

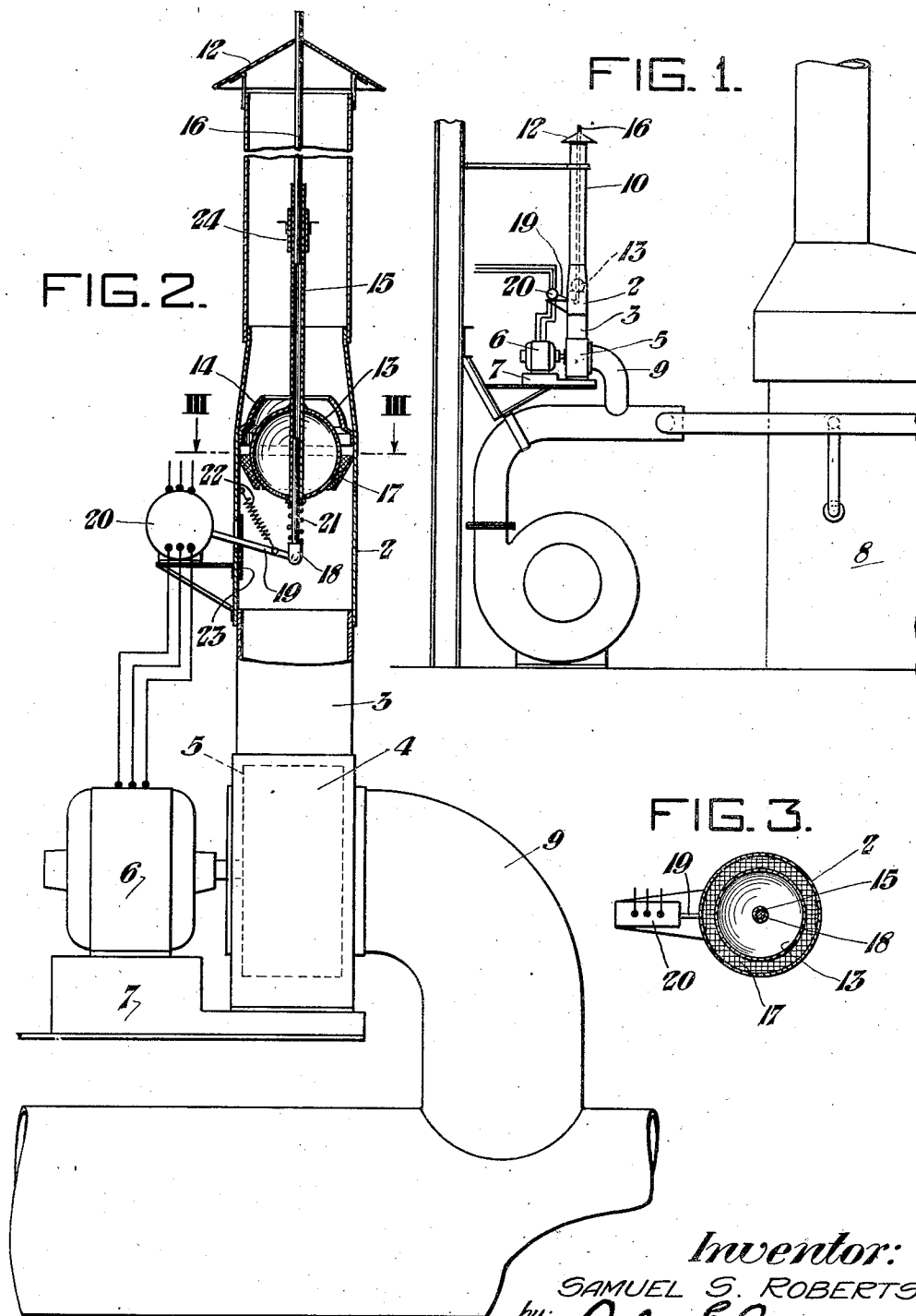
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SAFETY GAS-EXPULSION DEVICE FOR FURNACES

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SAFETY GAS-EXPULSION DEVICE FOR FURNACES

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This invention relates to furnaces and, particularly, to an automatic safety gas-expulsion device therefor.

In furnaces, especially of the type used for heating metallic articles, having a forced draft or pressure air burners for firing combustible gaseous fuels, the gases oftentimes accidentally seep into the forced draft blast mains, the furnace, or the combustion chamber during the time the forced draft is shut off and the furnace is not in operation, and explode when the furnace is again put into operation, resulting in damage to the furnace and a hazard to human life. It is therefore desirable that any waste gases, or gases that may have leaked into the furnace and its associated parts, be expelled therefrom while it is not in operation or, at least, before it is again fired and put into operation.

According to the present invention, there is conveniently positioned, close to the furnace in the forced draft system, a gas-expulsion device which automatically goes into operation to expel the gases from the furnace and its associated parts whenever the forced draft is shut off and the furnace is not operating.

It is an object of the present invention to provide an improved gas-expulsion device which will automatically expel any gases from the furnace when the furnace is not in operation.

