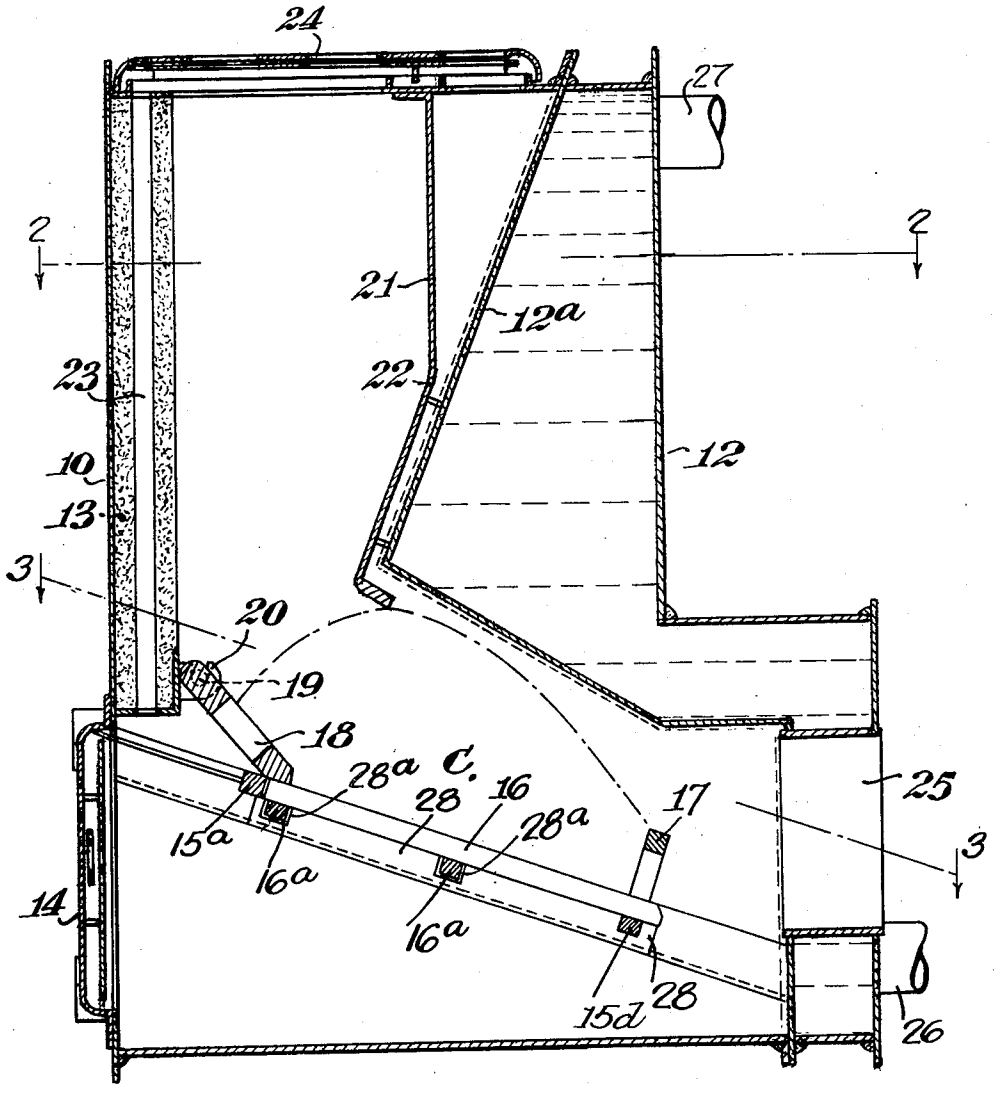
Oct. 7, 1952 R. G. CUBITT 2,612,877

STOVE OR FURNACE FOR HEATING WATER

Filed Oct. 25, 1949 2 SHEETS—SHEET 1

FIG. 1.



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FIG. 2.

