivot means being disposed in spaced relation to the adjacent wall of the duct when the plate is in an inclined position, and an adjustable stop member carried by the duct on the side of the plate adjacent the burner casing whereby to limit the forward swinging movement of the plate under the pressure of air from said blower, said plate coacting with said duct in effecting a swirling movement of air about said nozzle at the forward end of the casing.

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