

E. V. COULSTON.

FURNACE.

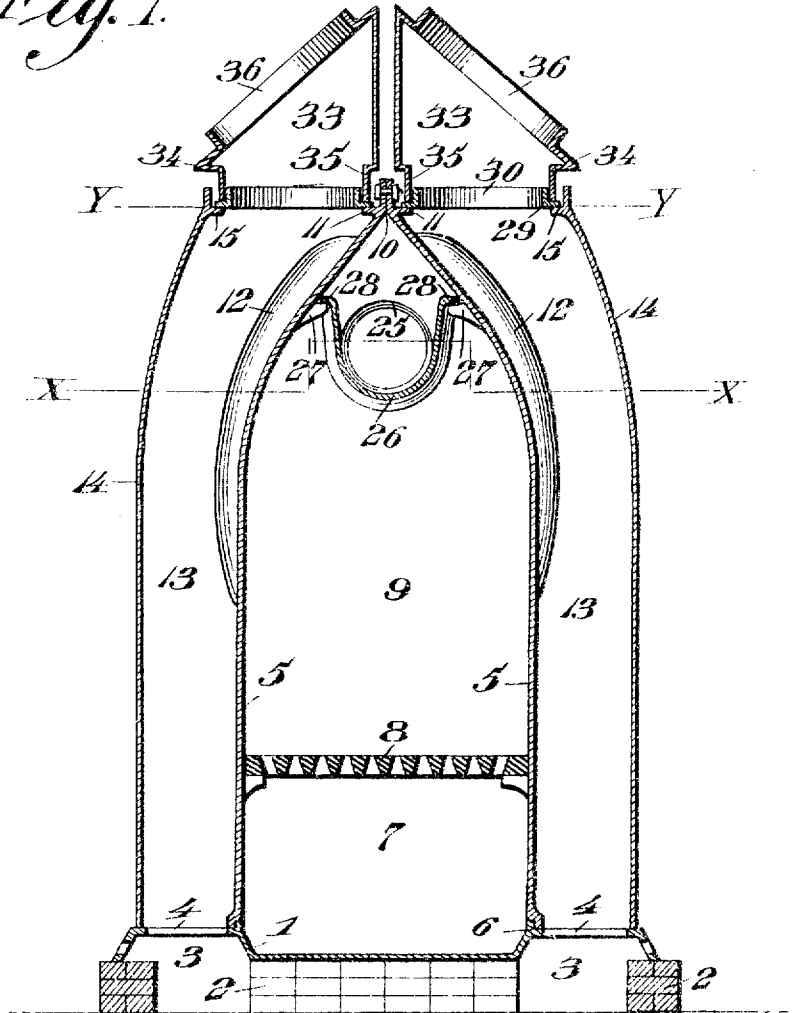
APPLICATION FILED JULY 10, 1908.

Patented Nov. 23, 1909.

3 SHEETS-SHEET 1.

940,789.

Fig. 1.



Witnesses

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APPLICATION FILED JULY 10, 1908.

Patented Nov. 23, 1909.

3 SHEETS-SHEET 2.

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Fig. 2.

