W. N. BEST.

FURNACE.

APPLICATION FILED FEB. 17, 1915.

1,166,807.

Patented Jan. 4, 1916.

3 SHEETS—SHEET 1.

Fig. 1.

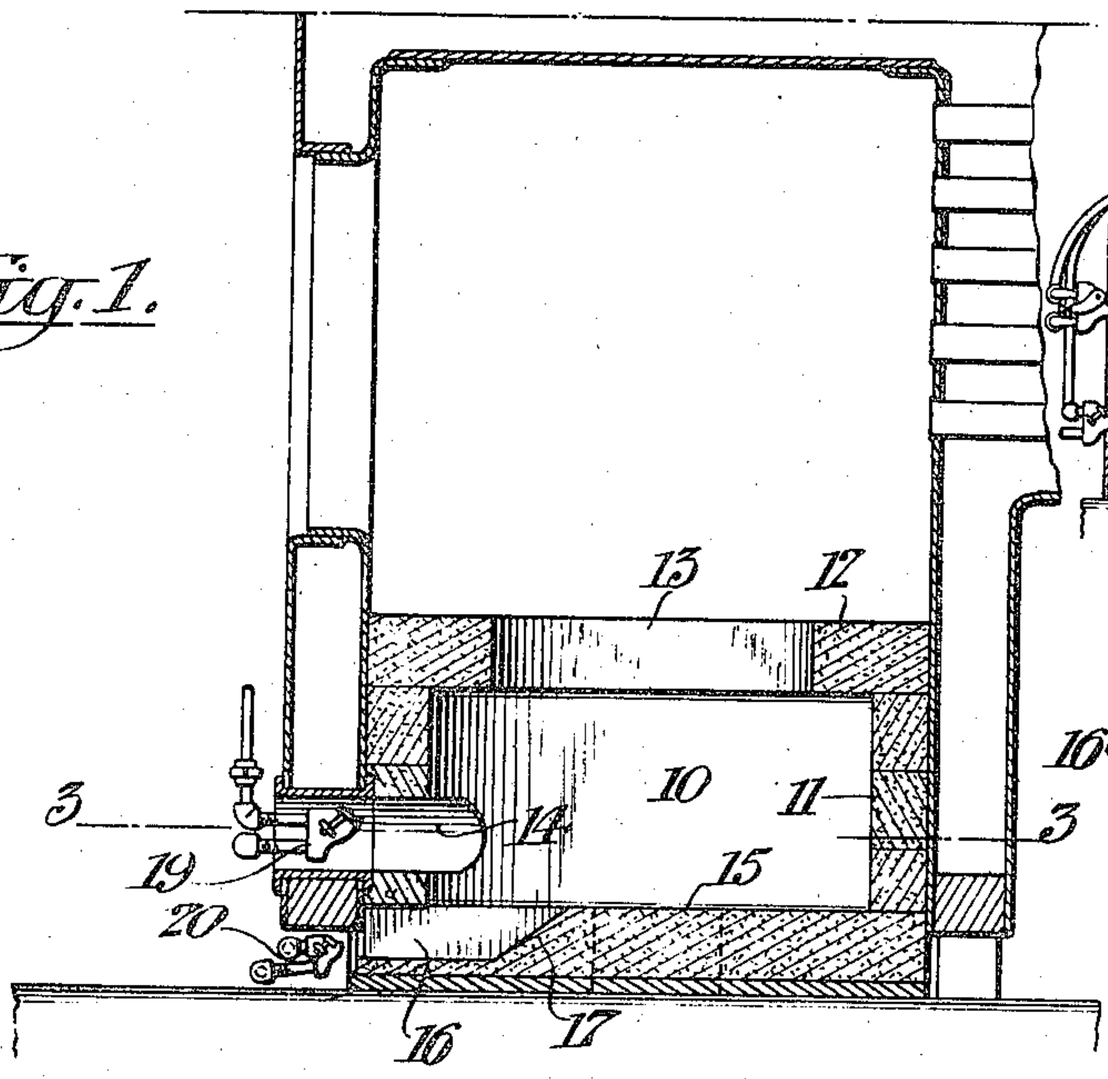


Fig. 4.

