Aug. 31, 1926. 1,598,579

J. VAN BRUNT ET AL

FURNACE

Filed May 28, 1924

Fig. 1.

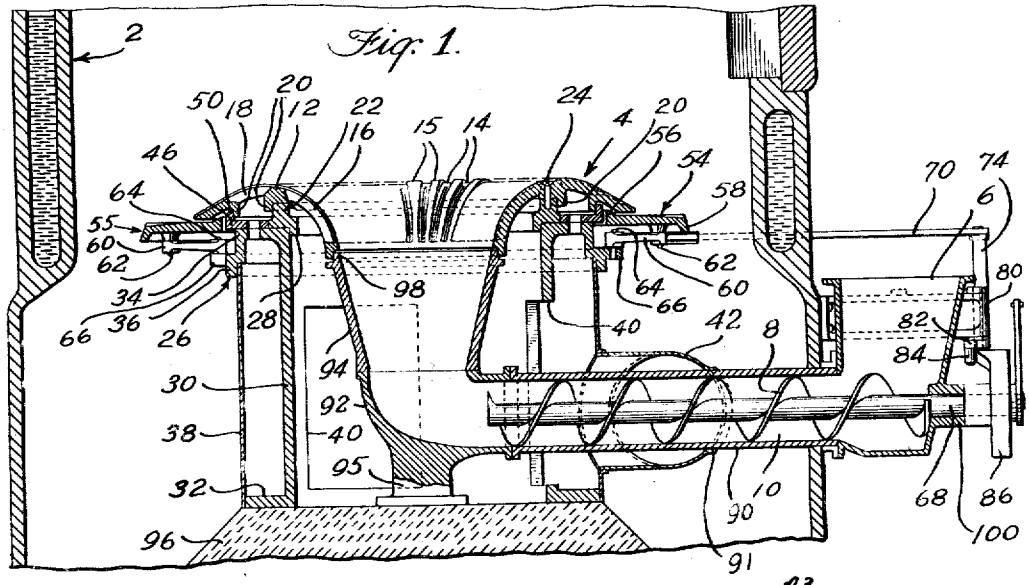


Fig. 2.

