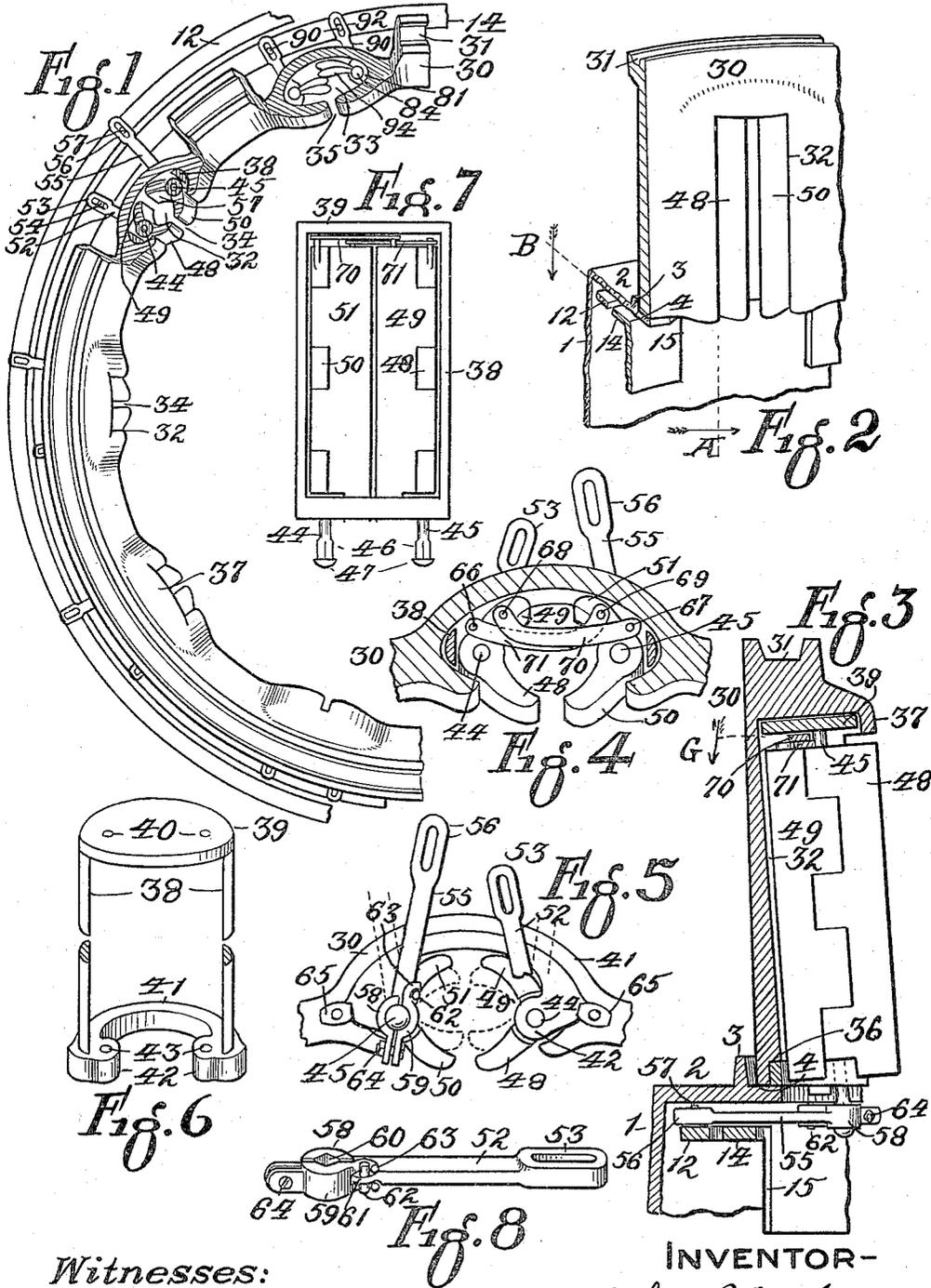


J. R. WILLEMIN.
 FIRE POT FOR HOT AIR HEATING FURNACES.
 APPLICATION FILED FEB. 12, 1915.

1,154,901.

