

June 2, 1925.

F. H. WAITE ET AL

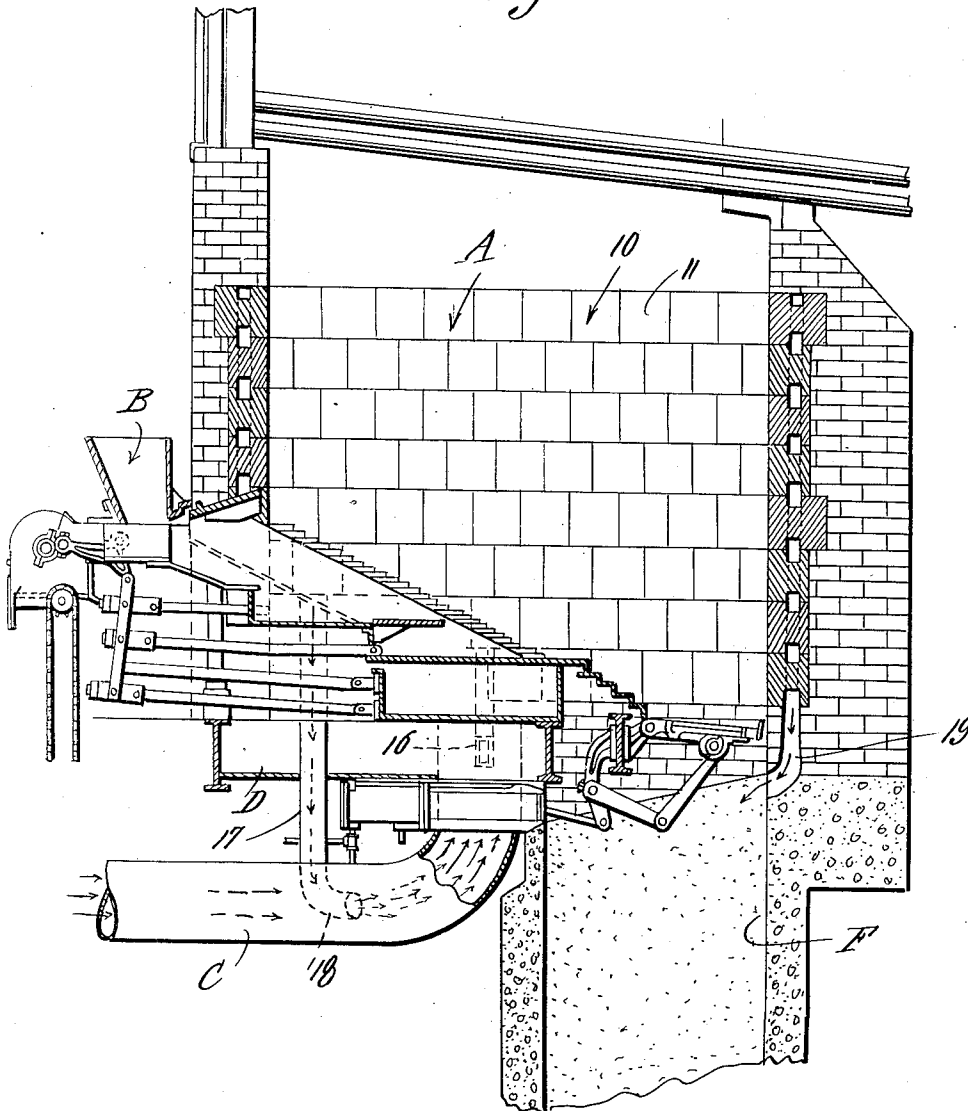
AIR COOLED FURNACE

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Fig. 1.



WITNESSES

Guy M Spring

George W. Wright

Inventor
FRANK H. WAITE
GEORGE W. DAVEY

GEORGE W. DAVEY

By

Richard B. Owen

Attorney

June 2, 1925.

