March 25, 1930. F. S. BITGOOD 1,751,722

BURNER

Filed May 25, 1927 2 Sheets-Sheet 1

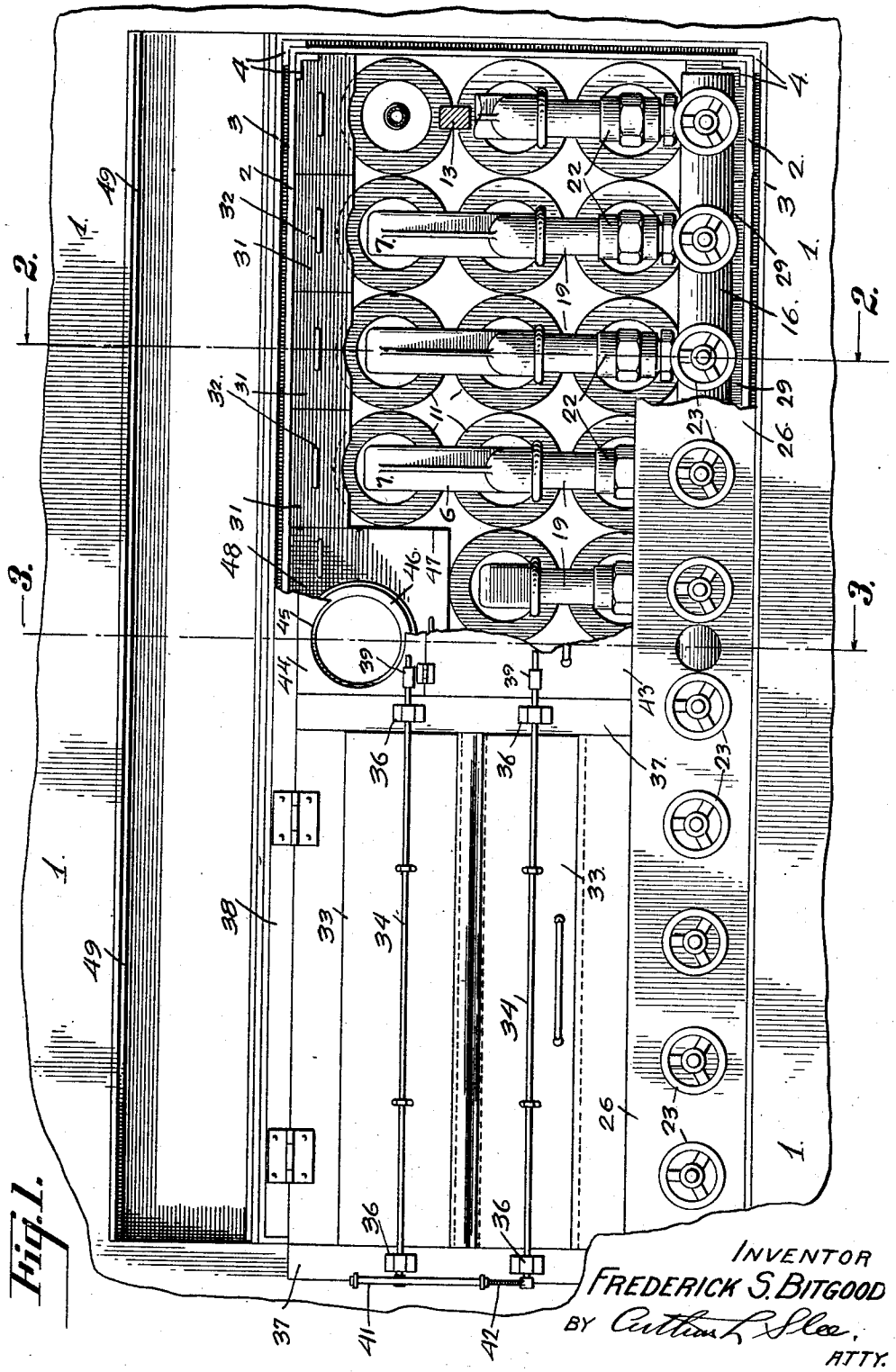

Fig. 1.

