W. THOMAS.

OPEN GRATE.

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1,013,330. Patented Jan. 2, 1912.

Fig. 1.

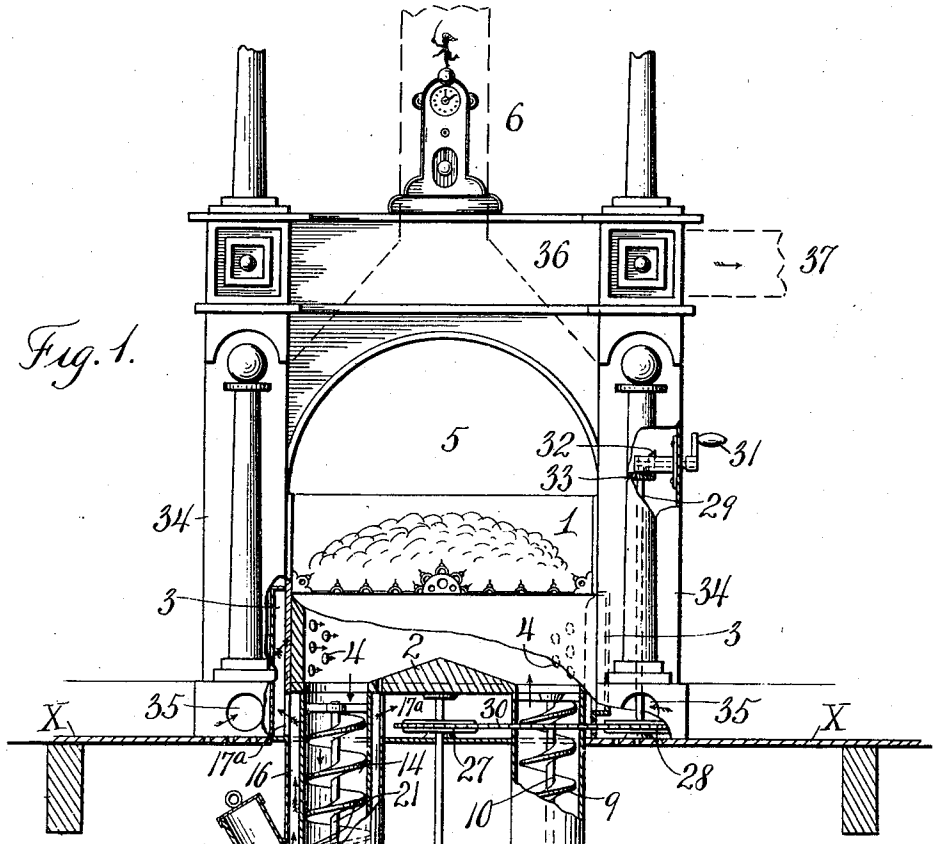
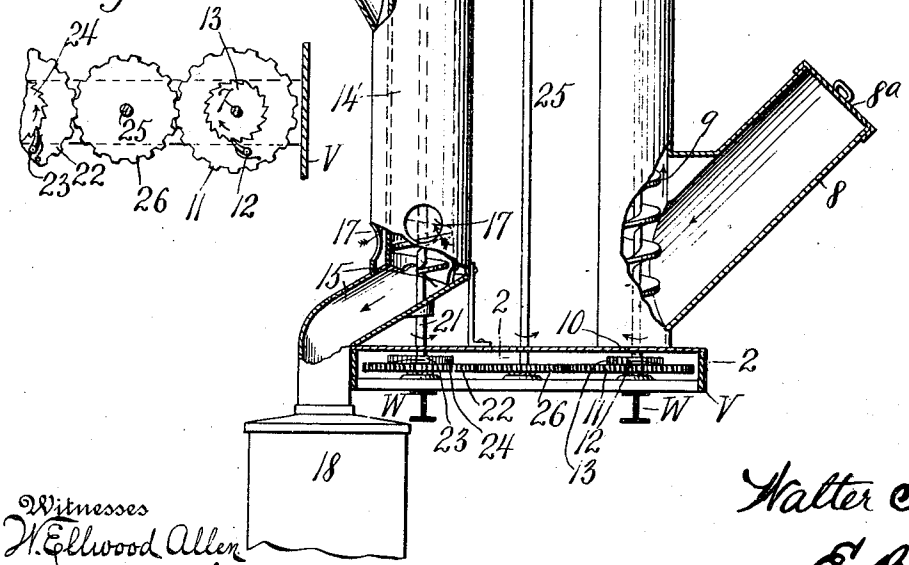


Fig. 2.



