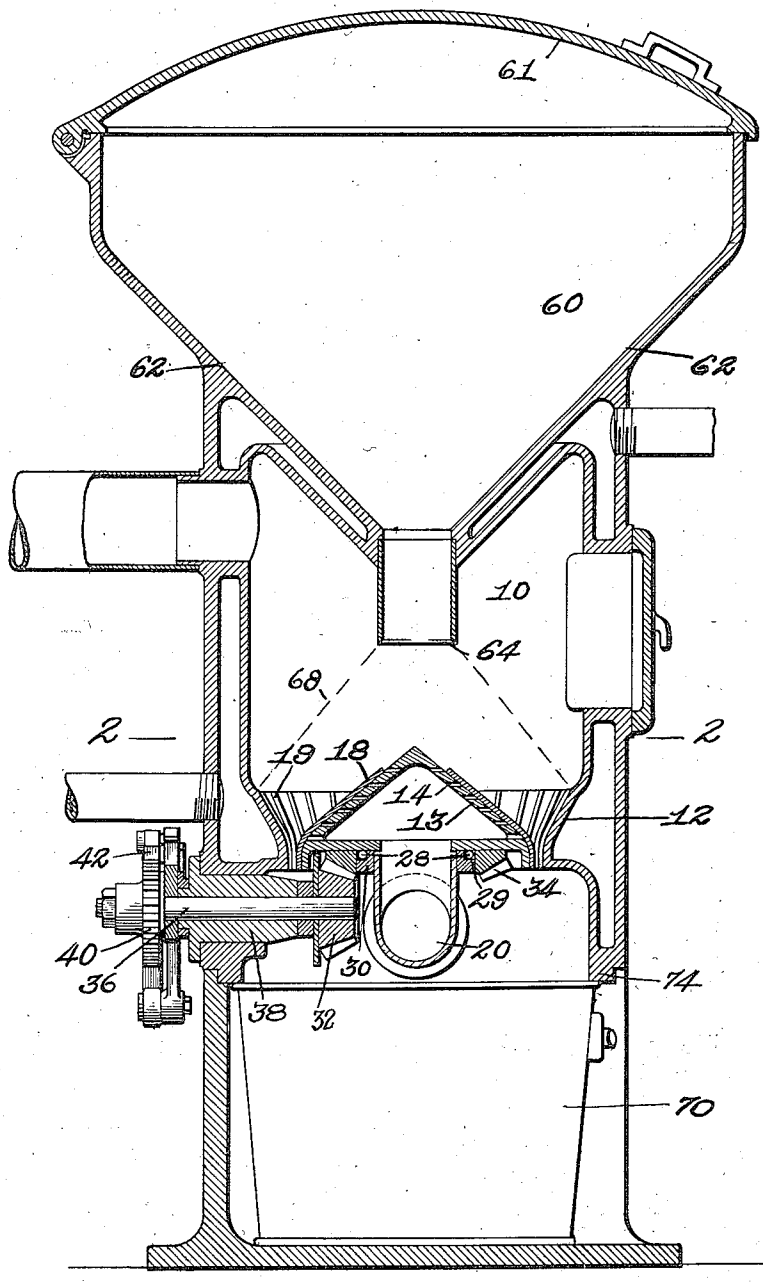
Oct. 15, 1935. L. W. CORBETT 2,017,340

COMBUSTION APPARATUS

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FIG. 1.



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FIG. 2.

