(No Model.)

W. KRUEGER.

STOVE OR FURNACE.

No. 507,017. Patented Oct. 17, 1893.

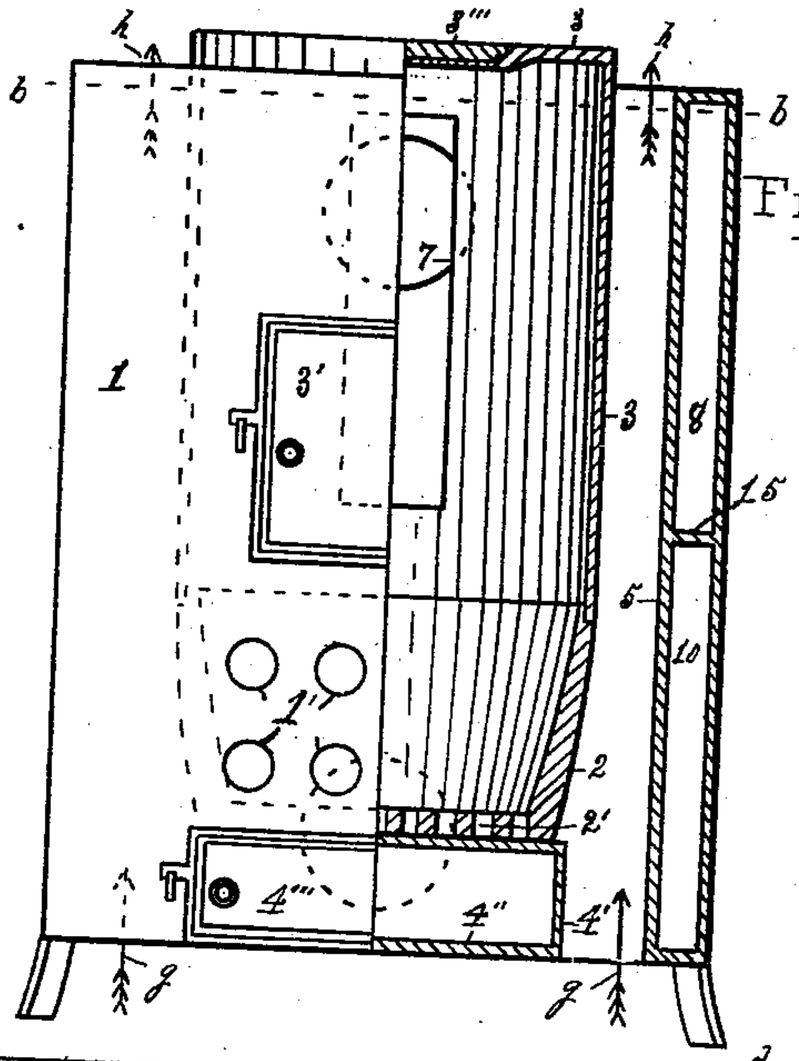

Fig. 1.

