

June 5, 1951

J. S. JOHNSON ET AL

2,555,546

GAS FURNACE

Filed Aug. 26, 1946

Fig. 2

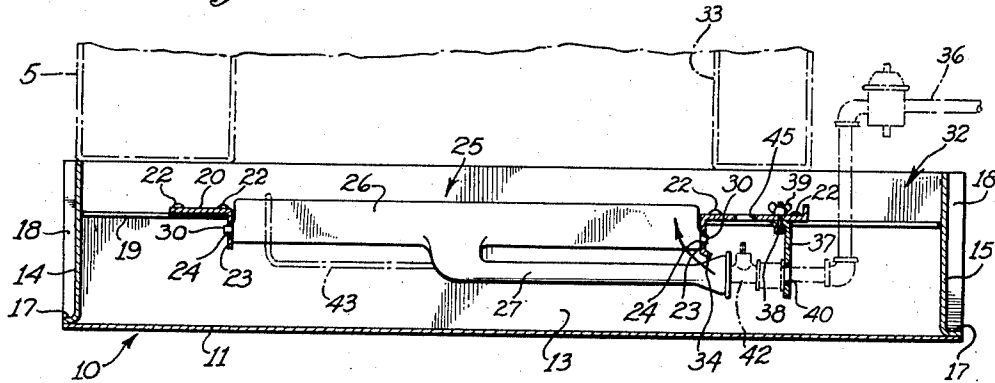


Fig. 1

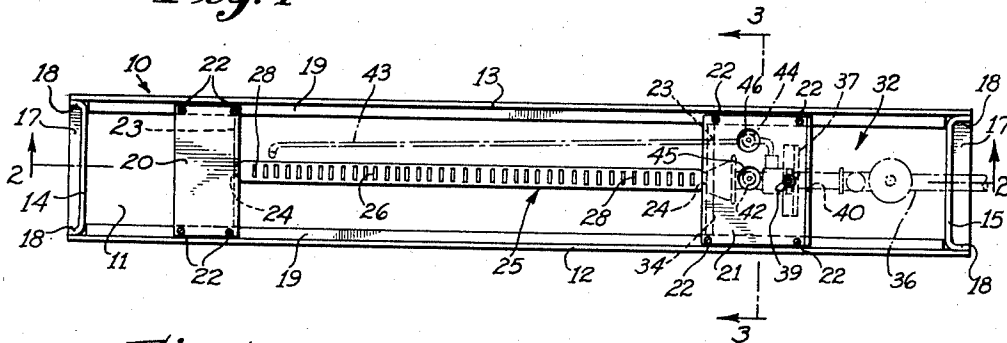
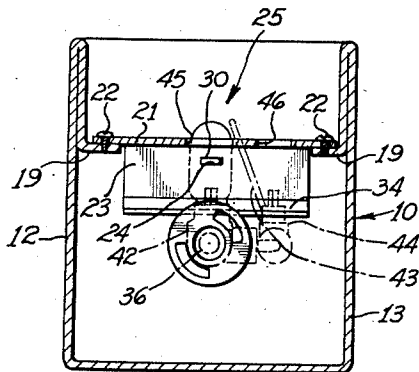


Fig. 3



INVENTORS:

JAMES STANLEY JOHNSON

KARL LEON BEDELL

By THEIR ATTORNEYS

HARRIS, KIECH, FOSTER & HARRIS

By *W. A. Dyer*

UNITED STATES PATENT OFFICE

2,555,546

GAS FURNACE

James Stanley Johnson and Karl Leon Bedell,
Pasadena, Calif., assignors to Holly Manufacturing Company, Pasadena, Calif., a corporation of California

Application August 26, 1946, Serial No. 692,945

10 Claims. (Cl. 158—7)

1

Our invention relates generally to heating units and particularly to improvements in floor furnaces of the types disclosed in the prior applications of James Stanley Johnson, Serial No. 551,557, filed August 28, 1944, now Patent No. 2,470,247, issued May 17, 1949, and Serial No. 560,133, filed October 24, 1944, now abandoned.

Floor furnaces constructed in accordance with the above-named applications include a watertight pan at the lower end of the furnace casing for preventing the entrance of water from the ground into said furnace casing and to provide a support and enclosure for the gas burner. In furnaces of such types generally employed, the gas burner is provided with a plurality of jets for the discharge of gas in a manner to define a combustion area having a length greater than its width. The gas burner is usually supported within the pan with its ends merely resting upon brackets therein and while this provides a convenient means for installing the burner, it has been found advantageous to mount the burner in such a manner that it is positively held against displacement in any direction. It is therefore an object of our invention to provide a heating unit having means for supporting the gas burner in place within the pan to prevent relative movement. We prefer to accomplish this mounting by providing a pair of spaced supporting members extending transversely within the pan and interengaging means between the supporting members and the gas burner for retaining the burner in place between the supporting members.

