J. ZANDER.

BURNER.

APPLICATION FILED NOV. 7, 1910.

1,011,100.

Patented Dec. 5, 1911.

2 SHEETS—SHEET 1.

Fig. 1.

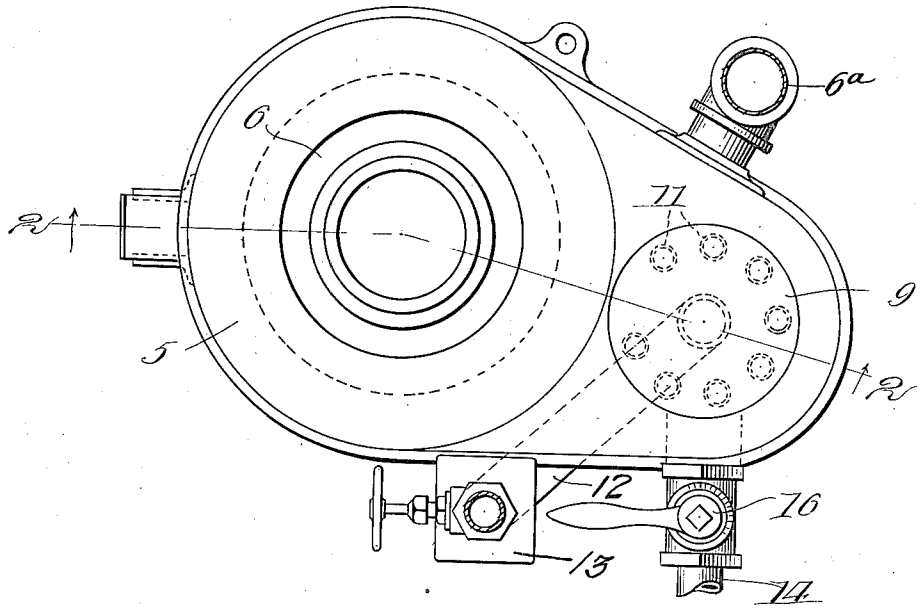
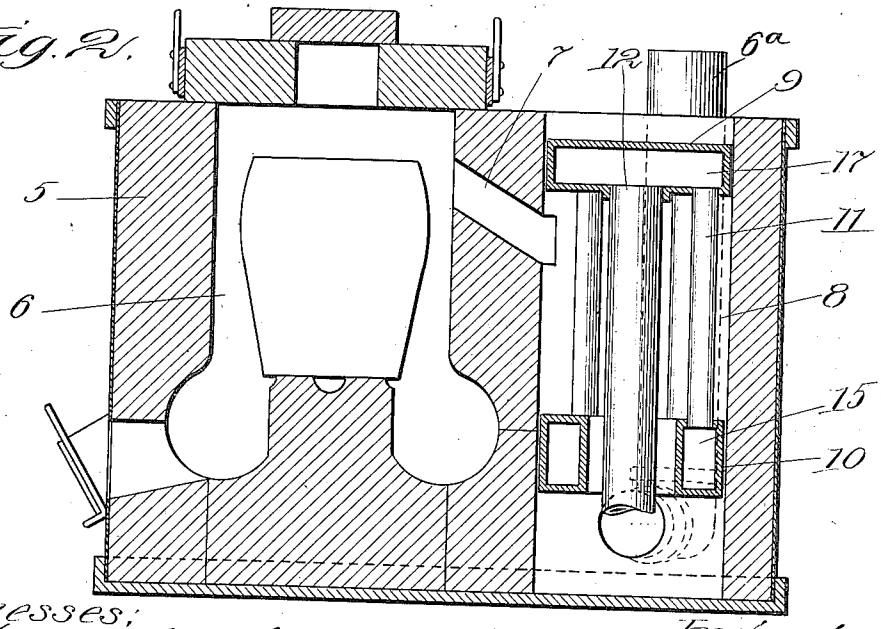


Fig. 2.



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2 SHEETS—SHEET 2.

Fig. 3.

