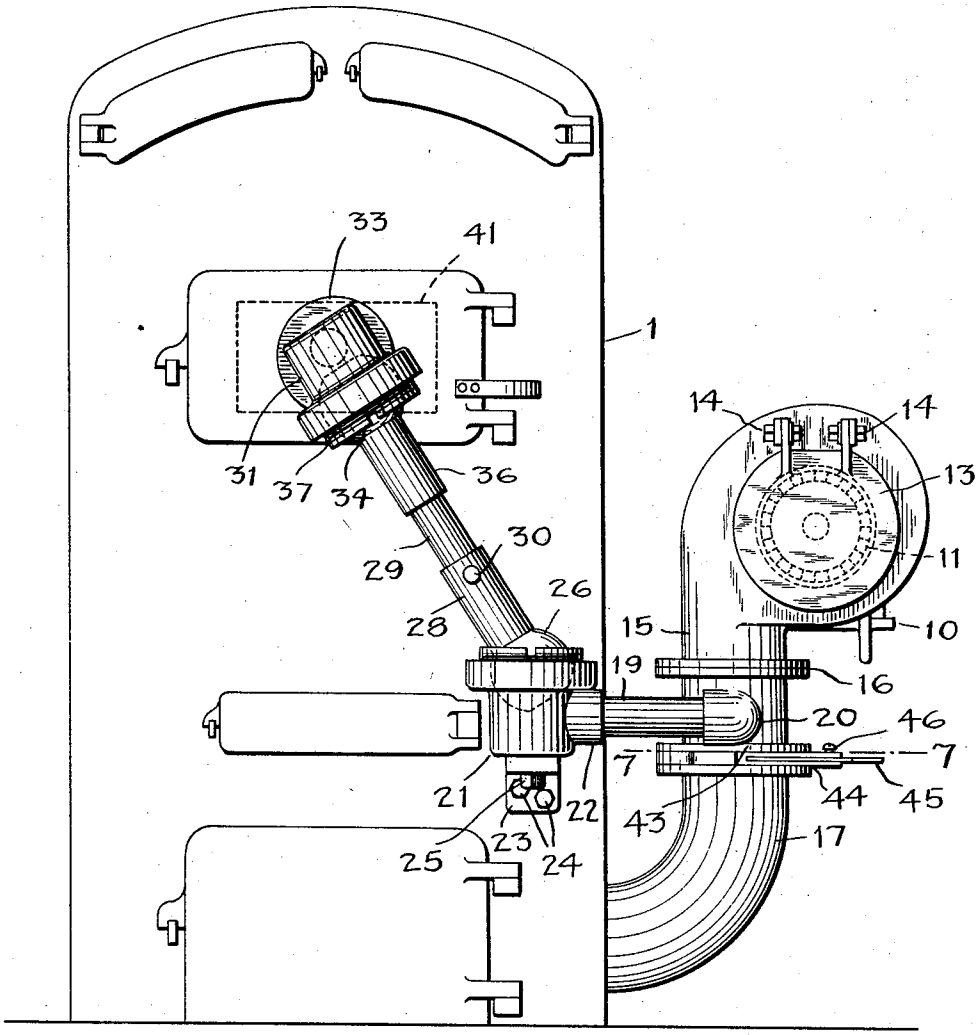
Nov. 18. 1930. H. F. EASTWOOD 1,781,811

FURNACE ATTACHMENT

Filed April 25, 1929 3 Sheets-Sheet 1

Fig. 1.