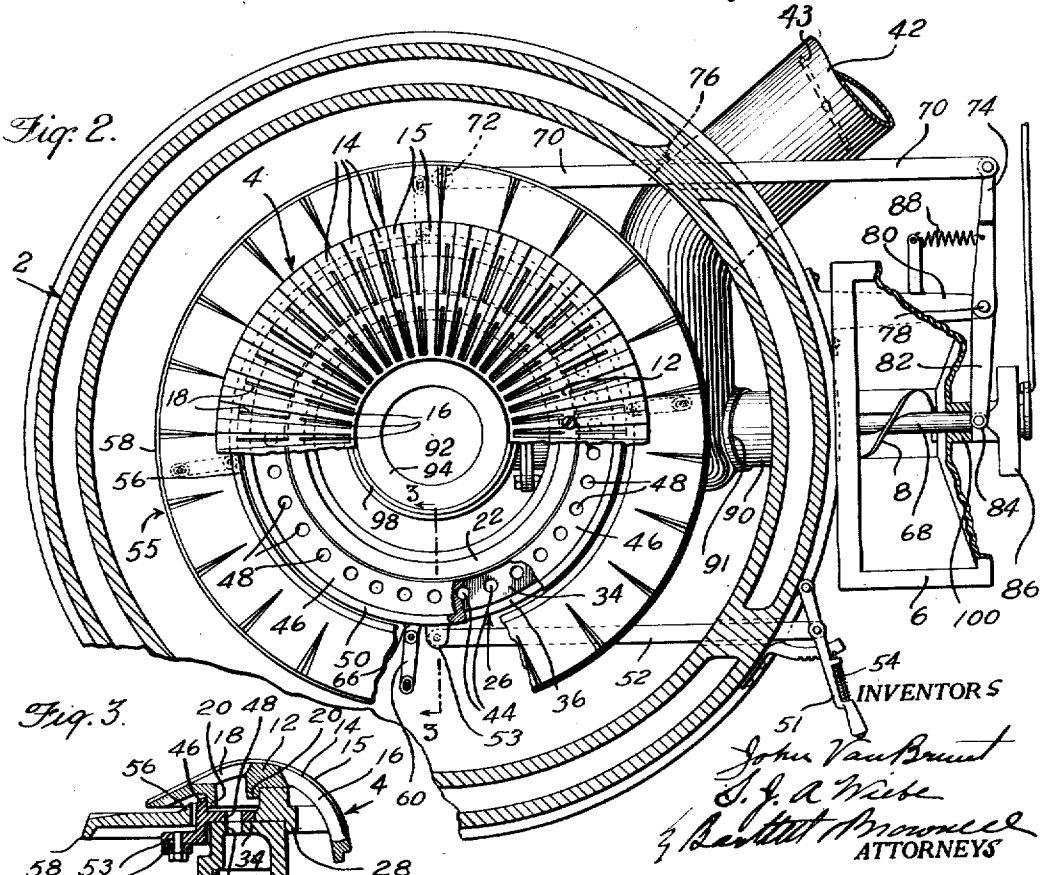


Fig. 3.

INVENTORS

John Van Brunt

J. J. A. Wise

Bartlett Brownell

ATTORNEYS

Patented Aug. 31, 1926. 1,598,579

UNITED STATES PATENT OFFICE.

JOHN VAN BRUNT, OF FLUSHING, NEW YORK, AND SIGURD J. A. WIEBE, OF EAST ORANGE, NEW JERSEY, ASSIGNORS TO INTERNATIONAL COMBUSTION ENGINEERING CORPORATION, OF NEW YORK, N. Y., A CORPORATION OF DELAWARE.

FURNACE.

Application filed May 28, 1924. Serial No. 716,319.

Our invention relates to furnaces, and has special reference to furnaces that are particularly adapted for household use.

An object of the invention is to provide a novel and improved furnace of this character.

Another object of the invention is to provide a furnace of this character which is of simple construction and highly efficient, and in which the feeding of the fuel and the discharge of the refuse of the fuel from the furnace grate are effected automatically.

A further object of the invention is to provide a furnace of the character indicated having novel and improved air supplying means.

The several features of the invention, whereby the above mentioned and other objects may be attained, will be clearly understood from the following description and accompanying drawings, in which,

Figure 1 is a longitudinal sectional view, partly in elevation, of a furnace embodying the features of the invention in their preferred form;

Fig. 2 is a plan view of the same partly broken away and with the furnace wall shown in section; and

Fig. 3 is a detail sectional view, on an enlarged scale, taken on the line 3—3 of Fig. 2.

The furnace illustrated in the drawings is provided with a cylindrical wall 2 and an annular grate 4 mounted concentrically therein. The fuel is fed upwardly through the central opening of the grate from a hopper 6 by means of a feed screw 8 which is arranged in a conduit 10 connecting the hopper with the central opening in the grate. The grate is curved upwardly and outwardly from its inner periphery to substantially an intermediate annular portion 12, and is curved or inclined from said annular portion downwardly to the outer periphery thereof. The top surface of the grate is provided with narrow grooves 14 and ridges 15 alternately arranged and extending from a point in proximity to the inner periphery to the outer periphery of the grate, the side walls of the grooves and ridges being arranged radially, and the grooves and ridges being of substantially equal width. The upwardly and outwardly curved portion of the grate is provided with a series of narrow elongated slots 16, and the outer portion of the grate is provided with a series of narrow elongated slots 18 having their outer ends spaced from the outer periphery of the grate, both series of slots opening up through the bottom walls of the grooves 14. The under side of the grate is provided with two concentrically arranged annular ribs or flanges 20 adjacent the ends of the slots 18 providing part of the structure defining an air passage leading into the slots. The grate is supported by a supporting ring 22, the inner rib or flange 20 fitting over a shoulder on the supporting ring, and the grate being secured to the ring by means of screws 24. The supporting ring 22 is in turn supported by the top wall of an annular pan or casing 26, the supporting ring having a depending flange 28 engaging the inner peripheral surface of the casing. The annular casing 26 is provided with an inner wall 30, a bottom wall 32, and a top wall 34, the outer edge of which has a depending flange 36 which together with a sheet metal cylinder 38 forms the outer wall of the casing, the inner wall 30, the bottom and top walls 32 and 34, and the flange 36 being cast in one piece. The space between the inner and outer walls 30 and 38 of the casing is in communication with the space within the inner wall through rectangular openings 40 in the inner wall. Air under pressure is adapted to be supplied to the space between the inner and outer walls of the casing through a conduit 42 which extends through an opening in the wall of the furnace and its inner end, which is in the form of an elbow, surrounds the fuel feeding conduit 10 and is connected with an opening in the outer wall 38 of the casing. The conduit 42 is provided with a damper 43 for controlling the supply of air therethrough.