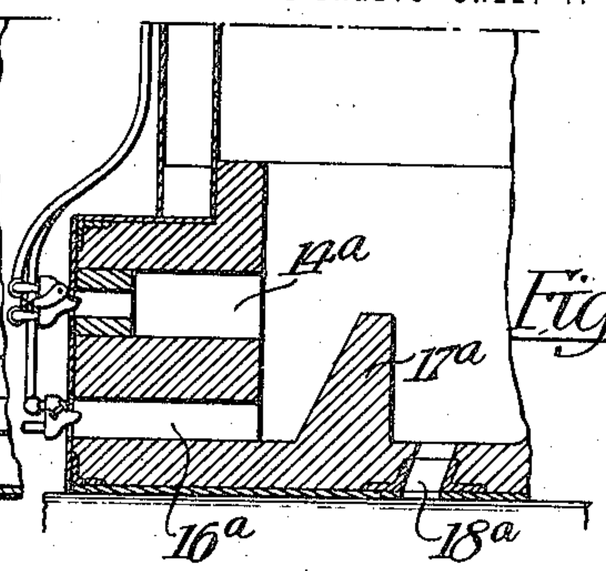


Fig. 5.

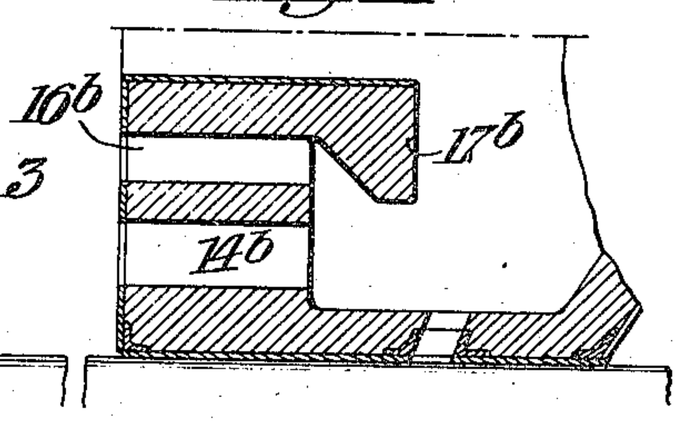


Fig. 2.

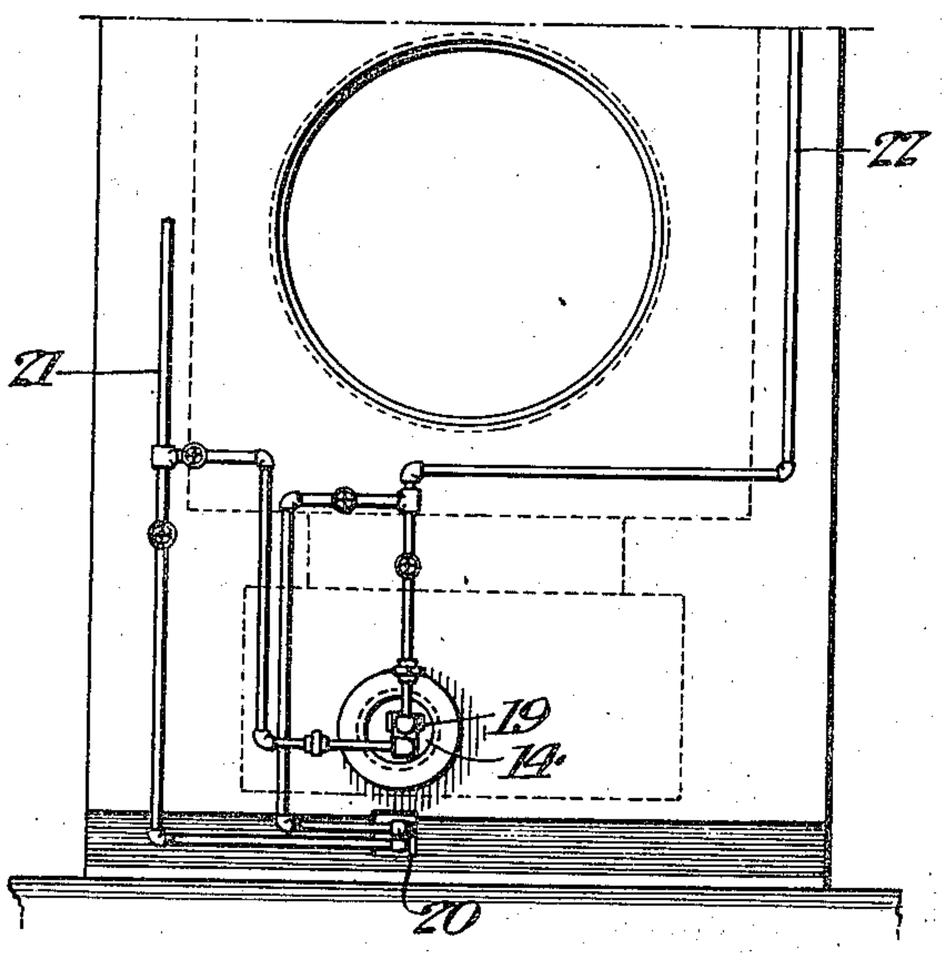
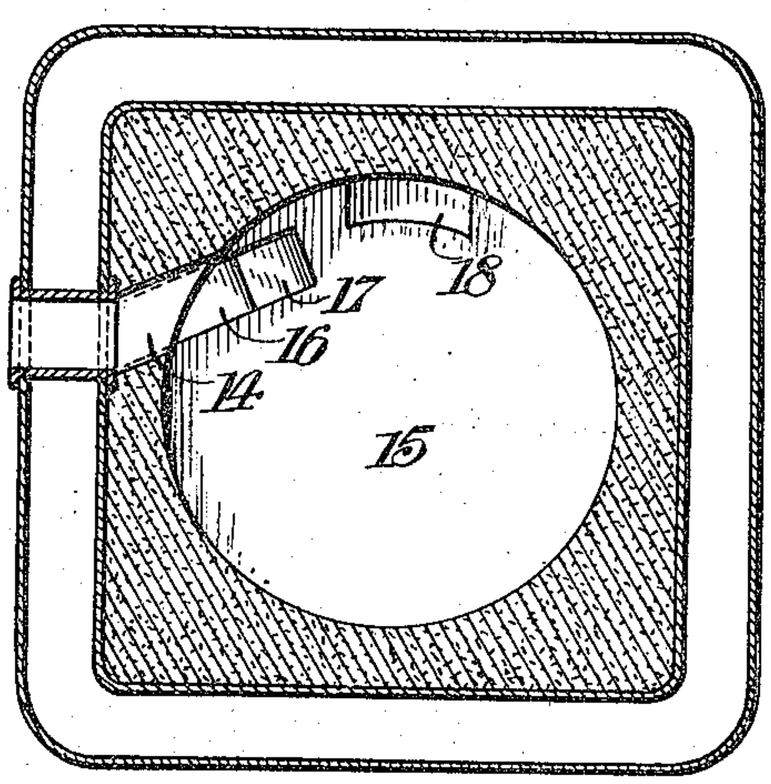


