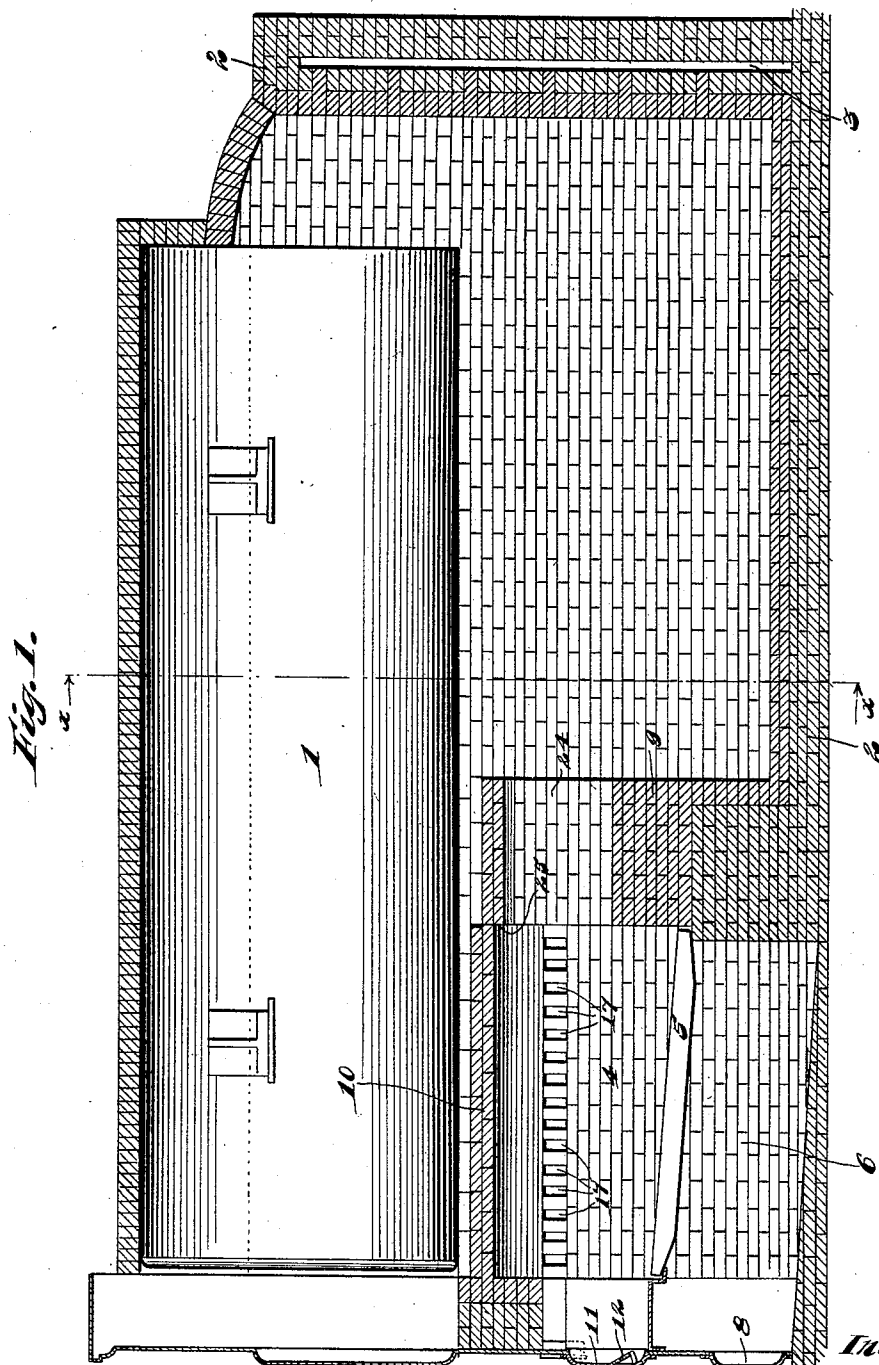


1,065,702.

J. McMILLAN.
STEAM BOILER FURNACE.
APPLICATION FILED MAR. 23, 1912.

Patented June 24, 1913.

2 SHEETS-SHEET 1.



Witnesses:
C. E. Wessels.
A. A. Olson

Inventor.
James McMillan,
By Joshua H. Horn
his Attorney.

1,065,702.

J. McMILLAN.
STEAM BOILER FURNACE.
APPLICATION FILED MAR. 23, 1912.

Patented June 24, 1913.

2 SHEETS—SHEET 2.

Fig. 3.