Patented Sept. 28, 1915.

3 SHEETS—SHEET 1.



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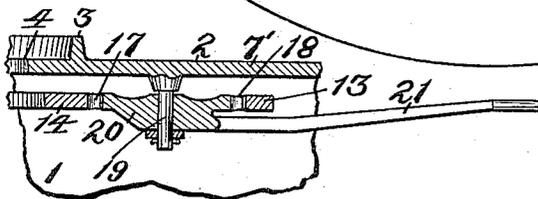
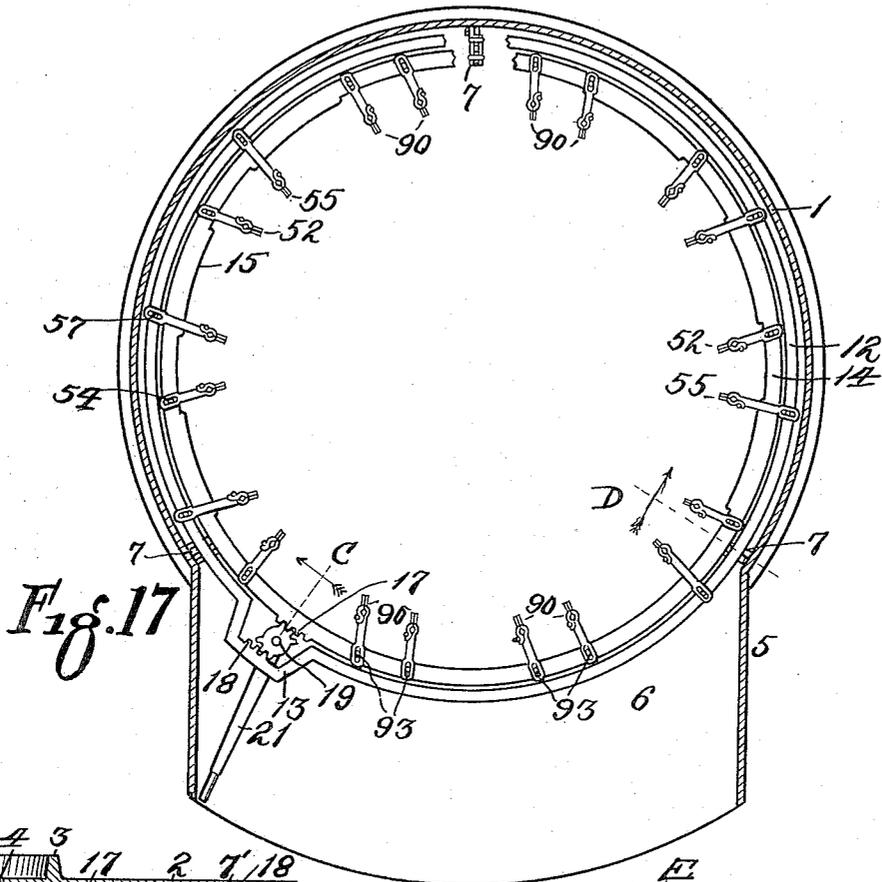


Fig. 18

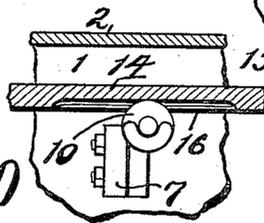


Fig. 20

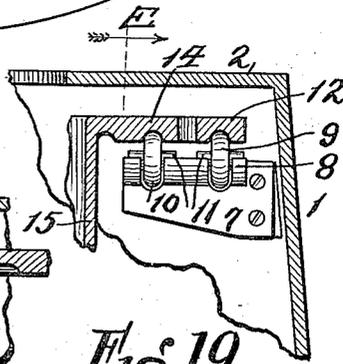


Fig. 19

Witnesses

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UNITED STATES PATENT OFFICE.

