April 14, 1936. C. G. O'HARA 2,037,665

BOILER

Filed July 21, 1934 3 Sheets-Sheet 1

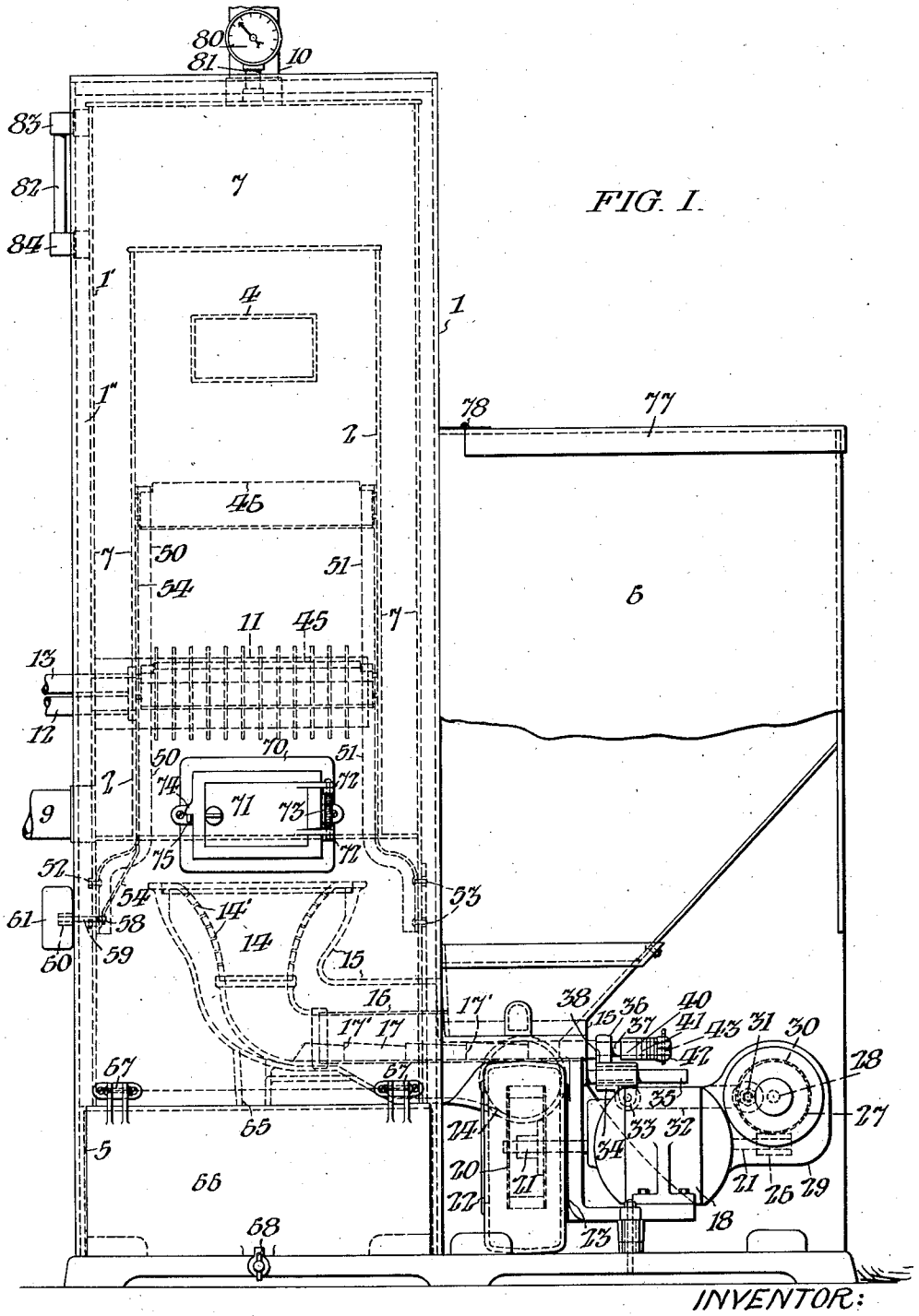


FIG. 1.