The top wall 34 of the annular casing is provided with a series of equally spaced circular apertures 44 which are adapted to be opened and closed as desired by means of a damper 46. This damper 46 comprises an annular plate that is mounted to slide circumferentially on the top wall 34 and has a series of apertures 48 corresponding to

the apertures 44, so that by shifting the damper circumferentially the apertures 44 may be opened and closed varying degrees as desired. The inner periphery of the damper 46 is in sliding engagement with a shoulder formed on the outer surface of the supporting ring 22 and the outer periphery of the damper is provided with an upstanding flange 50 which is in sliding engagement with the outer side of the outer annular flange 20 on the under side of the grate. With this construction it will be apparent that the air supply to the outer series of air openings or slots 18 may be controlled by the damper 46 independently of the air supply to the air openings or slots 16, the depending flanges 20 defining an annular air passage leading into the slots 18. The damper 46 is adapted to be adjusted by means of a hand operated lever 51 pivotally mounted at one end on the outside of the furnace wall. The lever is connected with the damper by means of a link 52 extending through an aperture in the furnace wall and having its inner end pivotally connected with a pivot pin on the horizontal portion of a lug 53 projecting downwardly and then outwardly from the outer periphery of the damper, the hand-operated lever 51 being held in adjusted position by the engagement of a spring-pressed locking detent 54 with one of a series of notches in a segment 55 secured to the furnace wall.

The furnace is further provided with an annular shaker plate 55, the inner portion of which extends a distance beneath the outer portion of the grate 4 and is arranged closely adjacent thereto, and its outer periphery is spaced a distance from the furnace wall 2, the space beneath the shaker plate and between the furnace wall and annular pan or casing 26 providing an annular ash pit. The shaker plate is provided with an upstanding flange 56 at its inner periphery for preventing ashes from working back over its inner edge, and is further provided with a depending strengthening flange 58 on the under side of its outer periphery, the outer peripheral surface of the plate being inclined downwardly and outwardly. The shaker plate is supported upon the outer ends of a series of links 60, having their outer ends provided with slightly elongated slots for receiving pins or studs 62 projecting from bosses on the under side of the plate, and having their inner ends pivotally mounted on pins or studs 64 projecting upwardly from supporting lugs 66 on the casing flange 36.

During the operation of the furnace the shaker plate 54 is oscillated circumferentially so as to effect the required shaking action, through connection with a shaft 68 that carries the feed screw 8. The connection between the shaker plate and said shaft comprises a link 70 having one end pivotally mounted on a pin 72 on the under side of the shaker plate, and having its other end pivotally connected with the outer end of an arm 74, the link 70 extending through an aperture 76 in the furnace wall 2. The arm 74 is secured on the upper end of a rock shaft 78 that is mounted in a vertical bearing in a bracket 80 secured to the furnace wall. An arm 82 is secured on the lower end of the rock shaft 78 and its free end is provided with a cam roll 84 that engages a cam 86 carried by the feed screw shaft 68, the cam roll being held against the cam by means of a coiled spring 88 connected with the rear arm 74.