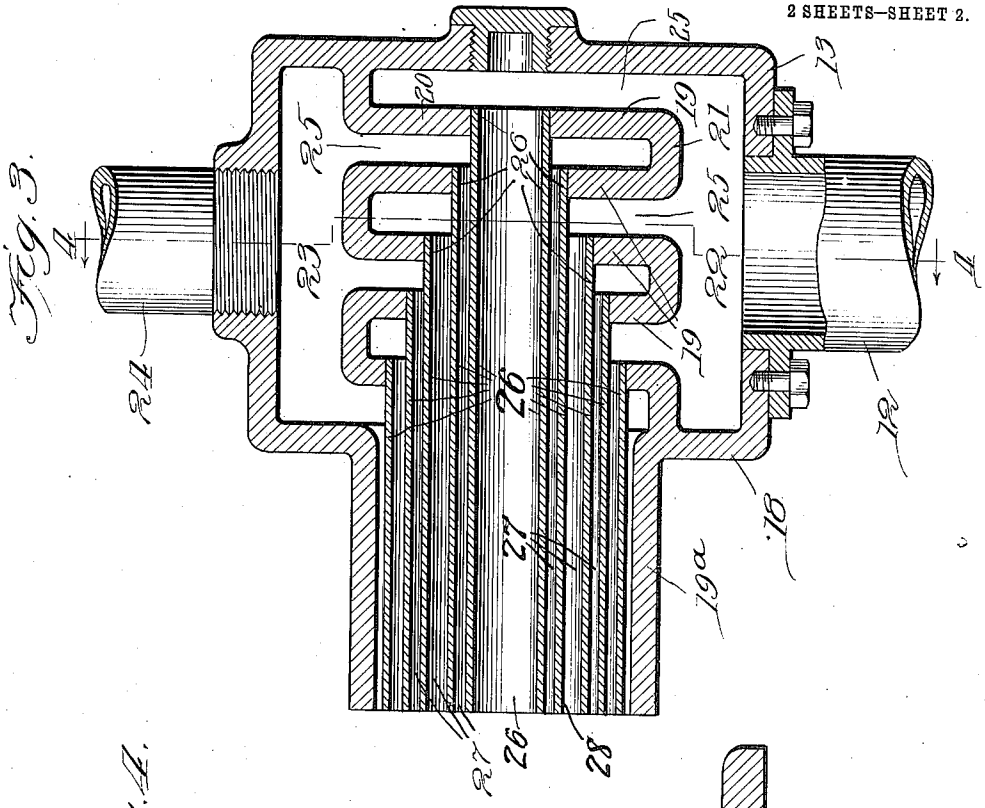
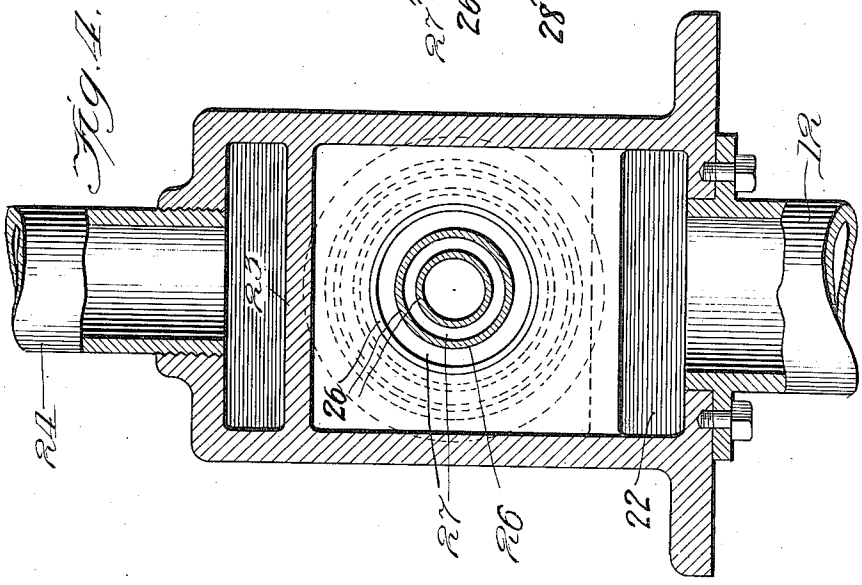


Fig. 4.



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UNITED STATES PATENT OFFICE.

JOHN ZANDER, OF CHICAGO, ILLINOIS.

BURNER.

1,011,100. Specification of Letters Patent. Patented Dec. 5, 1911.

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To all whom it may concern:

Be it known that I, JOHN ZANDER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Burners, of which the following is a specification.

This invention relates more particularly to a form of burner employed in a crucible melting furnace, or other similar device.

The object of the present invention is to provide a burner having independent chambers for the initial reception of the air and gas, and to provide independent passages for conducting the air and gas from these chambers to the point of combustion.

The invention further consists in the features of construction and combination of parts hereinafter described and claimed.

In the drawings, Figure 1 is a plan view of a crucible melting furnace, equipped with the devices of the present invention; Fig. 2 is a section on line 2—2 of Fig. 1; Fig. 3 is an enlarged sectional elevation of the burner of the present invention; and Fig. 4 is a section on line 4—4 of Fig. 3, looking in the direction of the arrow.

