July 10, 1945. A. K. WALTON ET AL 2,380,000

MAGAZINE FEED SOLID FUEL HEATER

Filed Aug. 11, 1943 2 Sheets-Sheet 1

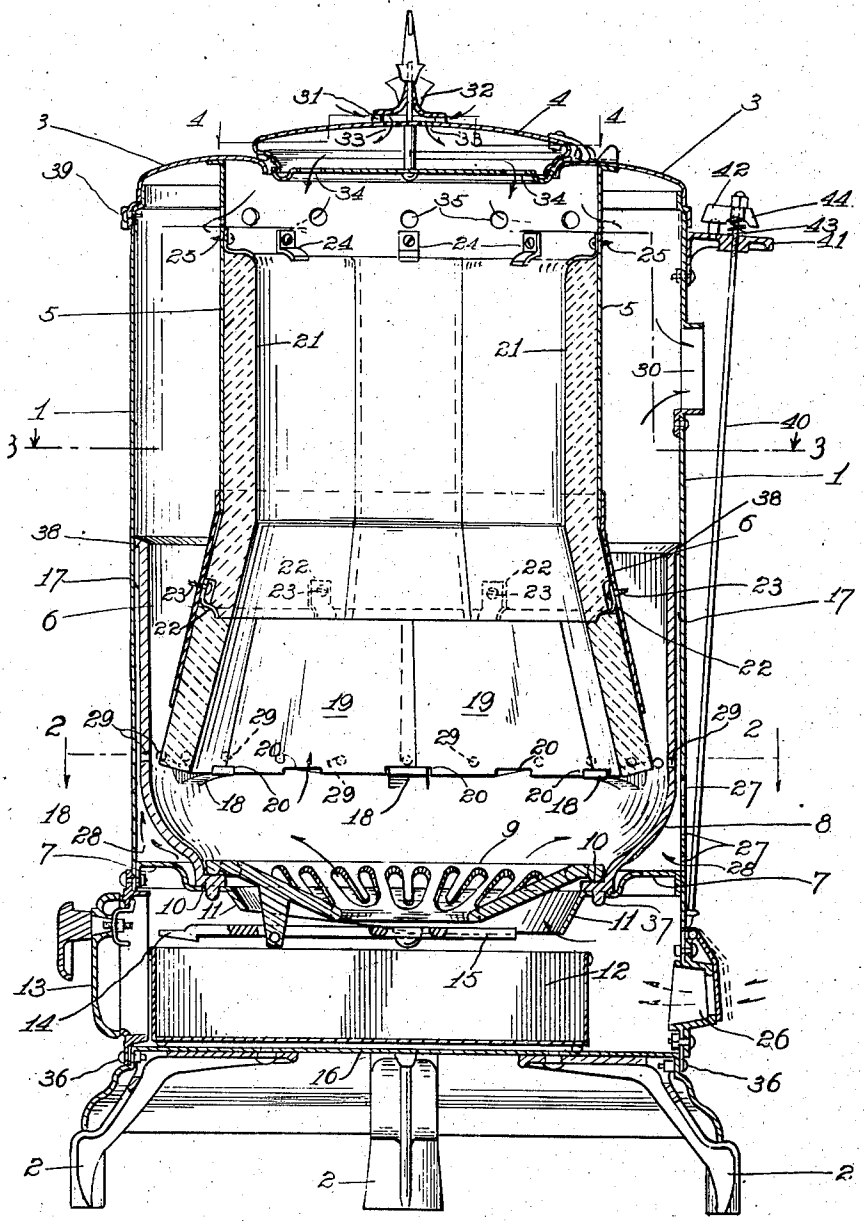


Fig. 1.

Inventors;
Arthur K. Walton
Cecil E. Chesser.
by Robert H. Burton
Louis Shelton Attorneys

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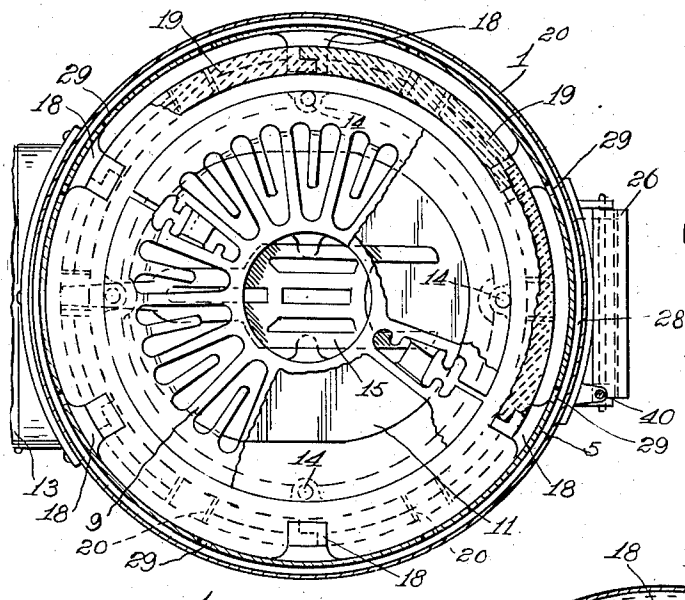


Fig. 2.