Fig. 3.



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3 SHEETS—SHEET 2.

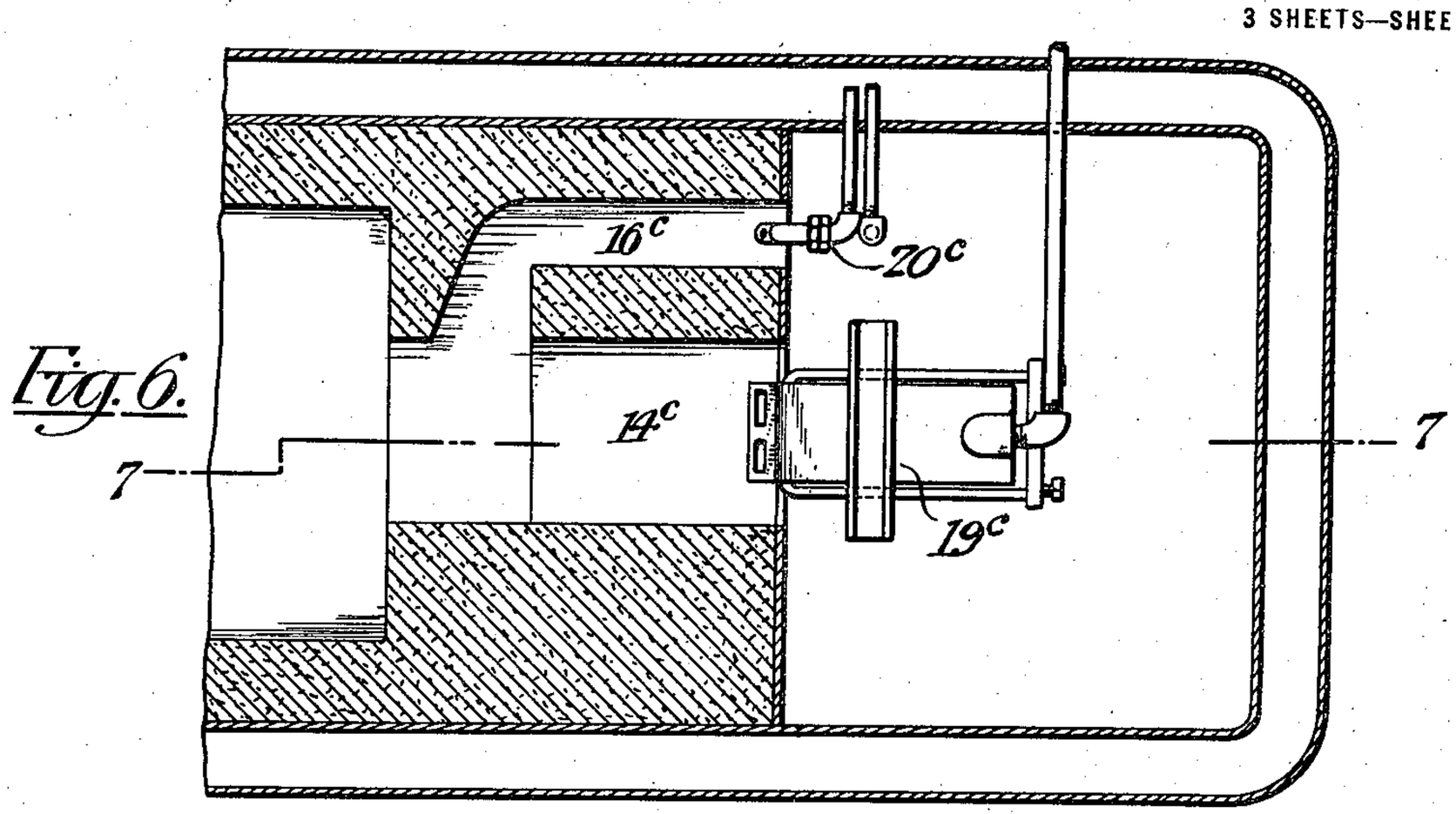


