

B. S. HARRISON.

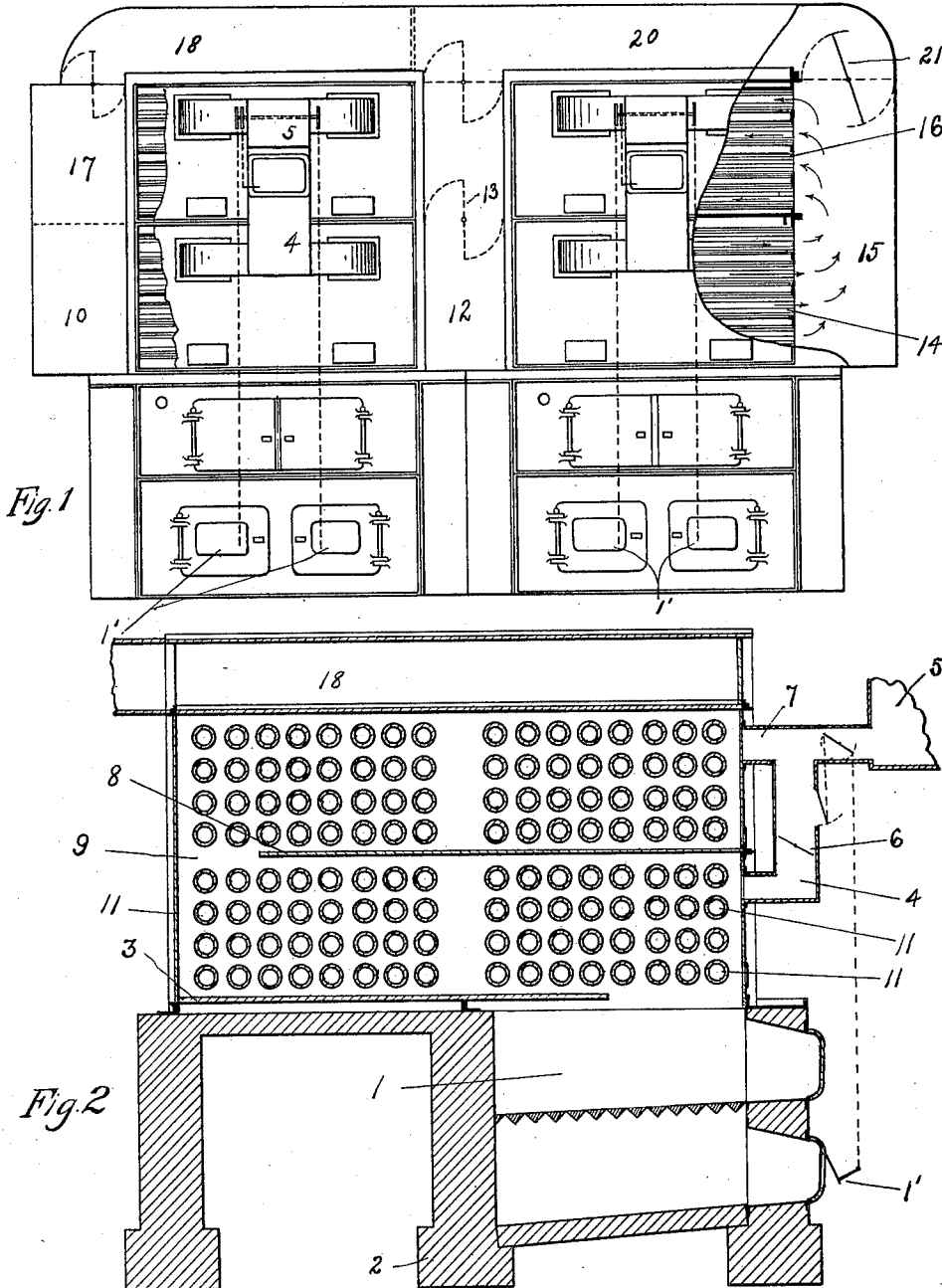
AIR TUBE HEATER.

