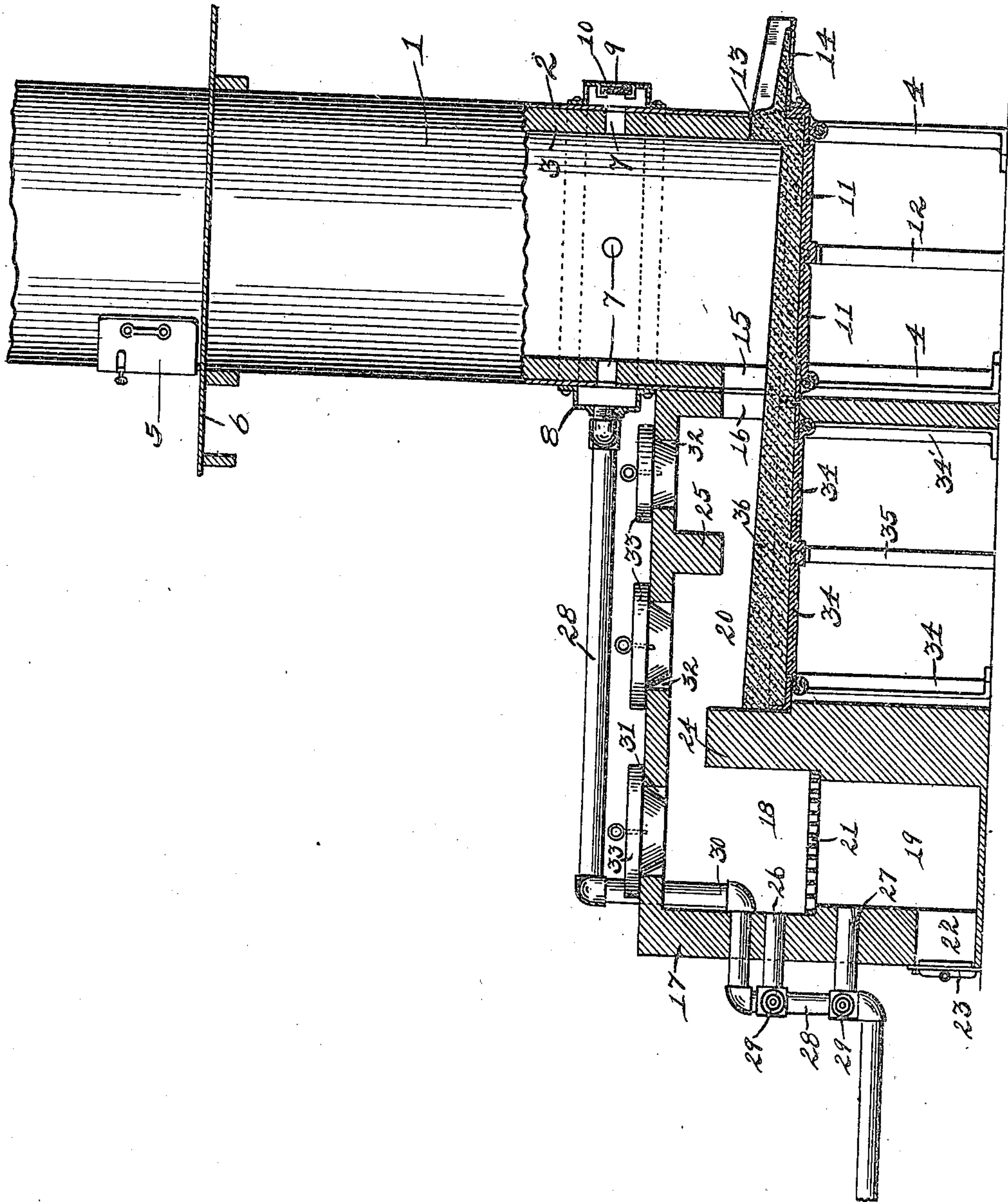


963,024.

T. HOLLAND.
COMBINATION FURNACE.
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UNITED STATES PATENT OFFICE.

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COMBINATION-FURNACE.

963,024.

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To all whom it may concern:

Be it known that I, TIMOTHY HOLLAND, a citizen of the United States, residing at Chicago, county of Cook, and State of Illinois, have invented a certain new and useful Improved Combination-Furnace, of which the following is a specification.

My invention relates to improvements in melting furnaces and more specifically to a combined cupola and reverberatory furnace.

In reverberatory furnaces of the design now generally in use, a great percentage of the heated gases passed therethrough in the course of operation thereof escape unutilized and are wasted. Further, in furnaces of this character, when the same are used for melting finely divided particles of metal such as filings or turnings, a considerable proportion of the metal granules to be melted is carried by the intense draft created through the furnace and up through the furnace flues and thus wasted.

