

(No Model.)

3 Sheets—Sheet 1.

J. FLANNERY.

FURNACE.

No. 263,500.

Patented Aug. 29, 1882.

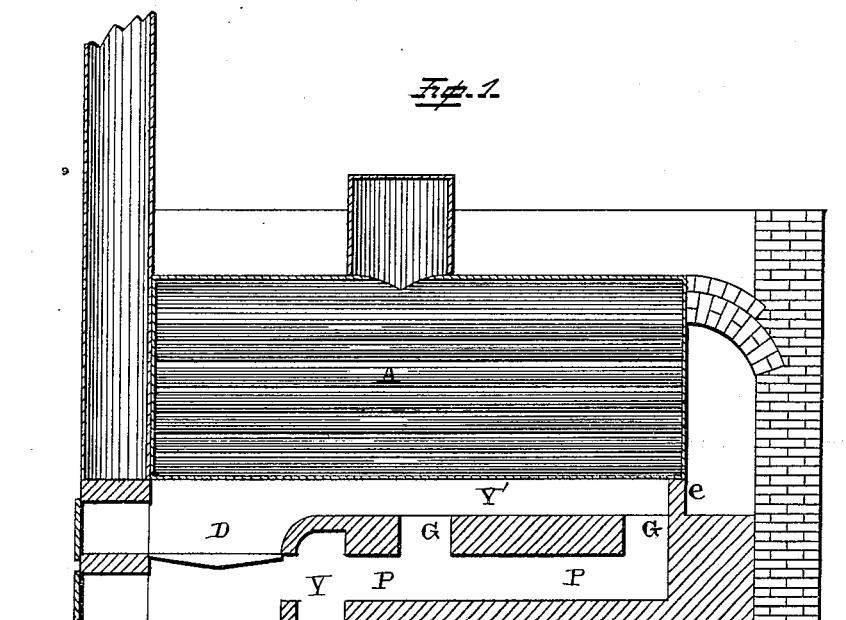
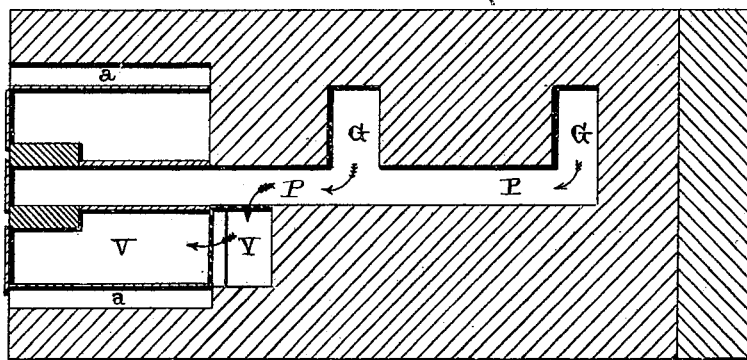


Fig. 2.



Witnesses.