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OPEN GRATE.

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To all whom it may concern:

Be it known that I, WALTER THOMAS, a subject of the King of Great Britain, residing at Vancouver, in the county of Vancouver, Province of British Columbia, Canada, have invented certain new and useful Improvements in Open Grates, of which the following is a specification.

This invention relates to a mechanically fed and cleaned open grate and air heater for warming purposes.

The principal object of my invention is to provide for mechanically feeding an open grate from below and also for mechanically removing ashes from the bottom of the fire or fuel basket down through a tube into a basement, so as to avoid the annoyance, labor and dirt incident to manually carrying up coal and taking down ashes, and cleaning the fire in the old way now generally practiced.

Another object is to provide for effectively and economically burning in an open grate a comparatively low grade of coal, and at the same time obtaining a higher heat or incandescence of the coal and more perfect combustion of the resulting smoke or gaseous products, so as to practically prevent the escape of dense smoke and therefore produce numerous economical results.

Another object is to provide improved mechanical details of construction for conveniently operating the coal feeding and ash discharge devices with freedom from flying dust and ashes from the grate in the living room or other place where the grate may be located.

The matter constituting my invention will be defined in the claims.

I will now describe the details of construction of my invention by reference to the accompanying drawings, in which—

Figure 1 represents a front elevation of the underfed grate and air heater, with parts in section. Fig. 2 represents a top view of the gearing for operating the coal and ash screw conveyers.

The open grate and surrounding air heating flues are located in the living room above the floor line and the coal feeding and ash discharging tubes and operating mechanism are located in the basement below, being supported on metallic I-beams or bars W, or in any other convenient manner.

The fire or fuel basket 1 is made of metal and may have a fire brick lining and is provided centrally at the bottom with a transverse double inclined bridge 2. This bridge may be made of different heights and with differently inclined surfaces or may be omitted. The grate or fire box is set into a chimney opening 5 which is provided with an arched top leading into a chimney flue 6 indicated by dotted lines. The basket or box 1 is provided with a surrounding jacket 3 extending down to the floor line, as shown. This jacket may inclose the fire box front and back and at the ends and is provided with perforations or ports 4 opening into the interior of the box for supplying hot air to support combustion. These ports 4 may be placed both at the front and back of the box and in such position as to secure the best effects in burning the fuel and completely consuming the smoke or gases of combustion. The bottom of the fire box is provided at one end with an opening with which is connected the vertical depending fuel supply pipe 7 having at its lower end a fuel hopper 8 provided with a cover 8^a. Within this feed tube is placed a screw conveyer 9 having a shaft 10, which projects down through the lower end of the tube into a housing V containing the operating gearing. To the shaft 10 is applied a gear wheel 11 turning loosely on the shaft and having a spring pawl 12 which engages with a ratchet wheel 13 rigidly secured to the shaft.

In the bottom of the fire box at the opposite end from the feed tube and on the opposite side of the bridge 2 is provided an ash opening with which is connected the vertically depending ash discharge tube 14, having at the lower end a discharge chute 15 connecting with a receptacle 18. The discharge tube 14 is provided with an air heating jacket 16 having at the lower end air inlet openings 17 and at the top discharge openings 17^a opening into the air jacket 3 which surrounds the fire basket or grate. The heating jacket 16 may also have an air inlet opening 19 provided with a cover as shown. A screw conveyer 20 is suitably journaled in the discharge tube 14 and at its lower end the shaft 21 projects down

into the housing V where it is provided with a tube gear wheel 22 provided with a spring pawl 23 which engages with a ratchet wheel 24 secured to the shaft 21 for turning the same. The gear wheels 11 and 22 are engaged by the intermediate gear wheel 26 secured on the lower end of an operating power shaft 25 which is suitably journaled in the housing V and in a box secured to the floor X. To the upper end of this shaft is secured a sprocket wheel 27 which is connected by a sprocket chain 30 with a sprocket wheel 28 on the lower end of another upright shaft 29. This shaft 29 is journaled in a side flue 34. At a convenient height in flue 34 is journaled a short shaft 32 provided at its inner end with a beveled pinion which engages with a beveled gear 33 secured to shaft 29. A handle crank 31 is applied to the short shaft 32 for operating the shafts 29 and 25 and the connecting gearing, either for forcing coal up through the feed tube 7 or ashes down the discharge tube 14. The details of construction of this operating gearing may be varied and the power shaft 25 may be operated in the basement by application of a crank directly thereto, but for convenience of the house-wife I preferably construct the gearing substantially as shown, so that it may be operated by a crank, as 31, in the living room.