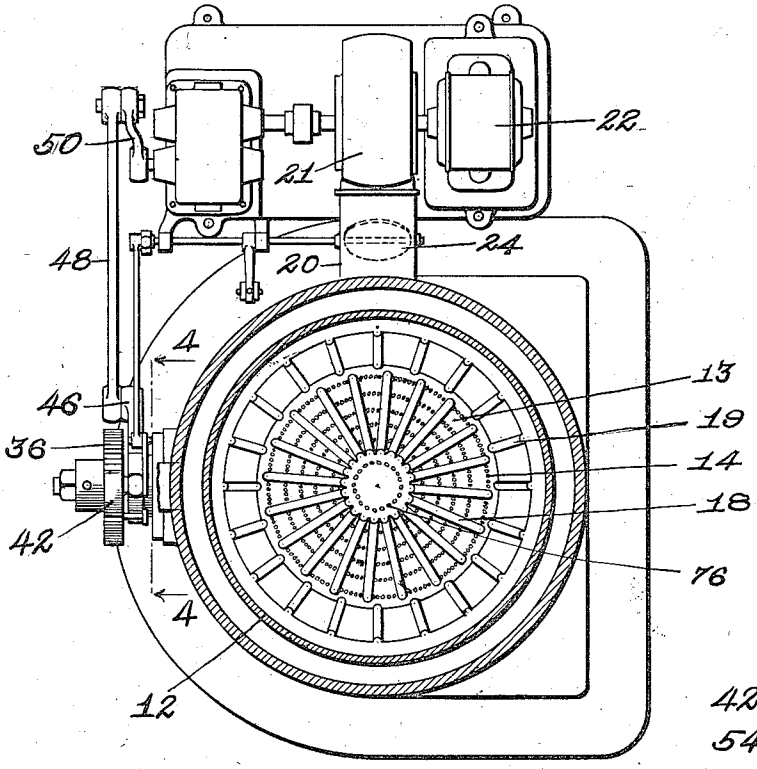


FIG. 4.

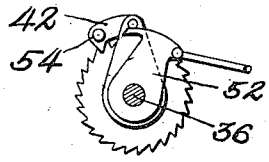
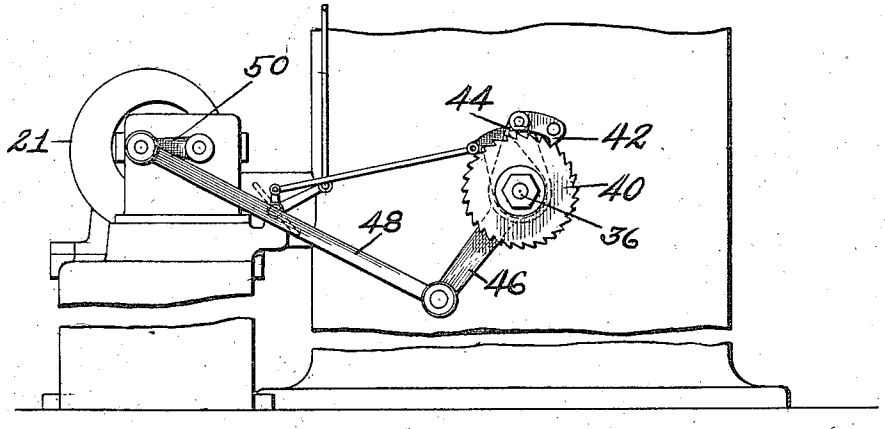


FIG. 3.



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UNITED STATES PATENT OFFICE

2,017,340

COMBUSTION APPARATUS

Lawrence W. Corbett, Belmont, Mass., assignor, by direct and mesne assignments, of thirty-four per cent to William H. Doble, Quincy, Mass., and thirty-three per cent to Blanche L. Doble, Hingham, Mass.

Application November 15, 1930, Serial No. 495,863

2 Claims. (Cl. 110—36)

This invention relates to combustion apparatus for burning solid fuel.

One object of the invention is to provide a novel and improved construction of combustion apparatus which may be economically manufactured and finds particular use as automatic heating apparatus for those uses requiring a comparatively small capacity, such for example as heating apparatus for heating domestic hot water supply, for heating garages, small greenhouses, and small dwelling houses.

With this object in view and such others as may hereinafter appear, the invention consists in the combustion apparatus and in the structures, arrangements, and combinations of parts hereinafter described and particularly defined in the claims at the end of this specification.

In the drawings illustrating the different features of the invention, Fig. 1 is a vertical sectional view of an automatic heating apparatus for heating a domestic hot water supply; Fig. 2 is a sectional view taken on the line 2—2 of Fig. 1; Fig. 3 is a detail in side elevation illustrating the grate operating mechanism; and Fig. 4 a detail to be referred to.