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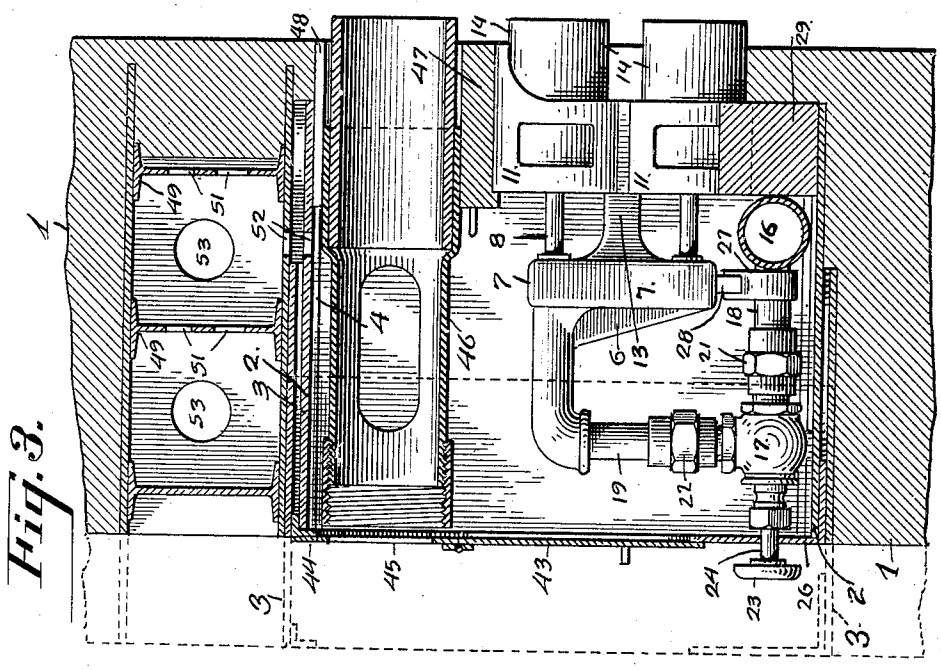

Fig. 3.

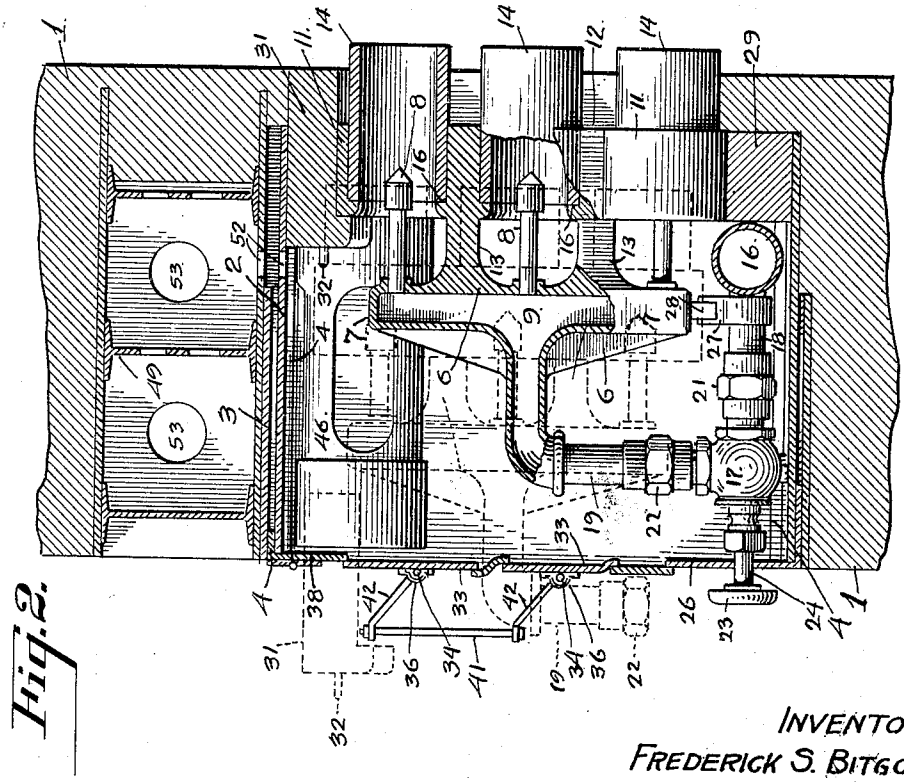

Fig. 2.

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Patented Mar. 25, 1930 1,751,722

UNITED STATES PATENT OFFICE

FREDERICK S. BITGOOD, OF SAN FRANCISCO, CALIFORNIA

BURNER

Application filed May 25, 1927. Serial No. 194,085.

My invention relates to improvements in burners for furnaces and the like wherein a plurality of independently controlled burner units are mounted in separately removable relation within an adjustable burner setting.

The primary object of my invention is to provide an improved fuel burner for furnaces.

Another object is to provide an improved burner consisting of a plurality of separately controlled and independently mounted burner units, said units being separately removable from the burner setting to permit the repair or replacement of any unit without interfering with the operation of the remaining units of the burner.