Fig. 6.

Fig. 7.

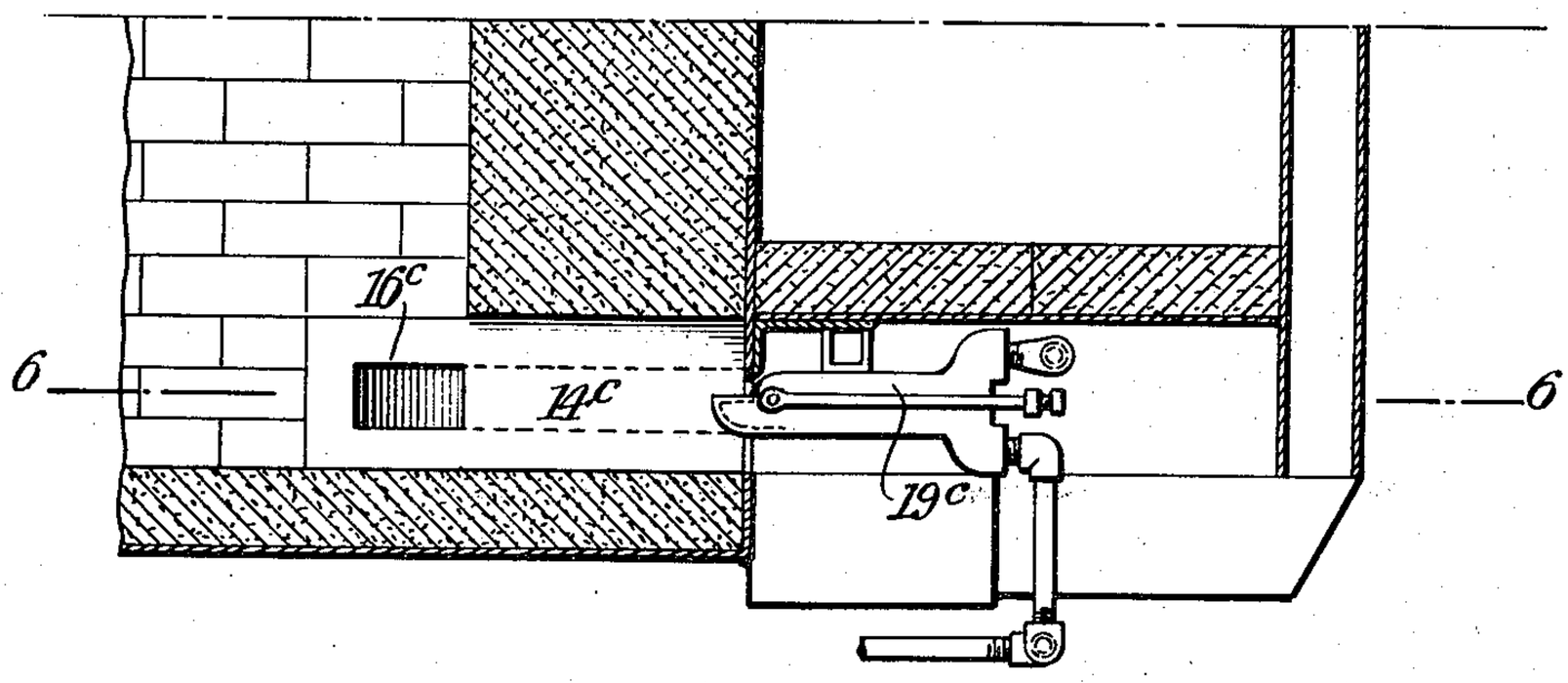
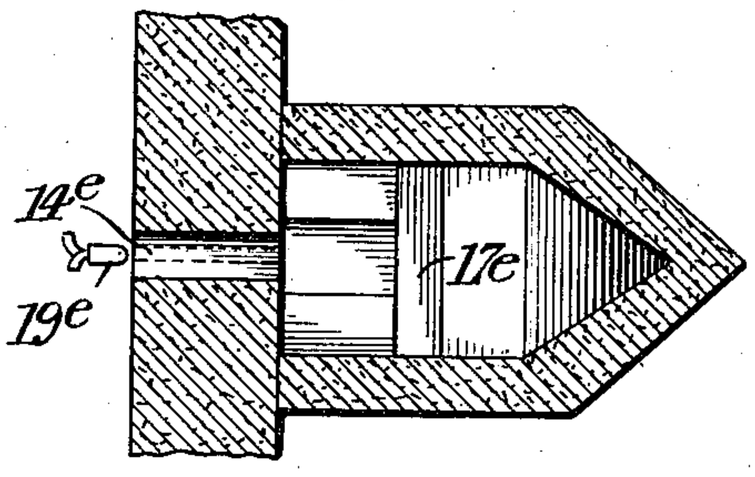