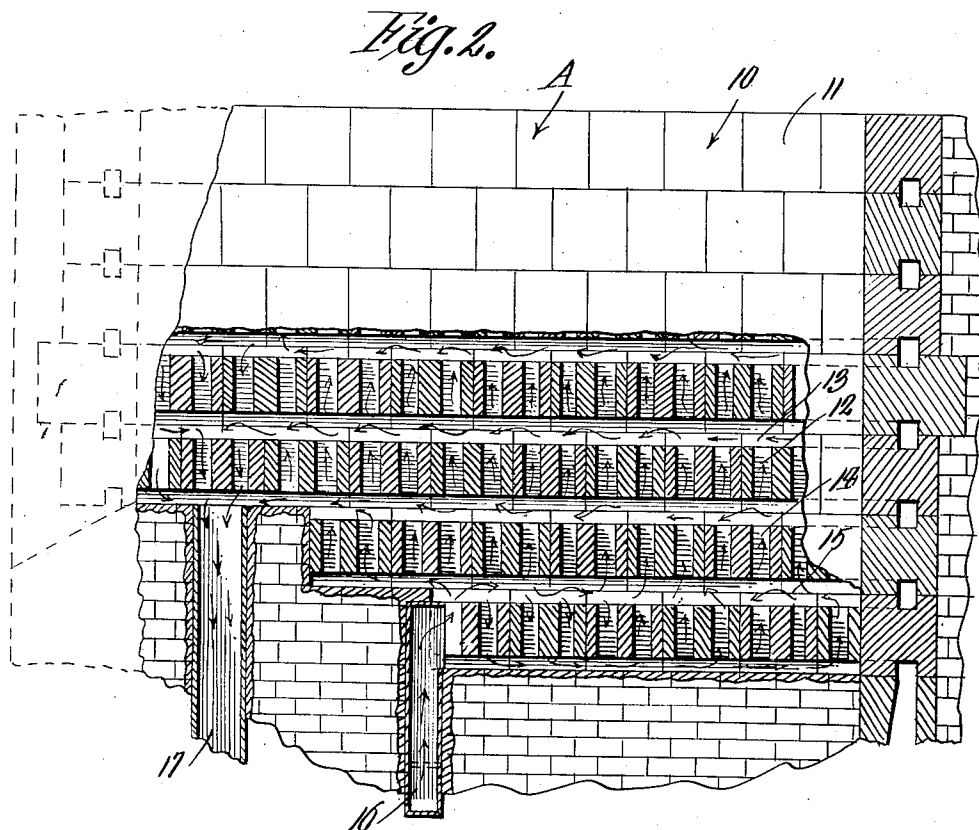
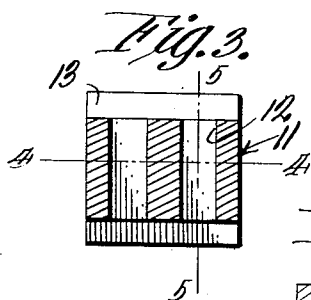
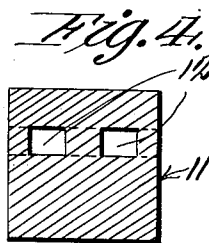
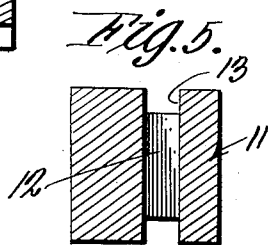
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WITNESSES

Guy M. Spring
George W. Davey

FRANK H. WAITE *Inventor*
GEORGE W. DAVEY

By *Richard B. Owen* *Attorney*

June 2, 1925.

