June 19, 1945. W. B. ENSIGN ET AL 2,378,839

FILTER FOR INSPIRATORS

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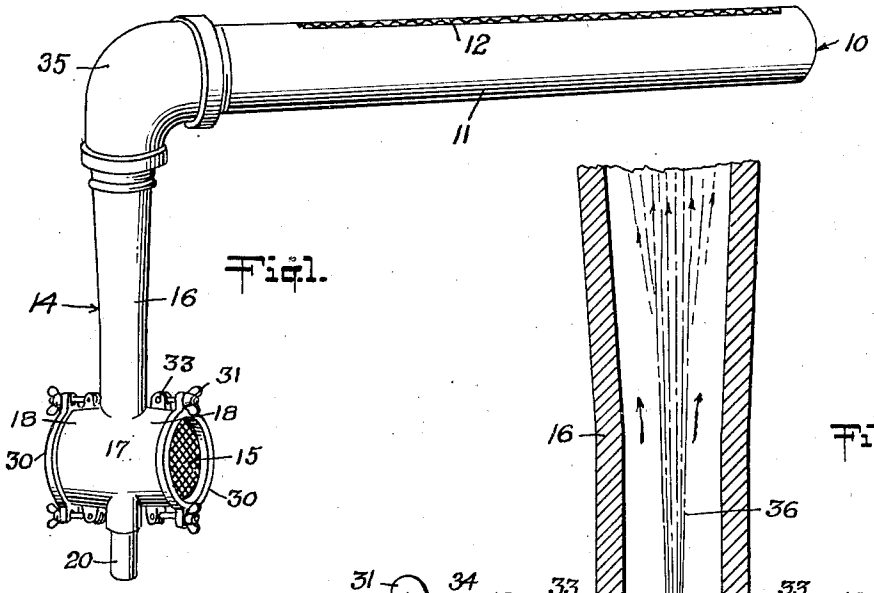


Fig. 1.

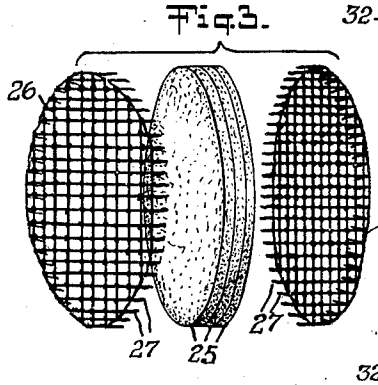


Fig. 3.

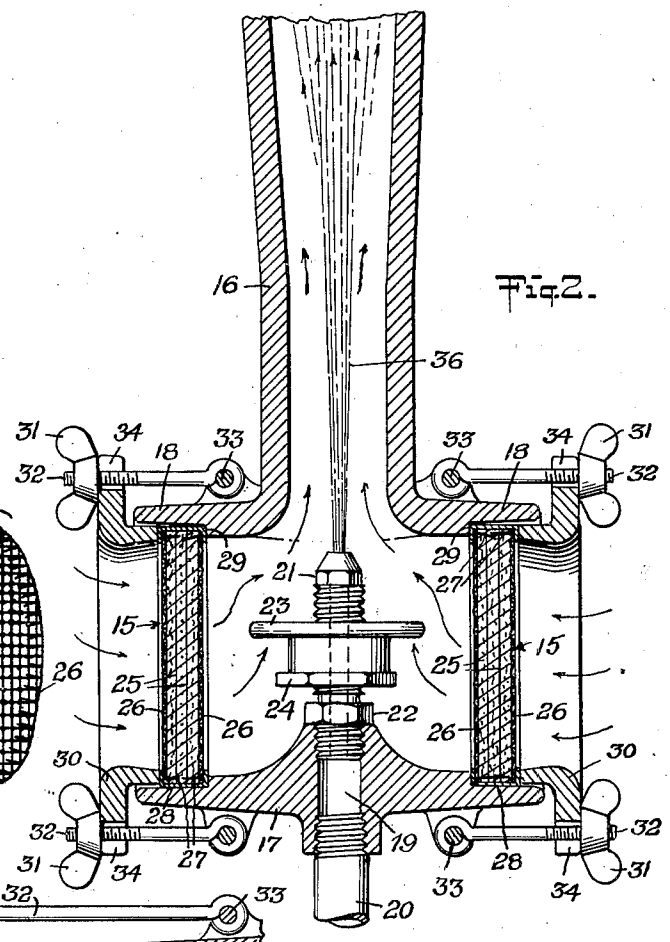


Fig. 2.