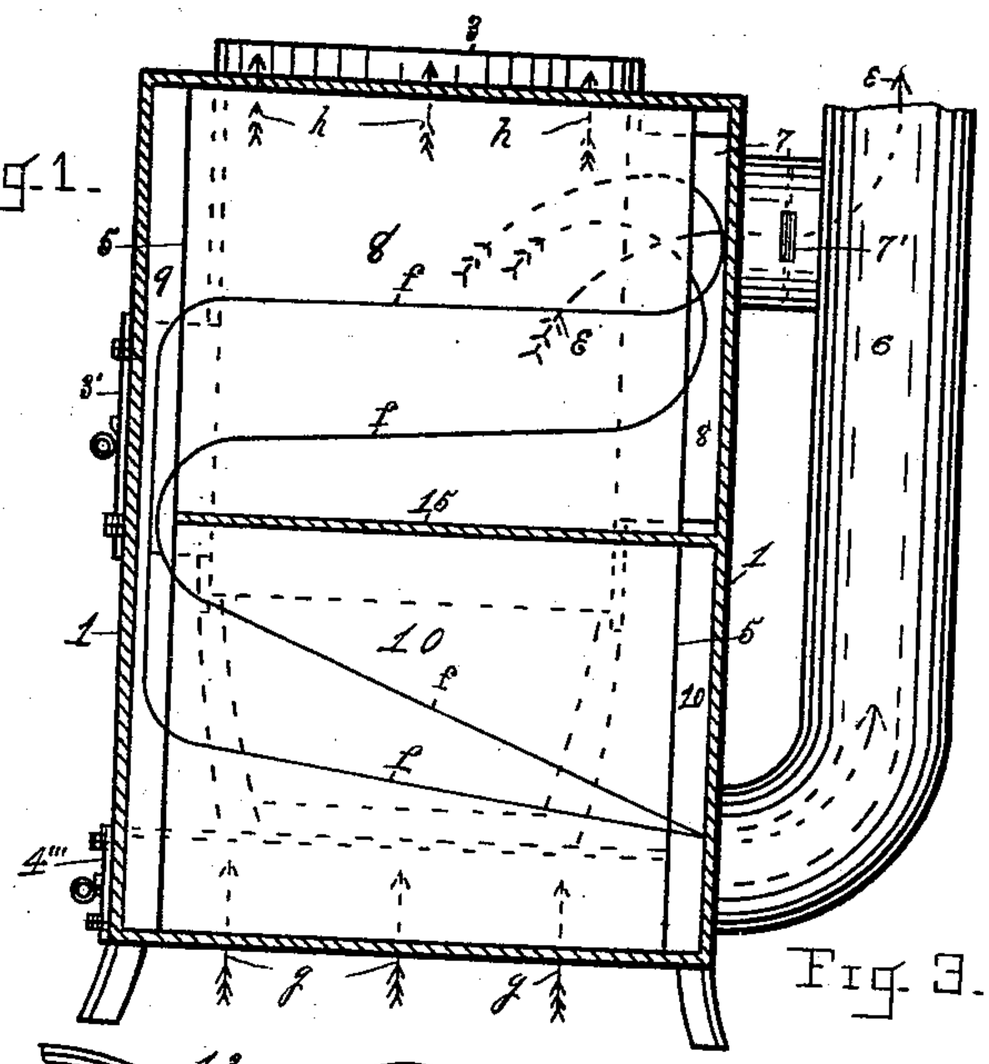

Fig. 3.

