

Oct. 2, 1923.

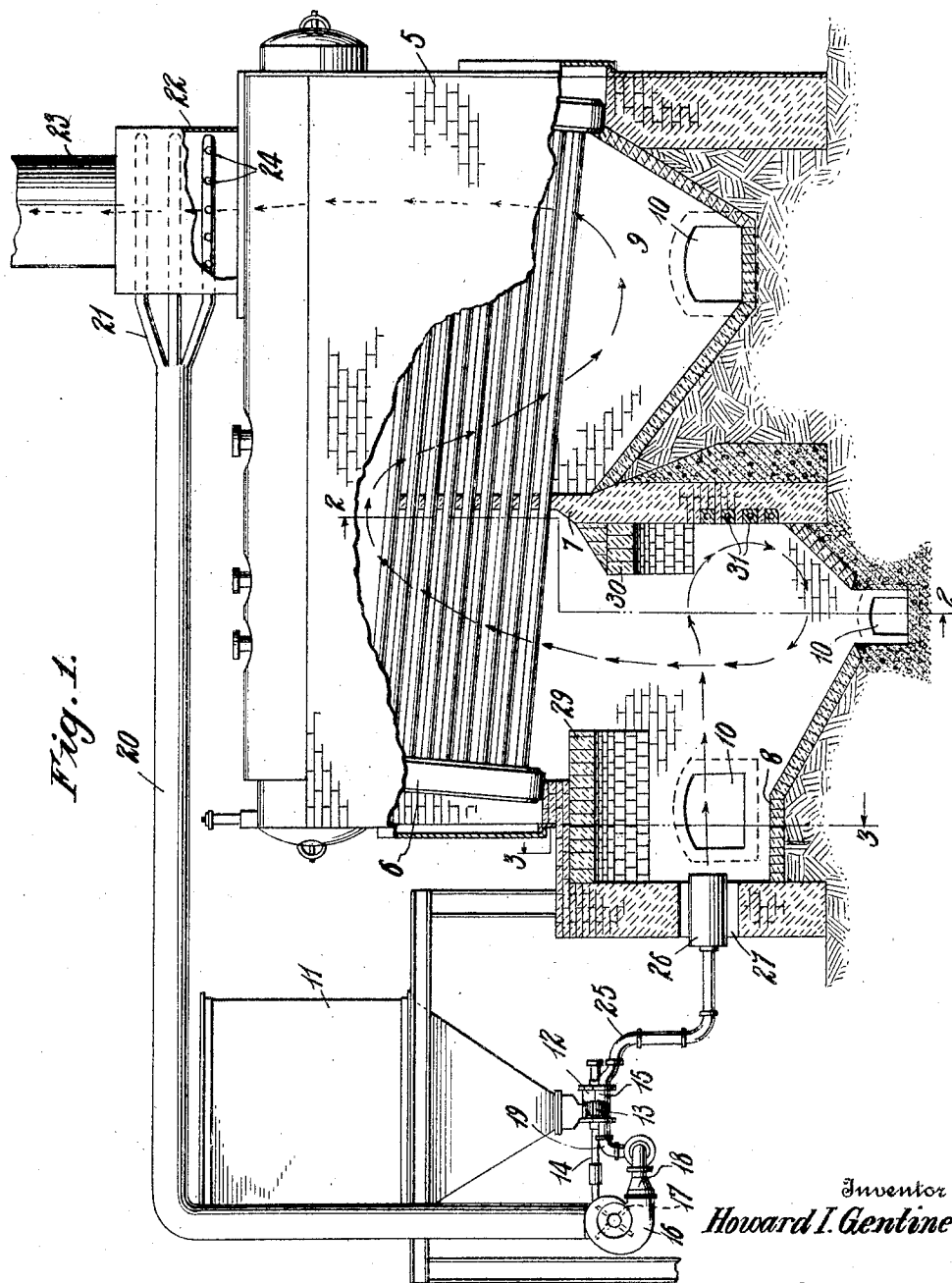
H. I. GENTINE

1,469,313

FURNACE

Original Filed Nov. 1, 1920

3 Sheets-Sheet 1



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By Norman J. Whitaker
his Attorney