For the purpose of illustration, the devices of the present invention are shown in conjunction with a crucible melting furnace 5 which consists of a combustion chamber 6 leading from which is a passage 7 which enters a compartment 8 formed in the body of the furnace, and said furnace is further provided with an ordinary smoke stack 6^a, as best shown in Fig. 2; an upper casing 9 and a lower casing 10, each of which forms a portion of a receptacle into which the air enters prior to being conducted to the burner of the furnace. The casings 9 and 10 are connected by a series of pipes 11, said pipes extending circumferentially around a main conduction pipe 12, which leads to a casing 13, in which is located the burner for the furnace.

The operation of this superheating device is as follows: Air from the main supply pipe 14 is admitted to a chamber 15 of the casing 10, through a valve 16. The air passes upward through the pipes 11 and enters a chamber 17 of the upper casing 9, from whence it is conducted by the pipe 12 to the casing 13. The casing 13 comprises a rectangular portion 18, which is provided with a neck 19^a of proper length to communicate with the combustion chamber of the furnace. Located in the interior of the rectangular portion 18 is a partition member 19, which comprises a plurality of parallel walls 20 extending from side to side of the rectangular portion and extending the entire distance transversely of said portion, as more clearly shown in Figs. 3 and 4. These walls are joined together by a series of relatively short walls 21 extending at right angles to the walls 20 and joining the ends thereof; and these walls 21 are staggered with respect to one another, so that the walls 20 and 21 constitute, in effect, one continuous wall winding back and forth from side to side of the rectangular portion 18 of the casing 13 and constituting a partition member 19. Since the walls 20 and 21 extend the entire distance transversely of the rectangular portion 18, this divides said rectangular portion into two compartments, 22 and 23, said compartments forming, in effect, oppositely disposed independent chambers, the chamber 22 being in communication with the pipe 12, which conducts the air from the mechanism heretofore described for superheating the air. A pipe 24, leading from a suitable source of gas supply, is in communication with the chamber 23, hence the gas enters into a chamber independent of and out of communication with the chamber in which the heated air enters. The spacing of the walls 20 away from one another produces a plurality of passages 25, a portion of which, as more clearly shown in Fig. 3, are in communication with the chamber 23, and a portion of which are in communication with the chamber 22. The passages 25, which are in communication with the chamber 23, are cut off from communication with the chamber 22 by the connecting walls 21, and the same arrangement applies to the passages in communication with the chamber 22. Thus a plurality of independent passages are formed communicating with the chambers 22 and 23 and serving to conduct the mediums from said chambers in a manner to prevent any commingling of the mediums during such conduction.

In the construction shown, the passageways 25 extend the entire transverse distance of the chamber in the rectangular portion 18 of the casing 13 and form in effect what might be termed interstices in a division wall within the chamber of the rectangular portion 18. Each of the walls 20

has extending therethrough and mounted therein a pipe 26, and each of these pipes, as shown in Fig. 3, terminates at the edge of the wall in which it is mounted, after passing therethrough. The pipes, as shown in Fig. 3, are arranged concentrically and are spaced away from one another to provide passageways 27 therebetween. Thus a number of these pipes are in communication with the passages 25 leading from the chamber 23, and a number of these pipes are in communication with the passages 25 leading from the chamber 22; and by this construction a plurality of passageways are formed, extending at right angles to the passages 25, and constituting independent passages for conducting the air and gas from the passages 25 to the combustion chamber; and, by arranging the passages as described, said air and gas being prevented from commingling with one another during their travel through the passages 27.

As shown in Fig. 3, the innermost pipe 26 is in communication with the innermost passage 25, which is in communication with the chamber 22. Thus this innermost passage 25 coöperates with the innermost pipe 26 to produce a passageway from the chamber 22 for conducting the air therefrom to the combustion chamber. The pipe 28, which is the one adjacent to the innermost pipe 26, is spaced away from said pipe to form the passage 27 which is in communication with the second of the passages 25, which latter passage is in communication with the chamber 23. Thus this passage 25, together with the passage 27 between the innermost pipe and the pipe adjacent thereto, constitutes means for conducting the gas from the chamber 23 to the combustion chamber. Lying concentric to the pipes 26 and 28 are a series of pipes each similar to the pipes 26 and 28, and between said pipes are passageways similar to the passageway 27; and the pipes are so arranged that the passageways between them alternately communicate with the air and gas chambers, whereby the gas is heated by the air. And, as will be seen, these passages for the air and gas are entirely independent of one another, whereby no commingling of the air and gas ensues while being conducted to the combustion chamber. This is an important and, in fact, a salient feature of the present invention, since, by means of this independent conducting of the air and gas, a superheating of the gas is possible prior to its entrance into the combustion chamber. Hence, when the air and gas commingle and the combustion ensues, the temperature of combustion is raised materially from what it would be if no superheating of the air had taken place, and thus the efficiency of the heat produced by the combustion is materially increased. Were it not for the independent means of conduction of the air and gas, obviously this superheating could not be effected, since the minute the gas and superheated air commingled combustion would take place, and hence a superheating of the air prior to its entrance into the combustion chamber could not be had unless independent means for conducting the air and gas to the combustion chamber were provided.