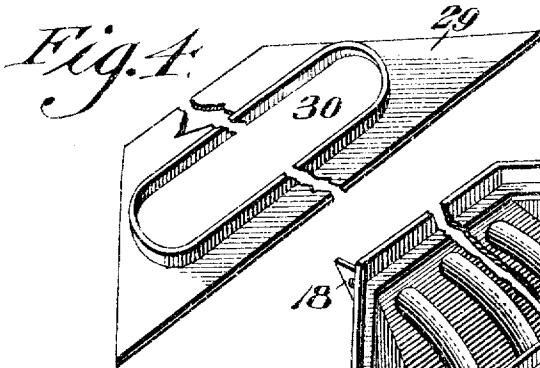
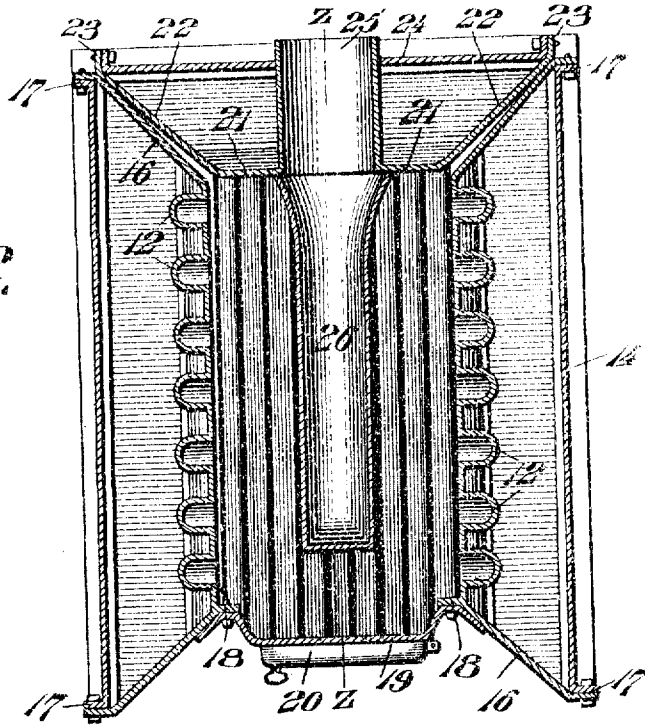
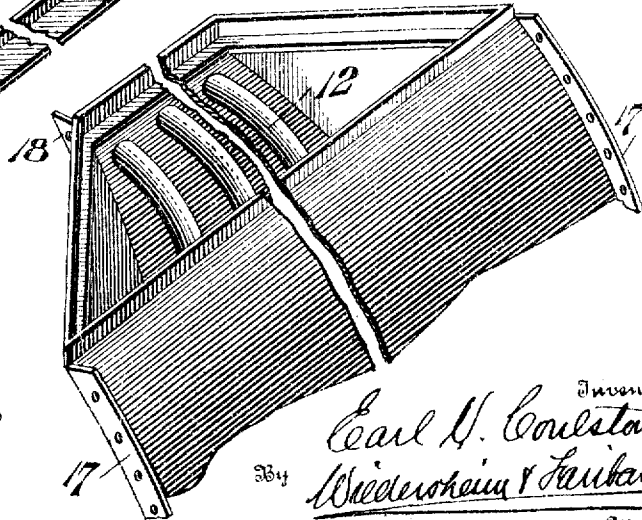


Fig. 3.



Witnesses

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APPLICATION FILED JULY 16, 1908.

Patented Nov. 23, 1909.

3 SHEETS-SHEET 3

940,789.

Fig. 5.

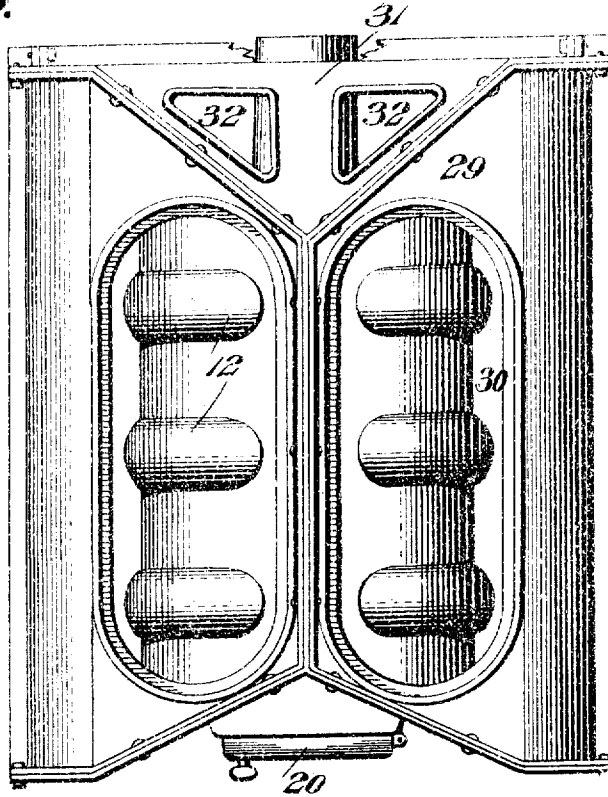
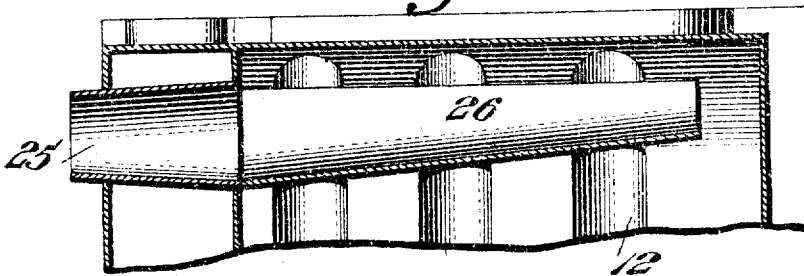


Fig. 6.