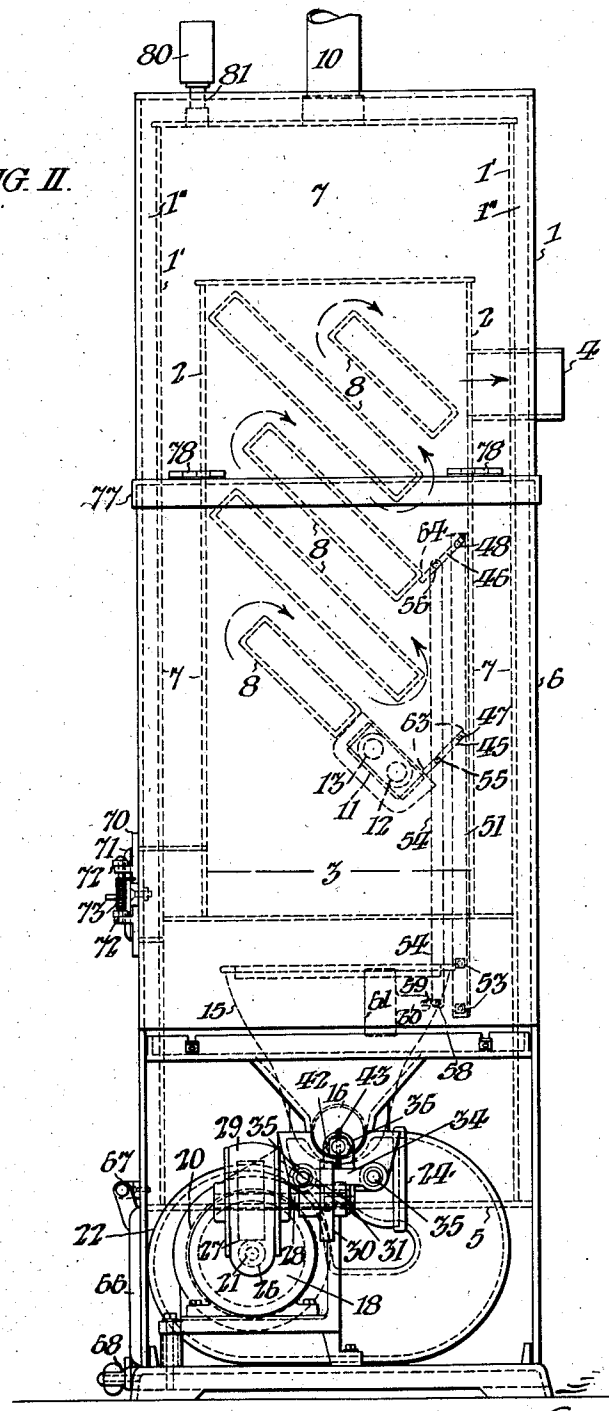
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April 14, 1936. C. G. O'HARA 2,037,665

BOILER

Filed July 21, 1934 3 Sheets-Sheet 2

FIG. II.