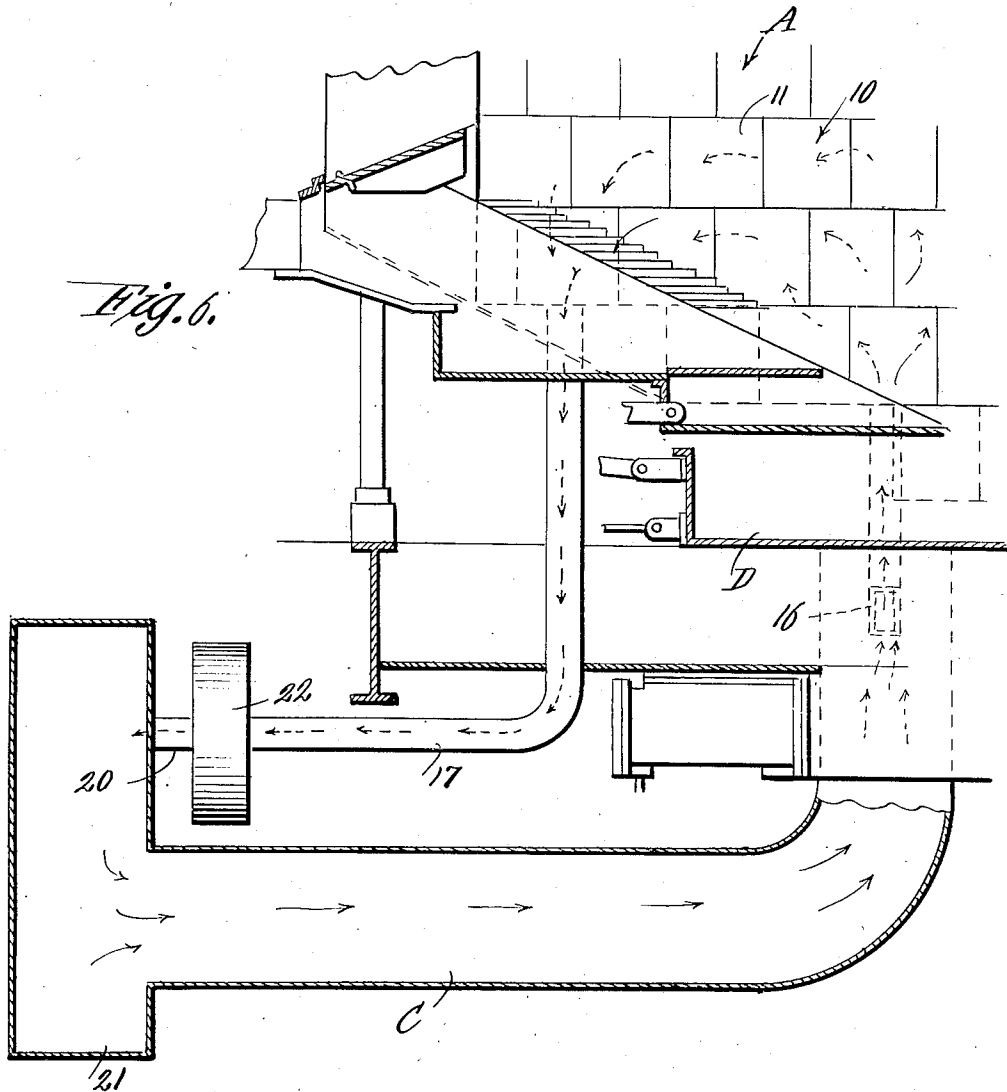
F. H. WAITE ET AL

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Filed Jan. 3, 1924

4 Sheets-Sheet 3



WITNESSES

Guy M. Spring

X 2072 D. Wright

Inventor

FRANK H. WAITE
GEORGE W. DAVEY.

By

Richard B. Owen

Attorney

June 2, 1925.

