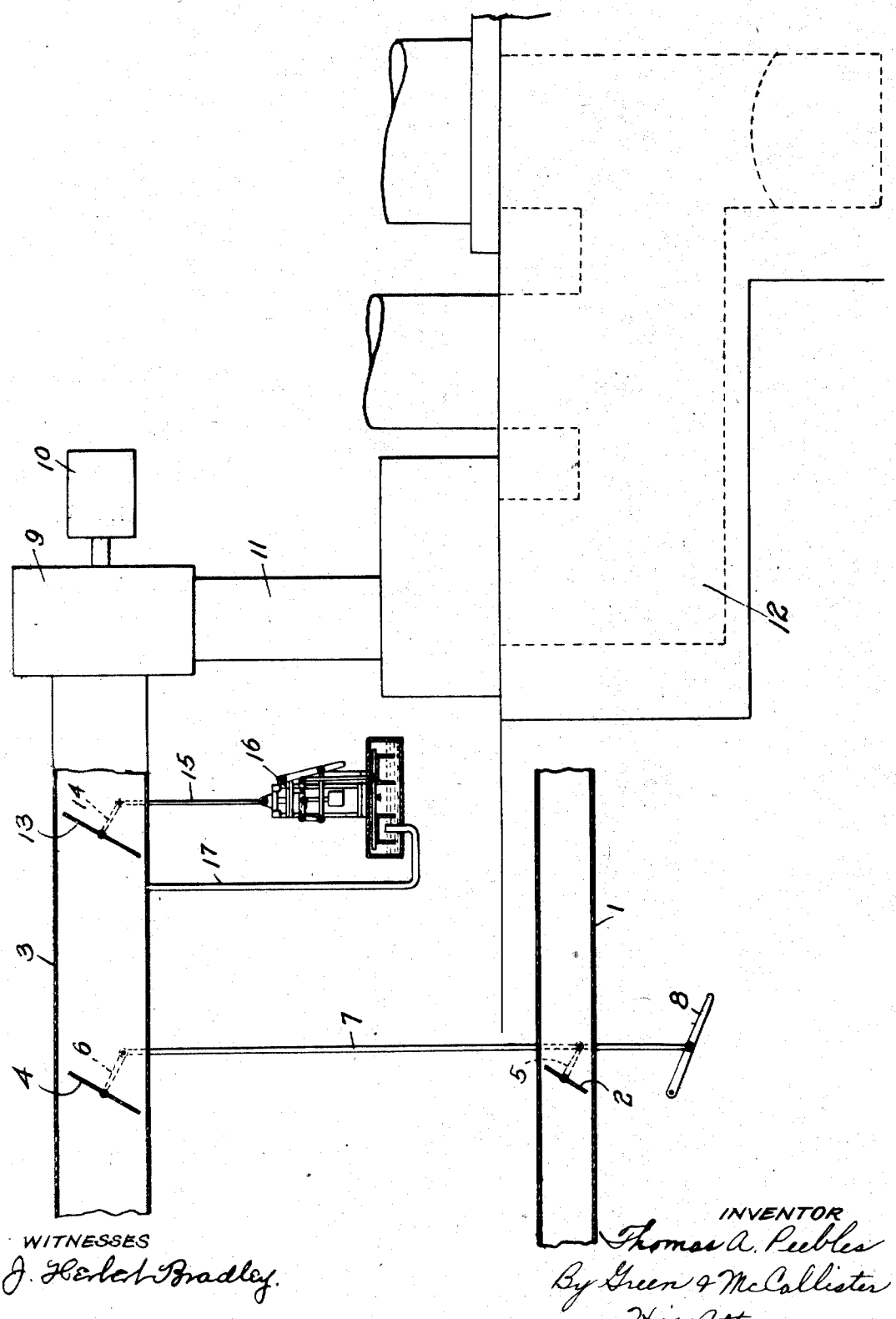
April 30, 1929. T. A. PEEBLES 1,710,839

FUEL SUPPLY SYSTEM

Filed Sept. 3, 1925



WITNESSES

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UNITED STATES PATENT OFFICE.

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FUEL-SUPPLY SYSTEM.

Application filed September 3, 1925. Serial No. 54,349.

This invention relates to systems for supplying fluid fuel to furnaces and the like.

Furnaces of this type are usually provided with burners in which the fuel is mixed with air in the proper proportion for the most efficient combustion. The rates of flow of the fluids to the burner are usually controlled by means of valves which may be interconnected for unitary movement, but, obviously, the rate of flow of either of the fluids will vary and the proportions of air and fuel be changed by any variations in the resistance to the flow of either fluid between the controlling valve and the burners. The air which is usually passed through a preheating device such, for example, as a checkerwork is particularly subject to this drawback, due to the fact that such a preheating device becomes clogged with dirt and foreign matter resulting from various causes.

An object of this invention is to provide a system for supplying fuel to furnaces of such construction and arrangement that any variations in the resistance to the flow of fluid from the controlling valve to the burners will be so compensated for as to maintain the proper proportions and rate of flow of the fluids forming the fuel.