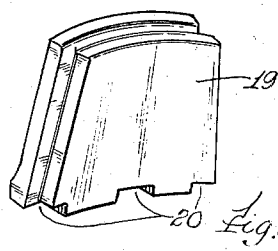


Fig. 5.

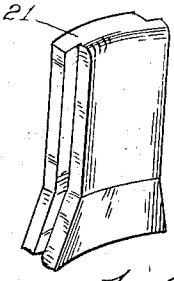


Fig. 6.

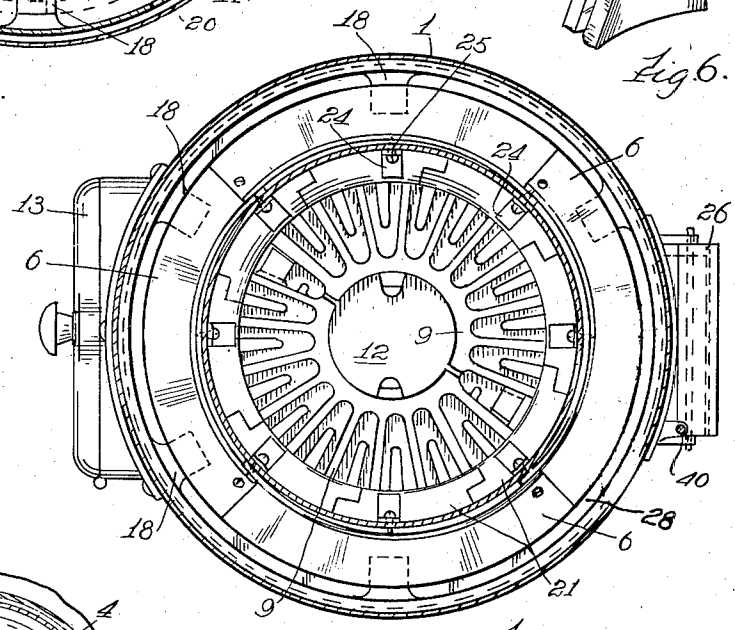


Fig. 3.

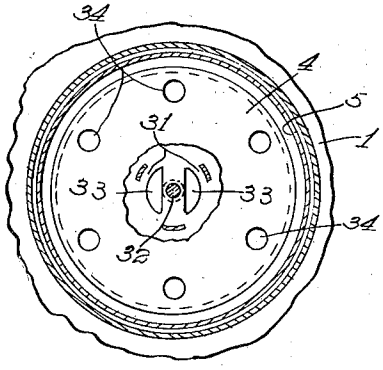


Fig. 4.

Inventors
Arthur K. Walton.
Cecil E. Chesser.
by
Louis Sheldon Attorneys

Patented July 10, 1945 2,380,000

UNITED STATES PATENT OFFICE

2,380,000

MAGAZINE FEED SOLID FUEL HEATER

Arthur K. Walton and Cecil E. Chesser, Newark, Ohio, assignors to Newark Stove Company, Newark, Ohio, a corporation of Ohio

Application August 11, 1943, Serial No. 498,158

1 Claim. (Cl. 126—73)

Our invention relates to stoves, heaters and furnaces, being adaptable for space heaters as well as for hot air furnaces, water heaters and other heating appliances. More particularly our invention has to do with the type of heating device commonly known as a magazine stove, base burner, or self-stoker.

In general this type of heater includes a centrally disposed magazine for solid fuel such as coal, sawdust, briquets, etc., said magazine being in the form of a hopper into the top of which the fuel is fed at intervals, and a grate being disposed under the magazine to support the fuel body. The grate is spaced below the end of the magazine and an outer wall encompassing the magazine provides an annular combustion chamber. The device may be circular, square or otherwise shaped as to its general cross-sectional contour. In operation, the fuel placed in the magazine rests on the grate and is coked as it approaches the lower portion of the magazine, gaseous combustion taking place mainly in the space above the fuel bed and within the annular combustion chamber.

One object of the invention is to provide a new and improved heater of the self-stoking type adapted to operate with greater efficiency than its predecessors.

Another object of the invention is to provide in a heater of the type described an improved arrangement for holding in place a refractory lining for the magazine.