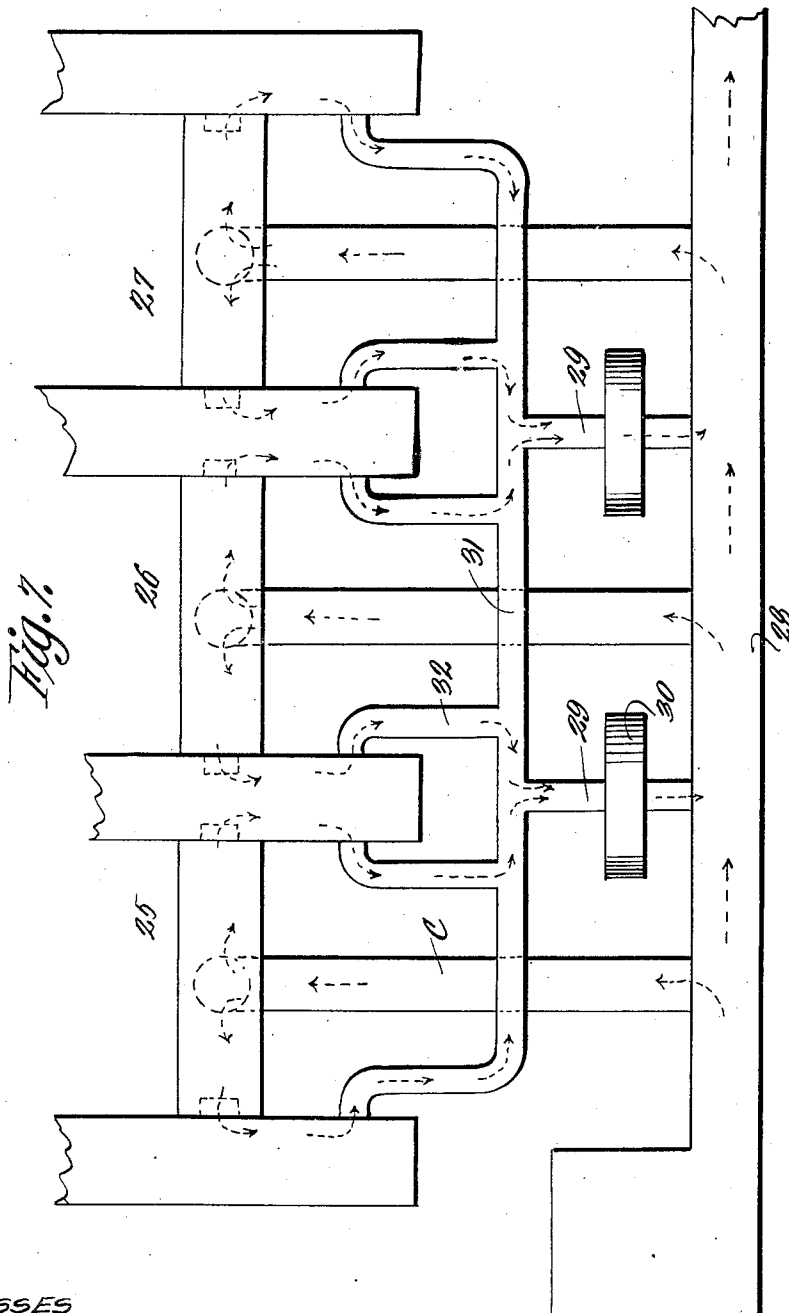
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F. H. WAITE ET AL

AIR COOLED FURNACE

Filed Jan. 3, 1924

4 Sheets-Sheet 4



WITNESSES

Guy M. Spring

Henry W. Wright

Inventor

FRANK H. WAITE
GEORGE W. DAVEY

334

Richard B. Owen

Attorney

Patented June 2, 1925.

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UNITED STATES PATENT OFFICE.

FRANK H. WAITE AND GEORGE W. DAVEY, OF LONG ISLAND CITY, NEW YORK.

AIR-COOLED FURNACE.

Application filed January 3, 1924. Serial No. 684,226.

To all whom it may concern:

Be it known that we, FRANK H. WAITE and GEORGE W. DAVEY, citizens of the United States, residing at Long Island City, in the county of Queens and State of New York, have invented certain new and useful Improvements in an Air-Cooled Furnace, of which the following is a specification.

10 This invention appertains to novel improvements in air cooled furnaces and the primary object of the present invention is to provide a novel system of cooling the walls of a furnace from the forced or in-
15 ducted air utilized in stoking systems of furnaces.

Another prime object of this invention is to provide a furnace embodying walls built up of air cooled blocks and novel means for
20 connecting the air cooled blocks with the forced air duct of a stoker at one end for causing the delivering of air to the air cooled blocks and for connecting blocks at a spaced point with the forced air duct for causing
25 a suction therethrough, thereby insuring a complete circulation of air through said air cooled wall.

A further prime object of the invention is the provision of novel means for insuring
30 a circulation of air through the channels of the blocks from which the furnace walls are built by the use of a Venturi suction from the main air duct utilized for supplying air below an automatic furnace stoker.

35 A still further object of the invention is the provision of novel means for insuring a circulation of air through the channels of the blocks from which a furnace or battery of furnaces are built, which embodies the use
40 of a suction fan for withdrawing the air from the channels and for reintroducing the air back into the forced air feed duct.