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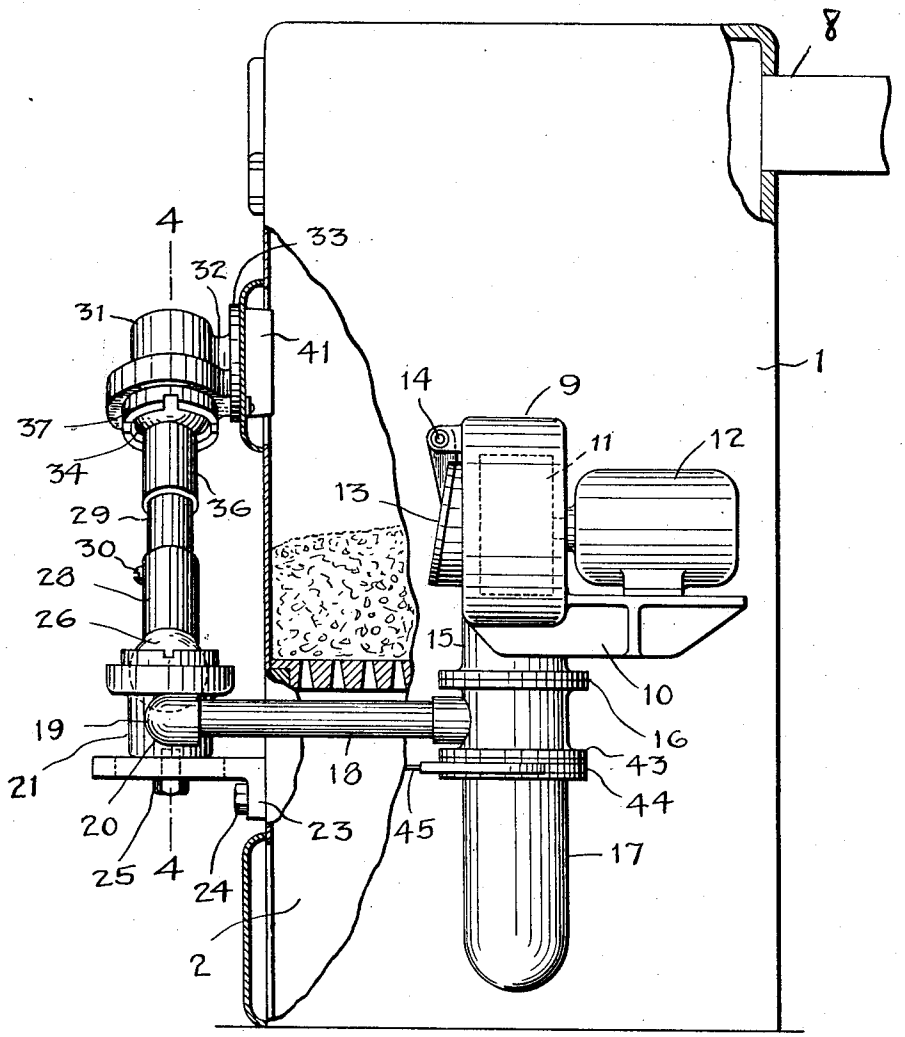
FURNACE ATTACHMENT

Filed April 25, 1929 3 Sheets-Sheet 2

Fig. 2.



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FURNACE ATTACHMENT

Filed April 25, 1929 3 Sheets-Sheet 3

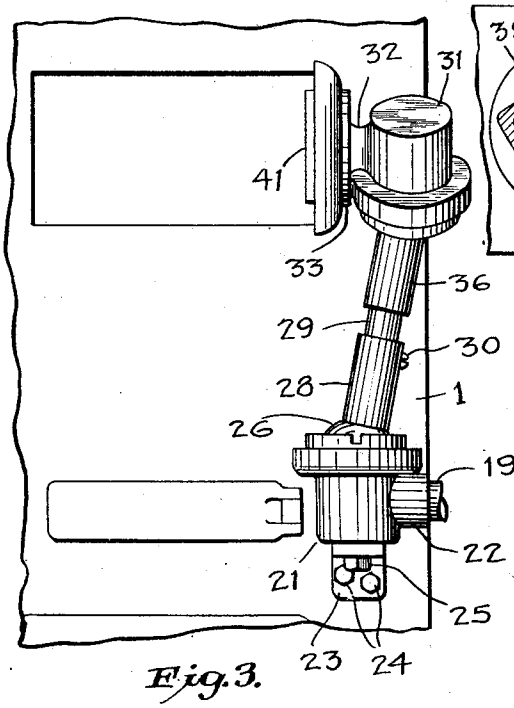


Fig.3.