APPLICATION FILED JAN. 15, 1909.

Patented July 16, 1912.

2 SHEETS—SHEET 1.

1,032,601.



WITNESSES:

Justin P. Record
William Lyman

INVENTOR.

Burt S. Harrison
BY *Arthur F. [Signature]*
ATTORNEY

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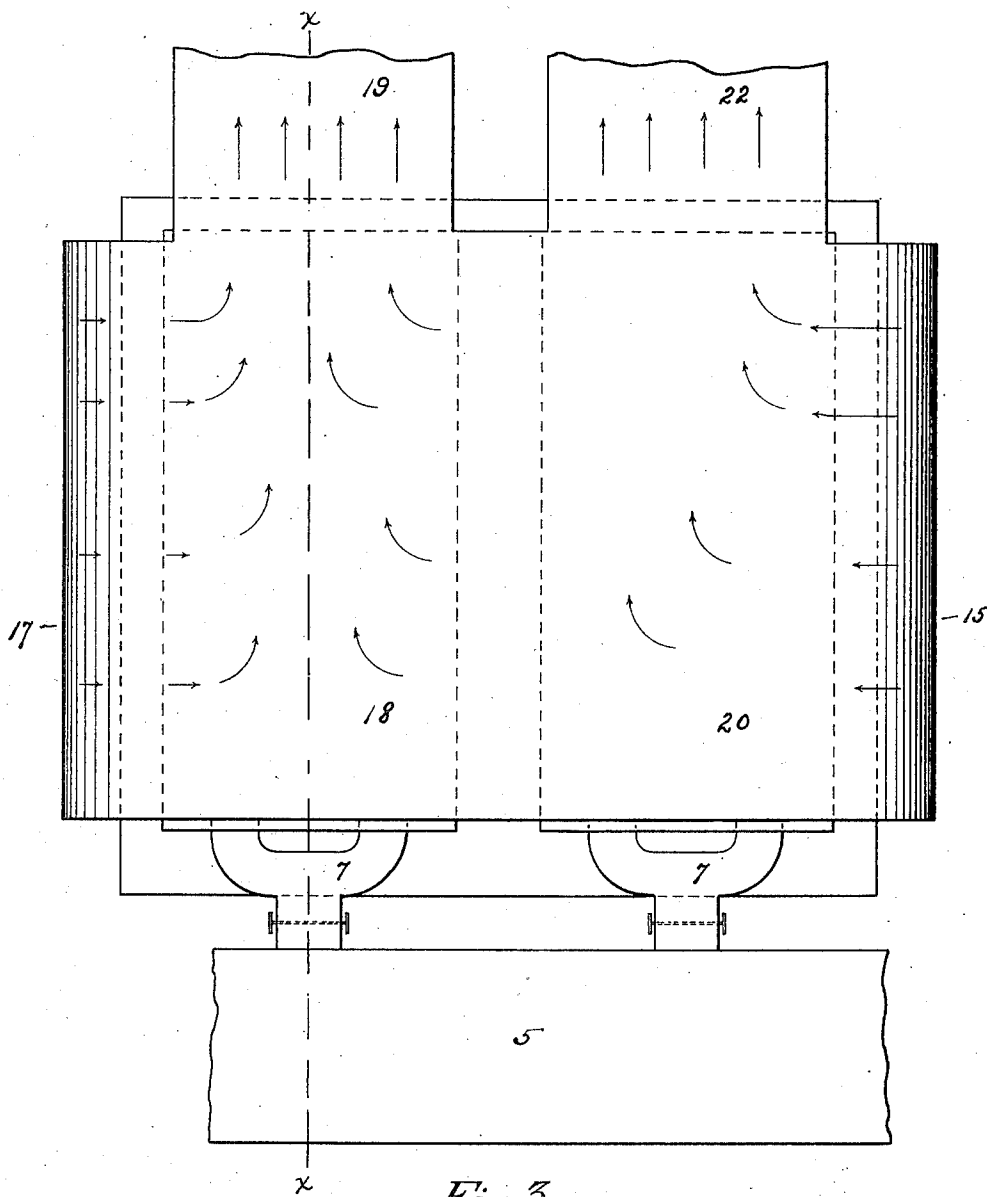


Fig. 3

WITNESSES:

Justin P. Pallane
William Lyman.