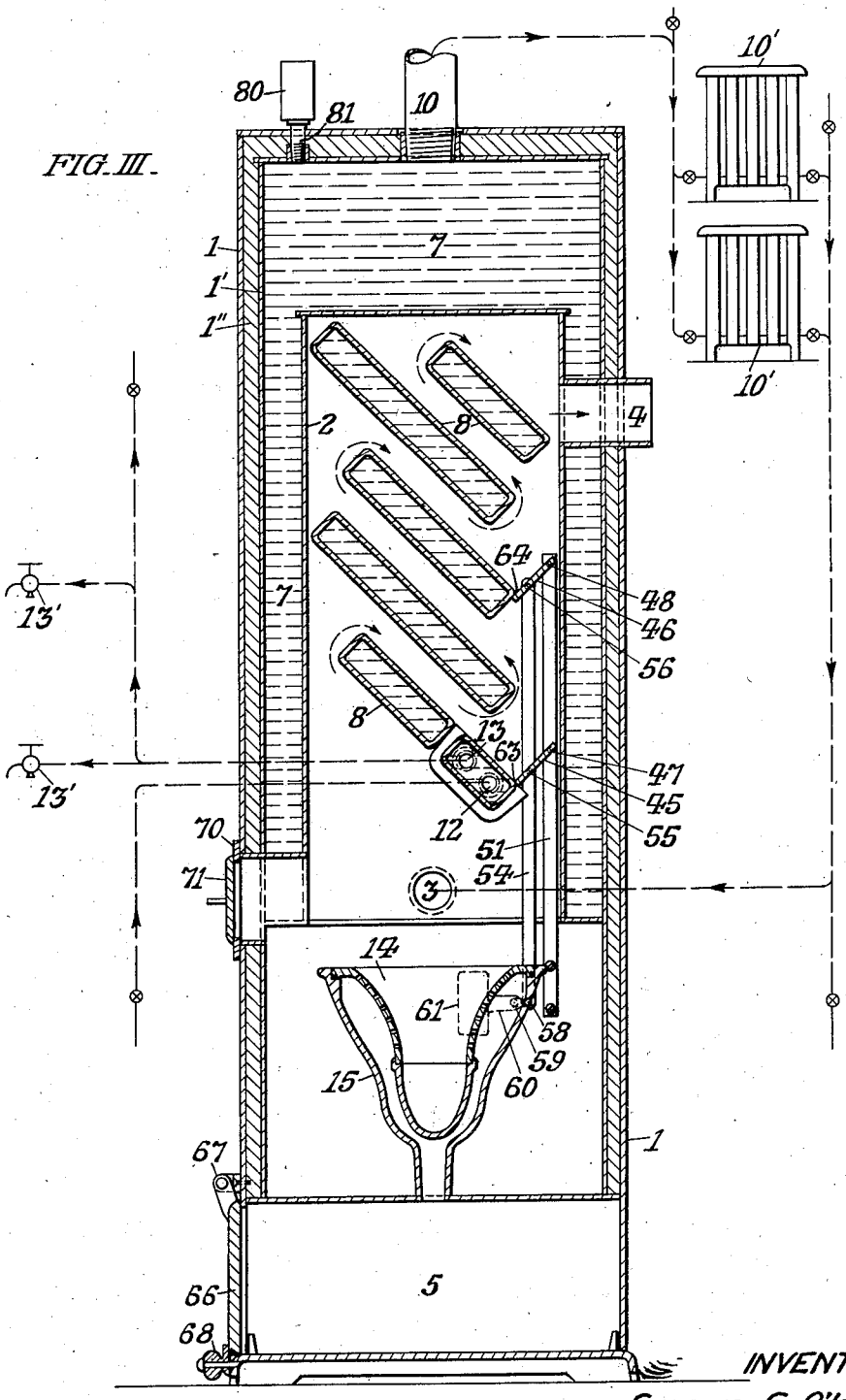
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April 14, 1936. C. G. O'HARA 2,037,665

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Filed July 21, 1934 3 Sheets-Sheet 3

FIG. III.



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Patented Apr. 14, 1936 2,037,665

UNITED STATES PATENT OFFICE

2,037,665

BOILER

Charles G. O'Hara, Norristown, Pa., assignor to Norristown Foundry Company, Inc., Norristown, Pa., a corporation of Pennsylvania

Application July 21, 1934, Serial No. 736,301

10 Claims. (Cl. 122—165)

It is the object and effect of my invention to provide an outer integral casing, comprising a combustion chamber, an ash pit at the bottom of said combustion chamber, and a coal bin laterally adjoining said combustion chamber; with two water containers in said combustion chamber having respective water inlets and outlets extending to the exterior of said casing; one container being included in a substantially closed circuit for supplying hot water or steam to radiators, and the other container being included in the water supply system to furnish hot water through taps; a single burner bowl being mounted in said combustion chamber below said water containers and in heating relation with both of them; a stoker casing cooperatively connecting said coal bin with said burner bowl; stoker mechanism in said stoker casing including a coal conveyer in cooperative relation with said burner bowl; an electric motor in said furnace casing exterior to said stoker casing and below said bin; an air blower in said furnace casing below said bin having an air inlet from the atmosphere and an air outlet to said stoker casing, and including a rotor directly connected with the armature of said motor; and adjustable means operatively connecting said motor with said coal conveyer for varying the rate of operation of said coal conveyer with reference to the rate of operation of said motor; whereby combustion of fuel from said burner bowl is facilitated by a forced draft, but the temperature of the water in said containers may be controlled and regulated by adjustment of said means connecting said motor with said coal conveyer.