For the purpose of heating air to be supplied to another room above or adjacent to the room in which is located the open grate, I construct on each side of the chimney opening 5 the upright air heating flues 34 and above the opening a connecting horizontal flue 36 with which may connect a pipe 37 indicated by dotted lines, leading to a separate room. The flues 34 and 36 are preferably made of metal and with ornamental designs to form a mantel. The lower ends of the air flue 34 are provided with air inlet openings 35.

The spring pawls and ratchet wheels are so arranged upon the gear wheels 11 and 22 and the shafts 10 and 21 that when the power shaft and engaging gear 26 are turned in one direction coal will be forced up by the conveyer 9 through feed tube 7 into the bottom of the fire box or basket 1, and by turning the shaft 25 and gear 26 in the opposite direction the conveyer 20 will be operated to force ashes down through the discharge tube 14 and chute 15. This coal feeding and ash discharging operation can be quickly performed at suitable intervals of an hour, more or less, according to the rate of combustion and the heat required. Slack coal or other inferior coal can be successfully fed to and burned in the fire box for the reason that the upper portions of the fuel in the box will be ignited and partially or wholly incandescent, so that the gases or smoke from the fresh fuel supplied at the bottom will be caused to pass through such highly heated fuel above where hot air will be supplied through the ports 4 to cause complete combustion of such gaseous products. By pushing up the fresh fuel from the bottom, the fuel in the fire box will be gradually forced over the bridge 2 toward the ash opening at the opposite end of the box. Hot air is also here admitted through the ports 4 for completing combustion of the fuel and gaseous products so that only ashes will pass down into the discharge tube 14. The rate of combustion of the fuel may be controlled by the discharge of ashes through tube 14. If a comparatively low fire is required, the ashes will be allowed to accumulate more or less at the discharge opening before the conveyer 20 is operated to convey them down through the tube. The rate of combustion may also be somewhat regulated by the time or intervals of feeding coal up through the tube 7 and the amount of fuel which is maintained at one time in the fire box. The periods of feeding fuel and discharging ashes will be regulated by the amount of heat required.

By forcing the fuel up into the fire box the partially coked coal will be broken up and fed forward so as to keep the bed of fuel well open in good burning condition. Air will be heated to the desired temperature in the flues 34 and 36 and may be conveyed by pipe 37 to any other room, warming the same.

Having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. An open grate or fire basket for a chimney opening, having connecting with its bottom a fuel supply tube and mechanical means for feeding fuel therethrough, and an ash discharge tube connecting with the bottom and having independent means for controlling the discharge of ashes in the desired relation to the feed of coal in the fuel supply tube, substantially as described.

2. An open grate or fire basket for a chimney opening, having a bottom fuel feed tube and a screw conveyer therein, and an ash discharge tube opening into the bottom and having a screw conveyer, operating mechanism for the conveyers, the conveyer in the ash tube having separate operating mechanism to control the discharge of ashes and thus regulate the combustion of fuel in the grate, substantially as described.

3. The combination with a fire box or basket, of a depending fuel supply tube opening into the bottom at one side or end, a conveyer for feeding or forcing fuel up through the tube, an ash discharge tube connecting with the bottom at the opposite side or end and a screw conveyer for discharging ashes down through said tube, and sepa-

rately operative mechanism for said screw conveyers for controlling the feed of coal and independently the discharge of ash and thereby regulating the combustion in the grate, substantially as described.

4. The combination with a fire box or basket for a chimney opening, of a depending fuel supply tube connecting with the bottom and having a fuel feed hopper, a depending ash discharge tube also connecting with the bottom of the basket, screw conveyers in said fuel and ash tubes, and gear wheels at their lower ends, and operating gearing and a shaft connecting with said wheels, and independent means connecting the gear wheels with the conveyer shafts for controlling the feed of fuel and discharge of ashes and thereby regulating the fire.

5. The combination with a fire box or basket, of means for mechanically feeding it with fuel from below upward, a depending ash discharge tube connecting with its bottom, a heating jacket surrounding the ash tube and fire box and having air openings communicating with the box for supplying hot air to the fuel.

6. The combination with an open fire box or basket for a chimney opening, of a depending bottom fuel feed tube, a depending bottom ash discharge tube, an air heating jacket surrounding said ash tube and connecting by openings with the fire box, and air heating flues at the sides and top of the chimney opening for the fire box or basket and having an exit pipe for conducting hot air to a separate room from that containing the fire box or basket.

In testimony whereof I affix my signature in presence of two witnesses.

WALTER THOMAS.

Witnesses:
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