It is the object of the present invention to provide a furnace combining a reverberatory furnace and a cupola in such a manner that the before mentioned heated gases of the reverberatory furnace upon leaving the latter before being exhausted, will be directed up through the cupola and there utilized to augment the heat generated in the latter and also the drafts created therethrough.

Further, it is the object of the combination in directing the gases from the reverberatory furnace through the cupola to effect the straining of said gases in the latter and to thereby intercept or retain and consequently utilize the metal particles carried thereby and thus prevent their being wasted.

Another object is the provision of a combination furnace of the character mentioned wherein the metal melted in the separate comprising furnaces thereof will be united or intermingled into a single pouring, the union, as found by practice, resulting in a metal of a higher grade than each would be if drawn therefrom separately.

A still further object is to provide a combination furnace wherein the twyers of the reverberatory furnace and the cupola embodied therein will be fed by a common air supply pipe, and further to so arrange said supply pipe that a portion thereof will communicate with the interior of the fire-box of the reverberatory furnace, whereby the heating of the air passed therethrough prior to

its injection into the cupola, and consequently a heated blast for the latter, will be effected.

Other objects will appear hereinafter.

With these objects in view my invention consists in a combination furnace characterized as above mentioned and in certain details of construction and arrangement of parts all as will be hereinafter fully described and particularly pointed out in the appended claims.

My invention will be more readily understood by reference to the accompanying drawing forming a part of this specification, and wherein is illustrated a partially sectional side elevation of a combination furnace embodying the preferred form of my device.

Referring now to the drawing 1 indicates a cupola of the ordinary tubular design, comprising an outer metallic shell 2 provided with a refractory lining 3 and supported upon suitable legs 4.

5 is the charging door and 6 the platform whereby access is made possible to said door.

7 indicates the usual twyers radially arranged in the lateral wall of the cupola and 8 the annular wind chest arranged upon said wall and which communicates with the outer extremities of said twyers. 9 indicates one of the usual sighting holes provided at intervals in said wind chest, the same being covered by a suitable refractory transparent plate 10. The bottom of the cupola is formed as usual of the swinging doors held in closing position, when the cupola is in use, by a removable bar 12.

13 is the outlet or discharge opening provided with the usual spout 14. Provided in the rearward side of the lateral wall of the cupola, or opposite the outlet opening at the base of said wall, is an opening 15. Arranged at the rearward side of the cupola, an opening 16 in the rearward end wall thereof communicating with the opening 15 of the cupola, is a reverberatory furnace 17. The latter is comprised of the fire-box 18, the ash pit 19, and the melting chamber 20.

21 is the fire grate and 22 the admission opening to the ash pit over which is arranged a suitable door 23.

24 is the usual bridge over which the heated gases are required to pass before entering the melting chamber 20. Depending from the top wall of the chamber 20 inter-

mediate, preferably substantially midway, the extremities thereof, is a transversely extending baffle 25. With this provision the heated air current, induced by means to be presently described, and which is directed into the chamber 20 from the fire-box will be diverted downwardly into direct contact with the metal arranged upon the bottom of said chamber, whence it will pass under said baffle through the remainder of said chamber and into the lower end of the cupola.

Having their inner ends communicating with the ash pit and the fire-box of the reverberatory furnace or preferably immediately above and below the fire grate of said furnace, are twyers 26 and 27 respectively. The outer ends of said twyers are connected to a compressed air supply pipe 28 which also communicates, as shown, with the wind chest 8. By means of suitable valves 29 provided at the juncture of the supply pipe 28 with said twyers 26 and 27, the flow of air to the latter and hence the velocity of the draft to the furnace, and also the flow of air to the wind chest 8 and hence the draft created in the interior of the cupola may be regulated as desired. By the positioning, as stated, of the twyers 27 below the grate 21, the cold air blast injected into the fire-box through the former, in addition to its service as a creator of a draft through the furnace, will also serve as a means of cooling said grate, the latter, when the device is in operation, being subjected to an intense heat. The pipe 28 intermediate its connection with the valves 29 and said wind chest is provided with an offset 30 which communicates with the interior of the fire-box 18. With this arrangement, the blast directed to the cupola will be in a highly heated condition and whereby its efficiency will evidently be increased.