A further object of the invention is to provide improved means for feeding secondary air into the gaseous products of combustion in the annular combustion chamber with a view to producing maximum heating efficiency.

It is also an object of the invention to provide for an additional supply of air feeding directly into the space above the fuel supply in the hopper and passing therefrom to the stack for carrying off gases formed in the hopper.

Other objects and advantages of the invention will appear from the following description taken in connection with the drawings in which:

Fig. 1 is a vertical sectional view of a self-stoking heater embodying this invention, being taken substantially at the vertical axis of the heater and in a plane extending from the front to the rear thereof.

Fig. 2 is a horizontal sectional view taken substantially as indicated at line 2—2 on Fig. 1.

Fig. 3 is also a horizontal sectional view taken as indicated at line 3—3 on Fig. 1.

Fig. 4 is a fragmentary horizontal section taken as indicated at line 4—4 on Fig. 1.

Fig. 5 is a perspective view of one of the lower tiles making up the refractory lining.

Fig. 6 is a perspective view of one of the upper tiles for said lining.

While there is shown and described herein a certain preferred embodiment of our invention, it will be evident that various changes coming within the spirit thereof will be apparent to those skilled in the art and hence we do not wish to be limited to the specific form shown or to the particular uses mentioned herein, except to the extent indicated by the appended claim.

For purposes of illustration the drawings show a stove or space heater which is of the radiant type, but it may be understood that a suitable air jacket or casing may be added to this structure if desired to cause it to operate as a circulating heater. As shown in Fig. 1 the structure includes an outer wall or casing 1 supported on legs 2 and provided with an annular top wall 3 having a removable cover 4 for the central opening in the top wall through which the fuel is introduced. Extending downwardly from the top wall 3 in spaced relation to the outer wall 1 is the shell 5 of the hopper or fuel magazine, and toward the lower end this shell includes a flared portion 6 permitting the fuel to occupy a somewhat greater cross-sectional area at the lower portion than at the top. An annular flange or supporting ring 7 extends inwardly from the lower portion of the casing 1 and the metallic fire pot 8 rests upon said flange while the grate structure 9 in turn rests upon an annular shoulder 10 of the fire pot 8. The flange 7 extends inwardly and downwardly to form a skirt 11 which tends to direct the ashes from the grate 9 into the removable receptacle 12 provided in the ash pit for that purpose. A door 13 in the front side of the casing 1 is dimensioned to permit removal of the ash receptacle 12 when desired and through this door access is also afforded to the shaker bar 14 for actuating the movable portion 15 arranged slidably at the middle of the grate structure 9. The ash pit is closed by a bottom wall 16 to which the legs 2 are secured as seen in Fig. 1.

The fire pot 8 is preferably a metallic casting and as shown it extends upwardly to about half the height of the casing 1 above the level of the grate, being spaced inwardly from the casing wall 1 by a narrow annular air space 17 which tends to prevent overheating and disfigurement of the outer surface of the casing 1 due to the proximity of the fire. The cast fire pot 8 is provided with inwardly extending lugs 18 which support the lower tiles 19 of the refractory lining for the fuel magazine or hopper. Preferably these tiles are six in number and they are made with rabbeted vertical edges which interengage as shown in Fig. 2. The lower edges of the tiles 19 rest upon the lugs 18 and for definitely positioning them these tiles may have notches 20 in their lower edges, some of which will be positioned to register with the supporting lugs 18 and prevent the tiles from shifting circumferentially thereon. The upper edges of the tiles 19 are also of rabbeted form so as to interlap with correspondingly formed lower edges of an upper set of refractory tiles

21 which line the cylindrical portion 5 of the magazine and the upper portion of its flared form. The lower tiles 19 are inclined upwardly and inwardly so that if they are accurately fitted, the frusto-conical form which they produce when assembled will tend to hold them in position; but for further securement we provide metallic clips 22 secured as by screws 23 to the wall 6 of the magazine and having hook-shaped extensions which fit over the upper rabbeted edges of the tiles 19 and lie between these edges and the lower edges of the tiles 21. Similarly, the upper edges of the tiles 21 are engaged by clips 24 secured by screws 25 to the wall 5 of the magazine near its upper end.

The primary air supply for combustion enters the ash pit below the grate 9 by way of a controlled inlet damper 26 which is shown in Fig. 1 as disposed at the rear side of the stove. This air passes through the grate 9 and through the fuel bed supported thereon, contributing to the combustion of the fuel which occurs mainly in the annular space betwen the lower edges of the refractory lining tiles 19 and the inner surface of the fire pot 8, the spaces between the lugs 18 affording draft openings through which the air and products of combustion can escape upwardly into the annular space immediately surrounding the fuel magazine.