In general the present invention contemplates a novel construction of combustion apparatus in which the combustion is caused to take place upon a mechanically moved grate within the firepot, and in which provision is made for supplying air, preferably under pressure, through the grate to maintain the combustion. The solid fuel is maintained in an ample supply for operation of the apparatus for a substantial length of time, as for example a week, within a reservoir located above the grate, and provision is made for permitting the fuel to automatically feed by gravity downwardly onto the grate, thus obtaining the benefits of efficient combustion on an overfeed principle. The operation of the grate and the air supply are preferably controlled in definite relation to maintain the most efficient combustion. Provision is also preferably made for the disposition of ash in a novel manner, thus enabling the apparatus to operate automatically for a substantial period of time, as for example a week.

As above indicated, the present invention aims to provide a novel construction of combustion apparatus for burning solid fuel such as the different grades of bituminous and anthracite coal and coke, and which is designed to supply the need of a small heating unit for heating domestic water supply, garages, small greenhouses, and even small dwellings, in an automatic manner, and with an economy in fuel cost obtainable by the efficient combustion of smaller sizes of anthracite coal or bituminous coal. The invention contemplates the provision of a construction of apparatus which may be manufactured and sold at much less expense than other forms of heating apparatus now upon the market and which is suitable for the purposes and uses referred to, and which may operate to efficiently burn the more inexpensive grades of fuel with accompanying economies in the heating costs. The need of such an apparatus is particularly apparent in certain outlying districts where gas is not available, although the apparatus may also be used with advantage wherever a relatively small heating capacity is required.

Referring now to the drawings, which as above stated illustrate the preferred embodiment of the invention, the invention is as above stated therein illustrated as embodied in apparatus for heating a supply of domestic hot water and contemplates a combustion chamber 10 formed within the body of the furnace, the lower portion 12 of the walls of which is preferably tapered as shown, and surrounds a conical grate 13 having a plurality of air passages 14 therein for the passage of air upwardly through a bed of fuel maintained upon the grate. The periphery of the base of the conical grate 13 is spaced a short distance from the surrounding lower portion 12 of the walls of the combustion chamber to permit the passage of ash therebetween as the conical grate is rotated. Ribs 18, 19 are provided upon the surface of the conical grate and upon the surrounding dead plate for assisting in breaking up the ash as the grate is rotated. The conical grate 13 is hollow and the interior thereof is preferably connected by an air pipe 20 to a blower or fan 21 driven by a motor 22, as illustrated in Fig. 2, and the flow of air through the air pipe 20 is controlled by a damper 24 herein shown as operatively connected to the mechanism for moving the grate to the end that the proportion of air to the fuel fed and the rate of combustion may be properly maintained. The

conical grate 13 is herein shown as supported upon bearings 28 within a raceway 29 formed in a transverse supporting member 30, and provision is made for rotating the grate through the cooperation of a bevel gear 32 with a ring gear 34 mounted upon the bottom of the conical grate. The bevel gear 32 is mounted upon the end of a drive shaft 36 journalled in bearings 38 supported in the casting forming the support or bottom portion of the combustion apparatus as illustrated in Fig. 1. The shaft 36 has affixed to its outer end a ratchet 40 with which a pawl 42 cooperates to advance the ratchet and consequently to effect the rotation of the conical grate when the pawl is advanced during its oscillation. The pawl 42 is carried upon the top of a pawl arm 44 connected to an arm 46, the latter being connected by a link 48 to a crank 50. The crank 50 is arranged to be revolved from the motor 22 through the medium of a reduction gear mechanism which may comprise any usual or preferred form now upon the market. The manner in which these parts cooperate is clearly illustrated in Fig. 2.

Provision is made for controlling the effective throw of the pawl 42 to control the extent of grate movement, and as herein shown a shield member 52 pivoted upon the shaft 36 is arranged to be moved relative to the pawl so as to slide under a pin 54 projecting from the pawl to maintain the nose of the pawl disengaged from the teeth of the ratchet for the desired portion of the normal stroke of the pawl, to thereby prevent it from picking up any desired number of teeth. The pivoted shield 52 is preferably connected to a control link running from a thermostat or from a manual control. A connection is also preferably made between the shield and the air damper 24, thus controlling the supply of air to the grate in accordance with the extent of grate movement so that most efficient combustion may be secured irrespective of the rate.