The fuel feeding conduit 10 comprises a horizontal pipe 90 that extends through the air inlet opening in the annular casing 30 and through an opening in the outer side of the elbow at the inner end of the air inlet pipe 42, the latter opening being provided with a flange 91 that embraces the pipe 90 and forms an air-tight joint therewith. The inner end of the pipe 90 extends through an opening in the furnace wall and is connected with a discharge opening in the hopper 6, and its inner end is connected by an elbow 92 with a short vertical pipe 94 which flares upwardly and outwardly, the elbow 92 being provided with a supporting base 95 that rests upon the base 96 of the furnace. The pipe 94 has an upstanding flange 98 on its upper end which fits into an annular recess in the inner side of the inner periphery of the grate. The feed screw 8 closely fits in the horizontal portion of the conduit 10 and its shaft extends through and is journaled in a bearing 100 on the outer wall of the hopper 6. It has been found that with the feed screw closely fitting the conduit that a bearing for the inner end of the shaft 68 is unnecessary, the shaft being cut off at the inner end of the feed screw so as not to interfere with the passage of the fuel from the horizontal portion of the conduit through the elbow 92 and into the vertical portion 94 of the conduit. An intermittent feeding movement is imparted to the screw 8 through any suitable variable speed driving connection with the outer end of the shaft.

It will be apparent that during the operation of the furnace the feed screw 8 will act to feed the fuel from the hopper 6 through the horizontal portion of the conduit 10, up through the short vertical pipe 94 and then up through the central opening of the grate, the fuel being burned as it passes over the grate and the refuse of the fuel being deposited upon the shaker plate 55 from which it is discharged into the ash pit beneath. It may be noted that the fuel passing over the air slots 16 of the grate is underfed and that the fuel passing over the

air slots 18 is overfed, so that the grate is provided with both an underfeed section and an overfeed section both of which are active grate sections. The damper 46 permits the air supply to the overfeed section to be controlled independently of the air supply to the underfeed section to meet different conditions. The fuel is forced down over the overfeed section by the incoming fuel, and the operation of the shaker plate assists in feeding the fuel down over said overfeed section and depositing the refuse of the fuel upon the shaker plate, the agitation of the plate causing the refuse to be finally discharged into the ash pit. It will be apparent that there is an effective air supply to the fuel throughout its traverse over the grate so that complete combustion of the fuel is assured. As the operation of the shaker plate is accomplished through connection with the feed screw driving shaft 68 it will be apparent that the refuse is discharged in direct proportion to the feeding of the fuel and hence to the consumption of the fuel by combustion.

As will be evident to those skilled in the art, our invention permits of various modifications without departing from the spirit thereof or the scope of the appended claims.

What we claim is:

1. A furnace having, in combination, an annular grate having an inner and an outer series of air openings, an ash pit for receiving the refuse discharged from said grate, controllable means for supplying air to both series of air openings, independently of the ash pit, and means for controlling the supply of air to the outer series of openings independently of the air supply in the inner series.

2. A furnace having, in combination, an annular grate inclined upwardly from near its inner periphery to an intermediate annular portion thereof, and then downwardly toward its outer periphery, and having a series of air openings at both sides of said intermediate portion an ash pit for receiving the refuse discharged from said grate, means for supplying air to said openings independently of the ash pit, means for controlling the supply of air to the outer series of openings independently of the supply of air to said inner series, and means for feeding fuel upwardly through the central opening of the grate.

3. A furnace having, in combination, an annular grate inclined upwardly from near its inner periphery to an intermediate annular portion thereof, and then downwardly toward its outer periphery, and having a series of air openings at opposite sides of said intermediate portion, an ash pit for receiving the refuse discharged from said grate, separate air passages leading to the two series of openings independently of the ash pit, means for controlling the supply of air through at least one of said passages independently of the other, and means for feeding fuel upwardly through the central opening of the grate.

4. A furnace having, in combination, an annular grate having an outer series and an inner series of air openings, an ash pit for receiving the refuse discharged from said grate, means for feeding fuel upwardly through the central opening in the grate and outwardly over the outer periphery thereof, a shaking device for receiving the refuse of the fuel as it leaves the outer edge of the grate and for discharging the refuse therefrom, means for supplying air to the two series of openings independently of the ash pit, and means for controlling the supply of air to the outer series of openings independently of the air supply to the inner series.