Fig. 11.



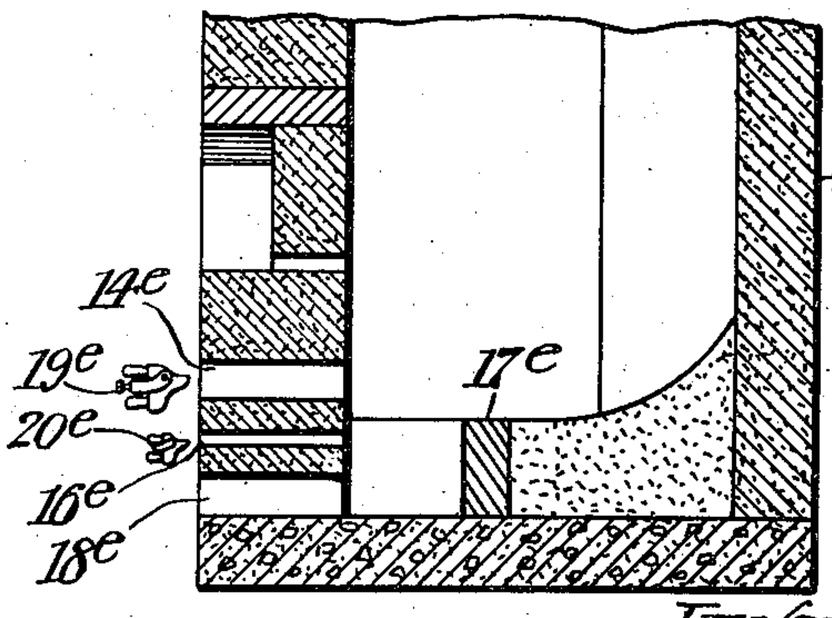


Fig. 12.

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FURNACE.

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1,166,807.

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3 SHEETS—SHEET 3.

Fig. 8.