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per
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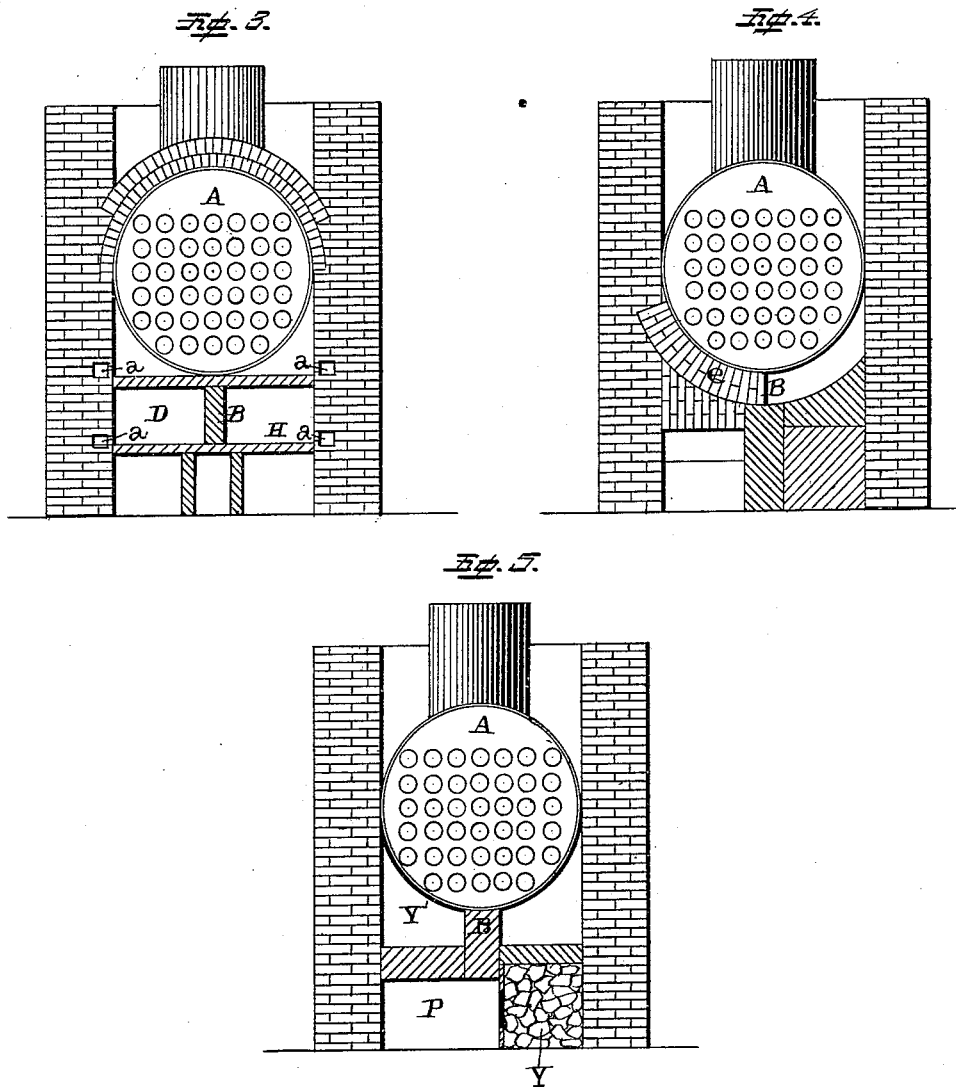
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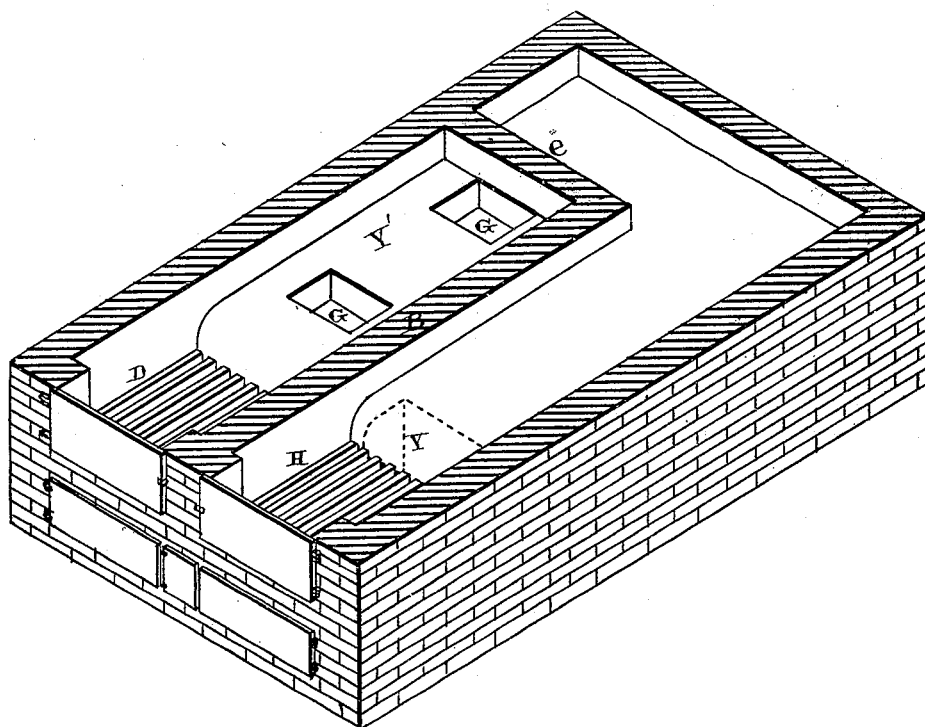
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Fig. 6.



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UNITED STATES PATENT OFFICE.

JOSEPH FLANNERY, OF PHILADELPHIA, PENNSYLVANIA.

FURNACE.

SPECIFICATION forming part of Letters Patent No. 263,500, dated August 29, 1882.

Application filed March 17, 1882. (No model.)

To all whom it may concern:

Be it known that I, JOS. FLANNERY, of Philadelphia, and State of Pennsylvania, have invented certain new and useful Improvements in Furnaces; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification

My invention relates to an improvement in furnaces; and it consists in the combination and arrangement of parts, whereby the products of combustion of the first fire are made to pass back under the boiler, then down through a flue to the front end of the boiler, and up through a second fire, and then up the stack, as will be more fully described hereinafter.

The great object of my invention is to produce a smokeless fire, and thus entirely do away with all those products of combustion which form a deposit in the return-flues of the boiler, and thus obviate the necessity of cleaning them out from time to time.