With these and other objects in view, the invention consists in the novel construction,
45 arrangement and formation of parts, as will be hereinafter more specifically described, claimed and illustrated in the accompanying drawings, in which drawings:

50 Figure 1 is a vertical section through a complete furnace provided with an automatic stoker and forced air duct showing our invention incorporated therewith.

55 Figure 2 is an enlarged fragmentary section through a furnace showing one of the side walls thereof partially broken away to illustrate the air channels formed in the

blocks of the walls and illustrating the means for connecting the channels in said blocks with the air supply and exhaust or suction pipe leading from the forced air
60 duct.

Figure 3 is a vertical section through one of the blocks utilized in the air cooled walls.

Figure 4 is a horizontal section through one of the blocks taken on the line 4—4 of
65 Figure 3,

Figure 5 is a transverse section taken on the line 5—5 of Figure 3,

Figure 6 is a fragmentary vertical section through a furnace showing the use of a
70 slightly modified form of the invention, and

Figure 7 is a diagrammatic plan view illustrating the form of the invention shown in Figure 6 applied to a battery of furnaces
75 or boilers.

Referring to the drawings in detail, wherein similar reference characters designate corresponding parts throughout the several views; the letter A generally indicates a furnace provided with any preferred
80 type of automatic stoker B, which is provided with a main air supply duct C leading below the same. This air duct C leads in the usual way to a main air duct D. The furnace is provided with the usual ash and
85 clinker dump F.

The walls 10 of the furnace are constructed from a plurality of blocks 11 which are provided with vertical ways 12 extending
90 therethrough and horizontal grooves 13 in their upper and lower faces. When the blocks are laid together to form a wall, the ways 12 and grooves 13 form vertical and horizontal communicating channels 14 and
95 15 respectively through the wall, as can be clearly seen by referring to Figure 2 of the drawings.

In accordance with this invention, a feed pipe 16 is utilized which communicates at its lower end with the air duct C adjacent to
100 its discharge point, as can be clearly seen by referring to Figure 1 of the drawings. This feed pipe 16 is built into one side wall of the furnace and communicates with the air channels 14 and 15 therein. This provides
105 means for permitting the forcing of air into the channels. In order to provide a continuous circulation through the walls of the furnace we provide a relatively large suction pipe 17 which also communicates
110 with the channels 14 and 15 at a point spaced from the supply pipe 16. The lower

end of the suction pipe 17 is provided with an elbow 18, which leads into the main air duct C at an angle at a point intermediate the ends thereof. It is evident that the forced air rushing through the duct C will create a suction in the pipe 17 thus effectively sucking the air from the walls and creating a forced draft or circulation there-through. The free circulation of air through the walls is due to a Venturi vacuum or suction from the main air duct as can be clearly seen by referring to the drawings.

If so desired an outlet channel 19 can be built in the walls of the furnace for connecting the air channels therein with the ash dump, to permit the air to escape to said dump.

In Figures 6 to 7 inclusive we have shown a modified form of the invention, in which the return or suction pipe 17 is extended as at 20 to the main forced air channel 21 which communicates with the forward end of the feed duct C. A suction fan 22 is incorporated in the length of the suction pipe 17 and it can be seen that this fan will forcibly suck the air through the pipe 17 from the channelways formed in the walls of the furnace and introduce the same back into the main air channelway 21, where the same will flow into the air duct C below the grate and back into the furnace wall.

In Figure 7 is shown a battery of furnaces or boilers 25, 26 and 27 which are provided with a main feed forced air channel 28 which extends transversely of the battery of furnaces or boilers below and in front of the same. The main air forced feed channel is connected to the battery of furnaces by means of the feed ducts C and air is adapted to be forced below the grate of the furnaces and up through the walls as heretofore described. Arranged between the forced air feed ducts C are main suction pipes 29 which have incorporated therewith suction fans 30 for sucking air through the pipes 29 and into the main feed air channel 28. These main suction pipes 29 are in turn connected with the transversely extending suction pipe 31 which extends in front of and below the furnaces. This suction pipe 31 is in turn connected by means of branch suction pipes 32 with the channelways in the walls of the furnaces.

Now it is evident that the air will be forced up into the channelways of the furnaces by means of the ducts C and then sucked out of the channelways by the suction pipes 29, 31 and the branch suction pipes 32 through the medium of the suction fans 30. The temperature of the air sucked from the walls will of course be raised, and as the same is forced under the grates of the furnaces, this air will aid in the combustion of the fuel.