It is another object of the invention to provide an improved gas-expulsion device which is automatically controlled by the forced draft of the furnace.

It is a further object of the invention to provide an improved automatic gas-expulsion device which is simple and inexpensive in its construction and operation and one which is dependable and will insure the expulsion of any gases from the furnace when not in operation.

It is a still further object of the invention to provide a gas-expulsion device which is adapted to be closed and rendered inoperative by the action of the forced draft when the furnace is in operation, and permitted to open and be in operation when the forced draft is shut off and the furnace is not in operation.

Various other objects and advantages of this invention will be more apparent in the course of the following specification and will be particularly pointed out in the appended claims.

In the accompanying drawing, there is shown, for the purpose of illustration, one embodiment which my invention may assume in practice.

In the drawing:

Figure 1 is an elevation showing the location

of the improved safety gas expulsion device of my invention relative to the blower and furnace;

Figure 2 is an enlarged elevation, partly in section, of my improved safety gas expulsion device; and,

Figure 3 is a section taken on the line III—III of Figure 2.

The improved safety gas-expulsion device of my invention comprises a metallic cylinder 2, vertically arranged on a delivery pipe or conduit 3 of a housing 4 of an exhaust fan 5 mounted on the end of a shaft of a motor 6, which is suitably arranged on a platform 7 above the blast or forced draft pipe or conduit of a furnace 8. The housing 4 of the fan is connected to the blast or forced draft pipe, preferably by means of an elbow connection 9 or any other suitable connecting means. The metallic cylinder 2 preferably has a reduced upper end on which there is mounted a smaller cylinder 10 having a hood 12 arranged on the top and spaced from the end thereof.

There is arranged in the cylinder 2 and centrally thereof, a valve comprising a movable spherical member 13, preferably a spun brass ball having a smaller outer diameter than the inner diameter of the cylinder and a cup-like seat member 14, also preferably of spun brass, attached to the inside walls of the cylinder and having an opening therein with which the ball is adapted to cooperate. The ball 13 has arranged diametrically therethrough and secured thereto an upwardly extending guide tube 15, preferably of brass, and on the end thereof there is arranged an upwardly extending rod 16 which is adapted to extend upwardly through an opening in the hood 12. There is arranged below the ball 13, and secured to the inner walls of the cylinder 2, a wire basket 17 which is adapted to support the brass ball 13. There is also arranged, just below the ball, an actuating member 18, preferably a forked member, having one end slidably positioned in the lower end of the tube 15 and the forked end thereof pivotally connected to the end of an actuating switch lever 19 extending through a vertically extending slot in the side of the cylinder 2 to a switch 20, preferably of a mercoide type. There is arranged on the forked member 18 a coil compression spring 21 which is adapted to cooperate between the forked portion of the member 18 and the bottom of the ball 13 to cushion the seating of the same in its downward travel.

It will be understood that the weight of the ball and the parts connected therewith forces the

lever 19 downwardly, closing the switch 20 to actuate the motor 6 and the fan 5. There is arranged within the cylinder 2 a tension coil spring 22 connected to the switch lever 19 and to the inner wall of the cylinder 2 which is adapted to force the switch lever 19 upwardly to open the switch when the ball 13 and interconnected parts are in their top-most position, with the ball seated in the member 14. There is associated with the lever 19, next to the slot in the side of the cylinder 2 through which the lever 19 extends, a sliding door 23 which is adapted to be moved by the switch lever in its movement to keep the slot in the cylinder closed at all times so as to prevent the escape of the air therethrough.

The guide tube 15 is, of course, arranged centrally of the cylinders 2 and 10 and there is positioned in the cylinder 10 guide means, such as preferably a short piece of brass tubing 24 around the tube 15, for guiding the vertical movement of the tube 15 and ball 13. The rod 16 is adapted to extend through the hood 12 so as to indicate, at all times, the position of the ball 13 in the cylinder 2.

It will be understood that so long as the air pressure in the blast or forced draft pipe of the furnace is normal, as it is supposed to be during the firing thereof, the device is inactive; but when the pressure in this pipe decreases below a fixed point or upon discontinuing the forced draft, that is, when the furnace is not being fired, the device becomes active automatically as follows:

The air pressure in the blast or forced draft pipe which is of a relatively higher pressure than that generated by the exhaust fan, lifts the ball 13 upwardly to seat it in the member 14, closing the outlet through the cylinder to the atmosphere with the switch lever 19 being moved simultaneously in an upward direction to open the switch 20, thereby stopping the motor 6 and exhaust fan 5. When the air pressure drops below a predetermined point, or the blast or forced draft is discontinued during the time the furnace is not in operation, the ball 13 drops, cushioning itself on the coil spring 21, opening the blast pipe to the atmosphere and forcing the lever 19 downwardly to close the switch 20, thereby starting the motor 6 and the exhaust fan 5. The exhaust unit then automatically starts to remove any gases that may collect in the furnace or its associated connections through gas seepage that may occur through leaking burners or gas valves or any unburned gases that may have been left in the furnace when it was shut down, thereby preventing the building up of any explosive mixture in the furnace or the parts connected therewith. The exhaust gases are forced upwardly through the cylinder 2, through the wire basket and the space between the spherical member or ball 13 and the inner wall of the cylinder into the atmosphere. It will be understood that the pressure in the forced draft pipe is great enough to raise and seat the ball to close the valve and the cylinder while the pressure generated by the exhaust fan is not sufficient to raise it, thereby permitting the exhaust gases to pass along the sides thereof through the cylinder and out of the furnace.