A further object is to provide an improved device of the character described wherein the burners are accessible from outside of the furnace and in which repair and replacement may be made without shutting down the furnace.

Another object is to provide an improved burner provided with improved means for admitting and regulating the air supply.

A further object is to provide an improved device having an adjustable setting adapted to be applied upon furnaces of various types and in connection with the furnace walls of various constructions and thicknesses.

Another object is to provide an improved burner comprising a plurality of independent burner units adapted to be readily removed and applied in connection with various types and sizes of furnaces.

A still further object is to provide an improved burner which can be economically manufactured and installed and which will facilitate repair, alteration, and adjustment.

I accomplish these and other objects by means of the improved device disclosed in the drawings forming a part of the present application wherein like characters of reference are used to designate similar parts throughout the specification and drawings, and in which

Fig. 1 is a front elevation of my improved fuel burner and setting, parts being broken away to show the arrangement of the burner units.

Fig. 2 is a vertical section taken upon the line 2—2 of Fig. 1 in the direction indicated, and disclosing the manner in which the burner units may be removed from the setting, and

Fig. 3 is a vertical section taken upon the line 3—3 of Fig. 1 in the direction indicated, and disclosed the manner in which the setting may be extended to conform to walls of various thicknesses.

Referring to the drawings, the numeral 1 is used to designate the wall of a furnace within which is mounted a burner setting consisting of a main housing box 2 set within the wall 1 and an adjustable housing box 3 slidably telescoping onto the main housing box 2. The housing boxes 2 and 3 are made of suitable sheet metal in rectangular form and provided with suitable angles 4 secured within the corners. The adjustable housing box 3 is preferably arranged to slide over the outside of the main housing 2 and is arranged to be extended as indicated in dotted lines in Fig. 3 of the drawings to conform to various thicknesses of wall construction.

Within the housings 2 and 3 are mounted a plurality of burner units designated in general by the numeral 6, each consisting of a burner holder 7 provided with a plurality of vertically spaced burner nozzles 8 connected upon the holder and communicating with a fuel passage 9 formed therein. Annular rings 11 are formed integrally with the holder 7 in axial alinement with the burner nozzles 8, said rings being connected together at their points of tangency as at 12 and connected to the holder by webs 13. The rings 11 are arranged to receive induction tubes 14 abutting against inwardly disposed shoulders 16 formed within the rings, said tubes extending inwardly into the furnace. The burners 8 extend axially into the rings 11 and tubes 14 to project a flame horizontally therethrough into the furnace.

The burner units 6 are independently connected to a common supply manifold 16 through control valves 17 connected between nipples 18 and 19 communicating with the manifold 16 and the holder passages 9 re-

spectively by means of suitable unions 21 and 22. The valves 17 are provided with operating knobs 23 secured upon the outer ends of stems 24 extending outwardly through angles 26 secured across the front of the housing box 3 whereby each unit can be separately controlled from the front of the furnace.

The burner units 6 are supported and aligned by means of clamps 27 clamped upon the nipples 18 and detachably engaging extensions 28 formed upon the bottoms of the holders 7. The lowermost rings 11 of the units rest upon tiles 29 placed upon the bottom of the main housing box 2 at the extreme back thereof, the weight of the units being supported upon said tiles. Tiles 31 are removably placed between the top of the main housing box 2 and the uppermost rings 11 of the units 6 to close the space above said units and to normally hold the units in operative position. The tiles 31 are preferably provided with handles 32 whereby the tiles may be moved outwardly from the setting. The space between the rings 11 of the units 6 is left open to admit air between the units and around the burner induction tubes to support combustion within the furnace.

Dampers 33 are pivotally mounted across the front of the burner setting by means of damper rods 34 carried in suitable bearings 36 secured upon frames 37 hingedly mounted upon angles 38 extending across the top of the housing box 3, a frame 37 and dampers 33 being mounted at each end of the setting. The damper rods 34 mounted upon one frame 37 and supporting dampers 33 thereon are connected by suitable couplings 39 to corresponding rods supporting similar dampers upon the adjacent frame 37 whereby the dampers upon each of the frames 37 may be operated together by a single damper operating handle 41 connected between levers 42 secured upon the outer ends of the rods 34 at one end of the setting. The space between the adjacent ends of the frames 37 is closed by a center door 43 hingedly connected to a panel 44 mounted within the upper portion of said space and having an opening 45 therethrough.

The units 6 positioned adjacent the center of the burner are provided with one less burner nozzle 8 and ring 11 than the remaining units, thereby providing a space at the top of the burner setting within which is mounted an oil burner sleeve 46 axially alined within the opening 45 and opening into the furnace. The sleeve 46 is removably supported by tiles 47 and held by removable tiles 48, said sleeve being arranged to admit a suitable oil burner which may be used independently of the units 6 in event the fuel supply thereto becomes interrupted for any reason.