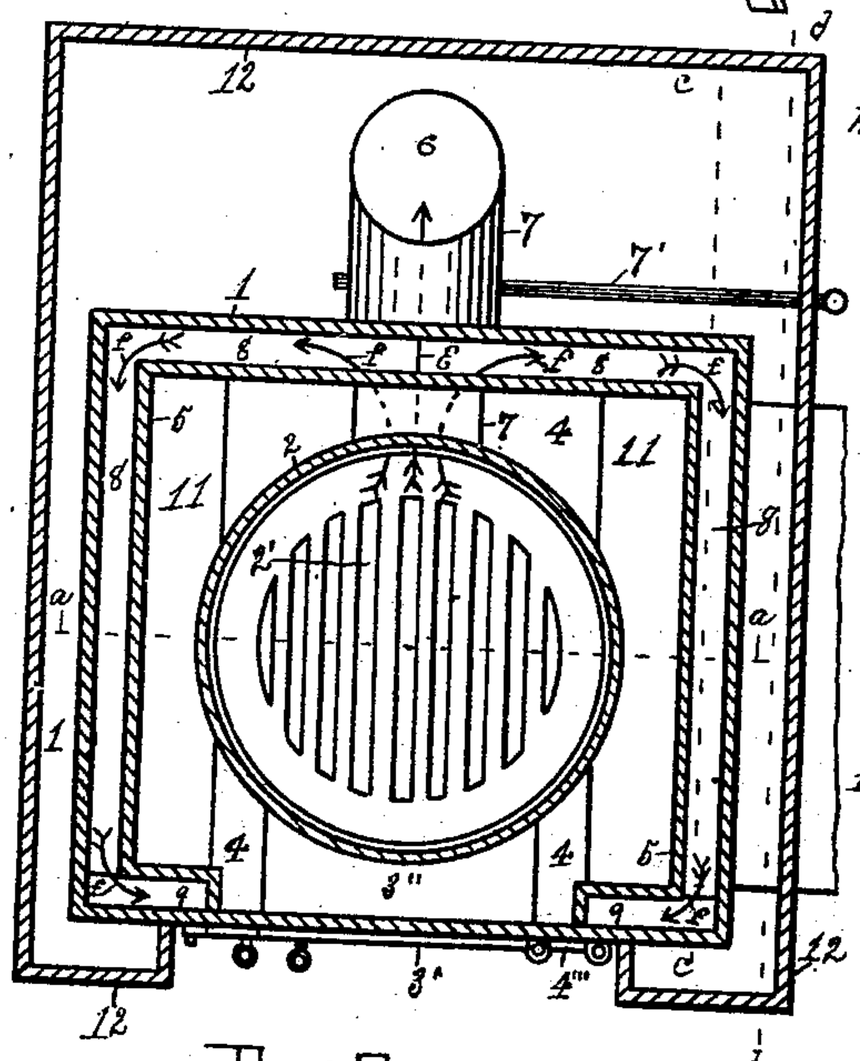

Fig. 2.