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FIRE-POT FOR HOT-AIR HEATING-FURNACES.

1,154,901.

Specification of Letters Patent. Patented Sept. 28, 1915.

Application filed February 12, 1915. Serial No. 7,726.

To all whom it may concern:

Be it known that I, JOHN R. WILLEMIN, a citizen of the United States, residing at Akron, in the county of Summit and State of Ohio, have invented new and useful Improvements in Fire-Pots for Hot-Air Heating-Furnaces, of which the following is a specification.

This invention relates to improvements in fire ports for hot-air-heating furnaces and stoves and has especial relation to fire pots in which the wall of the fire pot is provided with a plurality of upwardly-extending air cells formed therein, and having slots establishing communication with the interior of the fire pot for promoting combustion.

The object of the invention is to equip a fire pot of the foregoing description with mechanism positioned in the cells for keeping them free and clean from accumulated dust, ashes, and other matter, to the end that free passage of air through the cells may be had and also to provide mechanism for controlling the exit of air from the cells to the interior of the fire pot, the mechanism for accomplishing the foregoing being easily and simply controlled by the operator of the furnace by means of mechanism which can be reached for operation through the ash pit door.

With the foregoing and other objects in view, the invention consists in the novel construction, combination and arrangement of parts constituting the invention to be hereinafter specifically described and illustrated in the accompanying drawings which form a part hereof wherein is shown the preferred embodiment of the invention, but it is to be understood that changes, variations and modifications can be resorted to which come within the scope of the matter hereinafter claimed.

In the drawings in which similar reference numerals indicate like parts in the different figures,

Figure 1, is a fragmentary view in perspective of a portion of a fire pot, embodying this invention looking downwardly therein; Fig. 2, is a view of the inner face of the wall of a fire pot showing one of the cells and a portion of the mechanism contained therein; Fig. 3, is a vertical, central, sectional view approximately on line A of Fig. 2; Fig. 4, is a view partly in section on line

G of Fig. 3 partly in perspective of the mechanism positioned in the upper ends of a portion of the air cells; Fig. 5, is a plan view of a portion of the fire pot wall inverted with a cell formed therein and the mechanism used for controlling the egress of air therefrom; Fig. 6, is a perspective view of a cage employed in an air cell and removed therefrom; Fig. 7, is a rear elevation of the cage shown in Fig. 6 with the air-controlling mechanism in position therein; Fig. 8, is a perspective view of an operating arm employed in this device; Fig. 9, is a view similar to Fig. 2 showing a cell with cleaning device mounted therein; Fig. 10, is a vertical, sectional view of the mechanism shown in Fig. 9; Figs. 11, 12, 13 and 14, are details of the cell-cleaning device, Fig. 13 being a sectional view taken on line F of Fig. 14; Fig. 15, is a horizontal, sectional view of the wall of the fire pot with the cleaning mechanism therein; Fig. 16, is a front view of the fire pot wall with portions thereof broken away to better illustrate the cleaning mechanism; Fig. 17, is a horizontal, sectional view of an ash-pit embodying this invention and taken approximately on line B of Fig. 2; Fig. 18, is a sectional view taken approximately on line C of Fig. 17; Fig. 19, is a sectional view taken approximately on line D of Fig. 17; and, Fig. 20, is a sectional view taken approximately on line E of Fig. 19.