The weight of the wall 1 extending over the top of the burner setting is preferably supported upon suitable beams 49. Openings 51 are formed in the beams and openings 52 are formed in the top of the main housing box 2 whereby air, admitted between said beams through openings 53 formed in the furnace wall, may be circulated between the beams to prevent overheating and sagging thereof and admitted in preheated condition into the furnace.

In operation the setting and burner units are mounted within the furnace wall as above explained, the setting being adjusted to conform to the thickness of the wall of the furnace. Fuel gas supplied through the manifold 16 is controlled for each burner unit by the valves 17 and the burning fuel is projected into the furnace through the induction tubes 14 in the well known manner. The dampers 33 are set to regulate the supply of air entering the furnace between the burner units 6 to obtain a proper combustion within the furnace.

In event any of the burner units become inoperative for any reason, the supply of fuel to that particular burner unit is shut off by means of its valve 17. The adjacent damper frame 37 or door 43 is then raised upon its hinges and the inoperative unit disconnected at the union 22. The tile 31 above the unit is moved outwardly from the setting thereby permitting the unit itself to be raised and moved outwardly from the setting as indicated in dotted lines in Fig. 2 of the drawings. In this manner, the inoperative unit may be removed for repair, cleaning, or replacement without disturbing the normal operation of the remaining burner units 6 and without requiring that the furnace be shut down and cooled to give access to the burners. This permits all the burners to be maintained at full operative efficiency and greatly facilitates the repair and maintenance of the furnace.

The independent mounting and operation of the units permits a desired number of identical units to be assembled to provide a burner of desired size. In event it is desired to utilize the burner in connection with another and different furnace, the independent mounting of the units permits the burner to be readily dismantled and adapted to the new installation, thereby avoiding unnecessary duplication of equipment.

As the supply of fuel gas for the burner units 6 is frequently interrupted, the oil burner sleeve 46 permits an oil burner of any suitable form to be inserted into the furnace to burn oil and thereby keep the furnace in operation from a different fuel supply when the main fuel supply is shut off, thereby preventing the furnace from being rendered inoperative during such interruptions.

While I have illustrated and described what I now regard as the preferred construction

and arrangement of my improved fuel burner, the details of construction and arrangement are of course subject to modification in numerous ways without departing from the spirit of my invention. I therefore do not wish to restrict myself to the specific construction disclosed, but desire to avail myself of all modifications which may fall within the scope of the appended claims.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

1. A burner for furnaces comprising a burner setting; a plurality of burner holders independently mounted and separately removable from the setting, said holders having matching recessed portions to provide air passages therebetween; burner nozzles mounted upon each holder; a fuel manifold; and valve controlled means connecting the manifold and each holder for supplying fuel through the holders to the burner nozzles whereby any holder may be removed independently of the remaining holders and burner nozzles.

2. A burner for furnaces comprising a burner setting; a plurality of burner units each consisting of a burner holder and a plurality of burner nozzles connected thereto; a common supply manifold; means for supplying fuel independently to said units from said common supply manifold; and tiles mounted above and below each burner unit for detachably mounting the burner units in separately removable relation within the setting whereby any unit may be removed without interfering with the operation of the remaining units.

3. A burner for furnaces comprising a burner setting; a plurality of burner units each consisting of a burner holder and a plurality of burner units connected thereto; a common supply manifold; means for supplying fuel independently to said units from said common supply manifold; and separately removable tiles engaging and normally holding the burner holders in operative relation within the setting.

4. A burner for furnaces comprising a burner setting; a plurality of burner units each consisting of a burner holder and a plurality of burner nozzles connected thereto; a common supply manifold; means for supplying fuel independently to said units from said common supply manifold; and means for detachably mounting the burner units in separately removable relation within the setting, said units having matched recessed portions to form air passages therebetween.

5. A burner for furnaces comprising a burner setting having a burner opening in a vertical wall thereof; a plurality of burner holders detachably mounted within the opening, each holder being independently supported and separately removable from the setting, said holders each comprising a tubular body portion provided with an inlet connection and also provided with induction tube mounting rings formed integrally with the holder; burner nozzles connected to the holder bodies and extending axially into the rings; a fuel manifold; and valve controlled means connecting each holder with the manifold for supplying fuel through the holders to the burner nozzles whereby any holder may be removed independently of the remaining holders.