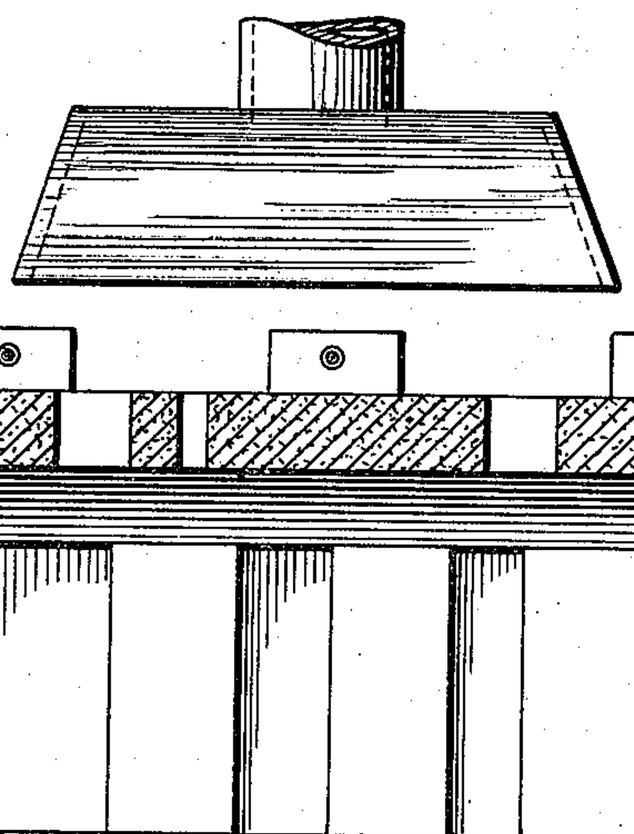


Fig. 9.

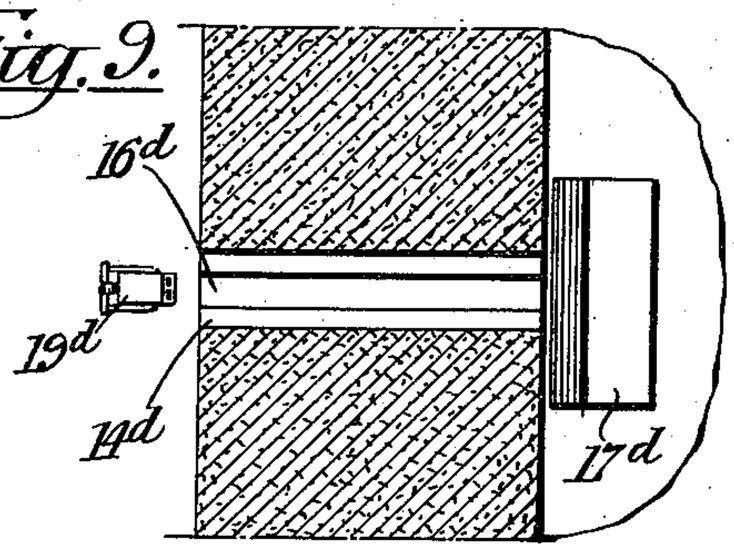
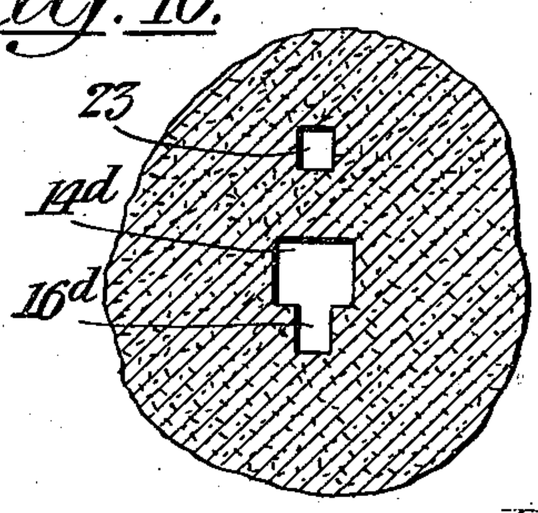


Fig. 10.



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UNITED STATES PATENT OFFICE.

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1,166,807. Specification of Letters Patent. Patented Jan. 4, 1916.

Application filed February 17, 1915. Serial No. 8,967.

To all whom it may concern:

Be it known that I, WILLIAM N. BEST, a citizen of the United States and a resident of the city of New York, borough of Brooklyn, county of Kings, and State of New York, have invented certain new and useful Improvements in Furnaces, of which the following is a specification.

This invention relates to certain improvements in furnaces and more particularly to the means for producing and maintaining the desired high temperature through the use of oil fuel.

My invention is applicable to furnaces of various different characters but is particularly useful in connection with furnaces for heating boilers.

The main object of my invention is to provide simple and efficient means whereby the boiler or other part, object, or device to be heated, may be held at the desired temperature during normal working conditions through the use of one heating means and may be held up to that temperature at other times through the use of auxiliary heating means which may also serve as a pilot light for the mean heating means.

My invention is particularly useful with that type of boilers or that class of service where the service is intermittent, such, for instance, as steam engines, pile drivers, cranes, switching engines, etc.