Referring to the drawings in detail, the reference numeral 1 denotes the outer wall of the ash pit of an ordinary air-heating furnace or stove which is provided at its upper portion with an inwardly-projecting horizontal flange 2 having on its upper face a sinuously-formed beading 3, the portion 4 of the flange within the bearing constituting a seat for a purpose to be later described. The wall 1 of the ash pit is usually circularly-formed and integral with the side walls 5 of the ash-pit entrance 6. Secured to the inner face of the wall 1 are a plurality of brackets 7 provided with bearings 8 for friction rollers 9 and 10 provided with trunnions 11 which are supported therein. The entrance 6 of the ash-pit is provided with an upper wall or roof 7' which is customarily formed integral with the side walls 5 and the side wall 1 of the ash-pit. Mounted for horizontal revolution on the friction

rollers 9 is a ring 12 which is preferably provided at one point with an offset portion 13. Similarly mounted for horizontal revolution on the friction rollers 10 and in the same horizontal plane as the ring 12 is a ring 14, the inner face of which is provided with the downwardly-projecting integral deflecting members 15 spaced from each other and their positions and functions will be described later. The under faces of the rings 12 and 14 are both provided with circumferential grooves 16 adapted to receive the rollers 9 and 10 respectively, and form races in which the rollers run. In the outer face of the ring 14 opposite to the offset 13 is provided with gear teeth 17 and the inner face of the offset 13 is provided with gear teeth 18. Secured to the under face of the wall 7' of the ash pit is a downwardly-projecting pin 19 on which is mounted a gear 20 the teeth of which intermesh with the teeth 17 on the ring 14 and the teeth 18 on the offset 13 of the ring 12. Preferably formed integral with the gear 20 is an operating handle 21 which is positioned within the entrance 6 to the ash pit.

From the foregoing description it will be seen that when the operating handle 21 is oscillated the two rings 12 and 14 are horizontally revolved in opposite directions, and when the operating handle 21 is at rest it constitutes a locking means for preventing unintentional movement of either of the rings.

Mounted on the seat 4 and within the beading 3 on the upper flange 2 of the ash pit wall 1, is a fire pot designated generally by the reference numeral 30. The upper portion of the wall of the fire pot 30 is provided with a groove 31 forming a seat on which the dome forming a portion of the combustion chamber of the furnace or stove is adapted to rest. The wall of the fire pot 30 is provided with a plurality of upwardly-extending air-cells all open at their lower ends to communicate with the interior of the ash pit and having their upper ends closed. The air-cells employed are preferably of two types, one type adapted to contain mechanism for controlling the passage of air from the cells to the interior of the fire pot and the other type of cell provided with narrower slots for the constant and uncontrolled passage of air there-through, this latter type of air cells containing mechanism for constantly keeping them free from any accumulation of ashes, dust, soot and other foreign matter. The first type of cell will be designated generally by the reference numeral 32 and the latter type by the reference numeral 33. I preferably so arrange these cells that the two air cells of the type designated by the reference numeral 33 are placed immediately in front of the entrance 6 of the ash pit

and the other two immediately at the rear of the fire pot or opposite to the entrance and the cells between these and along the sides of the ash pit are of the type designated by the reference numeral 32.

All of the air cells are preferably oval or elliptical in cross section, but the air cells 32 are provided with wider slots 34 than are the cells 33 wherein the openings are designated by the reference numeral 35. A description of the type of air cells designated by the reference numeral 32 and the mechanism contained therein is as follows: The lower portions of the wall of the fire pot surrounding the air cells 32 are rabbeted out at 36 and the upper wall of the fire pot is provided with over-hanging integral lips 37, the latter in conjunction with the wall of the ash pit surrounding each opening constituting a seat. Adapted to be positioned in each of the cells 32 is a cage, having two upright lateral members 38 connected at their upper ends by a head 39 fitting in the seat at the upper end of each cell. This head 39 is provided with a pair of apertures 40 constituting bearings for a purpose to be later described. The general form of the cage is trough-shaped and the lower portion thereof comprises an enlarged oval-shaped base 41 which is adapted to be received in the rabbeted portion 36 and held there by means to be described. The base is provided with a pair of lugs 42 in each of which is an opening 43 in alinement with one of the openings 40 and the two constitute bearings. Mounted in one of the openings 43 and in one of the openings 40 in each cage is an upwardly-extending rotatable shaft 44 and mounted in the other openings 43 and 40 is a shaft 45. These two shafts are provided at their lower ends with squared portions 46 and with heads 47. Hinged on the shaft 44 is a damper 48 and a cell cleaner 49, the former projecting forwardly toward the interior of the ash pit and into the slot or opening 34 and the latter rearwardly and along the inner face of the rear wall of the cell 32. Hinged on the shaft 45 is a damper 50 and a cell cleaner 51 and similar in construction and conformation to the members 48 and 49. All of the members 48—51 are loosely mounted on their respective shafts and the dampers 48 and 50 are adapted when oscillated to contact to close the openings or slots 34. Secured to the squared portion 46 of each of the shafts 44 is an oscillating arm 52 provided with a slotted end 53 which is adapted to be engaged by a pin 54 on the ring 14. Mounted on the squared portion 46 of each of the shafts 45 is an operating arm 55 provided with a slotted end 56 adapted to engage with a pin 57 on the outer ring 12. The arms 52 and 55 are similar in all respects, except that they differ in length to enable them to connect with