INVENTOR

Burt S. Harrison

BY

Arthur Fred. J.
ATTORNEY

UNITED STATES PATENT OFFICE.

BURT S. HARRISON, OF NEW YORK, N. Y.

AIR-TUBE HEATER.

1,032,601.

Specification of Letters Patent.

Patented July 16, 1912.

Application filed January 15, 1909. Serial No. 472,401.

To all whom it may concern:

Be it known that I, BURT S. HARRISON, a citizen of the United States, and resident of the borough of Brooklyn, city of New York, in the county of Kings and State of New York, have invented a certain new and useful Air-Tube Heater, of which the following is a specification.

My invention relates to improvements in heating and ventilating systems and particularly to that class in which heated air is used as a heating medium and the object of my invention is to provide an effective and economical system for heating buildings, and utilizing in said system the heat from waste gases where such may be available. I accomplish this object by the device illustrated in the accompanying drawings in which—

Figure 1 is a front elevation of my improved furnace with parts broken away, Fig. 2 is a sectional view on the line $x-x$ in Fig. 3, Fig. 3 is a plan view of the device.

Similar reference characters refer to similar parts throughout the several views.

My improved heater is provided with any desired form of combustion chamber 1 for burning coal, wood, oil or gas, and above the same is located the heater provided with transverse preferably horizontal air tubes. The number and size of the air tubes is to be determined by well known principles and will depend upon the quantity of air to be handled and the desired temperature rise, and the grate area will be proportioned thereto according to the desired rate of fuel consumption and the kind of fuel. As will be seen, the capacity of my device is unlimited as batteries of air tubes may be added to any desired extent. In the drawings I have shown four batteries of tubes, but I do not intend to limit myself to this number or arrangement, as a greater or less number may be used as desired. The device may be used singly or in any desired combination of several heaters in battery, working in multiple or series or both.

Upon a foundation 2 I provide a horizontal baffle plate 3 to throw the gases of combustion against the lower front tubes 11 before passing to the rear of the heater. At the front of the heater above the combustion chamber 1 I provide a smoke duct 4 to the smoke flue 5 leading to the chimney or stack.

A damper 6 is provided in this smoke duct 4 so that it may be closed when desired. At the upper part of the furnace preferably above the smoke duct 4 is provided another smoke duct 7 also connected with the smoke flue 5. It will thus be seen that when the fire is first started in the combustion chamber 1 the damper 6 in the lower smoke duct 4 will be opened so that a good draft to the chimney may be obtained. After the fire has been well started this damper 6 will be closed so that the draft will be across the air tubes below the horizontal baffle 8 through the vent 9 and back across the upper air tubes to the upper smoke duct 7 and thence to the chimney.

When used in conjunction with a gas engine installation, gas producer, or other installation where hot waste gases are available the smoke duct 4 is preferably omitted and the waste gases to be utilized are carried into the heater at that point. This point of entrance is far enough above the combustion chamber 1 so as not to interfere with the combustion of fuel on the grate, but mixes with the gases of such combustion and traverses the gas passages of the heater, giving up its heat to the air tubes. The temperature of these waste gases may be reduced or otherwise controlled by the admission of a proper proportion of cold air into the fuel combustion chamber by means of the draft damper 1' in the ash doors of the furnace.

I prefer to separate the air tubes at suitable intervals by horizontal baffles or partition plates 8 leaving an open space or vent 9 therein so that the products of combustion will pass back and forth across the air tubes as many times as may be desired. The number of baffles used being arranged to suit the condition of fuel, gas temperatures and air temperatures.