My invention includes the various novel features of construction and arrangement hereinafter more definitely specified, and particularly the inclusion in the water containers of several substantially rectangular partitions arranged to baffle the products of combustion in their passage through said combustion chamber to a flue outlet; said partitions being inclined so that ash dust will gravitate therefrom; baffle plates which are pivotally supported in said casing and provided with connecting means normally holding them in cooperative relation with certain of said partitions to direct the draft with respect to the latter and catch ash dust; said baffle plates being movable, together, by said connecting means, to open the air passages which they normally obstruct and dump the ash dust therefrom.

In said drawings Fig. I is a front elevation of a unitary structure conveniently embodying my invention.

Fig. II is an elevation of the right hand end of said structure, as shown in Fig. I.

Fig. III is a vertical sectional view of said structure taken centrally with respect to the burner and combustion chamber in Fig. I and looking to the left in that figure.

In said figures: the entire combination is held in the outer casing 1. Said casing 1 has the metal lining 1' with heat insulating material 1'' between them. The inner shell 2 forms the combustion chamber 3 having the flue outlet 4 at the top thereof and the ash pit 5 at the bottom thereof. Said casing 1 holds the coal bin 6 laterally adjoining said combustion chamber. The rectangular main water space 7 is cross connected by the series of substantially rectangular hollow partitions 8 in said combustion chamber arranged in parallel planes so inclined as to baffle the products of combustion on their way to said flue 4, and with their opposite ends welded to said shell 2 in registry with openings in the latter. Said water space 7 has the water inlet 9 and the water outlet 10 extending to the exterior of said casing for supplying with hot water or steam heat exchanging devices such as radiators 10 remote from said furnace.

The smaller water container 11 in said combustion chamber has the water inlet 12 and the water outlet 13 extending to the exterior of the casing and for inclusion in the water supply system to furnish hot water through taps 13'. Said container 11 is preferably mounted below the container 7 so as to be subjected to a greater degree of heat from the burner bowl 14 which is the heating means common to both containers and in which coal of extremely small sizes may be burnt by a forced draft of air through perforations 14' in the sides of said bowl, supplied as hereinafter described.

The stoker casing 15 and the coal conveyer tube 16 cooperatively connect said coal bin 6 with said burner bowl 14. Stoker mechanism in said stoker casing includes the reciprocatory coal conveyer bar 17 having a longitudinal series of wedge-shaped abutments 17' for engaging the coal from said bin 6 and feeding it toward said burner bowl 14. The electric motor 18 in said furnace casing 2 exterior to said stoker casing 15 and below said bin 6 is arranged to operate both said coal conveyer 17 and the air blower 20. The latter includes a rotor directly connected with the armature shaft 21 of said motor 18 mounted within the casing 22 and having an inlet 23 from the atmosphere and an outlet 24 to said stoker casing 15. Said motor thus creates a forced draft from

the lower portion of said casing 2 to said flue 4 through said burner bowl 14.

The opposite end of said armature shaft 21 carries the worm 26 engaging the worm gear 27 on the countershaft 28 which is journaled in the casing 29 inclosing said worm and gear. Said countershaft 28 has, at the right hand end thereof shown in Fig. II, the crank disk 30 carrying the crank 31. Said crank 31 is pivotally connected with the outer end of the rod 32, the opposite end of which is pivotally connected, at 33, with the yoke 34 which is mounted to reciprocate upon the two cylindrical studs 35 which extend in parallel relation from the right hand end of said stoker casing 15, as shown in Fig. I. Said yoke 34 has the bearing 36 in sliding engagement with the reduced and cylindrical outer end 37 of said reciprocatory coal conveyer 17 so that when said yoke is thrust to the left in Fig. I said bearing 36 comes in contact with the shoulder 38 on said conveyer bar 17 so as to thrust the latter to the left in the stoker casing 15 and feed the coal from the coal bin 6 through said coal conveyer tube 16 to the burner bowl 14.