Additional or secondary air is admitted through openings 27 in the casing 1 which are shown just above the position of the supporting flange 7 so that they lead to an annular space 28 surrounding the curved lower surface of the fire pot 8. The air is distributed from this manifold 28 upwardly to a plurality of small ports or tuyères 29 which are arranged adjacent the level of the lugs 18 and in the spaces between them, thus feeding oxygen directly to the space adjacent the lower end of the magazine and insuring complete combustion of the fuel and gases present in this zone. The products of combustion rising in the space between the outer wall 1 and the magazine wall 5, 6, eventually escape through the stack which is connected to the outlet 30 shown in Fig. 1.

A small amount of additional air is admitted into the upper portion of the heater by way of openings 31 formed under the edge of the central ornament 32 attached to the cover 4, these openings leading the air through ports 33 in the outer wall of the cover and ports 34 in the inner lining thereof. The air thus introduced into the space directly over the fuel magazine is drawn from that space through openings 35 and flows toward the stack outlet 30 through which it escapes. This air may contribute somewhat to combustion in the annular space adjacent the level of the stack outlet 30, but its principal function is to purge the space above the fuel magazine of gases which are formed by the coking of the fuel therein so as to eliminate any danger of sudden ignition of these gases when the cover 4 is opened for refueling purposes, and to prevent the escape of such gases into the room at all times.

The construction shown and described lends itself to economical manufacture and convenient assembly. The legs 2 may be riveted to the floor 16 of the ash pit and upon this base structure the outer casing wall 1 may be erected and secured by bolts seen at 36 in Fig. 1. This wall 1 may have previously attached to it the inwardly extending supporting flange or ring 7 with its horizontal ledge apertured to receive the locating dowels or pins 37 which project downwardly from the lower edge of the fire pot or bowl 8 so that the latter is readily lowered into place and is thus definitely positioned, while the flange 38 at the upper edge of the fire pot fits snugly into contact with the inner surface of the casing wall 1. The grate 9 may then be lowered into position onto the shoulder 10 of the fire pot 8; and thereafter the annular top wall 3 with the cover 4 omitted is placed in position and secured by bolts as at 39. This top wall 3 carries with it the sheet metal magazine wall 5, 6 which is thus suspended above the lugs 18 of the fire pot so that the tiles 19 and 21, introduced through the central opening in the top wall 3, may be assembled on the lugs 18 and secured by means of the clips 22 and 24 already described. Addition of the hinged cover 4 substantially completes the assembly.

For controlling the draft damper 26 we may provide any suitable form of thermostatic regulator, and a very simple device for this purpose is indicated in Fig. 1. This comprises a rod 40 bearing at its lower end on the pivotally suspended damper door 26 and threaded at its upper end to engage a threaded bracket 41. The engagement of the rod 40 with the door 26 is of the swivel type, permitting the rod to be rotated about its axis so that by means of a handle 42 at the upper end the rod may be vertically adjusted in its threaded engagement with the bracket 41. The handle 42 is rotatively engaged with the rod 40, and a spring 43 reacting between the bracket and the handle 42 provides sufficient friction to hold the handle at any desired position of rotative adjustment. The bracket 41 may carry a graduated scale if desired and the handle 42 will then include a pointer or index member 44 to traverse such scale. As combustion proceeds and the temperature of the casing wall 1 rises, the wall will expand vertically to a greater extent than the rod 40 which is spaced away from the combustion zone and is more or less cooled by air circulating freely around the heater. This relative change in the vertical dimensions of the heater casing and the rod 40 will have the same effect as a shortening of the rod, operating to move the air inlet damper 26 toward closed position and eventually to close it so as to retard combustion when the desired temperature has been reached.

We claim:

In a heater, an outer casing, a fire bowl supported therein, and a fuel magazine including an outer metallic shell disposed in spaced relation to said casing and extending downwardly into said fire bowl, a refractory lining in said shell, said fire bowl having a series of inwardly projecting lugs upon which said refractory lining is supported, the portions of said fire bowl wall between adjacent lugs being spaced from the outer surfaces of said lining substantially at the combustion zone, said refractory lining being composed of segmental tiles placed row upon row with the lowest row of tiles having their upper edges rabbeted and disposed with high portions of said rabbeted edges adjacent said metallic shell, and clips secured to said shell and formed to overhang said high portions of the tile edges, a succeeding row of tiles resting on the upper edges of the lower row, the lower edges of said second row being rabbeted to interlap with the edges of the first row for making close joint connection therewith at the inner face of said lining.

ARTHUR K. WALTON.
CECIL E. CHESSER.