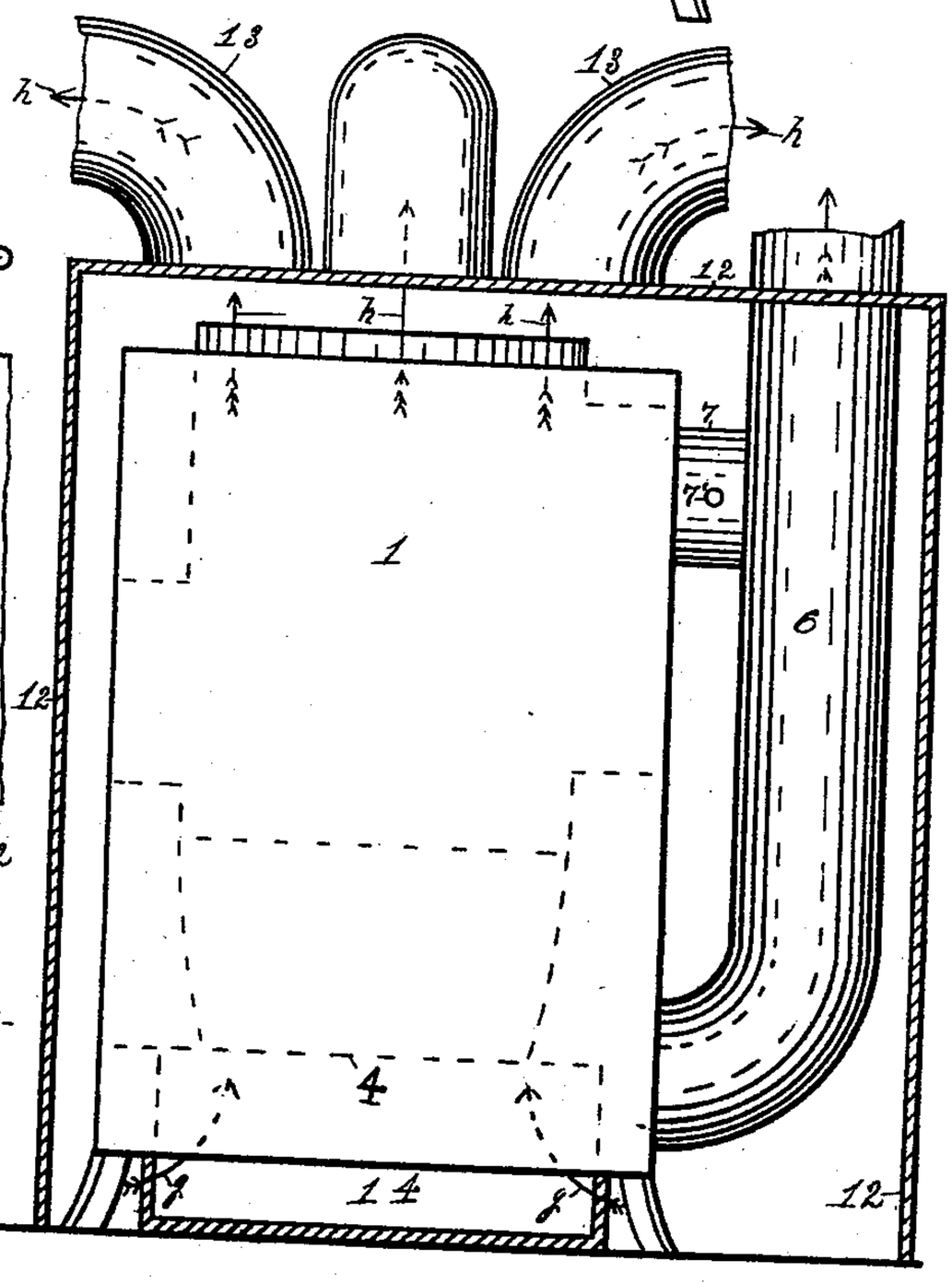

Fig. 4.

Witnesses.
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UNITED STATES PATENT OFFICE.

WILLIAM KRUEGER, OF NEENAH, WISCONSIN.

STOVE OR FURNACE.

SPECIFICATION forming part of Letters Patent No. 507,017, dated October 17, 1893.

Application filed March 13, 1893. Serial No. 465,848. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM KRUEGER, a citizen of the United States, residing at Neenah, in the county of Winnebago and State of Wisconsin, have invented a new and useful Improvement in Stoves or Furnaces, of which the following is a specification.

My invention relates to the arrangement of flues for distributing the heat from the fuel which is burned, over nearly the entire surface of the stove or furnace and to supplying said heated surfaces with cold, or fresh air, to be heated and distributed, if the heater be a stove, to the room in which it is located, and if a furnace, to pipes for delivery to other rooms, and the object of my improvement is, to increase the heat distributing capacity of stoves and furnaces, in proportion to the amount of fuel burned, over those which are at the present time in general use. I attain these objects by the construction, and arrangement of parts, illustrated in the accompanying drawings, in which—

Figure 1 is a front elevation of a stove embodying my invention, the right hand half of it being a section upon the line *a*, *a*, of Fig. 2. Fig. 2 is a top view in section, upon the line *b*, *b*, of Fig. 1, of a stove with a casing inclosing it upon three of its sides and a part of its front, for adapting it for a furnace. Fig. 3 is a vertical section of the stove, upon the line *c*, *c*, of Fig. 2, and Fig. 4, vertical section upon the line *d*, *d*, of Fig. 2, showing the stove arranged with a casing inclosing its sides and top, the casing over the latter being provided with hot air distributing pipes and the bottom of the stove with a fresh air supply box.

Similar figures and letters of reference indicate like parts in the several views.

1, indicates the outside shell of the stove, or heater; 2, its fire pot; 2′, a grate therein; 3, an extension of the fire pot, which forms a combustion chamber; 3′, a door thereto; 3″, a fuel conductor leading from the door to said combustion chamber; 4, an ash chamber top; 4′, its sides; 4″, its bottom; 4‴, a door opening thereto; 5, the inner shell of the heater; 6, the smoke pipe; 7, a direct smoke flue leading from the rear of the combustion chamber to the smoke pipe; 7′, a damper in said flue; 8, indirect smoke flues extending from the direct flue 7, to the right and left across the rear, around the opposite sides to the front side of the heater; 9, diving flues at each front corner of the heater; 10, return flues which return directly under the flues 8 to the rear of the heater and there connect with the smoke pipe 6 at its lower end; 11, cold air flues; 12, an inclosing case which incloses the heater top, its rear, sides, and a part of its front; 13, hot air distributing pipes; 14, fresh air supply box; *e*, (E,) arrows indicative of the course of the direct draft from the combustion chamber to the smoke pipe; *f*, arrows showing the course of the indirect draft in reaching said pipe; *g*, arrows indicating cold air and its direction; *h*, arrows representing warm air escaping from within and around the heater.

The heater may have its several parts made of cast, or wrought metal, sheet steel being preferable for some of its parts while for others, as the fire pot and grates, a cast metal is preferred, and the form of the heater, in a horizontal direction, may be rectangular, circular, oval, or any combination of these forms which may be best suited for the particular use of the heater, and it may be fitted for burning wood or coal.

In the drawings the heater is represented as being nearly square and the flues 11 as being open for the passage of air their entire length through both the bottom and top of said heater. The heater may be provided upon its upper end with a cover of any fanciful design, the cover being properly perforated for the free escape of the heated air from its interior air heating surfaces.