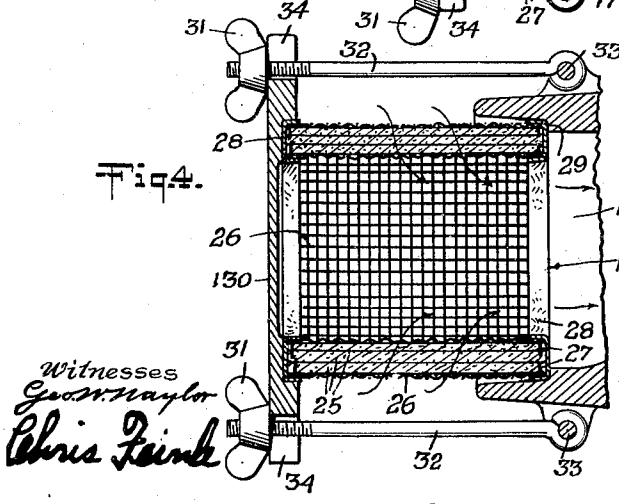


Fig. 4.

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FILTER FOR INSPIRATORS

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4 Claims. (Cl. 48—180)

This invention relates to a device for use in conjunction with gas burners for industrial gas heat applications.

More particularly, the invention relates to a device which serves to mix air and gas, and to filter the air prior to being mixed with the gas, to produce a clean combustible mixture supply to gas burners used for heat applications in such places as bakeries where the air is laden with flour dust, foundries where the air is laden with sand dust, woolen and cotton mills where lint is in the air, and other places.

The principal object of the invention is to eliminate dirty air by cleaning or filtering out of it all extraneous matter tending to clog, slow down, or completely stop the combustible mixture from burning at the port or jet area of the burner.

A further object of the invention is the provision of a device of the indicated character which will obviate the present removal of a burner, mixer and connections from the apparatus or equipment in which these parts are used, so that they may be cleaned for the maintenance of the desired thermal efficiency. In this connection it will be appreciated this cleaning of the parts due to clogging of extraneous matter in the air requires considerable time and labor and that during this cleaning period, the apparatus or equipment including the burners must be shut down for a considerable period of time which is costly because of the loss of production, and also costly from the repair and maintenance viewpoint.

A further object of the invention is the provision of a device of the indicated character which embodies air filtering means enabling the use of a simple vacuum cup to clean such means easily and with a minimum of labor, especially where there are several hundred filters as in the case of a large baking oven for instance, to the end that the burner will maintain high efficiency for an indefinite time without interruption of the operation of the apparatus or equipment in which the burners are installed.

With the foregoing and other objects in view, the invention resides in the combination, arrangement, construction and functions of the parts hereinafter described and illustrated in the accompanying drawing, in which—

Fig. 1 is a perspective view of a ribbon type burner which is selected to illustrate the device of the present invention shown applied thereto.

Fig. 2 is an enlarged vertical sectional view through the device, a portion being broken away.

Fig. 3 is a collective view of the parts of one of the filters.

Fig. 4 is a fragmentary sectional view showing a modification of a filter.

Referring now more particularly to the drawing, it will be apparent that in Fig. 1 is simple ribbon type burner 10 selected to illustrate the device of the present invention applied thereto. The burner consists of a tube 11 having a longitudinal slot therein at the top and in this slot crimped or corrugated strips 12 of metal are arranged to provide a multiplicity of ports or jets for the outflow of the combustible mixture to produce a knife edge ribbon flame.