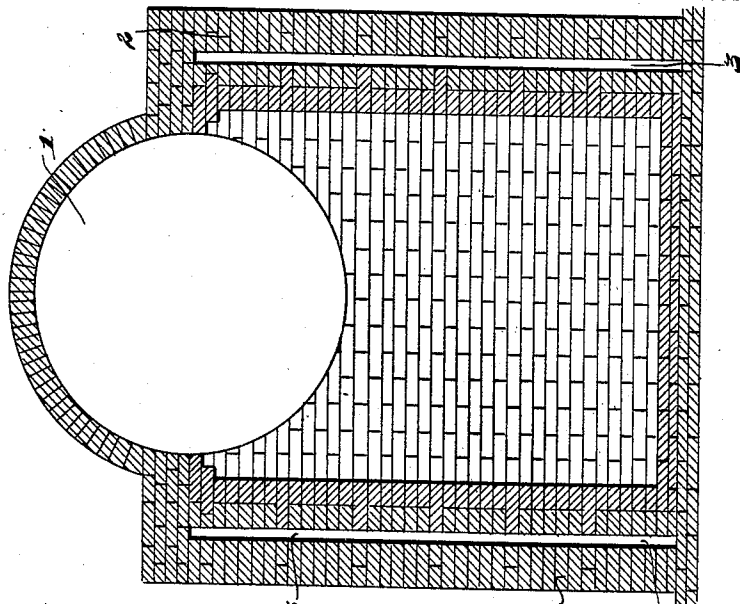
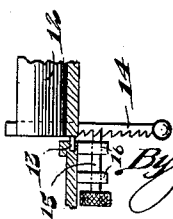
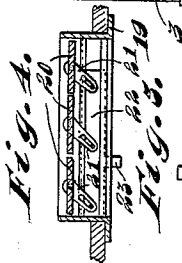
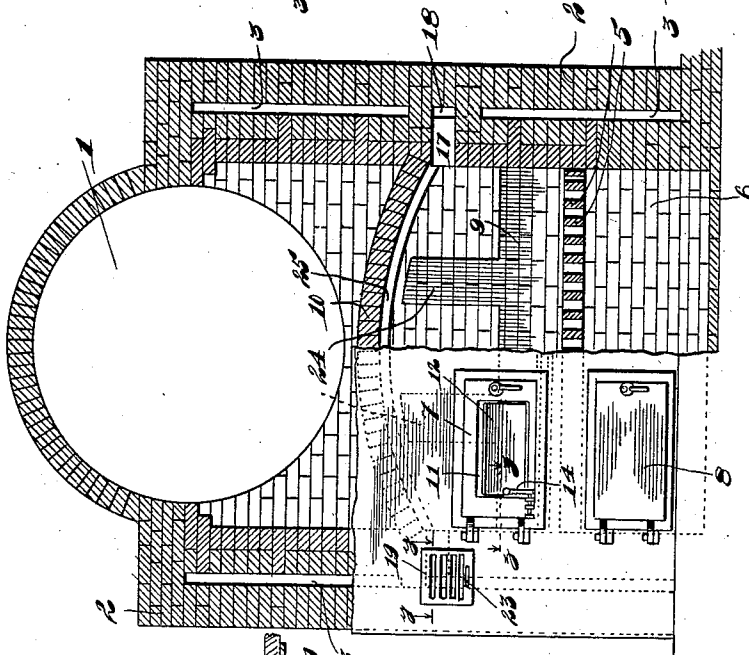


Fig. 6.



Witnesses:
C. E. Wenzel.
A. A. Olson.

Inventor:

James McMillan,
By Joshua H. Dorr
his Attorney.

UNITED STATES PATENT OFFICE.

JAMES McMILLAN, OF CHICAGO, ILLINOIS.

STEAM-BOILER FURNACE.

1,065,702.

Specification of Letters Patent.

Patented June 24, 1913.

Application filed March 23, 1912. Serial No. 685,745.

To all whom it may concern:

Be it known that I, JAMES McMILLAN, a citizen of the United States, and a resident of the city of Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Steam-Boiler Furnaces, of which the following is a specification.

My invention relates to improvements in steam boiler furnaces and has for its object the production of a furnace of this character, which will be so designed as to be adapted to secure complete combustion of the smoke and gases emanating from the fire box and so as to thereby render the furnace smokeless when in operation.

A further object is the production of a steam boiler furnace which will be of durable and economical construction and of high efficiency in operation.

Other objects will appear hereinafter.

The invention consists in the combinations and arrangements of parts hereinafter described and claimed.

The invention will be best understood by reference to the accompanying drawings forming a part of this specification, and in which,

Figure 1 is a central longitudinal section of a steam boiler furnace embodying my invention, Fig. 2 is a partial sectional front elevation of the furnace, Fig. 3 is a vertical transverse section taken on line $x-x$ of Fig. 1, and Figs. 4 and 5 are enlarged detail sections taken on substantially lines $y-y$ and $z-z$ respectively of Fig. 2.