Figure 1 is a vertical longitudinal section of my furnace, taken through the chamber D. Fig. 2 is a horizontal section of the same, taken through the ash-pits. Figs. 3, 4, 5 are vertical cross-sections taken at different points. Fig. 6 is a horizontal section, shown in perspective.

A represents an ordinary boiler, of any desired construction, but which is preferably provided with return-flues, and which has the furnace-chamber and ash-pit under it divided by the vertical wall B. This wall divides the furnace into two separate and distinct furnaces, each one of which is provided with doors of its own, so as to be entirely separate and distinct from the other.

In the chamber D is made a fire of any bituminous coal, or of any hydrocarbon, and the products of combustion pass off as nitrogen, water vapor, carbonic acid, carbonic oxide, and soot, with atmospheric air, which does not enter into the products of combustion, along under the boiler through the passage Y' to the downtakes or flues G. These products of combustion do not escape up the stack on account

of the wall e, which is built up across the rear end of the passage Y', as shown in Figs. 1 and 6. By this construction the whole of the bottom of the first half of the boiler is acted on by the heat with but little more loss than if the products of combustion passed directly up the stack. These products of combustion, in passing along under the boiler, part with a large portion of their heat for the purpose of producing steam, and then pass off into the downtake and flue or passage P toward the front end of the boiler again, and in their passage are made to pass through gas-flues, which act on the regenerative principle, and where the products are equalized. Before the products of combustion reach the ash-pit V of the second chamber they are compelled to pass through a chamber, Y, which is filled with carbonate of lime, in any suitable form or material which will act to arrest the soot or other solid particles which may go over with the products of combustion. Where the chamber is filled with carbonate of lime the heat from the products of combustion causes large quantities of carbonic-acid gas to be evolved, and this gas, together with the products of combustion, pass up through the grate of the second fire H, of soft or bituminous coal, where they are caused to mingle with a suitable quantity of atmospheric air, which passes in through suitable ducts, a, which are made in the side of the furnace for that purpose. The products from the second fire are entirely smokeless and free from any soot or other substance which would be deposited in the return-flues in the usual manner. Where two bituminous fires are thus used a chemical reaction is obtained, and all of the smoke and the soot from both fires are so perfectly consumed that not only is there nothing seen in the shape of smoke passing from the second fire, but there is none of that deposit either in the shape of soot or any other substance which requires the return-flues of the boiler to be cleaned out from time to time.

I do not limit myself to the arrangement of the two fires here shown; but it will be found most preferable in many cases to arrange them side by side where boilers are used in batteries, and for the reason that both fires can be fed from the same point. Should the boilers

not be used in batteries, or for any other cause which may exist in the construction of the boiler or the brick-work around the boiler, the second fire may be placed at the rear end of the boiler, as is shown in my patent of January 3, 1882. Where the fire is arranged at the rear end of the boiler and both fires are made of bituminous coal they will act in the same manner as above described. So great is the effect which is produced by having the second fire made of bituminous coal that the first fire may be made of tar or any other hydrocarbon, and the whole of the products of combustion will be arrested, as above described, and a smokeless fire produced upon the second grate. The heat and gaseous products of the fire pass through the return-flues, and, where a single boiler is used, passes up through the stack from the front end of the boiler; but should the boilers be worked in batteries the second battery may or may not have its furnace divided into two chambers by means of a vertical wall, and the products of combustion from the first boiler will be passed down into the ash-pit of the fire that is made under the second boiler. If no division-wall is used in the furnace of the second boiler, the products will be merely discharged into the ash-pit and allowed to pass up through the fire; but should the division-wall be used, the products of combustion will discharge under the first fire. Where the boilers are connected together a damper or valve will be placed in the flue which connects them together, so that the products of combustion can be shut off at any time and either boiler be thrown

out of connection for repairs or any other purpose.

In applying my invention to a locomotive or portable engine of any kind the two fires may be arranged one directly over the other. However short the distance between the two, the same effect will be produced so far as the production of a smokeless fire is concerned.

Where my invention is to be applied to a locomotive the furnace may be divided by the partition-wall and the products of combustion pass through a section of the flues on one side of the boiler, and then the products will be carried around through a central flue or series of flues through the center of the boiler, and then they will be passed down into the ash-pit under the second fire, as above described.

The construction here shown is adapted to the form of boiler shown; but it is evident that my invention can be applied to boilers and furnaces of all kinds without departing from the spirit of my invention.

Having thus described my invention, I claim—

The combination of the furnace D, the passage Y', leading therefrom, the walls or partitions B c, downtake G, passage P, furnace H, and passage leading to the stack, all arranged substantially as shown.

In testimony whereof I affix my signature in presence of two witnesses.

JOSEPH FLANNERY.

Witnesses:

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Z. W. DAVIS.