Air to support combustion is generally admitted to the burner and combustion chamber over the upper edge of the pan or lower housing and beneath the lower edge of the furnace casing or through the pan, and in either event there is a tendency during combustion for the air to be supplied to different parts of the combustion area at different rates, whereby the efficiency of combustion is substantially impaired. Stated more specifically, it has been determined that during combustion the air, which is drawn into the pan by the displacement of heated air from the furnace, flows through the pan longitudinally of the gas burner and it is obvious that because the air will be drawn past that end of the burner which is closest to the air inlet passage of the pan at a relatively high velocity and because it is drawn beneath this end of the burner, it tends to by-pass this end of the burner. It is therefore another object of our invention to provide means arranged within the pan of the heating unit and operative to control the flow of air to cause the same to be

2

supplied to that end of the gas burner and combustion chamber which would otherwise be inadequately supplied by the air stream, thereby effecting a more uniform distribution of the air throughout the entire length of the burner and combustion chamber. We prefer to accomplish this result by providing means within the pan for producing a relatively high velocity and low pressure area at a point adjacent the end of the burner which is closest to the inlet end of the pan to cause part of the air stream to be diverted to this end of the burner to ultimately effect a relatively even distribution of air throughout the entire length of the burner. The air flow control means is preferably, although not essentially, incorporated in one of the burner supporting members to simplify the structure.

Another object of this invention is to provide a heating unit having a lower pan which is simple in construction, efficient in operation and economical to manufacture.

Further objects of our invention will appear from the following specification and the drawing, which is intended for the purpose of illustration only, and in which:

Fig. 1 is a plan view of the lower portion of a floor furnace embodying a pan or housing and a burner mounting means constructed in accordance with our invention;

Fig. 2 is a longitudinal sectional view through the pan and mounting means, taken on line 2—2 of Fig. 1; and

Fig. 3 is a cross-sectional view taken on line 3—3 of Fig. 1.

Referring to the drawing in detail, our improved pan structure is illustrated as applied to use with a floor furnace which includes a main casing 5, indicated by broken lines in Fig. 2. The casing 5 is not herein shown or described in detail since it may be of any suitable construction. In this respect, attention is directed to the above-noted applications of James Stanley Johnson which disclose casings to which the present improvements may be advantageously applied.

Attached to the bottom of the casing 5 in any suitable manner is a lower enclosure member or pan 10 which may be constructed from sheet metal. The pan 10 comprises a bottom wall 11, side walls 12 and 13 and end walls 14 and 15. The bottom wall 11 and side walls 12 and 13 may be made from a single sheet of material bent to form shown in Fig. 3. The end walls 14 and 15 may have lateral flanges 17 and 18 at their lower and side edges respectively, the flanges being welded or otherwise secured to the bottom

wall 11 and side walls 12 and 13 of the pan. Rests or supports 19 are associated with one or more of the walls of the pan 10, for a purpose to be described. As illustrated these rests or supports 19 are formed by bending the upper extremities of the side walls 12 and 13 downwardly within the pan and then folding them inwardly. Such rests or supports 19 may be provided in other manners as, for example, by securing lugs, or horizontal strips or the like to the interior of the side walls 12 and 13.

Extending transversely within the pan 10 are longitudinally spaced supporting members 20 and 21 which are secured to the supports 19 by means of screws 22. The supporting members 20 and 21 have downwardly projecting legs or flanges 23 provided with rectangular apertures 24.

The gas burner 25 may be of the usual type including a hollow rectangular gas mixing chamber 26 and an offset tubular inlet duct 27 through which the combustible mixture of gas and air is introduced into the chamber, the chamber having apertures 28 providing nozzles through which the combustible gas mixture is emitted to be burned thereabove. The burner 25 is provided with a rectangular lug 30 at each end of its chamber 26 adapted to be inserted in the apertures 24 to mount the burner in place in the pan 10. Through the interengagement of the lugs 30 and apertures 24 the burner 25 is adequately supported and prevented from displacement or turning on the supporting members 20 and 21.