The preferred form of construction, as illustrated in the drawings comprises a furnace consisting of the usual boiler 1 which is mounted in masonry 2 in any well known manner, the vertical walls of the masonry 2 being shown formed with the usual insulating air spaces 3. At the front end of the furnace below the boiler 1 is the fire box 4 the grate 5 and the ash pit 6, access to said fire box and ash pit being gained through the usual hinged doors 7 and 8 respectively. At the rear of the ash pit and fire box is provided the bridge 9 over which, when the furnace is in operation, the products of combustion emanating from the fire box are required to pass in their rearward passage for entrance into the rearward ends of the flues of the boiler as is known. At the upper side of the fire box is provided

the usual arch 10 which is formed of fire brick.

The construction thus far described is old and well known, no claim being here made thereto, the construction embodying the present invention being set forth in the following.

In order to insure complete combustion, it is essential that sufficient air or oxygen be introduced to the fire box for mixture with the combustible gases generated therein. With a view to amplifying the supply of air or oxygen to the fire box the fire door 7 is formed with an air inlet opening 11 through which, when the furnace is in operation, air will be admitted to the fire box which will induce a draft therethrough toward the rear of the furnace and conduce to complete combustion. This opening 11 is controlled by a plate or damper 12 which is pivotally secured by trunnions 13 which project centrally from the opposite edges of said plate into the opposite sides of said opening. Regulation of the amount of air permitted to pass through said opening will evidently be controlled by said plate, it being clear that the supply may be lessened or increased by simply adjusting the angularity of said plate. The latter is held in positions of angular adjustment by means of an arcuate ratchet bar 14 which projects forwardly from the lower end thereof, the teeth in said bar being engageable by a slidable pin 15 which is mounted in lugs 16 provided upon the front side of the fire door. With this arrangement it will be seen that said pin 15 engaging with the teeth of said rack bar will serve to maintain the member 12 in any position of adjustment, release of said member 12, in order to adjust the position thereof, being permitted upon lateral sliding of said pin to disengage the ratchet bar.

Provided in the lateral walls of the fire box adjacent the upper end of the latter is a plurality of spaced openings 17 which communicate at their outer ends with air ducts 18 formed in the lateral walls of the masonry 2 of the furnace, said ducts 18 opening at their forward ends in the front plate of the furnace to the outside atmosphere. With this arrangement it will be seen that air will be supplied to the fire box from both of the lateral walls thereof which will supply the requisite amount of oxygen to conduce to complete combustion of the

smoke and gases arising in the fire box. The supply of air to the ducts 18 is controlled by registers provided at the front ends thereof upon the front plate of the furnace. Each of said registers comprises a rectangular frame or body in which is pivotally mounted a plurality of plates or damper members 20. The arrangement being such, that when said plates are positioned coplanar the opening through the register will be closed, tilting of said plates from this position opening the passage through the register for supplying air to the air ducts, and hence the openings 17. The plates 20 are provided with rocker arms 21 which are in slot-and-pin connection with a slidable bar 22 which, may be manually operated to tilt or actuate the plates 22 by means of an exteriorly projecting finger piece 23. With this arrangement it will be seen that regulation of the supply of air to the fire box through the opening 17 may be regulated by simply adjusting the finger pieces 23 of the registers. Arising from the bridge 9 are two spaced posts, obstructions or piers, which serve to break or divide the stream of gases passing over the bridge and to thereby thoroughly mingle the gases with the air introduced through the fire door opening 11 and the openings 17 so as to conduce to complete combustion. In order to further agitate the gases passing over the bridge from the fire box, the rearward end of the arch 10 is formed with a downwardly extending off-set 25 against which the gases will impinge with the desired result. By reason of the shrinkage and expansion of the structure caused by the variation in the temperature, the upper ends of the obstructions or posts

25 do not contact with the under side of the arch, there being a space intervening the latter and the upper ends of the post to permit of this shrinkage or expansion without fear of breakage.

The construction set forth is durable and economical and the employment thereof will insure complete combustion of the gases and smoke emanating from the fire box and thereby result in a smokeless furnace.

While I have illustrated and described the preferred form of construction for carrying my invention into effect, this is capable of variation and modification without departing from the spirit of the invention. I, therefore, do not wish to be limited to the precise details of construction set forth, but desire to avail myself of such variations and modifications as come within the scope of the appended claim.

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

In a steam boiler furnace, the fire box, arch and bridge in combination with a downwardly extending off-set in said arch, a plurality of upwardly extending obstructions on said bridge having flat forward faces in the same transverse plane as said off-set and said obstructions terminating a slight distance below said arch, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JAMES McMILLAN.

Witnesses:

WALTER J. McMILLAN,
JOSHUA R. H. POTTS.