The air and gas, when emerging from the ends of the passageways 27, will not commingle at a point directly at the end of the passageways; that is to say, the ends of the tubes 26 and the neck 19^a. But the commingling and consequent combustion will take place at a point removed from the termini of these members, this same principle of operation being manifest in an ordinary gas stove, where the blue flame extends for a distance beyond the openings in the burner before it is transformed into the yellow flame of combustion. This immerging of the gas a distance into the combustion chamber before commingling further increases the temperature of combustion by the passage of the mediums through the heated combustion chamber, and it also saves the ends of the pipes and the end of the neck from becoming melted by the heat of the consequent combustion. It will thus be seen that by the superheating of the air prior to its commingling with the gas, and by the projecting of the air and gas a distance into the combustion chamber before the commingling and combustion of the air and gas takes place, a distinct increase in the efficiency of the combustion is produced.

I claim:

1. In a device of the class described, the combination of a casing, a combustion chamber, a wall in the casing winding back and forth therein and dividing the interior of the casing into oppositely disposed chambers, one constituting an air chamber, the other a gas chamber, the winding formation of the wall providing separated passageways therein leading from said chambers, and means for conducting said air and gas from said passageways to the combustion chamber, whereby the air and gas are conducted separately to said combustion chamber, substantially as described.

2. In a device of the class described, the combination of a casing, a combustion chamber, a wall within said casing winding back and forth of the interior of the casing and forming oppositely disposed chambers therein, one constituting a gas chamber, the other an air chamber, the winding formation of said wall producing a plurality of passageways leading from said chambers, and members, one member communicating with each of said passageways, said members coöperating to separately conduct the air and gas from said passageways to the

combustion chamber, substantially as described.

3. In a device of the class described, the combination of a casing, a combustion chamber, a wall in said casing, winding back and forth of the interior of said casing, and forming oppositely disposed chambers therein, one constituting an air chamber, the other a gas chamber, the winding formation of said wall producing a plurality of passageways leading from said chambers, and members, one member communicating with each of said passageways, said members cooperating to separately conduct the air and gas from said passageways to the combustion chamber, said members being concentric to one another and spaced away from one another, substantially as described.

4. In a device of the class described, the combination of a casing, a combustion chamber, a division wall within said casing dividing the interior thereof into oppositely disposed chambers, one constituting a gas chamber, and the other an air chamber, said wall being composed of a series of sections extending from side to side of the casing and spaced away from one another, and a series of sections interposed between the first mentioned sections, whereby a series of separated passageways are formed leading from said chambers, and means for separately conducting the air and gas from said passageways to the combustion chamber, substantially as described.

5. In a device of the class described, the combination of a casing, a combustion chamber, a wall within said casing forming oppositely disposed chambers therein, one constituting an air chamber, the other a gas chamber, said wall being formed of a series of parallel sections spaced away from one another and extending from side to side of the interior of the casing, a series of sections interposed between the first mentioned sections and coöperating therewith to form a series of passages from said chambers, and a series of pipes, one pipe being mounted in each of the first mentioned sections of said wall, the pipes and passages coöperating to form a series of passages for separately conducting the air and gas from said air and gas chambers to the combustion chamber, substantially as described.

6. In a device of the class described, the combination of a casing, a combustion chamber, a wall within said casing forming oppositely disposed chambers therein, one constituting a gas chamber, the other an air chamber, said wall being formed of a series of parallel sections spaced away from one another and extending from side to side of the interior of the casing, a series of sections interposed between the first mentioned sections, a plurality of concentric pipes spaced away from one another, one pipe being mounted within each of the first mentioned sections of said wall, and each pipe extending through and terminating at the section of the wall in which it is mounted, the spaces between the first mentioned sections and the spaces between the pipes cooperating to produce means for separately conducting the air and gas to the combustion chamber, substantially as described.

JOHN ZANDER.

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