their respective rings. As these arms 52 and 55 are similar a description of one is believed to be sufficient for the understanding of both and reference is directed to Figs. 5 and 8 for an understanding thereof. The inner or unslotted ends of these arms 52 are provided with enlargements 58 with which are associated complementary members 59, both the latter and the enlargements provided with notches so that the two when assembled form a squared opening 60 to engage with the squared portion 46 of the shafts 44 and 45. The arm 52 is provided with a lug 61 through which extends a pin 62 and each complementary member 59 is provided with a bifurcated end 63 to engage the projecting portion of the pin 62 for holding one end of the member 59 in place and the opposite end thereof is secured to the arm 52 by means of a holding member 64. The peculiar construction of the inner ends of the arms 52 and 53 is due to the fact that they must be connected with their respective shaft after the latter have been positioned and the cages seated in their respective cells. In positioning the cages they are passed upwardly from the interior of the ash pit and when seated are held in position by keepers 65 pivotally mounted on the under face of the fire-pot wall. The rear upper portion of the damper 48 is provided with an upwardly-extending pin 66 and the damper 50 is provided with a similar pin 67. On the upper face of the cleaner 49 is a pin 68 and on the upper face of the cleaner 51 is a similar pin 69. Extending between the pins 68 and 67 is a link 70 and extending between the pins 66 and the pin 69 is a link 71 so that the dampers 48 and 51 will move in unison and the cleaners 49 and 50 in a similar manner. The dampers 48 and 50 are adapted to approximately contact with the side edges of the slots 34 and when they are moved toward each other sufficiently they are adapted to contact and constitute closure means for the slots 34 for preventing egress of air therefrom and when moved to their open position they permit the passage of air from the air cells 32 into the body of the fire pot and of course, the amount of air which passes through the openings between the inner edges of the dampers 48 and 50 will depend upon the position of these two gates and the control of the passage of air through the cells is thus attained. As before described, the rings 12 and 14 are reversely revolved through the medium of the operating handle 21 and as the arms 52 are connected with the inner ring 14 and the arms 55 are connected with the outer ring 12 the arms will be moved toward and away from each other at each movement of the rings 12 and 14, thereby oscillating the blades 48 and 50 toward and away from each other, all these operations taking place simultane-

ously. The effect of the operations of these members 48—51 is to control the passage of air from the cells and also to constitute to a certain extent cleaning devices for removing any foreign substances which may become lodged therein, the arms 48 and 50 being sufficiently powerful to crush any ordinary piece of ash between them when the rings are oscillated.