In order to supply the fuel to the conical grate 13, I provide a fuel reservoir 60 located above the grate in a position from which the fuel may automatically flow onto the grate by gravity. The flow of the fuel is preferably controlled by the bed of fuel on the grate, so that the supply may be automatic as long as fuel remains in the reservoir. The reservoir 60 is preferably made of a size sufficient to provide fuel for a substantial period of time, as for example for a week, during which the feeding of the fuel onto the grate is carried on in an automatic manner. As herein shown the fuel reservoir 60 is cast integrally with the combustion chamber, with the bottom walls 62 of the reservoir inclined at the correct angle to insure free flow of the fuel to the discharge orifice 64. The latter comprises preferably a pipe section located over the apex of the conical grate 13 and spaced therefrom a distance such that a conical bed of fuel such as is indicated by the dotted lines 68 is maintained at all times upon the grate. During the combustion the grate is slowly moved and the ash is discharged over the base of the grate falling down through the discharge opening formed between the periphery of the grate and the lower portion of the walls of the combustion chamber where the ash is collected in a removable ash receptacle 70 located below the grate as illustrated in Fig. 1. The front end of the lower portion of the apparatus may be open in order to permit the ash receptacle to be readily withdrawn from its illustrated position. When in its operative position, such as is shown in Fig. 1, the lip of the ash receptacle preferably forms a dust and air-tight joint with the annular portion 74 of the furnace shell to maintain an air and dust-tight chamber below the grate. The removable ash receptacle is an important part of the present combustion apparatus in that it avoids the handling of the ashes other than in containers, thus facilitating the work of removing the ashes and avoiding all bulk handling thereof with its dirt and inconvenience. The fuel reservoir 60 is provided with a cover member 61 for preventing the escape of gases from the combustion chamber.

In the operation of the present apparatus, as combustion proceeds, the conical fuel bed is maintained at the proper and most desirable thickness by the automatic flow of the fuel from the fuel reservoir and the conical shape of the grate. In operation when the grate is moved and combustion proceeds, the fuel bed gradually shrinks, thus permitting the flow of additional fuel from the supply reservoir. In addition the motion of the grate controls the rate of removal of the ash, thus tending to diminish the volume of the fuel bed which is, however, maintained at its correct volume by the flow of additional fuel.

While different forms of a power operated grate member may be utilized in the present unit, if found advantageous, I prefer to utilize a conical grate arranged as illustrated having the air passages 14 for providing the primary air through the fuel bed, and further having provision for supplying the necessary secondary air through an opening 76 in the apex of the conical grate, thus enabling most efficient combustion of the fuel to be obtained.

The present combustion apparatus is particularly adapted for use in heating water for those heating purposes requiring moderate or relatively small treating capacities, such for example as the heating of domestic water supply, and for some purposes the grate movement and the air supply may, in the manner above described, be controlled manually or by any usual or preferred form of thermostatic control, so that as long as a supply of fuel remains in the fuel reservoir the operation of the combustion unit may be rendered automatic.

While the preferred embodiment of the invention has been herein illustrated and described, it will be understood that the invention may be embodied in other forms within the scope of the following claims.

Having thus described the invention, what is claimed is:—

1. In a heating apparatus for domestic use in burning solid fuel, in combination, a combustion chamber, a grate rotatably mounted therein, fuel feeding means responsive to and controlled by the volume of the fuel bed, said fuel feeding means and grate cooperating to maintain a relatively thin fuel bed on the grate, a motor and connections between the motor and the grate for intermittently rotating the grate during the combustion of the fuel to thereby effect the continuous elimination of excess ash and to maintain the thin fuel bed in an incandescent condition during combustion, air supply means and means for effecting the operation of the air supply means and the rotation of the grate in predetermined relation.

2. In a heating apparatus for domestic use in burning solid fuel, in combination, a combustion chamber, a grate rotatably mounted therein, fuel

feeding means responsive to and controlled by the volume of the fuel bed, said fuel feeding means and grate cooperating to maintain a relatively thin fuel bed on the grate, a motor and connections between the motor and the grate for intermittently rotating the grate during the combustion of the fuel to thereby effect the continuous elimination of excess ash and to maintain the thin fuel bed in an incandescent condition during combustion, air supply means, means for effecting the operation of the air supply means and the grate rotating means in predetermined relation and means for adjustably varying the rate of operation of one of said means.

LAWRENCE W. CORBETT.