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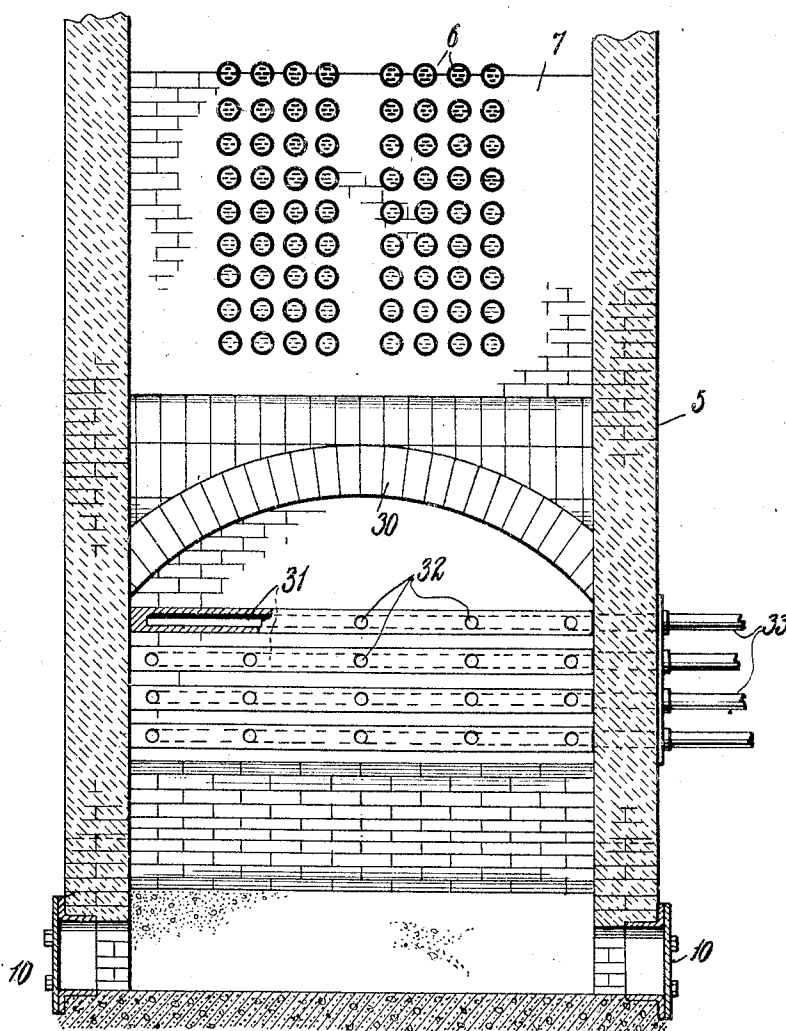
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Fig. 2.



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Fig. 3.