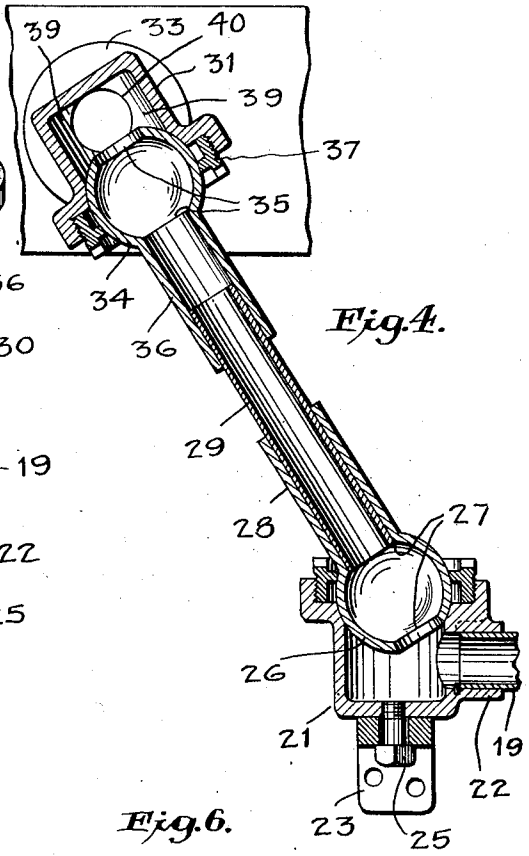
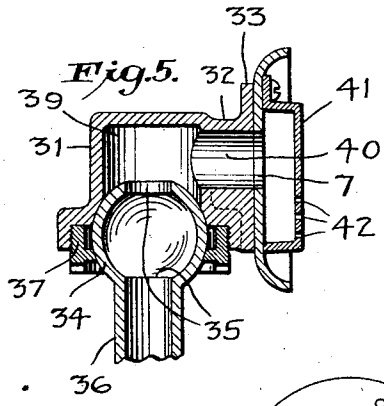
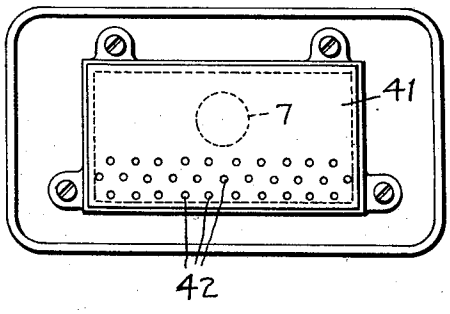


Fig.4.

Fig.6.

Fig.5.





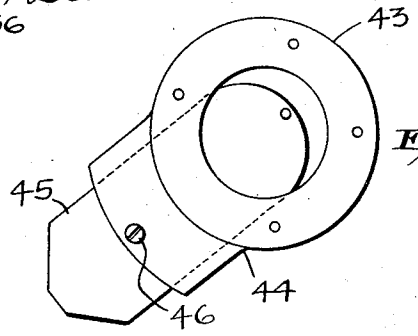


Fig.7.

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Patented Nov. 18, 1930 1,781,811

UNITED STATES PATENT OFFICE

HARRY F. EASTWOOD, OF MERRICK, NEW YORK

FURNACE ATTACHMENT

Application filed April 25, 1929. Serial No. 357,912.

This invention relates to means for supplying air to a furnace so as to promote the combustion efficiency of the furnace by supplying air below the grate, supplying air above the grate to the combustion chamber at a point distant from the furnace outlet and regulating the amounts of air so supplied to provide a constantly balanced relation between the amount supplied above and the amount of air supplied below the grate. In particular, the invention relates to a furnace attachment whereby the air supplied above the grate may be delivered through the furnace door by means of permanent connections, so that the door may be opened and the furnace fired without disconnecting the attachment.

One of the objects of the invention is to provide an attachment for furnaces in which the total air supply is delivered to a conduit leading to the ash pit and in which means are provided for diverting a portion of the air from the conduit and delivering it above the grate, the latter means including permanent connections to the fire door so that the door may be opened and the furnace fired without disconnecting the attachment.

Another object of the invention is to provide such an attachment with means for regulating the amounts of air delivered, so that a constantly balanced relation is provided between the amount of air delivered above the grate and the amount of air delivered below the grate of the furnace.

Another object of the invention is to provide means for controlling the total air supply thus enabling the attachment to be applied to furnaces of various sizes.

Another object of the invention is to provide a furnace attachment which may be applied to the furnace without alteration to the furnace with which it is used.

With the above and other objects in view, my invention consists in the parts, improvements and combinations more fully pointed out hereinafter.

Turning now to the drawings:

Figure 1, is a front elevation of a furnace showing the attachment applied.

Figure 2, is a side elevation, partly in section, showing the means, including the permanent connections, for supplying air to the combustion chamber, through the door.

Figure 3, is a detail view of the permanent connections between the branch pipe and the furnace door.