The supporting member 21 is spaced from the end wall 15 of the pan 10 to provide an air inlet passage 32 through which air is admitted to the pan from above. The air flows longitudinally through the pan 10 and is drawn upwardly into the combustion chamber 33 adjacent the nozzles 28 to support combustion of the gas mixture. As previously explained, it has been determined that as the air stream flows to the combustion chamber at a relatively fast rate it has a tendency to by-pass the end of the combustion chamber and burner which are closest to the air inlet passage and thus an even distribution of air to the combustion chamber is not obtained and the efficiency of combustion is substantially impaired. As illustrated, our invention contemplates obviating this tendency by a control element. The lower end of the flange 23 of the supporting member 21 may be sloped downwardly to provide such an air flow control element or baffle lip 34 which is disposed at a considerable distance below that end of the burner which is closest to the air inlet passage 32. As the air stream passes longitudinally through the pan 10 it flows across the tip of the inclined control element 34 at a high velocity and thus an area of low pressure is created at the rear of the flange 23 of the supporting member 21. It will be apparent therefore that part of the air stream will be drawn upwardly around the lower end or tip of this flange and into the low pressure area to adequately supply air to the end of the combustion chamber 33 which is closest to the air inlet passage 32. By thus preventing by-passing of this end of the burner 25 a more uniform distribution of air throughout the combustion chamber and more efficient operation of the heating unit as a whole are assured.

The gas is supplied to the inlet duct 27 of the burner 25 through a pipe 36, one end of which is supported by a sheet metal bracket 37 fastened to the under side of the supporting member 21 by welding or other suitable means. Any desired means, such as a screw 38 and thumbnut 39 may be provided to secure the supporting

member 21 and pipe to the furnace, the pipe passing through a hole 40 in the bracket. The gas supply pipe 36 includes a flow regulating valve 42 which, as is customary, is operated by a manually rotatable rod (not shown). The burner unit includes a pilot tube 43 having a valve 44, which also may be actuated by a rotatable control rod from above, the rotatable rods being adapted to pass through apertures 45 and 46, respectively, in the top portion of the supporting member 21.

It will be observed from the foregoing that our burner enclosure or pan and means for supporting the gas burner within the pan constitute an improvement over heating units of previous types. As a particular improvement, our invention provides means for more positively supporting the gas burning unit to prevent displacement thereof in any direction and to avoid turning of the unit within the pan. Moreover, our improved pan assembly is exceptionally simple in construction and thus may be manufactured at a relatively low cost. As another important feature of improvement, our invention provides a pan structure having means for controlling the flow of air to the burner and combustion chamber in such a manner that a more even distribution of air is effected throughout the entire length thereof and greater efficiency of combustion assured.

Although we have shown the heating unit as embodied in a preferred form of construction, by way of example, it will be understood that it may be modified in various particulars without departing from the spirit of the invention. Consequently, we do not desire to be limited by the foregoing specification but desire to be afforded the full scope of the appended claims.

We claim as our invention:

1. A heating unit, including: a box-like enclosure member having a bottom wall, side walls and end walls, said side walls having integral, downwardly and inwardly bent, longitudinally extending rests on their inner surfaces; supporting members secured to said rests and extending transversely of said enclosure member in longitudinal spaced relation to each other, said supporting members having depending stiffening flanges extending transversely of said enclosure member; and a burner unit having oppositely directed means at its ends engageable with said flanges to mount said burner unit longitudinally within said enclosure member and to prevent longitudinal movement thereof in both directions.

2. A heating unit, including: a box-like enclosure member having a bottom wall, side walls and end walls, the upper portions of said side walls being folded downwardly and laterally within said enclosure member to provide longitudinal rests; supporting members secured to said rests and extending transversely of said enclosure member in longitudinally spaced relation with respect to each other, said supporting members having depending flanges extending transversely of said enclosure member and provided with apertures; and a burner unit having oppositely directed means releasably engageable in said apertures to mount said burner unit longitudinally within said enclosure member and to prevent longitudinal movement thereof in both directions.

3. A heating unit, including: a box-like enclosure member having a bottom wall, side walls and end walls; a first supporting member extending transversely within said enclosure member, said first supporting member being spaced from one of said end walls to provide an air inlet

passage therebetween; a second supporting member within said enclosure member and spaced longitudinally from said first supporting member; a burner unit provided with an inlet opening and outlet nozzles; inter-engaging means on said burner unit and said first and second supporting members to mount said burner unit longitudinally within said enclosure member with its inlet opening disposed adjacent said air inlet passage; and deflector means for creating an area of relatively low pressure adjacent that end of said burner unit which is closest to said inlet passage to cause part of the stream of air entering said enclosure member through said passage and flowing through said enclosure member to be diverted toward said end of said burner unit.

4. A heating unit, including: a box-like enclosure member having a bottom wall, side walls and end walls; a first supporting member extending transversely within said enclosure member, said first supporting member being spaced from one of said end walls to provide an air inlet passage therebetween, said first supporting member having a depending flange; a second supporting member within said enclosure member and spaced longitudinally from said first supporting member; a burner unit provided with an inlet opening and outlet nozzles; inter-engaging means on said burner unit and said first and second supporting members to mount said burner unit longitudinally within said enclosure member with its inlet opening disposed adjacent said air inlet passage; and an inclined lip on said flange disposed in the stream of air entering said enclosure member through said passage and flowing through said enclosure member across said lip for creating an area of relatively low pressure in the stream adjacent that end of said burner unit which is closest to said inlet passage to cause part of the stream of air to be diverted toward said end of said burner unit.