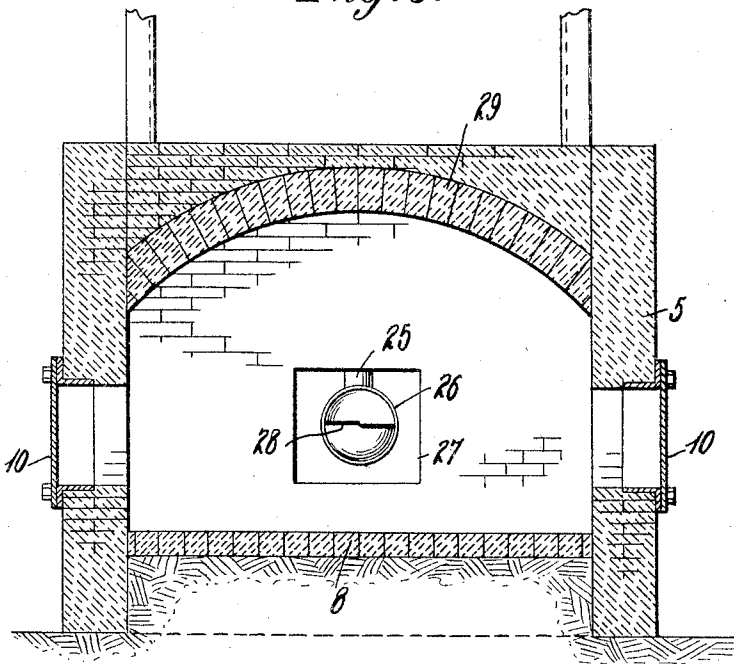
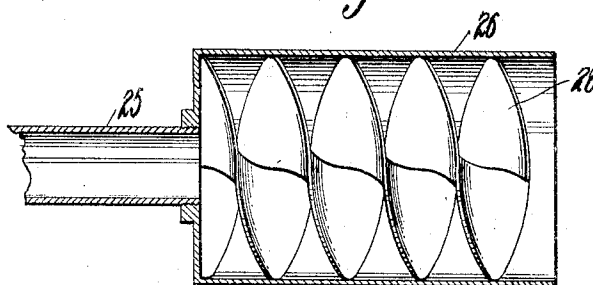


Fig. 4.



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UNITED STATES PATENT OFFICE.

HOWARD I. GENTINE, OF SHELBYVILLE, ILLINOIS, ASSIGNOR TO AMERICAN ATOMIZED FUEL COMPANY, OF SHELBYVILLE, ILLINOIS, A CORPORATION OF SOUTH DAKOTA.

FURNACE.

Application filed November 1, 1920, Serial No. 421,037. Renewed August 6, 1923.

To all whom it may concern:

Be it known that I, HOWARD I. GENTINE, a citizen of the United States, and a resident of Shelbyville, in the county of Shelby and State of Illinois, have invented a new and useful Furnace, of which the following is a specification.

My invention comprises a furnace and has as its all important object the provision of a fire box together with a fuel feeder, the construction of which is such as to insure complete combustion of the fuel fed to the fire box.

A further object of the invention is to provide a fire box for heating steam generating boilers and the like which causes the products of combustion to circulate in a sinuous manner through the fire box and around the boiler so that the latter is heated to a maximum degree and at the same time giving the maximum thermal efficiency.

It is also an object of the invention to provide a fire box wherein a main combustion chamber and a secondary combustion chamber are provided and between which, means are interposed to cause the products of combustion to circulate in a sinuous manner and the ashes or residue will be collected at the bottom of each of the chambers.

Still another object of the invention is to combine with a fire box, a pulverized fuel feeder which is in communication with an air pipe for conducting preheated air from the fire box to the burner for carburetion with the pulverized fuel.

With the preceding and other objects and advantages in mind, the invention consists in the novel combination of elements, construction and arrangement of parts and operations to be hereinafter more fully described, claimed and illustrated in the accompanying drawings, wherein:

Figure 1 is a view partly in vertical longitudinal section and partly in side elevation of the complete fire box and burner;

Figure 2 is a vertical sectional view taken on line 2—2 of Figure 1;

Figure 3 is a similar view taken on line 3—3 of Figure 1; and

Figure 4 is a fragmentary view of the fuel spreader embodied in the invention, parts being shown in cross section and parts being shown in elevation.

Referring in detail to the drawings wherein in similar characters of reference designate

similar parts throughout the several views, the numeral 5 designates a furnace structure built up of fire brick in which is mounted a boiler structure designated in general at 6.

The furnace 5 is divided by a vertical transverse wall 7 and located upon opposite sides of this transverse wall are a main combustion chamber 8 and a secondary combustion chamber 9, the latter being disposed at a slightly greater height than the former and the bottom walls of these chambers being inclined so that the ashes or residue will be collected at the bottom and removed from the furnace by way of the doors 10.

