Dec. 1, 1936. W. G. HARTWIG 2,062,749

BURNER CONTROL APPARATUS

Filed July 3, 1933

Fig. 1.

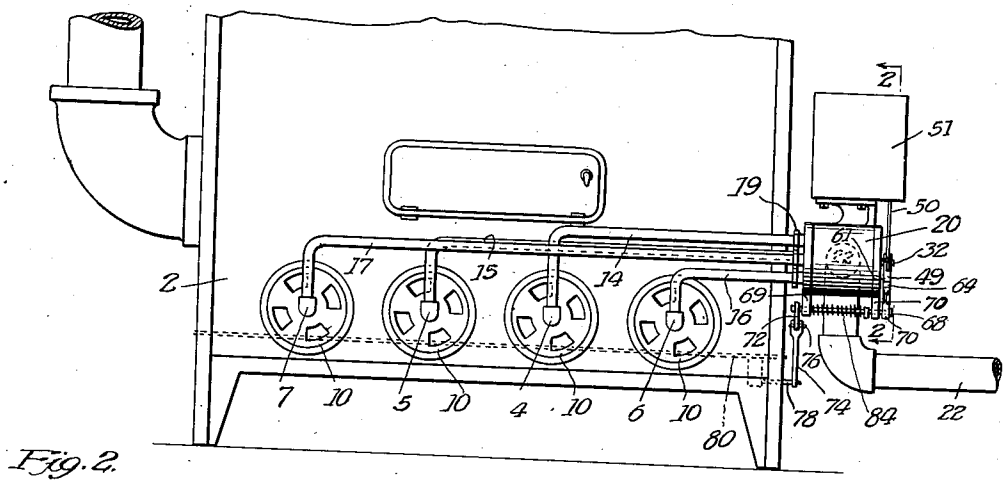


Fig. 2.

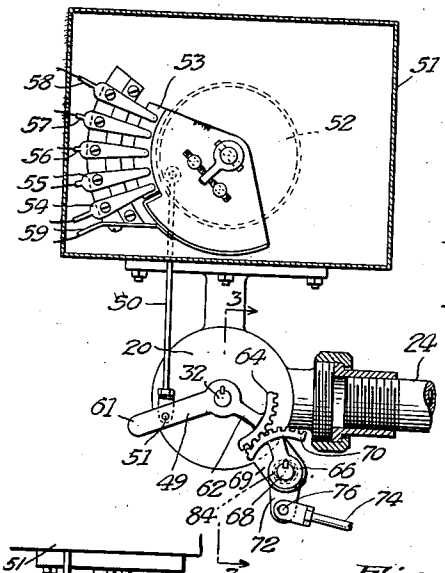


Fig. 3.

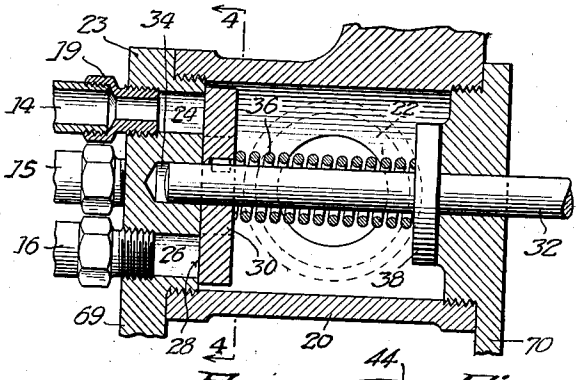


Fig. 5.

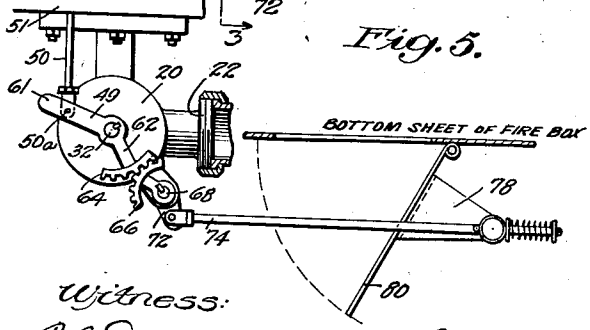
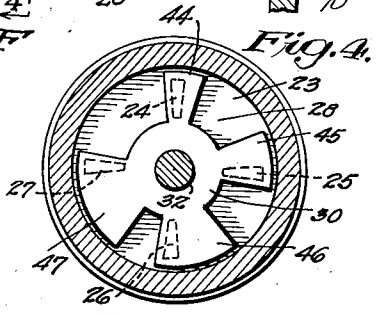


Fig. 4.