The cells 33, wherever placed in the wall of the fire pot are provided with mechanism for cleaning them, and a description of this mechanism is as follows:

In the upper wall surrounding each cell 33 are a pair of recesses 80 separated from each other and constituting bearings. In alinement with each of the recesses 80 and projecting from the side walls of each of the cells 33 is a lug 81 provided with an opening 82 constituting a bearing and communicating with the interior of the cell 33 by means of a slot 83. Each of the recesses 80 is immediately above an opening 82 in one of the lugs 81 and extending from the upper face of each lug 81 and terminating in one of the recesses 80 is a shaft 84, the upper portion of which is reduced in diameter to be received in its respective recess 80. These shafts are identical, and a description of one is believed to be sufficient for both. The lower ends of each of these shafts is provided with a central aperture 85, communicating with which is an upright slot 86 united with a horizontal slot 87, from which is a downwardly-extending recess 88. The central aperture 85 will be positioned in alinement with the opening 82 in the lug 81, and the shaft is adapted to be coupled to a pin 87' provided with a squared lower end 88', and also with a laterally-projecting stud 89. The pin 87' is positioned by passing it upwardly through the opening 82, the lug 89 passing through the slot 83 on the lug 81 and through the slot 86 in the lower end of the shaft 84, and when the pin 89 has reached the upper end of the slot 86 the pin is given a partial rotation, causing the stud 89 to travel horizontally in the slot 87, and from this it is lowered sufficiently to permit the stud to engage in the recess 88, thereby coupling the pin 87' to the lower end of the shaft 84. Mounted on the squared portion of each one of the pins 88 is an arm 90 provided with a head 91 having a squared recess therein to receive the squared end 84 of the pin 87, and the opposite end 92 is slotted to receive a pin 93 on the inner ring 14. Each of the shafts 84 is provided with a plurality of laterally extending fingers 94, the fingers on contiguous shafts being alternated in position, and each of them extending inwardly past a central line drawn between the two shafts. These fingers 94 on each shaft are preferably

placed out of vertical alinement, as shown in Fig. 15. The fingers are adapted to be oscillated with their respective shafts and to scrape and clean the interior of each of the cells 33 and free the same from clogged matter, such as dust, ashes, soot, etc. It will be noticed that all the arms 90 are loosely connected with the inner rings 14, so that the shafts all rotate in unison in the same direction when the ring 14 is horizontally revolved, thereby causing the fingers 94 on contiguous shafts to pass and re-pass each other during the cleaning operation, and as they alternate in position they effectually reach and clean a sufficient portion of each cell to effectually keep the same from being clogged by foreign matter.

It will be noticed that the fingers 94 are always operated whenever the rings are operated so that the air cells 33 placed on opposite sides of the fire pot are constantly kept clean for admission of a small quantity of air, which passes inwardly through the narrow slits 35, but by manipulating the operating-handle 21 a further supply of air to the interior of the fire-pot is controlled through the manipulation of the gates carried on the shafts 44 and 45, by which the main supply of air to the fire pot from the air cells 32 may be arrested, if desired. A large volume of air may be admitted, while a constant but small supply of air is afforded through the cells 33 which are kept open as before described by the fingers 94. The construction of the gates 48—51 is, as before stated, such as to constantly keep the cells 32 from becoming clogged.

By this device air may be admitted to substantially all portions of the fuel to aid in the combustion of the gas generated by the heated coal, and thereby better combustion is afforded which is not true where the construction of the fire pot is such that the air is permitted to freely pass from the air cells in the fire pot wall and pass into the fire-pot above the fire which in many cases carries the gases over and out through the up-take flue without giving the same the chance to become perfectly consumed.

I claim:—

1. A fire pot for furnaces and stoves provided in the wall thereof with an upwardly-extending air cell and a slot establishing communication between said cell and the interior of said fire pot, and a rocking member in said cell.

2. A fire pot for furnaces and stoves provided in the wall thereof with an upwardly-extending air cell and a slot establishing communication between said cell and the interior of said fire pot, and a horizontal revoluble member in said cell.

3. A fire pot for furnaces and stoves provided in the wall thereof with an upwardly-extending air cell and a slot establishing

communication between said cell and the interior of said fire pot, and a pair of co-acting cleaning members in said cell.