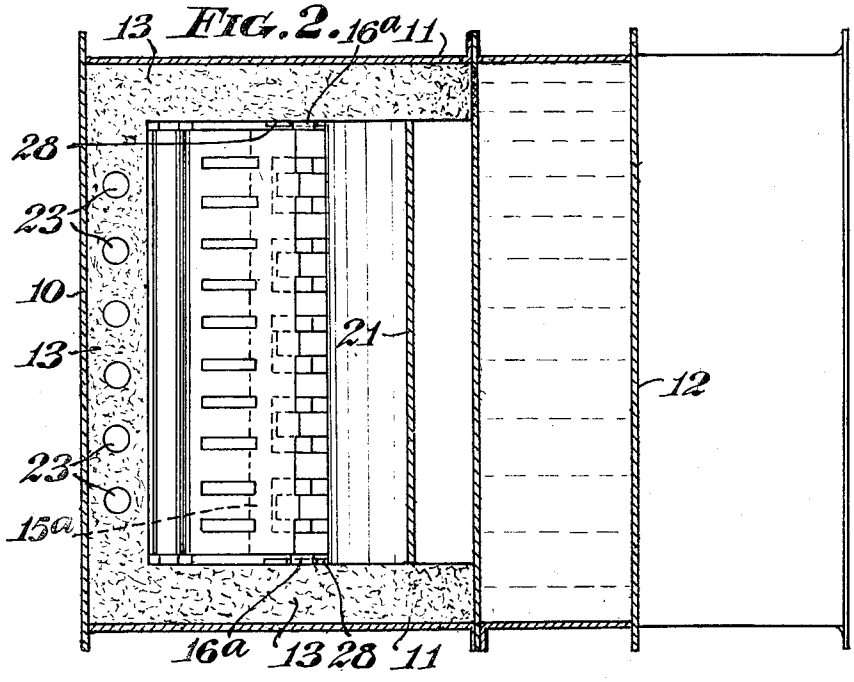
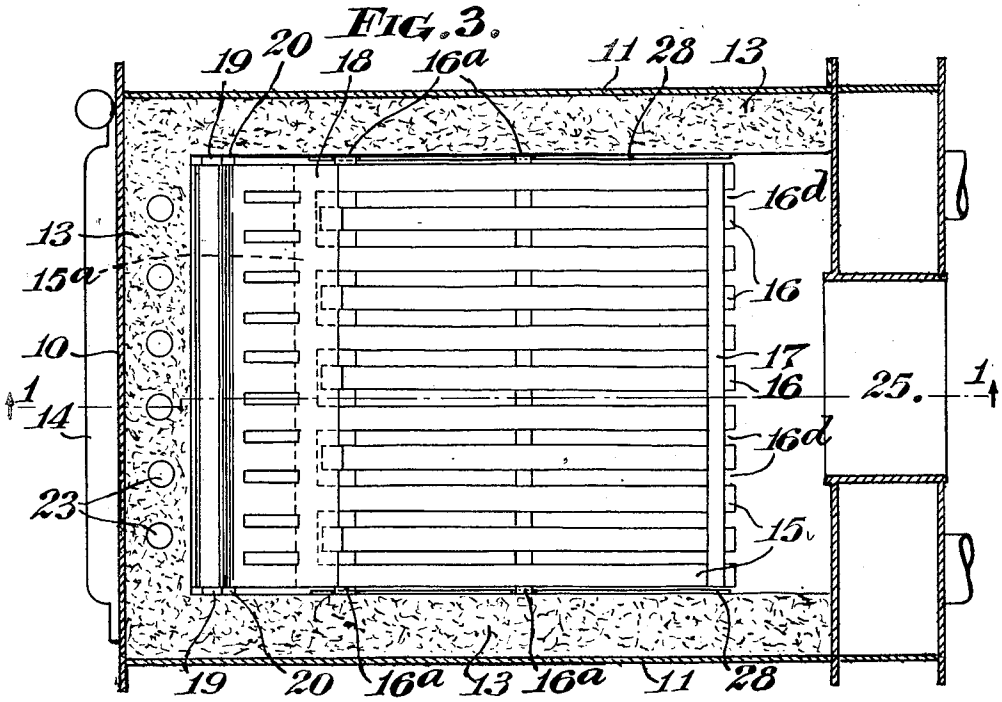


FIG. 3.



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STOVE OR FURNACE FOR HEATING WATER

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4 Claims. (Cl. 122—30)

1

This invention has reference to stoves or furnaces for heating water, particularly to such stoves or furnaces as are used for providing a domestic hot water supply or for central heating.