5. A heating unit, including: an enclosure member having a bottom wall, side walls, and end walls; inwardly extending rests formed integral with said side walls; burner-supporting members secured to said rests; a burner supported by said supporting members and a deflector member formed integral with a supporting member, said deflector member and its integral supporting member defining with said side walls and one of said end walls a passage disposed adjacent said deflector member through which air can enter said enclosure member, said deflector member being operative to direct air entering the enclosure member to the end of the burner adjacent said deflector member.

6. A heating unit, including: an enclosure member having a bottom wall, side walls, and end walls, the interior of said enclosure at one end communicating with the atmosphere to allow air to flow in a stream longitudinally through said enclosure; longitudinally extending rests on said side walls formed by bending upper portions thereof downwardly and inwardly; supporting members releasably secured to said rests and extending transversely of said enclosure member, said supporting members having stiffening depending flanges with elongated apertures therein; a burner unit having projecting portions elongated transversely of their length for reception in said apertures whereby said burner unit is releasably supported in said enclosure member by said supporting members and against rotation relative thereto; and a deflecting member

integral with one of said supporting members and projecting into said stream of air entering said enclosure member to direct air to the end of the burner unit adjacent said deflecting member.

7. A heating unit, including: an enclosure member having a bottom wall, side walls, and end walls; burner-supporting members secured to said enclosure member in spaced relation therein; a burner unit having ends supported by said supporting members; and a deflector member connected to one of said supporting members, said deflector member and said supporting member to which it is connected defining with said side walls and one of said end walls a passage disposed adjacent said deflector member through which air can enter said enclosure member, said deflector member being operative to direct air to one end of said burner unit.

8. A heating unit, including: an enclosure member having a bottom wall, side walls and end walls; a burner; burner-supporting members for supporting the ends of said burner so as to mount said burner within said enclosure member, said supporting members being secured within said enclosure member; and a deflector member integral with one of said supporting members, said deflector member and said integral supporting member defining with said side walls and one of said end walls a passage disposed adjacent said deflector member through which air can enter said enclosure member, said deflector member extending downwardly into the airstream passing therebeneath and operative to create a low pressure area adjacent said deflector member so as to draw air from said airstream into proximity with the end of said burner which is supported by said one of said supporting members.

9. A heating unit, including: a box-like enclosure member having a bottom wall, side walls and end walls, the upper portions of said side walls being folded downwardly and laterally within said enclosure member to provide longitudinal rests; supporting members secured to said rests and extending transversely of said enclosure member in longitudinally spaced relation with respect to each other, said supporting members having depending flanges extending transversely of said enclosure member and provided with apertures; and a burner unit having oppositely directed means releasably engageable in said apertures to mount said burner unit longitudinally within said enclosure member and to prevent longitudinal movement thereof in both directions.

10. A heating unit, including: a box-like enclosure member having a bottom wall, side walls and end walls; a first supporting member extending transversely within said enclosure member, said first supporting member being spaced from one of said end walls to provide an air inlet passage therebetween; a second supporting member within said enclosure member and spaced longitudinally from said first supporting member; a burner unit provided with an inlet opening and outlet nozzles; interengaging means on said burner unit and said first and second supporting members to mount said burner unit longitudinally within said enclosure member with its inlet opening disposed adjacent said air inlet passage; and deflector means for creating an area of relatively low pressure adjacent that end of said burner unit which is closest to said inlet passage to cause part of the stream of air entering said enclosure member through said passage and flowing through said enclosure member to be diverted toward said end of said burner unit, said first and

7

second supporting members being secured fast to
said side walls.

JAMES STANLEY JOHNSON.
KARL LEON BEDELL.

REFERENCES CITED

The following references are of record in the
file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,562,962	Heisler	Nov. 24, 1925

Number

1,744,439
1,844,768
1,862,182
5 1,932,242
1,984,933
2,013,237
2,131,221
2,153,915
10 2,162,374
2,231,391
2,335,678

8

Name

Date

Bitgood	Jan. 21, 1930
Kirby	Feb. 9, 1932
Fraser	June 7, 1932
Burch	Oct. 24, 1933
Kuenhold	Dec. 18, 1934
Funk	Sept. 3, 1935
Crary	Sept. 27, 1938
Dolibois	Apr. 11, 1939
Chambers	June 13, 1939
Martois	Feb. 11, 1941
Johnson	Nov. 30, 1943