A further object is to provide a system for supplying fuel to furnaces having a means for maintaining a constant quantity flow of the fluids for any given setting of the valves, regardless of variations in the resistance to flow resulting from such a device as a checkerwork used for preheating air.

A still further object is to provide a system of the type set forth which will be simple to manufacture, easy to control and reliable and accurate in operation.

These, and other objects which will be apparent to those skilled in this particular art, are accomplished by means of this invention, one embodiment of which is illustrated in the accompanying drawing, which is a diagrammatic view of a fuel supply system constructed in accordance with one form of this invention.

In the particular embodiment of this invention illustrated in the drawing, the system is arranged so as to automatically compensate for variations in the resistance to the flow of air from the controlling air valve to the burners in such a way as to supply the burners with a constant quantity of air despite any change in such resistance. Obviously, the same system can be so arranged as to compensate for any variations in the resistance to the flow of the fluid fuel such, for example, as oil or gas, but in view of the fact that the latter flows directly from the valve to the burners and that the air passes through such devices as a fan and a preheating checkerwork or the like, the latter will be subject to a varying resistance and the present description is, therefore, applied to a construction in which variations in resistance to the flow of air are compensated for.

The diagrammatic illustration in the drawing discloses a supply conduit 1, having any desired form of valve, such, for example, as the butterfly valve 2, for varying the rate of flow of fluid fuel such as oil or gas from a source of constant pressure (not shown) to the furnace burners (not shown).

An air supply conduit 3 is similarly provided with a valve such as the butterfly valve 4 for controlling the rate of flow of air through the conduit from a source at atmospheric pressure and the two valves 2 and 4 may have their operating arms 5 and 6, respectively, connected by a connecting bar 7 or the like for unitary movement by any form of operating means such as the hand lever 8.

A fan 9, operated, for example, by a motor or turbine 10 draws the air through the connecting conduit 3 and passes it through a second conduit 11 to the preheating checkerwork 12 which may be of any well known construction. From the latter, the air is passed to the furnace burners where it is mixed with the gas supplied through the conduit, and the valves 2 and 4 are so correlated that the fluids are delivered in such proportions as to form the most efficient combustible mixture. Opening or closing of the controlling valves 2 and 4 will cause a proportionate variation in the quantity flow of the fluids passing through the conduits to the burners.

After the furnace has been in use for some time, the passages of the checkerwork through which the air flows become clogged with dirt and other foreign matter, with the result that for a given amount of opening of the air controlling valve 4 a smaller quantity of air will pass, due to the increased resistance to such passage in the checkerwork. As a direct result of this reduced flow of air,

the most efficient proportion of air to gas which is ultimately supplied to the burners is destroyed resulting in faulty, inefficient operation.

I have found that this difficulty can be remedied, and a constant quantity of air caused to flow for any given opening of the air controlling valve 4, by maintaining the pressure in the air conduit 3 beyond the valve 4 constant, so that a constant pressure drop is maintained across the air controlling valve.

The preferred mechanism for accomplishing this result is illustrated in the drawing and consists of a second valve 13, the operating lever 14 of which is connected by a rod 15 to a pressure responsive valve regulator 16 such, for example, as the regulator, disclosed in Patent No. 1,150,097, granted August 17, 1915, to Francis H. Brown. The regulator is connected to the air conduit between the two valves 4 and 13 by a pressure tap 17 and is adjusted so as to open and close the valve 13 and maintain a constant subatmospheric pressure in the air conduit beyond the controlling valve 4. It will thus be seen that in view of the fact that the air is supplied to the conduit from a source at atmospheric pressure, there will be maintained a constant pressure drop across the air controlling valve with the result that any variation in the opening of the valve 4 will cause a proportionate variation in the quantity flow of air past the valve, through the conduit and to the burners. For example, as the checkerwork 12 clogs up so as to increase the resistance to the air flow, the pressure in the air conduit 3 beyond the valve 4 will tend to increase. Such an increase, however, will actuate the pressure responsive regulator 16 so as to open the valve 13 an amount just sufficient to compensate for the increased resistance of the checkerwork 12. The result is the maintaining of a constant total resistance to air flow from the controlling valve 4 to the burners so that any given position of the valves 2 and 4 will pass a constant quantity of air and gas to the burners in the most efficient proportions.

Obviously, the invention can be applied, if necessary, to the gas conduit but, ordinarily, this will not be necessary, due to the fact that the gas flows directly through the conduit 1 to the burners. Also the invention is not limited to systems using gas as a fuel but, may be applied with equal advantage to systems using other forms of fluid fuel.

Having described the preferred modification of this invention, what I claim as new and desire to secure by Letters Patent is:—

A fuel supply system for furnaces including a conduit for delivering fuel thereto, a conduit for supplying air thereto, a valve for controlling the quantity of air flowing through said air supply conduit, a second valve located in said air supply conduit between said first mentioned valve and said furnace and means operated entirely by the pressure in said air supply conduit between said valves for operating said second valve so as to maintain the total resistance from said first valve to said furnace constant for a given flow.

In testimony whereof, I have hereunto subscribed my name this 31st day of August, 1925.

THOMAS A. PEEBLES.