I provide adjustably variable means operatively connecting said motor 18 with said coal conveyer bar 17 for varying the rate of feed of coal with reference to the rate of operation of said motor so that the temperature of the water in said containers may be controlled and regulated by adjustment of said means. Such means conveniently include the abutment sleeve 40 and washers 41 which are mounted upon said reduced cylindrical end 37 of the coal conveyer bar 17, as shown in Fig. I, and retained thereon by the nut 42 which is screw threaded upon the end of said bar 17 and secured by the cotter pin 43. Of course, the axial position of said sleeve 40 on said conveyer bar is variably determinable by the number and axial thickness of the washers 41 interposed between the right hand face of said yoke bearing 38 and the left hand face of said sleeve 40 so that although the reciprocatory motion of said yoke and its bearing 38 remains constant, the effective stroke which it imparts to said conveyer bar 17 is variable to vary the amount of coal conveyed from the coal bin 6 to said burner bowl 14 in a given time.

As above noted, said hollow partitions 8 which connect the opposite sides of the main water space 7, through the combustion chamber 3, and the smaller water container 11 in said combustion chamber 3, are inclined, as indicated in Fig. II, so that ash dust will gravitate therefrom. However, in order to direct the draft with respect to said partitions so that it will follow the direction indicated by the arrows in Fig. II and thus afford maximum opportunity for the exchange of heat from the products of combustion of the fuel in said burner bowl 14 to the water in said containers, I find it necessary to provide the baffle plates 45 and 46 which are respectively hinged at 47 and 48 in the wrought metal angle brackets 50 and 51 which are rigidly but detachably secured to said lining 1', by the bolts 52 and 53 indicated in Fig. I. Said baffle plates 45 and 46 are connected by the rod 54 which is pivotally connected thereto respectively at 55 and 56, as indicated in Fig. II. The lower end of said rod 54 is pivotally connected at 58 to the crank shaft 59 which extends through said outer casing members 1 and 1', in which it is journaled, and carries at its outer end the lever 60 having the weighted end 61 so proportioned that it normally upholds said baffle plates 45 and 46, in the position shown in Fig. II respectively against the water container 11 and one of the partitions 8.

It is to be understood that the construction and arrangement last above described are such that at the will of the operator said weighted lever 60 may be uptilted to swing down the baffle plates 45 and 46 together to open the air passageways 63 and 64 which they normally obstruct, and dump the ash dust therefrom into the ash pit 5 at the bottom of the furnace casing. Referring to Fig. I, it may be observed that the stoker casing 15 is also provided with the ash dust outlet 65 beneath the burner bowl 14 through which ashes may gravitate into said pit 5 and, of course, the ashes formed by the combustion of the fuel which find their way above the bowl 14 gravitate over the edge of the top flange of said bowl into said pit. Therefore, I find it convenient to provide said ash pit 5 with the door 66 which is hinged at 67 to said outer casing member 1 and provided with the latch 68 by which it may be normally held shut. However, said door 66 may be unlatched and raised and the ashes manually removed from said pit 5 at the convenience of the operator.

Said combustion chamber 3 has the rectangular doorway 70 at the bottom thereof provided with the door 71 which is hinged at 72 and provided with the spring 73 by which it is normally held shut with the latch 74 engaging the keeper 75. The coal bin 6 is also conveniently provided with the cover 77 which is hinged at 78 so that it may be upturned in connection with said casing 1 to charge said bin with fuel. However, it is normally closed as shown in the drawings. I find it convenient to provide said main water container 7 with the pressure gage 80 connected therewith by the pipe 81 and also to provide said container with the water gage 82 connected therewith by the pipes 83 and 84.

Although I have found it convenient to dispose said main water container in upright position; it may be inclined or placed in horizontal position, provided that it is so located that the products of combustion from the burner bowl 14 are directed through the combustion chamber within said water container to the flue at the opposite end thereof.

Therefore, I do not desire to limit myself to the precise details of construction and arrangement herein set forth, as it is obvious that various modifications may be made therein without departing from the essential features of my invention, as defined in the appended claims.

