

D. JOHNSON.  
FURNACE.

APPLICATION FILED NOV. 23, 1907.

911,400.

Patented Feb. 2, 1909.

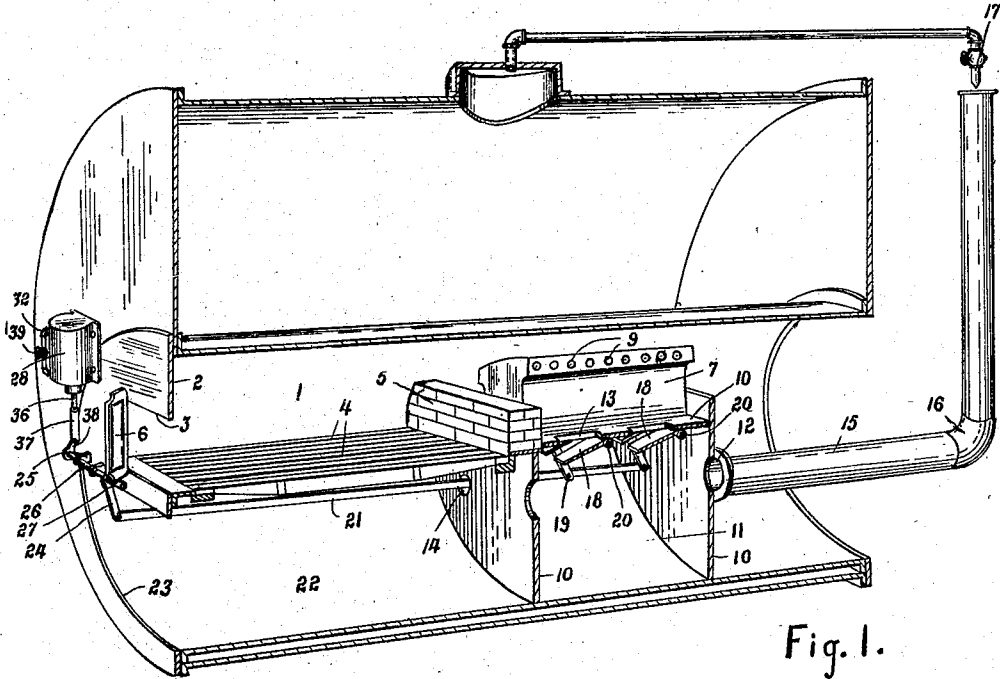


Fig. 1.

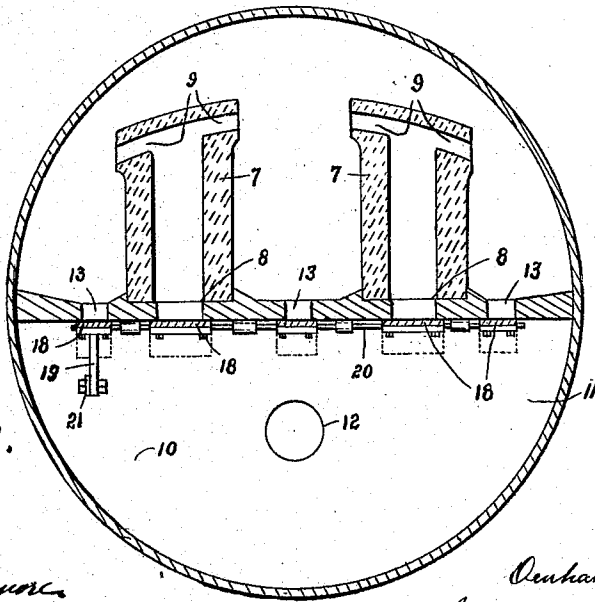


Fig. 2.

Witnesses.

*Noyd Blackmore*  
*M. M. Blackmore*

Inventor.

*Denham Johnson*  
*E. J. Fetterstonbaugh*

# UNITED STATES PATENT OFFICE.

DENHAM JOHNSON, OF LONDON, ENGLAND.

## FURNACE.

No. 911,400.

Specification of Letters Patent.

Patented Feb. 2, 1909.

Application filed November 23, 1907. Serial No. 403,538.

*To all whom it may concern:*

Be it known that I, DENHAM JOHNSON, a subject of the King of Great Britain, residing at Putney, London, England, have invented certain new and useful Improvements in Furnaces, of which the following is a specification.

The invention relates to improvements in furnaces, as described in the present specification and illustrated by the accompanying drawings that form part of the same.

The invention consists essentially in the novel arrangement and construction of parts whereby a superheating chamber is formed together with a hot air chamber and the fire box portion of the furnace, said chamber having a suitable air inlet and outlets in the path of the gases resulting from combustion.

The objects of the invention are to utilize thoroughly the combustion gases by the intermixture of prepared air therewith and thus augment the heat generated by the combustible fuel and to eliminate the smoke nuisance by the introduction of air to the path of said gases and the consequent assistance to perfect combustion.

In the drawings, Figure 1 is a longitudinal sectional perspective view of a furnace showing one of the hot air chambers of a pair or more as introduced thereinto. Fig. 2 is an enlarged cross sectional view of the furnace through the hot air chambers.

Like numerals of reference indicate corresponding parts in each figure.

Referring to the drawings, 1 is the fire box suitably inclosed and having the front wall 2 through which is the usual door opening 3, the grate bars 4 and the bridge wall 5. 6 are the doors closing the opening 3.

7 are superheating air chambers longitudinally arranged and parallel to one another immediately to the rear of the bridge wall 5 and having the inlet openings 8 through the bottoms thereof and a plurality of outlet openings 9 extending through the side walls of said chambers in proximity to the arched tops. The chambers 7 are supported by the plates 10 forming a hot air chamber 11 beneath the chambers 7, said chamber 11 having the air inlet 12, and air outlets into said chambers 7 and the air outlets 13 between and to each side of said chambers 7.