The invention relates particularly to furnaces of the type wherein a fuel magazine or hopper for the fuel is provided above a combustion space, to which space the fuel feeds by gravity from the said magazine or hopper, means being provided for feeding air for combustion through the fuel in the combustion space, means also being provided for feeding additional or secondary air downwardly on to the combustion space. With furnaces of this type, the burning fuel is generally supported by means of bars forming a grate or grid so that the ashes can pass therethrough to an ash pit beneath.

The primary object of the present invention is to provide a construction of stove or furnace in which bituminous or soft coal can be used as the fuel and substantially continuous burning obtained, the construction resulting in a more complete combustion with consequent reduction and elimination in solid deposits and smoke emission than would be obtained if fuel of this type were to be used in a water heating furnace of usual construction.

A further object of the invention is to provide a construction of furnace for heating water particularly for domestic hot water supply and central heating in which the production of volatile products is kept to a minimum until the raw fuel is actually within the combustion space.

Another object of the invention is to provide an arrangement in which a very complete combustion of the fuel on the combustion space is obtained, by arranging the air feeds to the combustion space so that combustion products are drawn through the mass of burning fuel, thus minimizing the amount of solid products passing to the flue or outlet.

A still further object of the invention is to provide a construction of furnace wherein the combustion space is beneath a jacketted water space so that efficient heat transference is obtained and wherein the air is fed to the combustion space in such a way that it tends to maintain the fuel in the hopper cool and at the same time is to some extent pre-heated.

A preferred construction of furnace, by way of example of the invention, is illustrated in the accompanying drawings, wherein

Figure 1 is a sectional side view of a stove or furnace on the line 1—1, Figure 3;

Figure 2 is a sectional plan view on the line 2—2, Figure 1, omitting the grate, and

Figure 3 is a sectional plan view on the line 3—3, Figure 1.

In the drawings, the stove housing is fabricated from metal plate and refractory material,

2

and includes a front plate 10, side plates 11 and a water jacket 12, the front and side plates being lined with a suitable material 13, with the water jacket 12 extending between the side plates. The lower part of the front plate 10 is open and a suitable ash pit door 14 is provided for said opening. Said door may have an adjustable air inlet but preferably only a small amount of air is fed to the fire space through the door. The water jacket 12 has a front wall 12*a* sloping downwardly and forwardly to meet the lower jacket wall which slopes rearwardly and downward above the combustion space C.

The grate constituting the bottom of the combustion space may be of any convenient form and it is preferred to provide a construction in which an agitating movement can be imparted thereto so that the clearing of the ash to the ash pit can be assisted by such movement. In the construction illustrated, the grate consists of two sets of members or bars 15, 16, each of grid-like form and arranged so that when in position, the members 16 interlace with the members 15, leaving spaces 16*d*, however, for the ash to pass to the ash pit. The members or bars 16 are united by two transverse or cross bars 16*a*, 16*a*, the ends of which at each side of the grate are supported by a plate 28, said ends being received in slots 28*a* in said plate. The members or bars 15 are united at the front end by a transverse part 15*a* so that this set of members is of a comb-like form, and by a transverse rear cross bar 15*d*.

It will be seen that the comb-like member comprising the set of bars 15 and transverse members 15*a*, 15*d*, is supported solely by the transverse or cross-bars 16*a* carrying the other set. Agitating or riddling movement can be imparted to the set of bars 15 in any known manner, for example by employing a hooked poker the end of which can engage a hole in the transverse part 15*a*. The members or bars 15 are also united at the rear by the upper transverse rear bar 17 which is of grid-like form and also serves to prevent fuel from gravitating down the grate.

A further sloping fire bar member 18 is also provided at the front, which is swivelly and removably mounted by a bar 19 engaging in end bracket supports 20. This fire bar member 18 directs fuel in the hopper towards the firebed.

A baffle plate 21 is provided in front of the wall 12*a* of the water jacket, the said wall 12*a* extending from the top of the stove towards the baffle plate the space between the baffle plate 21 and the wall 12*a* constituting an air duct which is throated at 22, the lower end of the baffle plate curving or bending rearwardly around the bottom plate of the water jacket. The lining 13 to the front 10 is also provided with a number of passageways 23 which serve as ducts communicating from above the stove to the fire grate and

which serve to feed air to beneath the combustion space. It will be understood that any suitable ducting may be provided at the front, for example, a passage or passageways of suitable shape may be provided between the front wall **10** and lining **13**.