4. A fire pot for furnaces and stoves provided in the wall thereof with an upwardly-extending air cell and a slot establishing communication between the said cell and the interior of said fire-pot, and a horizontally rocking damper in said cell arranged to control the passage of air through said slot.

5. A fire pot for furnaces and stoves provided in the wall thereof with an upwardly-extending air cell and a slot establishing communication between said cell and the interior of said fire pot; and a pair of horizontally rocking dampers in said cell arranged to control the passage of air through said slot.

6. A fire pot for furnaces and stoves provided in the wall thereof with an upwardly-extending air cell and a slot establishing communication between said cell and the interior of said fire pot, a horizontally revoluble member in said cell, and means outside of said fire pot for revolving said member.

7. A fire pot for furnaces and stoves provided in the wall thereof with an upwardly-extending air cell and a slot establishing communication between said cell and the interior of said fire pot, a horizontally revoluble member in said cell, a revoluble ring mounted outside of said fire pot and means for loosely connecting said ring and said member for revolving the latter.

8. A fire pot for furnaces and stoves provided in the wall thereof with an upwardly-extending air cell and a slot establishing communication between said cell and the interior of said fire pot, a pair of co-acting horizontally rocking dampers in said cell arranged to control the passage of air through said slot, a pair of horizontally revoluble rings positioned outside of said fire pot, and means connecting said dampers with said rings for simultaneously rocking said dampers when said rings are revolved.

9. A fire pot for furnaces and stoves provided in the wall thereof with an upwardly-extending air cell and a slot establishing communication between said cell and the interior of said fire pot, a pair of co-acting horizontally rocking dampers in said cell arranged to control the passage of air through said slot, a pair of horizontally revoluble rings positioned outside of said fire pot, means connecting said dampers with said rings for simultaneously rocking said dampers when said rings are revolved, and means for simultaneously revolving said rings.

10. A fire pot for furnaces and stoves provided in the wall thereof with an upwardly-extending air cell and a slot establishing communication between said cell and the interior of said fire pot, a horizontally revol-

ing member in said cell, and means for removably holding said member in position.

11. A fire pot for furnaces and stoves provided in the wall thereof with a plurality of upwardly-extending air cells, said air cells communicating with the interior of said fire pot through slots formed in said wall, and controlling dampers mounted in a portion of said members.

12. A fire pot for furnaces and stoves provided in the wall thereof with a plurality of upwardly-extending air cells, said air cells communicating with the interior of said fire pot through slots formed in said wall, controlling dampers mounted in a portion of said members, and means outside of said fire pot for actuating said dampers.

13. A fire pot for furnaces and stoves provided in the wall thereof with a plurality of upwardly-extending air cells, said air cells communicating with the interior of said fire pot through slots formed in said wall, controlling dampers mounted in a portion of said members, a horizontally revoluble ring positioned outside of said fire pot, means to revolve said ring, and means for loosely connecting said ring with said dampers whereby the latter are simultaneously moved.

14. A fire pot for furnaces and stoves pro-

vided in the wall thereof with a plurality of upwardly-extending air cells, said cells communicating with the interior of the fire pot through slots formed in the wall thereof, controlling dampers mounted in a portion of said cells, a plurality of cell-cleaning members mounted in other cells, and means outside of said fire pot for agitating said dampers and said cleaning members.

15. A fire pot for furnaces and stoves provided in the wall thereof with a plurality of upwardly-extending air cells, said cells communicating with the interior of the fire pot through slots formed in the walls thereof, controlling dampers mounted in a portion of said cells, a plurality of cell-cleaning members mounted in other cells, a horizontally revoluble ring positioned outside of said fire pot, means for revolving said ring, and means for loosely connecting said dampers and cleaning members with said ring whereby said members and dampers are simultaneously agitated.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

JOHN R. WILLEMIN.

Witnesses:

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A. L. McCLINTOCK.