Figure 4, is a detail view of the permanent connections showing the ball and socket joints and the telescoping pipes between them.

Figure 5, is a detail view of the ball and socket joint connected to the fire door, showing the openings for the passage of air.

Figure 6, is a view of the diffusing plate which distributes the air passing through the door above the grate.

Figure 7, is a top plan view of the valve or damper, on line 7—7 of Figure 1; this being the valve for regulating the amounts of air delivered below and above the grate.

In the drawings which illustrate one embodiment of the invention, the furnace 1, shown, is provided with the usual ash pit 2, ash pit door 3, and grate 4. Above the grate 4, is the combustion chamber 5, and fire door 6, provided at 7, with an opening. The furnace outlet is shown at 8.

The furnace attachment, which can be attached to the usual furnace 1, comprising housing 9, in which on bracket 10, is mounted a blower 11. Motor 12, also mounted on the bracket, drives the blower. Mounted on housing 9 in front of the blower is an adjustable flap valve 13, which is adapted to be adjusted about its pivots 14, so as to control the total amount of air accessible to the blower. Housing 9, as illustrated, into which the air from the blower is delivered, terminates in an air discharge pipe 15.

Means are provided for supplying air to the furnace, some of the air being delivered below the grate, and some of the air being diverted and delivered above the grate, the means for delivering the air above the grate including permanent connections to the furnace door. The connection terminates adjacent to the door and is preferably attached to the outside of the door.

As shown, connected to air discharge pipe 15, at 16, is a conduit 17, into which the total

air to be supplied to the furnace is discharged by pipe 15. Conduit 17 passes through the side of the furnace and communicates with the ash pit 2 of the furnace. Connected to and projecting from conduit 17, is branch pipe 18, for diverting a portion of the air passing through the conduit. Branch pipe 18, is provided with an elbow portion 19, connected to it by means of the elbow joint 20. In the form of the invention illustrated, the elbow portion 19 of the branch pipe is connected to a socket 21 by means of a hollow projection 22, of the socket into which the elbow portion fits. Bracket 23, secured to the front of the furnace by screws 24, provides a mounting for socket 21, which is secured to the bracket as by screws 25.

Mounted in the socket 21 is a hollow ball 26 which is provided at 27, with openings permitting the passage of air. Secured to ball 26, is an outwardly projecting sleeve 28, into which is fitted a pipe 29, the opening in which registers with the upper air opening of the ball 26. Pipe 29 is secured to the sleeve as by screw 30, passing through the sleeve and the pipe.

Mounted on the fire door of the furnace is another ball and socket joint. Socket 31 of the joint is provided with an inwardly extending portion 32, which terminates in a disc 33, the latter being secured by screws to the fire door 6. Socket 31, carries a hollow ball 34, provided at 35 with air openings. Ball 34, carries an outwardly projecting sleeve member 36, to which is secured a screw threaded collar 37. Socket 31, is also screw threaded to receive collar 37, thus connecting the ball to the socket. Sleeve member 36, surrounds a pipe 38, the opening of which registers with one of the air openings of the ball. Pipe 38, as shown, fits over pipe 29, so as to form a telescoping connection.

As will be seen in the drawings the socket 31 is provided with a hollow chamber 39. A passage 40, provided in the inwardly extending portion 32 of the socket registers with the hollow chamber of the socket at one end and at its other end registers with the opening at 7 in the fire door. Air may thus pass through the branch pipe, the lower ball and socket, the telescoping pipes, the upper ball and socket to and through the opening in the fire door.

Secured to the back of the fire door, is a diffusing plate 41, which by means of a plurality of orifices 42, distributes the air which passes through the opening in the door, uniformly over the fire bed.

Means are provided for regulating the amount of air supplied above the grate and the amount of air supplied below the grate so as to provide a constantly balanced relation between such amounts.

As illustrated, the conduit 17, is provided, below branch pipe 18, with an enlarged portion or collar 43, to which is secured a plate 44. A valve or damper slide 45, is provided which is adapted to slide across the opening in the conduit and allow more or less air to pass through the conduit and, consequently, less or more air to pass through the branch pipe. A set screw 46, is provided for securing the slide in its adjusted position.

It will be seen that the provision of an attachment having a conduit connected with the ash pit through the side of the furnace and permanently connected with the combustion chamber through the furnace door, enables the attachment to be applied without alteration of the furnace with which it is used.