Supported forwardly of the furnace 5 is a hopper 11 adapted to contain the pulverized fuel to be fed to the fire box. At the lower end of the hopper, a cylindrical casing 12 is formed in which a rotatable fed roller 13 is mounted, the latter having a laterally disposed shaft 14 extending therefrom to be driven by any suitable source of power (not shown). The casing 12 is formed with a chamber 15 adapted to receive the pulverized fuel from the roller 13.

A fan casing is designated at 16 and mounted therein is a rotatable fan shown in dotted lines in Figure 1 and designated at 17. The fan casing is provided with a forwardly extending outlet pipe 18 having communication with the chamber 15 by way of an elbow 19. A preheated air conducting pipe is designated at 20 and extends along the top of the furnace 5 and thence downwardly and has communication with the fan casing 16. The opposite end of the pipe 20 is formed with a plurality of branch pipes 21 which are received in a casing 22 which is arranged in the smoke stack or exhaust pipe 23. These branch pipes 22 are provided with a series of openings 24 through which some of the heated products, passing through the casing 22 on their way to the pipe 23, pass into the branch pipes 21 and conducted through the pipe 20 into the fan casing 16 from whence they are blown into the chamber 15 and mixed with the fuel therein.

An outlet pipe 25 extends from one end of the chamber 15 and communicates with a cylindrical casing 26 open at both ends, the latter being positioned in an opening 27 in the forward wall of the furnace. As shown in Fig. 1 the casing 26 is arranged centrally of the opening 27, thus air may

pass between this casing and the walls of the opening to support combustion in the chambers 8 and 9.

5 A spiral blade 28 is arranged within the casing 26 and serves to spread the combustible mixture before the same finally passes into the main combustion chamber 8.

10 In order to protect the boiler tubes, there is provided within the chamber 8 and above the casing 26 an outstanding transversely bowed arch 29. An ignition arch 30 extends transversely of the chamber 8, and also extends from one face of the vertical wall 7. This arch 30 is disposed slightly below the arch 29.

15 Embedded in the front face of the wall 7 is a plurality of parallel horizontally disposed rectangular pipes 31, each of which has a plurality of branch openings or right angularly disposed openings 32. Each of these pipes 31 is in communication with a steam conducting pipe 33, the latter being in communication with any source of steam supply (not shown). It will be seen that the steam passes through the outlet openings 25 32 and into the chamber 8.

30 In operation, the pulverized fuel and preheated air are blown from the chamber 15 and discharged through the cylindrical casing 26. As the mixture of pulverized fuel and preheated air is discharged in the chamber 8, it flows in the direction of the arrows shown in Figure 1 and mingles with the steam issuing from the openings 32. 35 The steam, in addition to insuring all of the carbon being burned, aids in causing the products of combustion to pass upwardly

in the direction of the arrows and thence into the secondary chamber 9 and the heat and gases are conducted out by way of the pipe 23. However, should heavy particles be contained in the products of combustion passing into the secondary chamber, the ashes or residue will drop to the bottom of this chamber.

45 It is to be understood that the form of my invention herein shown and described is to be taken as a preferred example of the same, and that various changes in the shape, size and arrangement of parts may be resorted to without departing from the spirit of the invention or the scope of the sub-joined claim.

50 Having thus described my invention, what I claim as new and desire to secure and protect by Letters Patent of the United States, is:

55 A furnace including a fire brick casing having communicating main and secondary combustion chambers built in the bottom thereof, a vertically extending baffle wall separating the two chambers, an arch disposed in the main combustion chamber and extending from the baffle wall and located at the approximate vertical center of the latter, means for ejecting fluid from beneath the last named arch, an arch extending from the front wall of the main combustion chamber into the main combustion chamber and means for injecting pulverized fuel and air from below the arch into the main combustion chamber.

HOWARD I. GENTINE.