The top wall of said furnace is provided directly above the fire-box with a fuel supply opening 31 and also with charging openings 32 communicating with the chamber 20, each of said openings 31 and 32 being provided with a suitable removable closure 33. The bottom of the melting chamber is of a form identical with that of the cupola bottom, before described, it being comprised of hinged doors 34 adapted to be held in closed position, when the furnace is in operation, by a bar 35. Additional legs 34' are preferably provided for the support of said doors. Said reverberatory furnace bottom is in substantially horizontal alinement with the cupola bottom, said bottoms constituting, when the comprising doors thereof are closed, one continuous surface. However, when in use, the clay or other refractory covering 36 for said bottoms will be so arranged that the upper surface thereof will slope gradually from the reverberatory furnace to the cupola, as clearly shown. With this

provision, it is clear, when in use, that the metal charge in the reverberatory furnace, when melted, will flow down the inclined bottom upon which it is arranged to the cupola bottom. Here, it is evident, it will be intermingled with the molten charge of the cupola, the united charges being removable through the discharge opening 13.

With a combination furnace of a construction as shown and described, all waste of minute particles of metal deposited in the reverberatory furnace through the agencies before described, will be eliminated. Further, with this construction, the heated gases from said reverberatory furnace will be utilized before exhaustion, by being directed into the cupola, to augment the heat and draft in, and hence increase the efficiency of, the latter. With the drop-door construction provided in both the reverberatory furnace and cupola, ready access to the interior of either is facilitated. By the provision of the common air supply for the twyers of both the cupola and the reverberatory furnace, and of the valves governing the admissions thereto, a uniform and equal pressure may be maintained in said cupola and furnace, and whereby back pressure into the latter from the cupola may be prevented. By heating the air supply before reaching the cupola the same will serve to augment the heat generated in the latter.

While I have shown what I deem to be the preferable form of my device I do not wish to be limited thereto as there might be various changes made in the details of construction and the arrangement of parts described without departing from the spirit of my invention comprehended within the scope of the appended claims.

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

1. The combination of a cupola and a reverberatory furnace, a direct connection between the rearward end of the melting chamber of said furnace and the lower end of the interior of said cupola, said furnace and said cupola being each provided with twyers, and a common air supply pipe for said twyers, a portion thereof passing through the fire-box of said reverberatory furnace, substantially as described.

2. The combination of a cupola and a reverberatory furnace, a direct communication between the melting chamber of said furnace and the lower end of the interior of said cupola, twyers in said furnace and said cupola, a common air supply pipe for said twyers, a portion of said pipe passing through the interior of said reverberatory furnace, and valves governing the passage from said supply pipe to said twyers, substantially as described.

3. The combination of a cupola and a re-

verberatory furnace, a direct communication between the rearward end of the melting chamber of said furnace and the rear end of the interior of said cupola, the bottoms of said furnace and said cupola being in substantially horizontal alinement, each being of the drop-door type, twyers for said furnace and said cupola, and a common valved supply pipe for said twyers, substantially as described.

4. The combination of a cupola and a reverberatory furnace, a direct communication between the rearward end of the melting chamber of said furnace and the lower end of the interior of said cupola, the bottoms of said furnace and said cupola being in substantially horizontal alinement, each of said bottoms being of the drop-door type, a transversely extending baffle provided in the melting chamber of said furnace depending from the top wall thereof, said top wall being provided with charging openings and a fuel supply opening, removable closures for said openings, twyers in said furnace and cupola, and a common air supply for said twyers, substantially as described.

5. The combination of a cupola and a reverberatory furnace, a direct communication between the rearward end of the melting chamber of said furnace and the melting chamber of said cupola, the bottoms of said furnace and said cupola being in horizontal alinement and in open communication with each other, each of said bottoms being of the drop-door type, a baffle provided in the melting chamber of said furnace depending from the top wall thereof intermediate its

extremities, said top wall being provided with charging openings and a fuel supply opening, twyers in said furnace and said cupola, and a common air supply pipe for the twyers of said furnace and said cupola, said pipe communicating with the interior of said reverberatory furnace immediately before its connection with the twyers of said cupola, substantially as described.

6. The combination of a cupola and a reverberatory furnace, a direct communication between the rearward end of the melting chamber of said furnace and the lower extremity of the interior of said cupola, the bottoms of said furnace and said cupola being in horizontal alinement and in open communication with each other, a baffle provided in the melting chamber of said furnace depending from the top wall thereof intermediate its extremities, charging openings and a fuel supply opening for said furnace, twyers in said furnace and said cupola, the twyers of said furnace being positioned one above and one below the grate thereof, and a common air supply pipe for the twyers of said furnace and said cupola, said pipe passing through the interior of said reverberatory furnace prior to its connection with the twyers of said cupola, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

TIMOTHY HOLLAND.

Witnesses:

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