Witnesses

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UNITED STATES PATENT OFFICE.

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FURNACE.

940,789.

Specification of Letters Patent.

Patented Nov. 23, 1909.

Application filed July 10, 1908. Serial No. 442,820.

To all whom it may concern:

Be it known that I, EARL V. COULSTON, a citizen of the United States, residing in the city and county of Rock Island, State of Illinois, have invented a new and useful Furnace, of which the following is a specification.

This invention relates to furnaces, more particularly of the type known as hot air furnaces and has for its object to prevent intermingling of the products of combustion and the noxious gases therein with the heated air delivered to the building.

It has for a further object to provide a hot air reservoir whereby the heated air currents may be divided and directed in different directions, one part being carried to one portion of a building and another part being directed to another portion, and also to provide a construction which may be increased in size and capacity at any time without discarding the original installation.

It consists of a furnace having air channels located adjacent to the combustion chamber and in such a position as to heat the air within them as it passes over the surfaces surrounding the combustion chamber and one in which the several parts are so joined together as to bring the joints that are exposed to the fire or products of combustion entirely outside of the air channels.

It further consists of other novel features of construction, all as will be hereinafter fully set forth.

Figure 1 represents a sectional elevation of a furnace embodying my invention. Fig. 2 represents a section on line $x-x$, Fig. 1. Fig. 3 represents a perspective view of a portion of one of the side sections. Fig. 4 represents the top plate of the same. Fig. 5 represents a plan on line $y-y$, Fig. 1. Fig. 6 represents a section on line $x-z$, Fig. 2, of the upper portion of the furnace.

For the purpose of illustrating my invention, I have shown the preferred form used by me, although it is to be understood that the various instrumentalities of which my invention consists can be variously arranged and organized and that my invention is not limited to the precise arrangement and organization of these instrumentalities as herein set forth.

Similar numerals of reference indicate corresponding parts in the figures.

Referring to the drawings:—1 designates the base or supporting plate of my novel furnace structure, the same being mounted on the usual foundation 2, whereby air passages 3 are provided to conduct outside air to the heating parts of the furnace into which it passes by openings 4 in the base 1, suitably located with respect to the air chambers.

5 designates the side walls, preferably of sectional construction, formed of suitable material and supported on the base 1, a suitable joint 6 being provided between them. These walls, 5 form the usual ash pit 7, above which is positioned a grate 8 of ordinary construction and mounted in any desired manner. The walls 5 also form a combustion chamber 9 located above the grate 8, the upper portion of which is somewhat reduced by the convergence of the side walls 5, which meet at a point approximately over the center of the combustion chamber and are there joined in any suitable manner insuring a tight joint, in the present instance bolts 10 serving this purpose. It will be noted that adjacent this joint each of the side walls 5 is preferably provided with a flange 11, whereby a support is formed for a portion of the furnace to be presently described.

In order to provide a much larger heating surface on the side walls 5, corrugations or like projections 12 are formed thereon and extend for some distance into an air passage 13 formed between the walls 5 and an outer casing 14, the contour of which substantially parallels that of the walls 5. These outer casing members 14 are, in the present instance, provided with inwardly extending flanges 15 serving a like purpose as the flanges 11. The sides of the outer casing are adapted to meet and be secured to outwardly extending sides 16 of the walls 5, which are formed preferably integral with each side of each wall 5. The joints between the members 14 and 16 are, as here shown, formed by flanges 17 on the member 14, securely bolted to the sides 16 in such manner that the joint between 14 and 16 does not overlap or meet the joint between 16 and the next adjoining section.

18 designates an inwardly turned flange or lug on each side wall 5, whereby a front plate 19 is secured in place, the same having

