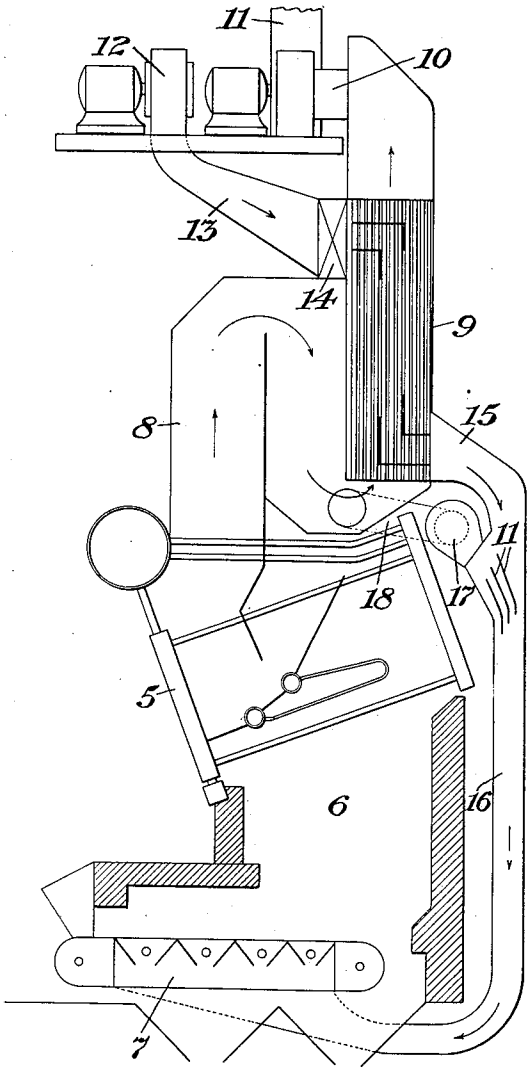
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AIR HEATER

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AIR HEATER

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This invention relates to furnaces such, for example, as boiler furnaces and more particularly to improvements in the air supply systems for such furnaces.

An object of this invention is to provide an improved arrangement for heating and conditioning the air employed for combustion purposes.

This and other objects which will be apparent to those skilled in this particular art are accomplished by means of the invention illustrated in the accompanying drawing in which

The figure in the drawing is a transverse sectional view, somewhat diagrammatic in form, illustrating a boiler furnace provided with an air conditioning and heating system constructed in accordance with one embodiment of this invention.

With reference to that particular form of the invention illustrated in the drawing, a boiler 5 of any desired type is shown in connection with a furnace combustion chamber 6 provided with a fuel supply mechanism such, for example, as a chain grate stoker 7. A passage 8 for the products of combustion leads to an air heater 9 through which the gases are drawn by an induced draft mechanism 10 and by which they are delivered to the stack 11. The air heater 9 may be of any desired type but as illustrated is of the tubular type in which the waste gases pass through the tubes. A blower 12 forces air for combustion through a connecting duct 13 to the air inlet 14 of the heater and thence through the air outlet 15 to the duct 16 which is arranged to deliver the heated air beneath the chain grate stoker 7.

A blower 17 has its inlet connected by a duct 18 with the flue passage 8 and the blower is arranged to deliver inert gas from the flue passage to the hot air duct 16 where the gases are mingled with the incoming air and the heat of the inert gases is employed to raise the temperature of the incoming air. Baffles 11 are provided for directing the incoming gases.

It will be appreciated that, by the use of this arrangement of air heater in two sections, a reduction in the amount of surface of the convection type heater section is obtained compared with that required where only a convection type of air heater is employed. Also, a reduction is obtained in the radiation losses which occur where the heat from the waste gases is transmitted through the medium of a tube wall or plate and a reduction is obtained in the size of the chimney and induced draught fan required to handle the waste gases. A lower temperature is provided within the boiler furnace, and hence longer life is ensured for the brickwork grates or burners, resulting from the intermixing of the waste gases and air in the contact section of the air heater.

It is also to be noted that by this arrangement I am enabled to carry the temperature of the heated air higher than would be the case if the air were not heated by admitting a portion of the gases of combustion directly to it; and that the arrangement of longitudinal passages is particularly effective in keeping down soot deposit, thereby enhancing heat transfer.

What I claim as new and desire to secure by Letters Patent is:

1. In combination, a furnace having a flue for the outgoing hot gases, a heat exchanger in the flue and having separate passages for the hot gases and air to be heated thereby, means passing air through said air passages in a direction counter-current to the flow of hot gases, and means by-passing a portion of the hot gases entering the heat exchanger to the heated air which has passed through the heat exchanger to additionally raise the temperature of the air by physical contact.

2. In combination, a furnace having a flue for the outgoing hot gases, a heat exchanger in the flue and having separate upright longitudinal passages for the hot gases and air to be heated thereby, means passing air through said air passages in a direction counter-current to the flow of hot gases, and means by-passing a portion of the hot gases entering the heat exchanger to the heated air which has passed through the heat exchanger to additionally raise the temperature of the air by physical contact.

3. The combination with a steam genera-

tor, of a furnace having a flue for the outgoing hot gases, a metallic heat exchanger in the flue and having separate passages for the hot gases and air to be heated thereby, means passing air through said air passages in a direction counter-current to the flow of hot gases, and means by-passing a portion of the hot gases entering the heat exchanger to the heated air which has passed through the heat exchanger to additionally raise the temperature of the air by physical contact.

4. The combination with a steam generator, of a furnace having a flue for the outgoing hot gases, a metallic heat exchanger in the flue and having separate upright longitudinal passages for the hot gases and air to be heated thereby, means passing air through said air passages in a direction counter-current to the flow of hot gases, and means by-passing a portion of the hot gases entering the heat exchanger to the heated air which has passed through the heat exchanger to additionally raise the temperature of the air by physical contact.

CHRISTOPHER SAMUEL DAVY.