The fire pot, 2, is provided with the usual grate, and ash chamber, and doors for feeding in the fuel and for the removal of ashes are arranged upon the heater, said fire pot being continued upward to the top, or a little above the top of the heater shell, 1, whereby a large and roomy combustion chamber is produced. The upper end of said combustion chamber is closed, but may have a removable cover, 3‴, for providing facilities for heating water, &c.

Upon the front side of the combustion chamber is a fuel conductor, 3″, which is closed upon its sides and leads from the door 3′ to said chamber, and upon the rear side of the

chamber, above the vertical center of the heater is a conductor, or flue, 7, which leads from said chamber and connects with the smoke pipe 6. This flue forms a direct draft from the combustion chamber to the smoke pipe, as indicated by the arrows *e*. Branching to the right and left from the flue 7 are flues, 8, 8, which extend around upon both sides of the heater to its front where they connect with the diving flues, 9, 9, and these diving flues in turn connect with the return flues, 10, 10. The latter flues are separated from the flues 8, 8, by the flue dividing plate 15, and return to the rear side of the heater directly under the flues 8, and at the lower end of the heater, connect with the smoke pipe 6. The flues 8, 8, 9, 9, and 10, 10, form a line of indirect draft flues from the chamber 3 to the smoke pipe and cover the entire surface of the heater's rear, its opposite sides, and a part of its front, and form thereby with its exterior surface and the exterior surface of the fire pot and combustion chamber a large amount of heat radiating surface. A damper, 7′, is located in the direct draft flue 7, for closing at will the direct draft and compelling the smoke and gases to reach the smoke pipe by way of the indirect passage. The ash chamber extends from the front of the heater to the flues 10 at its rear and is of a width sufficient to receive the ashes from the fire pot. Between its sides, 4′, 4′, and the flues 10, 10, are cold air flues, 11, 11, which receive their supply of air at their lower end, conduct it upward between the flues, 8, 8, 9, 9, and 10, 10, and the fire pot and combustion chamber, around the latter two parts, and deliver the heated air from the upper end of said flues.

When the heater is in operation the flues 11 are surrounded upon all sides excepting a small space upon the ash chamber sides and immediately around the doors with heated surfaces, and the temperature of the air therein gradually approaches a higher degree, whereby a continual and strong draft of air is created from around the bottom of the heater, upward through, and outward from said flues. The damper 7′ being opened for a direct draft, when the fuel is first lighted, the products of combustion will pass directly into the smoke pipe, but when the fuel is sufficiently lighted said damper may be closed when all of the heat from the combustion chamber will pass into the flues 8, 8, at the rear of the heater, around each side thereof, downward through the diving flues 9, 9, returning toward the rear of the heater through the flues 10, 10, and outward into the ascending smoke flue 6. A portion of the heat in passing from the upper to the lower flues will turn quickly around the ends of the flue dividing plate 15 and pass directly to the smoke pipe, while the larger portion, owing to the diving flues being narrow, transversely thereof, and to the arrangement of said dividing plate, is compelled to pass around into the front of the heater, go down the diving flues the greater portion of their length, and to reach the smoke pipe by a more circuitous route. The dividing plate, 15, is represented as being horizontal, but may descend slightly from the rear of the heater to its front without impairing its efficiency to any great degree. Its termini is shown to be at each front corner of the heater, under the arrows *f*, but may vary from said point, care being taken to provide sufficient area for the diving flues beyond the ends of said plate, and said flues may be carried nearer, or quite up to, the fuel conductor 3″.

Fig. 4 shows the heater arranged as a furnace. No change in its construction is required for this use of it. A casing, 12, incloses the heater, covering its top and all sides, excepting a small space around its doors, its top being provided with any desired number of hot air distributing pipes, 13.

A fresh air box, 14, is provided for supplying fresh air from any suitable source.