By means of my invention, the main heating means keeps the boiler up to working pressure when there is the maximum demand for steam and the auxiliary heating means comes into operation to maintain the boiler at substantially the same pressure during the period when no steam or very little steam is being used. Likewise the invention is useful for the heat treatment of metals in which case the main heating means is employed for bringing the charge of metal up to the desired temperature while the auxiliary means maintains it at that temperature to produce the desired heat treatment while the main heating means is shut off.

In the manufacture of fire-brick, terra cotta, etc., the auxiliary heating means may serve to drive off the moisture and bring the material to proper condition before the main heating means is brought into operation.

My invention may be put into practice in a large number of different ways, only a few of which are illustrated in the accompanying drawings, to which reference is to be had and in which similar reference characters indicate corresponding parts in the several views.

In these drawings, Figure 1 is a vertical section through a portion of a steam boiler furnace constructed in accordance with my invention; Fig. 2 is an end view of a portion of the boiler showing one arrangement of fluid supply conduits; Fig. 3 is a transverse section on the line 3—3 of Fig. 1; Figs. 4 and 5 are vertical sections through modified forms in which the frames are admitted directly rather than tangentially; Fig. 6 is a horizontal section through a further modified form; Fig. 7 is a vertical section taken on the line 7—7 of Fig. 6; Fig. 8 is a vertical section of a further modified form; Fig. 9 is a horizontal section on the line 9—9 of Fig. 8. Fig. 10 is a vertical section on the line 10—10 of Fig. 8, and Figs. 11 and 12 are horizontal and vertical sections respectively of a modified form.

In the specific form shown in Figs. 1, 2 and 3, I have shown my invention as applied to a furnace in which the flame is delivered tangentially to a combustion chamber or fire pot 10. This chamber has an annular wall 11 of refractory material terminating at its upper end in an inwardly directed peripheral flange 12 defining a central outlet opening 13 for the flame and gases of combustion. In the peripheral wall 11 at one point, I provide an inlet passage 14 extending substantially tangentially and at a short distance above the bottom 15. Directly below this tangential passage I provide a second tangential passage 16 extending in the same general direction and formed as a groove or channel in the bottom wall 15. The inner end of this second or lower passage 16 terminates in an inclined wall or surface 17 constituting a deflector as hereinafter particularly pointed out. Beyond the two passages and substantially in line therewith and adjacent to the side wall I provide an air inlet opening 18. At the outer ends of the two passages I provide burners 19 and 20 adapted to spray or atomize the fuel and deliver it lengthwise of said passages. Although various kinds of burners may be employed I preferably employ burners operating upon the same

general principle as the burner shown in my prior Patent No. 708,453, granted September 2, 1902. A burner of this character has a liquid fuel outlet and a steam or compressed air outlet delivering directly across the first mentioned outlet and serving to atomize or spray the liquid fuel and deliver it in a substantially flat sheet. I have shown an oil supply conduit 21 having valve controlled branches leading to the lower portions of the two burners and a steam or compressed air supply conduit having valve controlled branches delivering to the upper portions of the two burners.

The burner 19 is of larger size and greater capacity than the burner 20 and is sufficient to heat the furnace to the desired temperature and maintain it at that temperature during the maximum working period as, for instance, when steam is being used to the full extent of the steam generating capacity of the boiler. When the demand for steam suddenly terminates, as for instance, when a locomotive engine is to stand on a siding during a lunch hour, or when some repair is being made, or when for any other reason the power is not needed, the supply of oil and atomizing fluid is shut off from the main burner and is turned on to the auxiliary burner 20. This is of such size and capacity that it will generate sufficient heat to hold the boiler up to the desired pressure when there is no demand for steam or when the demand is comparatively slight. Of course the auxiliary burner takes far less fuel and less atomizing fluid than the main burner and thus great economy results. Far greater ecomony is secured in this way than is possible by partly shutting off or restricting the flow of fuel to the main burner.

A burner operates at the greatest efficiency under set conditions and by means of my invention I am able to secure the maximum efficiency both when the demand for heat units is greatest and when the demand for heat units is only that required to maintain the temperature after it has been raised to the desired point. It is of course evident that when the maximum heat is desired, both the main burner and the auxiliary burner may be employed and when slightly less steam is being used, the auxiliary burner may be shut off.

By arranging the auxiliary burner adjacent to the main burner and by directing the flame from the auxiliary across the path in front of the main burner, I am able to use the auxiliary burner as a pilot for the main burner. It will be noted in Fig. 1 that the flame delivered from the auxiliary burner will strike the inclined wall or baffle 17 and will be directed upwardly. When the main burner is turned on, this flame from the auxiliary burner will immediately ignite the fuel delivered by the main burner and at a point which will prevent the accumulation of any explosive mixture and avoid the necessity of special igniting means.