The top of the stove is covered by a suitable removable cover plate **24** which is perforate or apertured, and the arrangement may be such that the opening or closing of the apertures can be controlled. The said controlling means may consist of a plate slidably mounted, the arrangement being such that air control through the ducts **22, 23** and the hopper space between the baffle **21** and the front plate, can be controlled simultaneously. It will be understood, however, that the combustion air from the several sources can be independently controlled so that any desired proportion can pass to the combustion space through the various paths.

The combustion space C leads to a suitable flue outlet **25**, whilst inlet and outlet pipes **26, 27**, respectively are provided for the water jacket.

The construction is such that the fuel can burn on the grate, whilst the space between the front wall **10** and the baffle plate **21** comprises a hopper serving to feed the raw fuel on to the burning fuel as combustion proceeds. The raw fuel is maintained at a temperature which is sufficiently low to prevent distillation until it reaches the combustion space, i. e. until it is in physical contact with the burning fuel, so that no smoke issues from the hopper. Further the arrangement of the air duct above the combustion space is such that air is introduced at the top of the burning fuel either by natural or forced draught, and owing to the narrowing of this duct and the lip like end to the plate **21**, the air will sweep across the burning fuel assisted by the rearwardly turned lip of the plate **21** which will result in combustion of smoke and volatile matter by contact with the incandescent material on the firebed. The duct outlet may if desired be formed as a plurality of jets and the lower end is formed as a lip so that air tends to flow from said lip edge across the burning fuel. The supply of unburnt fuel to the firebed is determined partly by the shaping of the water jacket and this results in fuel on the bed being maintained in general in a definite contour on the top surface over which the air sweeps.

The fire grate slopes at a suitable angle so that the angle is less than the angle at the top surface of the fuel bed, a convenient angle for the grate being between 15°–35° to the horizontal. The arrangement results in the rapid transfer of fuel from the hopper into the combustion zone and reduces the pre-ignition period of the raw fuel to a minimum.

It will be understood that suitable draught regulating means will be provided to control the rate of combustion. For example, a certain amount of air must pass down through the hopper and up from beneath the firebed. It is by reason of the additional air introduced across the firebed, that complete combustion occurs and it will be understood that the proportion of additional air so introduced will be appropriately regulated in relation to the other air.

I claim:

1. A furnace for heating water comprising a front plate and side plates, a water back between the side plates and including a bottom wall declining rearwardly and a front wall rising upwardly and rearwardly therefrom, a baffle plate between the side plates spaced from the front wall of the water back and defining therewith a downdraft air duct, the baffle plate terminating at its lower end in a lip spaced from the bottom wall of the water back and directing the draft substantially parallel to the water back bottom wall, grate means mounted between the lower parts of the side plates and declining rearwardly directly beneath the water back bottom wall, means defining air passages extending downwardly and opening directly above the forward end of the grate means, an outlet flue communicating with the combustion space between the grate and water back bottom wall and surrounded by water of the water back.

2. The furnace according to claim 1 and wherein the baffle plate includes a lower forwardly declining portion defining with the front wall of the water back a throated portion of the air duct.

3. The furnace according to claim 1 and wherein the water back bottom wall and grate converge from front to rear.

4. A furnace for heating water, comprising, a casing including a front wall having an opening leading to an ash pit, a door for said opening, a rear wall having top and bottom water inlet and outlet connections and also having a bottom exhaust flue opening, side walls, a bottom wall, and a top wall at least a portion of which is open, a cover for said top wall, a grate having its front end located at the upper side of the opening in the front wall and extending downwardly and rearwardly toward the bottom of the exhaust flue, means forming a water back including the said back and side walls and a front wall which is forwardly and downwardly inclined and whose lower portion is inclined downwardly and rearwardly to meet a horizontal wall at the top of the exhaust flue and which latter wall meets a vertical wall spaced from the back wall to complete the water back about the exhaust flue, a baffle plate extending in part perpendicularly downward from adjacent the opening in the top wall to a point spaced from the front inclined wall of the water back where it continues in spaced parallel relation to the said inclined wall, said baffle plate forming a downdraft air duct in relation to the water back and discharging over the firebed on the grate toward the outlet flue and also cooperating with the first mentioned front and side walls to provide a raw fuel hopper accessible by removing said cover from the top wall, and means at the inner side of the first mentioned front wall having air ducts leading from beneath the cover to the front end of the grate.

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