From the foregoing, it can be seen that we have provided a novel means for insuring the forced circulation of air through the walls of a furnace by the use of the main air duct entering below the automatic stoking system of a furnace, whereby said walls are effectively maintained in a cool condition.

Changes in details may be made without departing from the spirit or the scope of this invention.

What we claim as new is:

1. The combination with a furnace including side walls having air channels extending therethrough and an automatic stoker including a main air duct for feeding forced air below the same, of an air supply pipe for feeding air from the duct to the channels in the walls, and a suction pipe communicating with the duct at a point intermediate its ends and with the channels in the walls at a point spaced from said air supply pipe.
2. The combination with a furnace including walls built up of blocks having ways therethrough to provide vertical and horizontal air channels in the walls, and an automatic stoker including a forced feed air duct arranged below the same, of means for creating a continuous circulation of air through said walls including an air feed pipe connected with the supply end of the air duct and with the air channels in the walls, and a suction pipe communicating with the air channels in the walls at a point spaced from the point of communication of the air feed pipe with said channels, and an elbow formed on the lower end of the suction pipe communicating with the main air duct at an angle and at a point intermediate the ends thereof.
3. The combination with a furnace including side walls having air channels formed therein, an ash dump, an automatic stoking system having a forced feed air duct entering below the same, of an air feed pipe connecting the outlet end of the forced air feed duct with the channels in the walls, and a suction pipe connecting the channels in the walls at a point spaced from the feed pipe with the main air duct at a point intermediate its ends, and an air escape built in one of said walls connecting the channels therein with the ash dump.
4. The combination with a furnace including walls built up of blocks having ways therethrough to provide vertical and horizontal air channels in the walls, and an automatic stoker including a forced feed air duct arranged below the same, of means for creating a continuous circulation of air through said walls including an air feed pipe connected with the supply end of the air duct and with the air channels in the walls, a suction pipe communicating with the air channels in the walls at a point

spaced from the point of communication of the air feed pipe with the channels, and extending to the forced feed air duct, and a suction fan arranged in said suction pipe
5 for creating a continuous force of suction through said pipe.

5. The combination with a furnace including side walls having air channels extending therethrough and an automatic
10 stoker including a main air duct for feeding forced air into said channels, a suction duct communicating with the said channels and main air duct whereby a continuous circulation of air may be created between
15 said channels to cool the said walls.

6. The combination with a furnace including side walls having air channels extending therethrough and an automatic
20 stoker including a main air duct for feeding forced air below the same into said channels, a suction duct communicating with the said channels at a point spaced from the main air duct and a fan for withdrawing the air from said channels to cool
25 the said walls.

7. The combination with a furnace including side walls having longitudinally and vertically communicating air channels throughout their surface and a stoker including a main air duct for feeding forced
30 air below the same and into the air channels, a suction duct communicating with the said channels and located at a point spaced from the main air duct and means cooperating with the suction duct for creating a continuous circulation of air through
35 the said channels to cool the said walls.

8. The combination with a furnace including side walls having air channels

therethrough, of an air supply duct for
40 feeding forced air into said channels, a suction duct communicating with the said channels and the air supply duct and means located between the said air supply duct
45 and suction duct for creating a continuous circulation of air through the channels to cool the said walls.

9. The combination with a furnace including side walls having air channels there-
50 through, of an air supply duct for feeding forced air into said channels, a suction duct communicating with the said channels and having an elbow formed passage leading to the air supply duct and means located
55 between the air supply duct and suction duct for creating a continuous circulation of air through the channels to cool the said walls.

10. The combination with a furnace including side walls having air channels there-
60 through extending in two directions of an air supply duct for feeding forced air from the bottom into said channels, a suction duct communicating with the said channels at a
65 point spaced from the air supply duct, the air supply duct and suction duct being in communication and having a fan located therebetween for creating a continuous circulation of air through the channels to cool
70 the said walls.

In testimony whereof we affix our signatures in presence of two witnesses.

FRANK H. WAITE.
GEORGE W. DAVEY.

Witnesses:

CHAS D. SMITH,
PETER DOUGLAS.