5. A furnace having, in combination, an annular grate having an inner and outer series of air openings, a shaking device comprising an annular member arranged adjacent the outer edge of said grate for receiving the refuse as it is discharged from said grate, means for circumferentially oscillating said member so as to effect the discharge of the refuse from the outer edge thereof, an ash pit for receiving the refuse discharged from said shaking device, and controllable means for supplying air to both series of air openings in the grate independently of the ash pit.

6. A furnace having, in combination, a stationary annular grate, inclined upwardly and outwardly from near its inner periphery to an intermediate annular portion thereof, and then downwardly toward its outer periphery, means for feeding fuel upwardly through the central opening in the grate and outwardly over its outer edge, a shaking device comprising an annular dead plate arranged substantially horizontally in close proximity to the underside of the outer edge of said grate and projecting outwardly beyond said outer edge for receiving the refuse as it leaves the grate, said plate being adapted to be oscillated with relation to said grate so as to discharge the refuse over the outer edge thereof.

7. A furnace having, in combination, a casing vertically arranged, an annular grate mounted upon the upper end of said casing, means for feeding fuel upwardly through the central opening in the grate and outwardly over its outer edge, a shaking device for receiving the refuse of the fuel from the grate, comprising an annular plate arranged beneath and projecting beyond the outer edge of the grate, means for supporting said plate for oscillating movement comprising a plurality of bracket members having inner ends pivotally mounted on said

casing, and their outer ends pivotally connected with said plate, and means for oscillating the plate.

8. A furnace having, in combination, a stationary annular grate inclined downwardly from an intermediate annular portion thereof toward its outer periphery, power operated means for feeding fuel upwardly through the central opening in the grate and outwardly over its outer edge, a shaking device comprising an annular dead plate arranged substantially horizontally in close proximity to the under side of the outer edge of the grate, and projecting outwardly from beyond said outer edge for receiving the refuse as it leaves the grate, said plate being adapted to be oscillated circumferentially with relation to said grate so as to discharge the refuse over the outer edge thereof, and power operated means for oscillating said plate in timed relation to the operation of said fuel feeding means.

JOHN VAN BRUNT.
SIGURD J. A. WIEBE.

casing, and their outer ends pivotally connected with said plate, and means for oscillating the plate.

8. A furnace having, in combination, a stationary annular grate inclined downwardly from an intermediate annular portion thereof toward its outer periphery, power operated means for feeding fuel upwardly through the central opening in the grate and outwardly over its outer edge, a shaking device comprising an annular dead plate arranged substantially horizontally in close proximity to the under side of the outer edge of the grate, and projecting outwardly from beyond said outer edge for receiving the refuse as it leaves the grate, said plate being adapted to be oscillated circumferentially with relation to said grate so as to discharge the refuse over the outer edge thereof, and power operated means for oscillating said plate in timed relation to the operation of said fuel feeding means.

JOHN VAN BRUNT.
SIGURD J. A. WIEBE.

Certificate of Correction.

It is hereby certified that in Letters Patent No. 1,598,579, granted August 31, 1926, upon the application of John Van Brunt, of Flushing, New York, and Sigurd J. A. Wiebe, of East Orange, New Jersey, for "Furnaces," an error appears in the printed specification requiring correction as follows: Page 3, line 39, claim 1, for the word "in" read *to;* and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 5th day of October, A. D. 1926.

[SEAL.]

M. J. MOORE,
Acting Commissioner of Patents.

Certificate of Correction.

It is hereby certified that in Letters Patent No. 1,598,579, granted August 31, 1926, upon the application of John Van Brunt, of Flushing, New York, and Sigurd J. A. Wiebe, of East Orange, New Jersey, for "Furnaces," an error appears in the printed specification requiring correction as follows: Page 3, line 39, claim 1, for the word "in" read *to;* and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 5th day of October, A. D. 1926.

[SEAL.]

M. J. MOORE,
Acting Commissioner of Patents.