Among the objects of the invention is the provision of an attachment for supplying air above and below the grates of furnaces of various sizes. This result is attained by so constructing the conduit, branch pipe and connections to the door that by properly adjusting the flap valve of the housing the amount of air accessible to the blower may be controlled so as to adapt the attachment to furnaces of various sizes. Consequently, it will only be necessary to manufacture the furnace attachment of my invention in three or four sizes and these will be sufficient for the full range of furnace sizes from the largest to the smallest.

In operation, after the flap valve has been adjusted so as to supply the proper total quantity of air, the amount of air flow to the ash pit below the grate and the amount of air to be delivered above the grate is estimated. This estimation is based on the kind of fuel used and the desired operating conditions of the furnace. The valve or damper 45, is then adjusted to permit such estimated flow. Upon starting the blower 11, air will be drawn into housing 9 and delivered by pipe 15 to conduit 16. Part of the air passes through conduit 16 and into the ash pit of the furnace where it passes upward to the grate and promotes combustion. The remaining portion of the air is diverted by branch pipe 18 and passes through the ball and socket joints and telescoping pipes to the opening in the furnace door, where, by means of the distributing plate, it is distributed uniformly over the fire bed and united with the carbon monoxide gases of the furnace. After a period of observation of actual operating conditions the valve 45 may be readjusted so as to regulate the flow of air through the conduit and through the branch pipe, so as to provide the desired balanced relation between the amount of air supplied above and the amount of air supplied below the grate of the furnace. After such final adjustment, the damper may be secured in position by means of the set screw 46. Thereafter, with the use of the same kind of fuel, if an average depth of fire bed is

maintained, and the same operating conditions are required, the attachment will automatically supply air above the grate and air below the grate, the air supplied above the grate bearing a constantly balanced relation to the air supplied below the grate. The door of the furnace may be opened and the furnace fired at regular intervals without disconnecting the attachment, the attachment in no way interfering with this firing operation.

Having thus described the invention and its operation, it will be understood that changes may be made in carrying the invention into effect, without departing from the principle thereof.

I claim:

1. An attachment for furnaces having an ash pit, a grate and a fire door with an opening above the grate, comprising a conduit connected to the ash pit, a motor driven blower for supplying air to the conduit, a branch pipe connected to said conduit for receiving a part of the air supplied to the conduit, permanent connections between the branch pipe and the fire door for supplying air through the opening in the door, a diffusing plate for distributing the air above the grate, said permanent connections including a universal ball and socket joint mounted on the door of the furnace, the ball and the socket of said joint being provided with openings for the passage of air and a valve for regulating the amount of air supplied by the conduit and by the branch pipe so as to provide a constantly balanced relation between the amount of air delivered above the grate and the amount of air delivered below the grate of the furnace.

2. An attachment for furnaces having a fire door with an opening above the grate, including a pipe, means for supplying air to said pipe and permanent connections between said pipe and the fire door for supplying air through the opening in the fire door above the grate, said permanent connections including a pair of universal ball and socket joints, the ball and the socket of each joint being provided with openings for the passage of air therethrough, one of said joints being connected to the fire door and the other to the air supply pipe and means for connecting said joints.

3. An attachment for furnaces having a fire door with an opening above the grate, including a pipe, means for supplying air to said pipe and permanent connections between said pipe and the fire door for supplying air through the opening in the door, said permanent connections comprising a ball and socket joint mounted on the door provided with air openings, a ball and socket joint provided with air openings, mounted on the furnace and connected to the air supply pipe and a pair of telescoping pipes connecting said joints.

4. An attachment for furnaces having an ash pit, a grate and a fire door with an opening above the grate, comprising a conduit connected to the ash pit below the grate, a motor driven blower for supplying air to the conduit, a branch pipe connected to and projecting from the conduit for receiving a part of the air supplied by the conduit, permanent connections between the branch pipe and the fire door for supplying air through the opening in the door above the grate, said connections comprising a ball and socket joint provided with air openings mounted on the door, a ball and socket joint provided with air openings mounted on the furnace and connected to the branch pipe and a pair of telescoping pipes connecting said joints, and means for regulating the amount of air supplied by the conduit and by the branch pipe so as to provide a constantly balanced relation between the amount of air delivered above the grate and the amount of air delivered below the grate of the furnace.

In testimony whereof, I have signed my name to this specification.

HARRY F. EASTWOOD.