6. A burner for furnaces comprising a burner setting having a burner opening formed in a vertical wall thereof; a plurality of burner holders detachably mounted within the opening and separately removable therefrom, each holder comprising a tubular body provided with an inlet connection and also provided with inwardly disposed extensions forming tube mounting rings; induction tubes mounted in said rings; burner nozzles connected to the holder and extending axially into the rings and tubes; a fuel manifold; and valve controlled means connecting each holder with the manifold for supplying fuel through the holders to the burner nozzles.

7. A burner for furnaces comprising a burner setting having a burner opening formed in a vertical wall thereof; a plurality of burner holders detachably mounted within the opening and separately removable therefrom, each holder comprising a tubular body provided with an inlet connection and also provided with inwardly disposed extensions having tube mounting rings formed integrally therewith; induction tubes mounted within the rings; burner nozzles connected to the holders and extending axially into the rings and tubes; a fuel manifold mounted below the holders; fuel supply connections connecting the manifold with each holder and supporting said holders within the burner openings; and means for independently controlling the supply of fuel through each connection to its holder and burner nozzles whereby any holder may be removed independently of the remaining holders.

8. A burner for furnaces comprising a burner setting having a burner opening formed in a vertical wall thereof; a plurality of burner holders detachably mounted within the opening and separately removable therefrom, each holder comprising a tubular body provided with an inlet connection, and also provided with inwardly disposed extensions having tube mounting rings formed integrally therewith; induction tubes mounted within the rings; burner nozzles connected to the holders and extending axially into the rings and tubes; a fuel manifold mounted below the holders; fuel supply connections connecting the manifold with each holder and supporting said holders within the burner openings; means for independently

controlling the supply of fuel through each connection to its holder and burner nozzles whereby any holder may be removed independently of the remaining holders, and independently removable tiles mounted within the opening above each holder.

9. A burner for furnaces comprising a burner setting having a burner opening in a vertical wall thereof; a plurality of burner holders detachably mounted within the opening and separately removable therefrom, each holder comprising a tubular body provided with an inlet connection and also provided with inwardly disposed extensions having a plurality of tube mounting rings formed integrally therewith, recesses being formed between the rings of each holder and matching with corresponding recesses of the adjacent holders to form air passages between the holders; burner nozzles connected to the holders and extending axially into the rings and tubes; a fuel manifold; fuel supply connections connecting the manifold and the holders and supporting said holders within the burner opening; and means for controlling the supply of fuel through each connection and holder independently of the remaining holders.

10. A burner for furnaces comprising a burner setting having a burner opening in a vertical wall thereof; a plurality of burner holders detachably mounted within the opening and separately removable therefrom, each holder comprising a tubular body provided with an inlet connection and also provided with inwardly disposed extensions having a plurality of tube mounting rings formed integrally therewith, recesses being formed between the rings of each holder and matching with corresponding recesses of the adjacent holders to form air passages between the holders; burner nozzles connected to the holders and extending axially into the rings and tubes; a fuel manifold; fuel supply connections connecting the manifold and the holders and supporting said holders within the burner opening; means for controlling the supply of fuel through each connection and holder independently of the remaining holders; and independently removable tiles mounted within the openings above each holder.

11. A burner for furnaces comprising a burner setting having a burner opening formed in a vertical wall thereof; a plurality of burner holders detachably mounted within the opening and separately removable therefrom, each holder comprising a tubular body mounted in vertical position adjacent the opening; an outwardly disposed inlet connection formed upon each holder; a plurality of tube mounting rings formed integrally with the holder and extending horizontally into the opening; induction tubes mounted within each ring; burner nozzles connected to the holders and extending horizontally into the tubes; a fuel manifold; fuel supply connections connecting the manifold with each holder and supporting said holders within the burner openings; and means for controlling the supply of fuel through each connection and holder independently of the remaining holders.

12. A burner for furnaces comprising a burner setting having a burner opening formed in a vertical wall thereof; a plurality of burner holders detachably mounted within the opening and separately removable therefrom, each holder comprising a tubular body mounted in vertical position adjacent the opening; an outwardly disposed inlet connection formed upon each holder; a plurality of tube mounting rings formed integrally with the holder and extending horizontally into the opening, recesses being formed between the rings of each holder and matching with corresponding recesses of the adjacent holders to form air passages between the holders; induction tubes mounted within each ring; separately removable tiles mounted above each holder to normally hold the holders in operative position; burner nozzles connected to each holder and extending horizontally into each ring and tube; a fuel manifold; and valve controlled means connecting each holder with the manifold for supplying fuel through the holders to the burner nozzles.

In witness whereof, I hereunto set my hand.

FREDERICK S. BITGOOD.