The fresh air is supplied to the cold air chamber 10 from the outer air in any desired manner and passes thence through the lower front air tubes 11 immediately above the combustion chamber 1 to an intermediate chamber 12 at the other end of the tubes 11. This chamber 12 is preferably divided in the plane of the baffle 8 by a damper 13 which, when the heater is operating to its full capacity, is closed. The air thus heated in the tubes 11 passes from the chamber 12 through the tubes 14 to the outer chamber

15 and thence upward to the upper battery of tubes 16 thence in a reverse direction through the tubes 16 to the chamber 12 above the damper 13 whence it passes through the last battery of tubes to the chamber 17 whence it is delivered to the heated air chamber 18 from which it is delivered to the duct 19 and through it to the rooms to be heated in any desired manner. The fresh air is supplied to the air tubes by a blower or other suitable device, or by natural draft, if desired, through the cold air duct, and will pass, as indicated by arrows, through the pipes to be discharged therefrom into the hot air chamber from which it is supplied to the room or rooms to be heated.

My device contemplates providing both hot air for heating and tempered air for ventilating; and this result may be obtained either by the use of two or more heaters, or where a single heater is used, by diverting part of the air which has passed through a number of tubes and has attained the desired temperature to the tempered air chamber 20 by the damper 21 and thence to the ventilation duct 22 and thence to the room or rooms, while the air to be heated to a high temperature is passed through a greater number of heating tubes where the desired temperature is reached, thence to the hot air chamber 18 from which it passes through hot air duct 19 to the rooms to be heated.

In the preferred form of multiple heating arrangement shown, the air tubes 11 open at their ends, are incased by the walls of the fresh air duct or chamber 10 so that the air from the cold air duct will enter the air tubes 11 of the first heater and will pass through these tubes either by forced or natural draft to a tempered air chamber 20 into which the adjoining stack of air tubes of the second heater also open and will pass through the tubes of this adjoining heater to another chamber, and this may be continued as many times as desired. The superheated air in the final stack of air tubes is discharged into a hot air chamber 18 from which it is conducted by means of pipes to the rooms to be heated in the usual well known manner.

If desired a single furnace arrangement may be used in which arrangement one or more stacks of air tubes are placed above the combustion chamber 1 and this single furnace will operate in the identical manner above described the unnecessary parts being omitted.

Having thus described my invention, what I claim is:

1. A device of the character described, having in combination a combustion-chamber, a cold-air chamber, means for supplying air to the cold-air chamber, an intermediate air-chamber, an outer air-chamber, a battery of air tubes situated above the combustion-chamber and in communication with the cold-air and intermediate chambers, a second battery of air-tubes in communication with the intermediate and outer chambers, a third battery of air-tubes situated above the second battery and in communication with the outer chamber, and with the intermediate chamber, a fourth battery of air-tubes situated above the first battery and in communication with the intermediate chamber, a baffle-plate between the lower and upper tiers of batteries, and dampers in the intermediate chamber, so arranged that a portion of the air passing through the first battery of tubes may be caused to pass into a suitable chamber from which it may be supplied for ventilating purposes, and a portion caused to pass through the third and fourth batteries of tubes and utilized for heating purposes.

2. A device of the character described, having in combination a combustion-chamber, a cold air chamber, means for supplying air to the cold-air chamber, an intermediate air-chamber, an outer air-chamber, a battery of air-tubes situated above the combustion chamber and in communication with the cold-air and intermediate chambers, a second battery of air-tubes in communication with the intermediate and outer chambers, a third battery of air-tubes situated above the second battery and in communication with the outer chamber, and with the intermediate chamber, a fourth battery of air-tubes situated above the first battery and in communication with the intermediate chamber, a temperate air-supply chamber, a hot air-supply chamber, and dampers in the intermediate chamber, so arranged that moderately-heated air may be directed into the temperate air-chamber and highly-heated air directed into the hot air-chamber.

Signed at New York in the county of New York and State of New York this twelfth day of January A. D. 1909.

BURT S. HARRISON.

Witnesses:

WILLIAM LYMAN,
JUSTIN S. GALLAND.