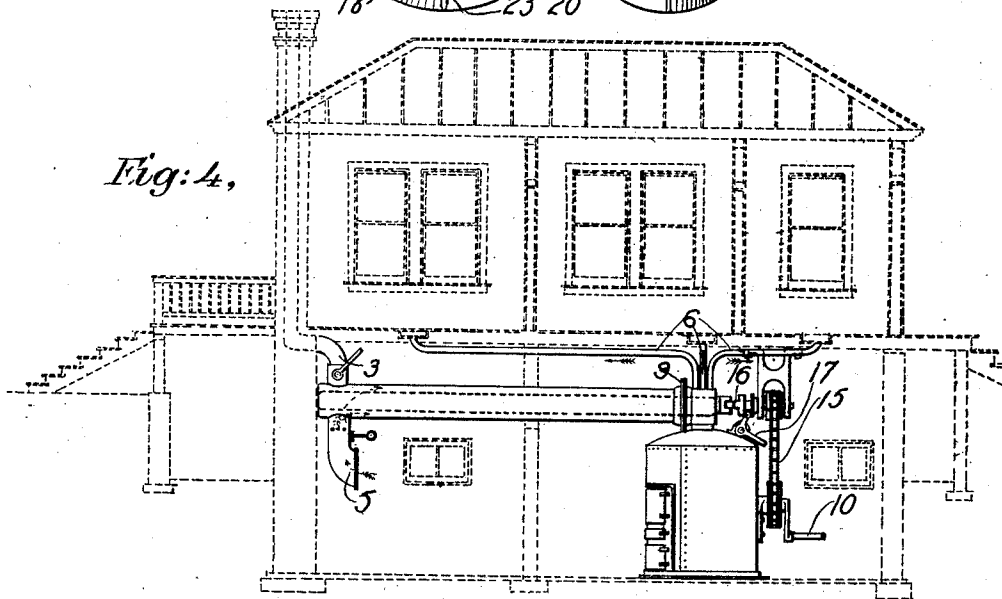
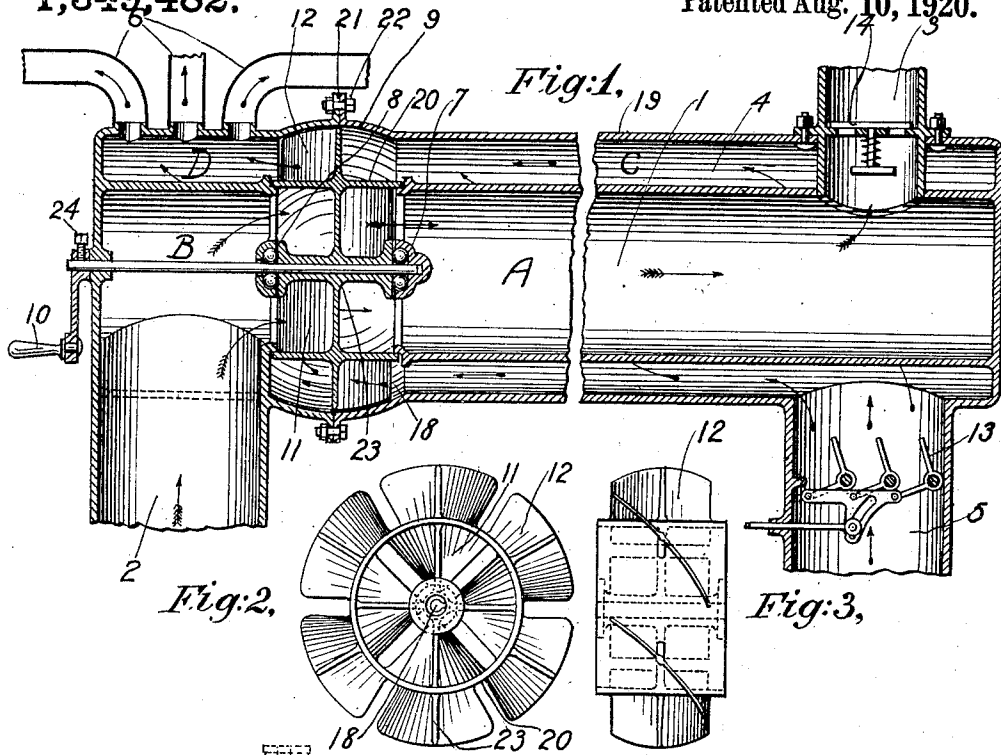


W. O. WOOD.
 DEVICE FOR CONSERVING FUEL.
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DEVICE FOR CONSERVING FUEL.