The device of the present invention is connected with the inlet end of the burner tube 11 to supply the combustible mixture of air and gas by suction action to the burner. The device consists of an inspirator 14 and one or more filters 15, there being two filters in the present instance. The inspirator consists of a flaring tube 16 and a relatively short cross tube 17 integral with the tube 16 and in communication with the interior thereof. The tube 17 embodies air inlet portions 18 which are angularly disposed with respect to the longitudinal axis of the tube 16, and are arranged diametrically opposite each other. The tube 17 has a gas inlet 19 in axial alinement with the longitudinal axis of the tube 16. A gas supply pipe 20 is threaded in the inlet 19. A removable nozzle or jet 21 is threaded in the inner end of the inlet 19, said jet having a male thread and a nut 22 for rotating the jet. A circular air shutter 23 is threaded on the jet 21. A jam nut 24 is also threaded on the jet 21 and serves to hold the shutter 23 in place. The shutter is adjustable on the jet axially thereof, so that it may be set in different positions to control the amount of air flowing into the tube 16 from the inlets 18. The jet 21 together with the shutter 23 and nut 24 as a unit may be removed and replaced from the inside of the inspirator through either inlet 18 by first removing the filter pad. This expedient permits the gas supply pipe 20 to be permanently connected with the inspirator.

The filters 15 are arranged in the inlets 18 respectively. Each filter consists of a circular pad of suitable foraminous or interstitial material capable of eliminating dust, lint and other foreign particles in the air. The pad consists of two or more plies 25 of loosely woven material, or fibrous material, and wide wire mesh or screen material in the form of disks 26 with the ends 27 of the wires bent at right angles at the circumferential line. The disks 26 are laid against

opposite sides of the pad and the ends 27 impale the plies 25 and so grip the latter and hold the disks 26 in place to form a unitary filter structure. The parts 25 and 26 of the pad are held together by adhesive tape 28 or equivalent means which covers the circumferential edges of the same.

Each inlet has an internal circular shoulder 29 against which the filter 15 fits, and a clamping ring 30 bears on the filter. The ring is held in the clamping position by means of wing nuts 31 on screw bolts 32 pivotally connected with the tube 17, as at 33. The bolts 32 are received in slotted lugs respectively on the ring, and the nuts 31 bear on the lugs to cause the ring to exert a clamping pressure on the filter, thereby squeezing the marginal edge portion thereof against the shoulder 29 and so preventing any short circuiting of the air entering the inspirator without passing through the filter.

The inspirator is connected with the open end of the tube 11 of the burner by an elbow 35. An air suction is developed by a high velocity gas stream 36 within the tube 16 which causes air to be drawn into the inlets 18 and through the filters 15 which collect all dirt, dust, lint and other foreign particles from the air, so that clean filtered air is mixed with the high velocity stream of gas, producing a combustible mixture for burning at the ports of the burner 10.

The wire mesh disk 25 on the outside of each filter 15 is placed there so that when the filter pad becomes dirty at the air inlet side, a special nozzle of a vacuum cleaner can be used to readily remove the objectionable matter from the filter disk without taking it out of the inlet portion 18 of the tube 17.

In lieu of the disk type of filters 15, use may be made of a cylindrical type of filter 115, as shown in Fig. 4. With this type of filter use is made of a cover 130 in lieu of the ring 30. In other respects the filtering means is similar to that described hereinabove and corresponding parts are given similar reference numerals for the sake of convenience and a correct understanding of its features.

We claim:

1. The combination with an inspirator for supplying a fuel mixture of air and gas to a burner, said inspirator having inlets, a gas feed nozzle extending into the inspirator between the inlets, an air filter unit fitting in each inlet, and means which retains said unit in functioning position in said inlet.

2. An inspirator for supplying a fuel mixture of air and gas to a burner, said inspirator including a tubular structure within which the air and gas are commixed and embodying an air inlet tube having an internal shoulder, and a gas feed nozzle on said structure within the same, and in combination, an air filter element, and means which cooperates with said shoulder to removably retain said filter element in functioning position with respect to said inlet tube at one side of said nozzle.

3. The invention as set forth in claim 2, wherein said means includes a clamping member engaged with an edge portion of said filter element.

4. The invention as set forth in claim 2, wherein said filter element consists of a disk, and said last means includes a clamping ring engaged with the marginal edge portion of the disk on the outside thereof.

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