the usual fire door 20 located therein, also an ash door and other usual openings (not shown). The rear portion of the combustion chamber is inclosed by an end wall 21 having outwardly flaring sides 22 terminating in flanges 23, which join an outer casing 24 in like manner as the side sections already described, so that a rear air heating conduit is provided. This end wall 21 has formed integral therewith, a substantially cylindrical member 25, the function of which is to conduct the products of combustion from the chamber to a smoke flue. In order that the products of combustion may not immediately pass to this exit formed by the cylinder 25, a baffle 26 is positioned so as to surround the lower portion of the flue opening and which extends, preferably on a slight taper, to a point adjacent the front wall of the combustion chamber. This baffle 26 is preferably supported on lugs 27 secured to the interior of the walls 5, upon which rest flanges 28 of the baffle 26. It will thus be seen that the products of combustion are deflected outwardly against the side walls of the combustion chamber and against the grooves or corrugations 12, and maintain the same at a very high temperature so that the air passing through channels 13 is well heated on its way to the portions of the building which are to be heated. The flanges 11 and 15 carry a top plate 29 having an aperture 30 therein, which is adapted to connect with an opening into the hot air reservoir. The aperture 30 may also be connected directly to a pipe carrying heated air into the building. The rear air chamber formed by the wall 21 and its members 22 and 24, aligns with an opening in the base plate and is also open at the top, and at this point is provided with a somewhat similar plate 31 having apertures 32 therein, which are substantially for the same purpose as the apertures 30. The heated air passing through the apertures 30 and 32 is led into a pair of hot air reservoirs 33, extending from front to rear at each side of the top of the furnace. These reservoirs have closed backs, ends and bottoms except for apertures corresponding with the openings 30 and 32 that each reservoir covers, these apertures being adapted to connect closely with said apertures 30 and 32. The hot air that is delivered to the reservoir on the right must pass into the pipes attached thereto and the air from the reservoir on the left must pass into its pipes. There is no communication between the reservoirs. This construction insures a more equitable and positive distribution of the hot air than the ordinary, wherein the hot air reservoir is common for all the hot air pipes.

It will be seen that the position of the plates 29 and 31 on the flanges 11 and 15 avoids any communication of their joints

with the joints between 5, 16, 21 and 22 and the connections between 30 and 32, and the hot air reservoirs being inside the periphery of the plates 29 and 31, there is absolutely no communication at this point between any of those joints that are exposed to the products of combustion and any joints in the air passages or reservoirs.

36 designates the air exits to which pipes leading to the several rooms are adapted to be connected.

It is apparent that by my novel construction I have formed a hot air furnace having all its air heating passages entirely free from any joint whatsoever that is in any way exposed to the products of combustion, and having solid integral walls interposed at all points between the products of combustion and the air heating passages, so that it is impossible for any of the noxious gases of combustion to pass into the heated air, while the furnace is composed of numerous members assembled substantially as described.

It is well known that all heretofore constructed furnaces have joints that are exposed to both the air and the products of combustion and that very frequently the gases and products of combustion leak through the joints and mingle with the air which is passing over the heated surfaces and the mixture is then led directly to the living rooms, in which the noxious gases are exceedingly injurious to health and a source of great annoyance. It is also well known that generally at night and at other times when the draft of a furnace is checked, the pressure within the combustion chamber will become greater than the pressure of the rapidly moving warm air in the air passages, whereupon the gases of combustion escape through the joints and become mixed with the air which is to be delivered to and breathed by persons in the living rooms. When, as quite frequently happens, a fan is placed in a hot air pipe to accelerate the movement of the heated air, this leakage is still further increased.

In the operation of my furnace the air is led through suitable channels from the exterior of the building, or any other source of pure air, into the passages 3 at the bottom of the furnace, from which it passes upwardly through the openings 4 into the spaces 13. The air may also be introduced through openings in the lower edges of casing walls 14 and 24 or in any other similar manner. It is thrown into contact with the heating surfaces and passes upwardly through the channels 30, 32, 33 and 36 to be delivered to the portion of the building which it is desired to heat. The products of combustion pass upwardly along side of the walls 5 and heat them to the required temperature, being deflected by the channel

26 through the grooves 12 and around the ends of 26 to the opening formed by the cylinder 25 to the smoke flue.

It will be clear that in my construction in which the joints that are exposed to the products of combustion are located entirely exterior of the air passages, there is absolutely no chance, whatever the pressure within the combustion chamber, of any of the gases leaking into the air passages and becoming mixed with the air that is to be delivered to the building.

By providing a suitable base plate, and links to close the gaps between them at the top, two or more of the members 5, 16 and 14 may be placed on each side and the capacity of the furnace correspondingly increased. Likewise the members 21, 22 and 24 may be vertically divided. It becomes evident at this point that by making a suitable portion of the rear of the base plate detachable, an extension to the base plate may be added so as to carry additional members 5, 16 and 14 as well as the rear members 21, 22, and 24, thus permitting enlargement of the apparatus at any time without sacrificing the original installation.

It will now be apparent that I have devised a novel and useful construction which embodies the features of advantage enumerated as desirable in the statement of the invention and the above description and while I have in the present instance shown and described the preferred embodiment thereof it is to be understood that the same is susceptible of modification in various particulars without departing from the spirit or scope of the invention or sacrificing any of its advantages.