1,349,482.

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To all whom it may concern:

Be it known that I, WILLIAM O. WOOD, a citizen of the United States, and a resident of Riverside, county of Providence, and State of Rhode Island, have invented a new and Improved Device for Conserving Fuel, of which the following is a full, clear, and exact description.

My invention relates to a device for use-fully employing the heat contained in the flue gases of stoves, furnaces and boilers.

One of the prime objects of my invention is to conserve fuel.

A further object of my invention is to utilize air, heated by the flue gases, for heating purposes.

A further object of my invention is to use the heat contained in the flue gases to pre-heat air supplied to the grate of the heating unit.

Before taking up a detailed description of the device, it should be noted that while I have shown the device for conserving fuel connected to a heating system for a house, I do not intend that the invention should be limited either in detail of construction, arrangement of parts, or application to the device illustrated in the accompanying drawing, wherein similar characters of reference refer to corresponding parts throughout the several views, and in which—

Figure 1 is a longitudinal sectional view of the device for conserving fuel;

Fig. 2 shows the fan and the arrangement of blades in the inner and outer sections thereof;

Fig. 3 is a side view of the fan;

Fig. 4 illustrates a house and heating system therein embracing the device for conserving fuel.

The device consists of a passage 1 for flue gases, communicating at one end with the stove, furnace, or boiler fire-box by means of a pipe 2, and at the other end with the atmosphere, by means of a flue 3. The passage 1 is partly surrounded or jacketed by a passage 4 for air, the supply of which is taken in through a pipe 5 at one end thereof, and distributed, after heating, through pipes 6 located at the opposite end of said passage 4.

The passages 1 and 4 are composed each of two sections, designated for convenience A, B and C, D, disposed on both sides of the drum 9. The sections A and B of the pas-

sage 1 are connected and passage 1 made continuous by the inner cylindrical partition 20 of drum 9, which also serves to make the sections C and D of passage 4 continuous. The sections of the outer casing 19 forming the outside wall of passage 4 are joined by means of flanges 21, secured by bolts 22.

The inner section of the drum 9 contains a fan, the blades 11 of which are disposed around the hub 23, and pitched to actuate or be actuated by the flow of flue gases from B to A, in direction indicated by arrow; the outer section of the drum 9 is equipped with a fan, the blades 12 of which are disposed around the outside surface of the cylindrical partition 20 and pitched to propel air from C to D, in direction indicated by arrows.

The drum 9 is keyed to a shaft 18 (key not shown), and is mounted in ball bearings 7 and 8. The outer end of shaft 18 carries a handle 10, which may be secured to the shaft by means of a set screw 24.

When it is desired to set the device in operation, the handle 10 is turned, causing the drum to rotate and fan blades 11 on the inner section thereof to propel a quantity of flue gases into section A of passage 1; and, simultaneously, the fan blades 12 on the outer section of the drum 9 to draw in a supply of cold air into the passage 4 from the pipe 5, through the open damper 13. The cold air entering passage 4 from the pipe 5, circulates through passage 4 and is heated by the hot flue gases contained in the passage 1, causing a drop in temperature of the flue gases, and a marked reduction in pressure, particularly in section A of passage 1, which induces a flow of flue gases from section B to section A of passage 1, through the inner section of the drum 9. The flowing gases act upon the fan blades 11 impelling and maintaining the rotation of the drum 9 started in turning the handle 10.