In Fig. 4, I have shown a slightly modified construction in which an upwardly extending transverse wall 17^a constitutes the baffle for directing the flame from the lower or auxiliary passage 16^a across the outlet from the main passage 14^a. The air inlet 18^a is here shown directly behind the baffle 17^a.

In Fig. 5 I have shown a further modified arrangement in which an auxiliary passage 16^b is disposed above rather than below the main passage 14^b. Thus the baffle or wall 17^b is placed above and extends downwardly.

The auxiliary passage may be mounted below the main passage as shown in Figs. 1 and 4, or above the main passage as shown in Fig. 5 and may also be arranged at one side of the main passage as shown in Figs. 6 and 7. Here, the main burner 19^c delivers through a main passage 14^c, while an auxiliary burner 20^c delivers through an auxiliary passage 16^c. The two burners are at the same elevation and the auxiliary passage extends first inwardly and then transversely across in front of the outlet of the main passage 14^c. A construction of this character is particularly desirable where the vertical space available for the insertion of the burners is limited.

It is not essential that the two passages be entirely separate and distinct as they may communicate or may in effect constitute parallel portions of the same passage. In Figs. 8, 9 and 10, I have shown a further modified form in which an auxiliary burner 20^d is mounted directly below the main burner 19^d and they both deliver through a passage including a main passage 14^d and a groove in the lower side thereof constituting the auxiliary passage 16^d. Here a peep hole 23 is shown as being positioned above the passages for the flame and a deflector 17^d is shown in front of the inner end of the auxiliary passage so as to deflect the flame therefrom across the path from the main passage and thus facilitate the igniting of the fuel from the main burner.

In Figs. 8, 9 and 10, I have shown my invention as applied to a furnace for heating metals, said furance being constructed in many respects substantially the same as that shown in my prior Patent No. 936,856 granted October 12, 1909. Of course the construction shown in said patent has only a single burner and does not embody the invention hereinafter claimed.

In details of construction, the furnace shown in Fig. 8 differs from that shown in said prior patent 936,856 in that the passages leading from the lower chamber to the upper chamber are of gradually decreasing width at increasing distances from the burner and

have higher inlets and outlets. A further detailed description of this furnace does not appear to be necessary.

In Figs. 11 and 12, I have shown my invention as applied to a bee-hive type of brick or terra cotta kiln instead of to a furnace for heating a boiler or for heating metals. I have shown the three passages 14e, 16e and 18e arranged one above the other, the first serving as the inlet passage from the main burner 19e, the second as the inlet passage from the auxiliary burner 20e and the third as the air inlet passage.

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

1. A furnace having a substantially round combustion chamber, a passage extending tangentially through the side wall thereof, a second passage constituting in part a groove within the bottom wall thereof, said groove at its inner end having an inclined wall for deflecting gases entering said second mentioned passage into the path from the first mentioned passage, and separate burners for delivering atomized liquid fuel through said passages.

2. A furnace having a substantially round combustion chamber, a passage extending tangentially through the side wall thereof, a second passage constituting in part a groove within the bottom wall thereof and disposed directly beneath said first mentioned passage and substantially parallel thereto, said groove at its inner end having an inclined wall for deflecting gases entering said second mentioned passage into the path from the first mentioned passage, and separate burners for delivering atomized liquid fuel through said passages.

3. A furnace having a combustion chamber, two passages leading in the same general direction through the wall thereof to said chamber, a main burner delivering atomized liquid fuel through one of said passages, an auxiliary burner for delivering atomized liquid fuel through the other of said passages, and a baffle presenting an inclined surface closely adjacent to said wall at the inner end of the last mentioned passage for deflecting the flame from the auxiliary burner into the path of the flame from the main burner closely adjacent to the inner surface of said wall at the inner end of said first mentioned passage.

4. A furnace having a main liquid atomizing burner and an auxiliary atomizing burner operating to deliver fuel through the wall thereof into the combustion chamber and a baffle presenting an inclined surface adjacent to the inner surface of said wall for deflecting the flame from the auxiliary burner into the path from the main burner closely adjacent to the inner surface of said wall at the inlet from said main burner.

Signed at New York city in the county of New York and State of New York this 13th day of February A. D. 1915.

WILLIAM N. BEST.

Witnesses:
C. W. Fairbank,
Florence Sevier.