The outer walls 14 and 24 may be composed of any suitable material, but should be preferably a non-conductor of heat and may for this purpose be composed of two or more thicknesses of material between which may be disposed a comparatively small air space to further retard the conduction of heat. The corrugations 12 may be omitted or other surface enlargements may be added. The outer wall 14 may also be formed integrally with 16 and 5, as may also the plate 29 with all three. The member composed of the wall 5 and the sides 16 on the one side may be formed integrally with the similar member in the opposite side, eliminating the top joint 10. The sections may be so shaped as to form a substantially circular construction, or any other shape instead of the rectangular frame shown. Instead of the front plate 19 an air carrying section similar to the one in the rear, provided with door openings after the manner of opening 25 may be substituted.

It is not essential to incline the walls 5 to each other at the top although I prefer that construction. They could be carried

straight up and an additional plate provided to span the opening between them, said plate being joined in the same manner as shown at 10.

The smoke outlet need not necessarily be located at 25. It could be formed by spreading apart for a sufficient space any of the joints between 16 and 22 or the top joints or it could be taken through the front frame 19 above the feed door 20.

These and many other variations within the scope of my invention will readily occur to those skilled in the art and I distinctly claim all possible modifications of my new method of joining the parts of hot air furnaces in which no joint is exposed to both the products of combustion and the air passages.

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

1. In a device of the character described, a plurality of sections forming a combustion chamber, an outer wall secured to each of a number of said sections to form with said sections air passages, and the joints, formed by connecting the several sections, being exterior of the walls of said air passages.

2. In a device of the character described, a plurality of sections forming a combustion chamber, a number of said sections having side extensions integral therewith, outer walls secured to said extensions whereby air passages are formed between said sections and said outer walls, and the joints, formed by connecting the several sections, being exterior of the walls of said air passages.

3. In a device of the character described, a base plate having apertures therein, a casing mounted in sections on said base plate, a plurality of sections interior of and secured individually to each section of said casing and forming therebetween air passages in alinement with said apertures, a top plate for each section having an opening therein and the joints, formed by connecting the several sections, being exterior of the walls of said air passages.

4. In a device of the character described, a plurality of sections forming a combustion chamber, an outer wall secured to each section, said sections and outer walls forming air passages, a top covering for each of said air passages provided with an opening leading into and connected with a hot air reservoir, the joints, formed by connecting the several sections, being exterior of the walls of said air passages and reservoir.

5. In a device of the character described, a plurality of sections forming a combustion chamber, a number of said sections having side extensions integral therewith, outer walls secured to said extensions whereby air passages are formed therebetween, top coverings having openings therein for said air

passages, a separate hot air reservoir connected with each side series of top openings, the joints, formed by connecting the several sections, being exterior of the walls of said air passages and reservoirs.

6. In a device of the character described, a base plate provided with openings, a plurality of sections erected thereon forming a combustion chamber, outer walls forming with said sections air passages substantially in alinement with the openings in the base plate, top coverings for said air passages provided with openings leading into and connecting with a plurality of hot air reservoirs, and the joints, formed by connecting the several sections, being exterior of the walls of said air passages and reservoirs.

7. In a device of the character described, a plurality of hollow sections forming a combustion chamber, said sections forming air passages, and the joints, formed by connecting the several sections, being exterior of the walls of said air passages.

8. In a device of the character described, a base plate having apertures therein, sections mounted on said base plate forming an ash pit and a combustion chamber, a grate above said ash pit and below said combustion chamber, an outer wall secured to each of said sections forming an air passage therebetween substantially in alinement with said apertures, a top covering with an opening therein for each air passage, and the

joints, formed above the grate by connecting the several sections, being exterior of the walls of said air passages.

9. In a device of the character described, a base plate having apertures therein, sections mounted on said base plate forming therewith an ash pit and a combustion chamber, a grate above said ash pit and below said combustion chamber, outer walls secured individually to said sections and forming air passages therebetween substantially in alinement with said apertures, a top covering for each of said air passages having an opening therein, and the joints, formed above the grate by connecting the several sections, being exterior of the walls of said air passage.

10. In a device of the character described, a base plate having apertures therein, hollow sections open at the top and bottom and forming air passages erected on said base plate substantially in alinement with said apertures, said sections and base plate forming an ash pit and a combustion chamber, a grate above said ash pit and below said combustion chamber, and the joints, formed above the grate by connecting the several sections, being exterior of the walls of said passages.

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Witnesses:

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