Witness:
A. B. Davison.

Inventor:
William G. Hartwig.

By: Wilkinson, Huxley, Byron & Knight
Attys.

Patented Dec. 1, 1936

2,062,749

UNITED STATES PATENT OFFICE

2,062,749

BURNER CONTROL APPARATUS

William G. Hartwig, Chicago, Ill., assignor to Railway Utility Company, Chicago, Ill., a corporation of Illinois

Application July 3, 1933, Serial No. 678,738

1 Claim. (Cl. 158—119)

This invention relates to the control of burners in a furnace, and particularly to a single valve for controlling a plurality of burners and to the combination of such burners and valve with automatic means for controlling the valve. The invention proceeds along the line of providing and it is an object of the invention to provide a valve which has a plurality of ports and a valve means for opening them successively, together with control means having a plurality of positions, in one of which the valve means closes all ports, and in the others the valve opens the various ports sequentially. There is a separately set independent primary air supply for properly determining the mixture supplied to each burner and a secondary air supply serving the burners collectively and commensurately with the number of fuel burners being fed at any given time; the said secondary air valve delivering a supply of air to properly support combustion of the aggregate of mixtures supplied to the combustion chamber. Also there are auxiliary means for automatically controlling the secondary air supply in accordance with the number of burners burning. It is a further object of this invention to provide means which are economical in construction and operation and which are compact for controlling a plurality of burners automatically according to temperature. It has a further object to provide a valve which may be readily controlled by a single valve unit and which will control a plurality of burners, said valve being economical and dependable.

With these and various other objects in view, the invention resides in certain novel features of construction and operation, as will be more fully described and particularly pointed out in the specification, drawing and claim appended hereto.

In the drawing, which illustrates one preferred embodiment, and wherein like reference characters are used to designate like parts,

Figure 1 is a front elevational view of the general combination forming a part of this invention;

Figure 2 is a view somewhat diagrammatic and partly in section, taken approximately along the line 2—2 of Figure 1;

Figure 3 is a fragmentary sectional view substantially along the line 3—3 of Figure 2;

Figure 4 is a sectional view taken along the line 4—4 of Figure 3; and

Figure 5 is an elevational view of portions of Figure 1 as seen from the right thereof, showing the burner control unit and the connections through which it coordinates the secondary air supply and burner regulation.

Although my invention may take many forms, only one has been chosen for illustration. This form illustrates the invention in combination with a gas furnace 2 although in some of its aspects the invention may have many other uses. Within this furnace are located four burners, not shown, to which may be connected the four burner pipes 4, 5, 6, and 7. Associated with each burner may be a primary air inlet control plate 10. Connected to each of the burner pipes 4, 5, 6, and 7 are burner supply pipes 14, 15, 16, and 17, respectively. These supply pipes are connected by nipples through the valve 20 to a main gas supply pipe 22. The valve 20 includes an outlet plate 23 into which the nipples 19 are screwed. This plate has four outlet ports 24, 25, 26, and 27 which communicate respectively with the pipes 14, 15, 16, and 17. The righthand face of the plate 23, as seen in Figure 3 is ground smooth to form a valve seat 28. Contacting this valve seat is a valve disk 30 which is mounted on the valve shaft 32 which extends into a bearing socket 34 in the plate 23. The valve disk 30 is pressed firmly against the valve seat by a spring 36 which is carried loosely by the valve shaft 32 and presses against a washer 38. The valve disk 30 is preferably so shaped as to close all the valve ports in its initial position and open them sequentially upon equal movements of the valve disk to make the necessary disk movement as small as possible for a given cross-sectional area of port movement. The valve ports may be shaped substantially as shown in Figure 4, i. e., in the form of elongated slots, the long walls of which are radially disposed. For convenience in attaching the nipples, the ports may be spaced equidistantly around the outlet plate 23. In that event the valve disk 30 is shaped according to the manner shown in Figure 4, i. e., with part segments removed, leaving the intermediate part segments 44, 45, 46, and 47 of various sizes acting as valve closures for the ports 24, 25, 26, and 27 respectively. The contacting surfaces of valve disk 30 and of valve seat 28 should of course be ground so that the valve disk will be an effective closure substantially without leaks. As shown in Figure 4, the valve disk is in its closed position. Upon being rotated to the right, however, it first opens port 24 as the segment 44 passes beyond said port, then as the segment 45 passes beyond port 25 the latter is opened, and as segment 46 passes beyond port 26 it is opened, and finally as segment 47 passes beyond port 27