I claim:

1. In a boiler furnace, the combination with an outer integral casing, of an inner casing in spaced relation with said outer casing, forming a water container, and comprising a combustion chamber, and an ash pit at the bottom of said combustion chamber; a burner at the lower portion of said combustion chamber; a flue at the upper portion of said combustion chamber; a substantially rectangular hollow partition extending transversely in said combustion chamber and inclined with respect to the axis of said chamber, the hollow of said partition being in communication with said water container, and said partition forming a baffle for the products of combustion from said burner on their way to said flue; said partition being so inclined that ash dust will gravitate down the upper surfaces thereof; a baffle plate pivotally mounted at the lower end of said partition, for normally obstructing the air passage between said partition and

the wall of said combustion chamber and supporting ash dust which gravitates thereon; means for operating said baffle plate including a rod pivoted to said plate; means for tilting said baffle plate for temporarily opening said air passage and dumping ash dust therefrom, including a crank shaft having a crank connected with said rod; and means for holding said baffle plate normally shut, including a weighted lever on said crank shaft.

2. In a boiler furnace, the combination with an outer integral casing, of an inner casing in spaced relation with said outer casing, forming a water container, and comprising a combustion chamber, and an ash pit at the bottom of said combustion chamber; of a burner at the lower portion of said combustion chamber; a flue at the upper portion of said combustion chamber; a substantially rectangular hollow partition extending transversely in said combustion chamber and inclined with respect to the axis of said chamber, the hollow of said partition being in communication with said water container, and said partition forming a baffle for the products of combustion from said burner on their way to said flue; another hollow partition forming a second water container distinct and separate from said first container; said partitions being so inclined that ash dust will gravitate down the upper surfaces thereof; baffle plates respectively pivotally mounted at the lower ends of said partitions, for normally obstructing the air passages between said partitions and the wall of said combustion chamber and supporting ash dust which gravitates thereon; means for operating said baffle plates together, including a single rod pivoted to each plate; and means for tilting said baffle plates for temporarily opening said air passages and dumping ash dust therefrom, including a crank shaft having a crank connected with said rod; and means for holding said baffle plates normally shut, including a weighted lever on said crank shaft.

3. In a boiler furnace, the combination with an outer integral casing, of an inner casing in spaced relation with said outer casing, forming a water container, and comprising a combustion chamber, and an ash pit at the bottom of said combustion chamber; a burner at the lower portion of said combustion chamber; a flue at the upper portion of said combustion chamber; a substantially rectangular hollow partition extending transversely in said combustion chamber and inclined with respect to the axis of said chamber, the hollow of said partition being in communication with said water container, and said partition forming a baffle for the products of combustion from said burner on their way to said flue; said partition being so inclined that ash dust will gravitate down the upper surfaces thereof; a baffle plate pivotally mounted at the lower end of said partition, for normally obstructing the air passage between said partition and the wall of said combustion chamber and normally supporting ash dust which gravitates thereon; means for operating said baffle plate to dump ash dust therefrom, into said pit, including a rod pivoted to said plate; and means for holding said baffle plate normally shut.

4. In a boiler furnace, the combination with an outer integral casing, of an inner casing in spaced relation with said outer casing, forming a water container, and comprising a combustion chamber, and an ash pit at the bottom of said combustion chamber; of a burner at the lower portion of said combustion chamber; a flue at the upper portion of said combustion chamber; a substantially rectangular hollow partition extending transversely in said combustion chamber and inclined with respect to the axis of said chamber, the hollow of said partition being in communication with said water container and said partition forming a baffle for the products of combustion from said burner on their way to said flue; another hollow partition forming a second water container distinct and separate from said first container; said partitions being so inclined that ash dust will gravitate down the upper surfaces thereof; baffle plates respectively pivotally mounted at the lower ends of said partitions for normally obstructing the air passages between said partitions and the wall of said combustion chamber and normally supporting ash dust which gravitates thereon; means for operating said baffle plates together, to dump ash dust into said pit, including a rod pivoted to each plate; and means for holding said baffle plates normally shut.

5. In a boiler furnace, the combination with a water container comprising two casings, one within the other, with a water space between them; the inner casing comprising a combustion chamber; of a burner at one end of said combustion chamber; a flue at the other end of said combustion chamber; a substantially rectangular hollow partition extending transversely in said combustion chamber and inclined with respect to the direction of travel of the products of combustion from said burner to said flue; the hollow of said partition being in communication with said water space at each end of said partition and said partition forming a baffle for the products of combustion from said burner on their way to said flue; said partition being so inclined that ash dust will gravitate down the upper surface thereof; a baffle plate pivotally mounted at the lower end of said partition for normally obstructing the air passage between said partition and the wall of said combustion chamber and normally supporting ash dust which gravitates thereon; means for normally holding said baffle plate shut; and means for operating said baffle plate to dump ash dust therefrom.