While I have shown and described one embodiment of my invention, it will be understood that this embodiment is merely for the purpose of illustration and description and that various other forms may be devised within the scope of my invention, as defined in the appended claims.

I claim:

1. In combination with a pipe or conduit for

supplying a forced draft to furnaces and the like, apparatus including an exhaust fan connected to said forced draft pipe, a vertically disposed hollow cylindrical member open to the atmosphere attached to said fan and extending upwardly therefrom, a valve arranged in said cylindrical member intermediate the length thereof above said fan, said valve consisting of a spherical member loosely disposed between two valve seats, a switch arranged adjacent to said valve which is adapted to control the motor of said exhaust fan, said apparatus being so constructed and arranged that the forced draft will move the spherical member upwardly seating the same in the upper valve seat closing the cylindrical member when a forced draft is passing through the pipe, thereby opening the switch so as to prevent the exhaust fan from operating and permitting the spherical member to move downwardly due to the force of gravity, thereby closing the switch and setting the exhaust fan in operation to expel any gases that may collect in the furnace and the parts associated therewith therefrom into and through the cylindrical member and valve into the atmosphere when a forced draft is not passing through the pipe.

2. In combination with a pipe or conduit for supplying a forced draft to furnaces and the like, apparatus including a safety gas expulsion device consisting of a vertically arranged hollow cylinder open at its ends, a spherical member arranged in said cylinder, means for supporting and guiding said spherical member therein, a seating member arranged in the cylinder above said spherical member and with which it is adapted to cooperate, an exhaust fan positioned below said spherical member and communicating with said cylinder and said pipe, said spherical member adapted to be forced upwardly into said seating member to close the cylinder by the forced draft passing through the pipe, and means actuated by said spherical member to set said exhaust fan in operation when the spherical member is in its lowermost position and the cylinder is open and the forced draft is not passing therethrough, said exhaust fan expelling any gases from the furnace and the parts associated therewith through said valve and cylinder.

3. In combination with a pipe or conduit for supplying a forced draft to a furnace, apparatus including an exhausting means connected to the forced draft pipe and in communication therewith so as to be effective when in operation to expel gases from the furnace and the parts associated therewith, and means responsive to a predetermined drop in the pressure of the forced draft for automatically setting said exhausting means in operation.

4. In combination with a pipe or conduit for supplying a forced draft to furnaces and the like, apparatus including an exhausting means associated with said pipe for expelling gases from the furnace and the parts associated therewith when the furnace and forced draft is not in operation, means controlled by the forced draft for controlling said exhausting means, said last mentioned means adapted to be actuated by the forced draft to control the exhausting means so as to make the same inoperative when a forced draft is passing through the pipe and adapted to control the exhausting means so as to make the same operative when a forced draft is not passing therethrough.

5. In combination with a pipe or conduit for supplying a forced draft to furnaces and the

like, apparatus including a safety gas expulsion device having an exhaust fan associated therewith which is connected to said forced draft pipe, means controlled by the forced draft for controlling said exhaust fan, said last mentioned means adapted to be actuated by the forced draft to make the exhaust fan inoperative when a forced draft is passing through the pipe and adapted to make the exhaust fan operative when a forced draft is not passing therethrough.

6. In combination with a pipe or conduit for supplying a forced draft to furnaces and the like, apparatus including a safety gas-expulsion device consisting of an exhaust fan, a switch for controlling said exhaust fan and a valve for controlling said switch, said device being constructed and arranged so that the forced draft actuates the valve closing the same and opening the switch so that the fan is inoperative when the forced draft is passing through the pipe and permits the valve to open when the forced draft is not passing through the pipe so as to close the switch thereby automatically setting the exhaust fan in

motion so as to expel any gases that may have collected in the furnace and the parts associated therewith therefrom.

7. In combination with a pipe or conduit for supplying a forced draft to a furnace, apparatus including a normally inactive exhaust fan connected to the forced draft pipe and in communication therewith so as to be effective when in operation to withdraw gases from the furnace and the parts associated therewith, an outlet duct associated with said fan, a valve interposed between the exit end of said outlet duct and said fan, a motor for driving said fan, and a switch for controlling said motor, said switch being actuated by the movement of said valve, said valve being normally closed when normal pressure is maintained in the forced draft pipe thereby maintaining the switch in an open position and the fan inoperative and being arranged to close the switch so as to place the motor and fan in operation when the forced draft pressure in the pipe drops below a predetermined point.

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