this is also opened. The valve disk 30 is rotated by the shaft 32 which in turn is rotated by lever 49 to which a connecting rod 50 is pivotally attached by a pin 50a. The connecting rod 50 may be operated by any control unit 51, the exact structure and circuits of which need not be illustrated here, inasmuch as there are a variety of control means which may be used. A preferred form is fully disclosed in my co-pending application Serial Number 660,112, filed March 9, 1933. It should be explained, however, that in the preferred form the connecting rod 50 is pivoted to a gear 52 which may be rotated by a suitable motor not shown, together with the contact segment 53 engaged by the spring contacts 54, 55, 56, and 57. Contacts 58 and 59 are merely common conductors, 58 carrying current to the motor from any of the contacts 54, 55, 56, and 57, and contact 59 carrying current to the holding circuit from any of contacts 54, 55, 56, or 57. Contacts 54, 55, 56, and 57 are so connected to thermostatic elements that when the temperature in a room being heated drops to a certain point, the contact 54 will be energized, causing the valve disk 30 to rotate to its first open position and open the valve port 24. Likewise if the temperature continues to drop, contacts 55, 56, and 57 will be sequentially energized, causing the sequential opening of valve ports 25, 26, and 27. It is of course to be understood that whenever the valve port 24 opens the burner 4 will be supplied with gas from the supply pipe 22 through the valve port 24 and the burner pipe 14. According to the usual practice a pilot light should be provided for the first burner, which in turn lights the adjacent burners when they are supplied with gas. Burners 5, 6, and 7 will be supplied with gas sequentially when valve ports 25, 26, and 27 are opened respectively.

Lever 49 may be extended to form a handle 61 and is provided with a second arm 62 having its end gear section 64 arranged to mesh with a gear section 66 keyed to a shaft 68 which is rotatably carried by the lugs 69 and 70 which form extensions of the valve 20. Keyed to the other end of the shaft 68 is a crank arm 72 to which is secured a connecting rod 74 by means of a suitable pivot 76. Connecting rod 74 is linked at its other end to an operating handle 78 carried by damper 80 controlling an opening 80a in the bottom 80b of the fire box (see Figure 5). As the successive burners are lit by rotation of valve shaft 32 the secondary air supply damper 80 is successively further opened to admit the proper amount of air for the secondary combustion. The various parts will be urged by the spring 84 to the positions shown, i. e. to the positions in which the valve ports and secondary valve are all closed. If desired, the spring may be mounted as shown on shaft 68, one end of the spring being secured to the lug 69 and the other end being secured to the shaft 68 by means of a collar 86. The spring should of course have sufficient tension to overcome resistance of the parts, including the resistance of the control unit 51 when said control unit is in a condition to permit the return of the parts to their normal position.

It is to be understood that many other embodiments of the invention, including some in improved form, will be apparent, and in the course of time more will be devised by those skilled in the art. It is not desired that this invention be limited to the details described, for its scope includes all such forms or improvements as come within the spirit of the following claim, construed as broadly as the prior art will permit.

What is claimed is:

In combination with a combustion chamber, a plurality of independent outlet ports adapted to supply fuel to said combustion chamber, valve means controlling said ports and adjustable to different positions whereby said ports are opened sequentially, increasing numbers of said ports being thereby caused to deliver an aggregate of fuel to said combustion chamber, individual primary air supply means adapted to be separately set to add air to the fuel charges escaping from the respective outlet ports whereby fuel reaching the combustion chamber from each port is in the form of a combustible mixture, secondary air supply means admitting air to said combustion chamber, movable to render its air delivery commensurate with the number of fuel charges entering the combustion chamber at any given time, and means controlling both the valve means and the secondary air supply jointly and insuring an opening of the secondary air supply appropriately to the aggregate of fuel charge delivered

WILLIAM G. HARTWIG.