6. In a boiler furnace, the combination with a water container comprising two casings, one within the other, with a water space between them; the inner casing comprising a combustion chamber; of a burner at one end of said combustion chamber; a flue at the other end of said combustion chamber; a plurality of substantially rectangular hollow partitions extending transversely in said combustion chamber and inclined with respect to the direction of travel of the products of combustion from said burner to said flue; the hollow of said partitions being in communication with said water space at each end of each partition, and said partitions forming baffles for the products of combustion from said burner on their way to said flue; said partitions being so inclined that ash dust will gravitate down the upper surfaces thereof; baffle plates respectively pivotally mounted at the lower ends of said partitions for normally obstructing the air passages between said partitions and the wall of said combustion chamber and normally supporting ash dust which gravitates thereon; means for normally holding said baffle plates shut; and means for operating said baffle plates together, to dump ash dust therefrom.

7. A structure as in claim 5, including another

hollow partition forming a second water container distinct and separate from said first container; said second partition being so inclined that ash dust will gravitate down the upper surface thereof; a baffle plate pivotally mounted at the lower end of said second partition; and means for operating said baffle plates together, to dump ash dust therefrom.

8. In a boiler furnace, the combination with cylindrical concentric outer and inner casings in integral relation, spaced to form a water container between them and comprising a combustion chamber within said inner casing and an ash pit at the bottom of said combustion chamber; of a burner at the lower portion of said combustion chamber; a flue at the upper portion of said combustion chamber; a substantially rectangular hollow partition extending transversely in said combustion chamber, the hollow of said partition being in communication with said water container, and said partition forming a baffle for the products of combustion from said burner on their way to said flue; another hollow partition forming a second water container, distinct and separate from said first container, said second partition forming a baffle for the products of combustion from said burner on their way to said first partition and said flue; both of said partitions being so inclined with respect to the axis of said chamber that ash dust will gravitate down the upper surfaces thereof; and baffle means carried by said second partition at the lower end thereof adapted to receive and temporarily support the ashes from both partitions; and means whereby said baffle means may be moved to dump ash dust therefrom into said pit.

9. In a boiler furnace, the combination with cylindrical concentric outer and inner casings in integral relation, spaced to form a water container between them and comprising a combustion chamber within said inner casing and an ash pit at the bottom of said combustion chamber; of a burner at the lower portion of said combustion chamber; a flue at the upper portion of said combustion chamber; a substantially rectangular hollow partition extending transversely in said combustion chamber, the hollow of said partition being in communication with said water container, and said partition forming a baffle for the products of combustion from said burner on their way to said flue; another hollow partition forming a second water container, distinct and separate from said first container, said second partition forming a baffle for the products of combustion from said burner on their way to said first partition and said flue; both of said partitions being so inclined with respect to the axis of said chamber that ash dust will gravitate down the upper surfaces thereof; said partitions being in the same inclined plane and immediately adjoining each other; whereby ash dust gravitating down said first partition passes over said second partition on its way to said pit.

10. In a boiler furnace, the combination with cylindrical concentric outer and inner casings in integral relation, spaced to form a water container between them and comprising a combustion chamber within said inner casing and an ash pit at the bottom of said combustion chamber; of a burner at the lower portion of said combustion chamber; a flue at the upper portion of said combustion chamber; a substantially rectangular hollow partition extending transversely in said combustion chamber, the hollow of said partition being in communication with said water container, and said partition forming a baffle for the products of combustion from said burner on their way to said flue; another hollow partition forming a second water container, distinct and separate from said first container, said second partition forming a baffle for the products of combustion from said burner on their way to said first partition and said flue; both of said partitions being so inclined with respect to the axis of said chamber that ash dust will gravitate down the upper surfaces thereof; said partitions being in the same inclined plane and immediately adjoining each other; whereby ash dust gravitating down said first partition passes over said second partition on its way to said pit; and movable ash dumping means carried by said second partition for temporarily detaining said ashes on their way to said pit.

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