After the initial rotation by hand of the drum 9 to start the operation, it is automatically kept in rotation by a succession of impulses on the fan blades 11 resulting from the action of the flue gases flowing from section B to section A of passage 1, as the pressure in the latter periodically drops due to the extraction of heat from the flue gases therein by the cold air. Between im-

pulses the drum 9 acts similar to a fly wheel, its rotation continuing by reason of the energy stored up therein.

When the drop in pressure in section A of passage 1 occurs, the check valve 14 in flue 3 designed to open only outwardly, prevents the inrush of air through flue 3 to break down the partial vacuum formed in section A of passage 1; and, on the other hand, when the pressure in section A of passage 1 becomes greater than the pressure of the atmosphere on the outside of the check valve 14, a quantity of flue gases is expelled until the pressures on both sides of the valve are equalized.

The complete cycle of operation then is as follows: Drum 9 is initially rotated by hand, causing fan blades 11 on the inner section thereof to propel hot flue gases into section A of passage 1; simultaneously, the fan blades 12 operating in passage 4 draw cold air into said passage. The cold air in passage 4, surrounding passage 1, absorbs heat from the hot flue gases contained therein, reducing their temperature and effecting a considerable drop in pressure more especially in section A of passage 1. The hot flue gases in section B of passage 1 being at least at atmospheric pressure, rush in through the inner section of the drum 9, to section A of passage 1, acting upon the fan blades 11 and impelling the rotation of the drum 9. At the same time, the fan blades 12 in passage 4, draw in a fresh supply of air and expel the heated air through distributing pipes 6, completing the cycle.

Fig. 4 of the drawings illustrates the device as an auxiliary heating system in a hot water or steam heating system for a house. For convenience, the starting handle 10 is shown connected with the drum 9, by means of a chain 15 and a clutch 16, the latter being thrown into and out of engagement with the drum 9, by means of a lever 17. The air intake 5 may be a flexible pipe so that air may be drawn from different parts of the house as desired.

The device may be advantageously installed in a power plant by leading the heated air into the fire-box of the boiler, thus effecting a saving of the heat units which would otherwise be consumed in heating the air supplied to the grate by the usual draft.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. In a device of the class described, in combination, a passage for relatively hot gases and means for automatically controlling the flow thereof through said passage, a passage for relatively cold gases, and

a single instrumentality cooperating with both said passages and actuated by the automatically controlled flow through one of the same to effect the flow through the other, said instrumentality having means for its operation independent of the flow through either of said passages.

2. In a device of the class described, in combination, a passage for relatively hot gases and means for automatically controlling the flow thereof through said passage, a passage for relatively cold gases, and a single instrumentality cooperating with both said passages and actuated by the automatically controlled flow through one of the same to effect the flow through the other, said instrumentality forming a part of each passage, and having means for its operation independent of the flow through either of said passages.

3. In a device of the class described, in combination, a passage for relatively hot gases, a passage for relatively cold gases, and a drum comprising fans included in each of said passages, and consisting of a single instrumentality, whereby both the relatively hot gases and the relatively cold gases pass through said fans the flow of said relatively hot gases being automatically controlled.

4. In a device of the class described, in combination, a passage for relatively hot gases, a passage for relatively cold gases, and a drum included within said passages, comprising two sets of fans operating, respectively, in each of said passages and consisting of a single instrumentality, the blades of said fans being oppositely pitched the flow of said relatively hot gases through the passage therefor being automatically controlled.

5. In a device of the class described, in combination, a chamber for relatively hot gases, a second chamber for relatively cold gases surrounding the first chamber, inlet and outlet passages to and from each of said chambers, respectively, for relatively hot gases and relatively cold gases, and a drum mounted and included within said chambers, comprising an inner and an outer section forming parts of said chamber for relatively hot gases and parts of said chamber for relatively cold gases, respectively, fans contained within each of said sections, the blades of the inner fan being oppositely pitched to the blades of the outer fan, and means contained within said inlet and outlet passages for controlling the flow of relatively hot gases and relatively cold gases therethrough.

WILLIAM OLNEY WOOD.