14 is a rod opening through the front of one of the plates 10.

15 is a pipe extending rearwardly through the furnace structure from the inlet 12 and

preferably elbowed at 16 and extending upwardly and out of said structure forming the means of communication from the outer air to the chamber 11. 60

17 is a steam jet at the mouth of the pipe 15 for facilitating the flow of the air inwardly through said pipe, this steam jet 17 may or may not be used, as it will depend entirely on the nature of the structure and the surrounding circumstances, as to whether or not it will be required. 65

18 are valves hinged to the bottoms of the air chambers 7 at the rear edge of the inlet openings 8 and to the top of the chamber 11 at the rear edges of the outlets 13 and stems 19 are rigidly secured centrally to certain of said valves and extending laterally and downwardly therefrom.

20 are rods forming part of the hinges and joining the valves 18 across said furnace. 70

21 is a main rod longitudinally arranged in the furnace beneath the fire grate and extending from the forward end of the ash pit 22 rearwardly through the opening 14 into the chamber 11, and pivotally joined within said chamber to the rods 19, so that any forward movement of the said main rod 21 has the effect of closing the valves 18. 75

23 is an opening through the front wall of the ash pit. 80

24 is an arm pivotally secured to the outer end of the main rod 21 and extending through the opening 23. 85

25 are brackets rigidly secured and extending outwardly from the front wall 2 of the fire box at the lower end thereof and having journal orifices therethrough at their outer ends. 90

26 is a shaft journaled in the brackets 25, the outer end of the link 24 being fixedly secured to said shaft 26, so that any movement of rotation of said shaft will push outwardly or push inwardly on the main rod 21 according to the direction of rotation. 95

27 is a trip lever fixedly secured at one end to the shaft 26 and arranged on said shaft to the front of one of the doors 6 and in the way of opening thereof, so that when the said door is opened in order to feed fuel to the furnace the trip lever 27 is thrown downwardly, which has the effect of pushing the main rod 21 inwardly and opening the valves 18 to permit the flow of air from the chamber 11 into the chamber 7 and through the outlets 13, the said air reaching 110

said chamber 11 through the pipe 15 and receiving its first heating in said chamber 11 and its superheating in the chambers 7 and therearound. The air continues its flow  
 5 through said chamber 7 to the outlets 9, where it is in the path of the combustion gases and intermixes therewith and assists the proper combustion of the said gases, in order that all the heat possible may be generated from the gases arising from the combustion of said fuel, and through the correct completion of said combustion by the introduction of said air, the smoke nuisance is thereby eliminated. On the fuel reaching  
 10 a proper state of incandescence incident to the continuous burning of the said fuel, the supply of air to the chambers 7 and through the outlets 13 is cut off as more particularly set forth hereinafter.

28 is a cylinder suitably supported at the front of the furnace.

32 is a tube forming a by-pass from one end of said cylinder to the other end.

36 is a piston rod extending through the  
 25 bottom of the cylinder 28, said rod at its lower end being pivotally connected to the toggle 37, and said toggle 37 being pivotally connected to the toggle 38 forming a toggle-joint. The toggle 38 is fixedly secured at  
 30 its lower end to the shaft 26, so that any movements of said piston rod will immediately affect the shaft and cause it to rotate.

39 is a valve manually operated and introduced in the length of tube 32 for determining the volume of fluid that may pass  
 35 therethrough in a given time.

It will thus be seen that a means of gradually returning the valves 18 to their closed position is provided, for, as soon as the said  
 40 valves are opened by the swinging of the door outwardly, the rod 21 as explained, is in its inward position and as the door is closed the trip lever 27 is released. The piston rod 30 is then lowered by the weight of  
 45 the piston, and by means of the toggle-joint connection the shaft 26 is rotated in the opposite direction from that in which it has been rotated by the trip lever 27, and as said shaft continues to rotate the valves 18 gradually close, until they are completely shut.

What I claim as my invention is:—

1. In a furnace, the combination with the fire-box, bridge-wall and rear structure

thereof, of a plurality of super-heating chambers having open under sides and parallelly arranged one to the other and extending longitudinally of said furnace in the rear of said bridge-wall and having a plurality of outlets arranged at intervals in the side walls thereof towards the top and in the plane of the passing of the combustion  
 55 gases from said fire-box, a hot-air chamber arranged below and supporting said super-heating chambers and having openings in the top thereof communicating directly  
 60 with the open under sides of said super-heating chambers and openings in the top thereof between and on each side of said super-heating chambers, a plurality of hinged valves covering said openings in the  
 70 top of said hot-air chamber, and means for adjusting said valves to govern the supply of hot-air passing therethrough.

2. In a furnace, the combination with the fire-box, bridge-wall and rear structure  
 75 thereof, of a pair of super-heating chambers having open under sides situated immediately to the rear of the bridge-wall and having arched tops and lateral outlets arranged at intervals along the sides of said arched  
 80 tops and on a plane with the passage of the combustion gases from the fire-box, a hot-air chamber supporting said super-heating chambers and having front and rear plates forming the end walls thereof and openings  
 85 in the top thereof registering with the open under sides of said super-heating chambers and openings in the top thereof arranged between and to each side of said super-heating chambers, said end plates having openings  
 90 therethrough, an air-supply pipe leading from the exterior of said furnace structure to one of said end-plate openings, a plurality of hinged valves closing said openings in the top of said hot-air chamber and  
 95 having stems extending downwardly therefrom, a valve-rod pivotally connected with said stems and means for reciprocating said rod.

Signed at London this 17th day of October, 1907.

DENHAM JOHNSON.

Witnesses:

H. D. JAMESON,  
 A. NUTTING.