In applying this heater in rooms where there is insufficient height, or for other reasons, it may be desirable to admit a supply of fresh air from a point above its bottom, not having said bottom open as here shown. This I provide for by perforating the outside shell of the heater above its bottom, the dotted line 4, representing the top line of the ash chamber being a line which may be the upper boundary of said perforation, the flue 10, upon one or both sides of the heater being shortened for allowing the entrance under its lower boundary of a sufficient quantity of air. Perforations may also be provided around the doors of the heater, as 1′, for admitting air, and these side air entrances may be used whether the heater be used as a stove or a furnace, but either modification will be at the expense of the use of some of the radiating surface for heating the fresh, or cold air.

The casing 12 may be constructed of brick or metal, and be of any suitable dimensions, and may inclose the smoke pipe, or said pipe may be a brick flue, and be outside of said inclosure, as the size and location of the heater may make desirable.

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

1. In a heating stove or furnace, the combination of a fire pot arranged upon the interior, near the lower end thereof, and being arranged for receiving a fuel supply, said fire pot having a combustion chamber extending upward therefrom, a flue extending rearward from near the upper end of said chamber to the outer shell of the heater and communicating with the smoke pipe and also branching to right and left flues which extend along the interior walls of the shell, across the rear and sides of the heater to the front wall of said shell, diving flues arranged within said front wall at opposite sides of the fire pot front, a return flue from each diving flue returning

under said right and left flues to the rear of the heater and communicating with the smoke pipe near the lower end of the heater, a division plate arranged between said diving flues and separating said right and left from the return flues, a damper arranged in the aforesaid rearward extending flue for changing the draft from passing directly from the fire pot to the smoke pipe, to passing around through said right and left, diving and return flues, and thence to the smoke pipe, said right and left, diving and return flues forming a hot air inclosure entirely around the heater, and from the upper to the lower end of its shell, excepting its doors and the parts above the same, substantially as described.

2. In a heating stove or furnace, the combination of a fire pot arranged upon the interior, near the lower end thereof, and being arranged for receiving a fuel supply, said fire pot having a combustion chamber extending upward therefrom, a flue extending rearward from near the upper end of said chamber to the outer shell of the heater and communicating with the smoke pipe, and also branching to right and left flues which extend along the interior walls of the shell, across the rear and sides of the heater to the front wall of said shell, diving flues arranged within said front wall at opposite sides of the fire pot front, a return flue from each diving flue returning under said right and left flues to the rear of the heater, and communicating with the smoke pipe near the lower end of the heater, a division plate arranged between said diving flues and separating said right and left from the return flues, a damper arranged in the aforesaid rearward extending flue for changing the draft from passing directly from the fire pot to the smoke pipe, to passing around through said right and left, diving and return flues, and thence to the smoke pipe, said right and left, diving and return flues forming a hot air inclosure entirely around the heater, and from the upper to the lower end of its shell, excepting its doors and the parts above the same, and cold air flues arranged within said inclosure upon opposite sides of the fire pot and extending from a point in, or near the bottom of said heater, in a vertical direction to the top of its outer shell, substantially as set forth.

3. In a heating stove or furnace, the combination of a fire pot arranged upon the interior, near the lower end thereof, and being arranged for receiving a fuel supply, said fire pot having a combustion chamber extending upward therefrom, a flue extending rearward from near the upper end of said chamber to the outer shell of the heater and communicating with the smoke pipe, and also branching to right and left flues which extend along the interior walls of the shell, across the rear and sides of the heater to the front wall of said shell, diving flues arranged within said front wall at opposite sides of the fire pot front, a return flue from each diving flue returning under said right and left flues to the rear of the heater and communicating with the smoke pipe near the lower end of the heater, a division plate arranged between said diving flues and separating said right and left from the return flues, a damper arranged in the aforesaid rearward extending flue for changing the draft from passing directly from the fire pot to the smoke pipe, to passing around through said right and left, diving and return flues, and thence to the smoke pipe, said right and left, diving and return flues forming a hot air inclosure entirely around the heater, and from the upper to the lower end of its shell, excepting its doors and the parts above the same, and cold air flues arranged within said inclosure upon opposite sides of the fire pot and extending from a point in, or near the bottom of said heater, in a vertical direction to the top of its outer shell, said cold air flues being provided with a fresh air supply box, and the heater with a casing inclosing its top and sides, excepting immediately around the doors in its front, and said casing being provided with one, or more, hot air distributing pipes, substantially as described.

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Witnesses:
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