

No. 826,441.

PATENTED JULY 17, 1906.

C. E. OLDACRE.
HOT AIR FURNACE.
APPLICATION FILED JULY 26, 1905.

2 SHEETS—SHEET 1.

Fig. 1.

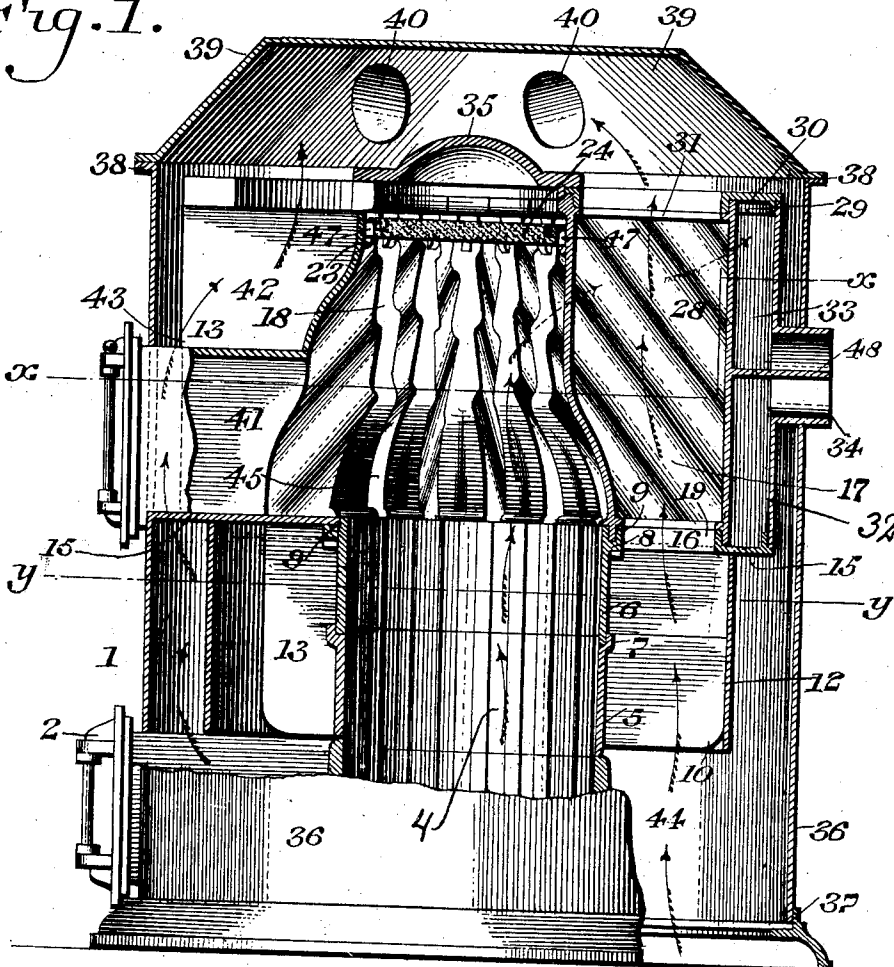
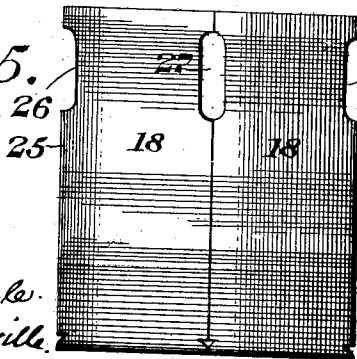
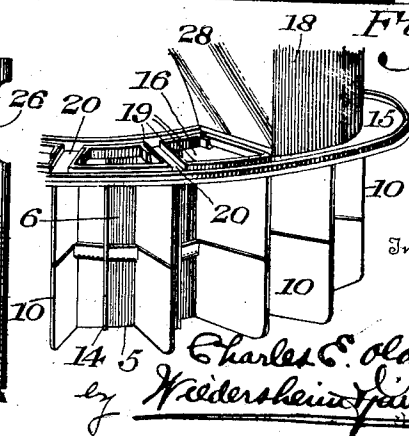


Fig. 5.



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Fig. 6.



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2 SHEETS—SHEET 2.

Fig. 2.

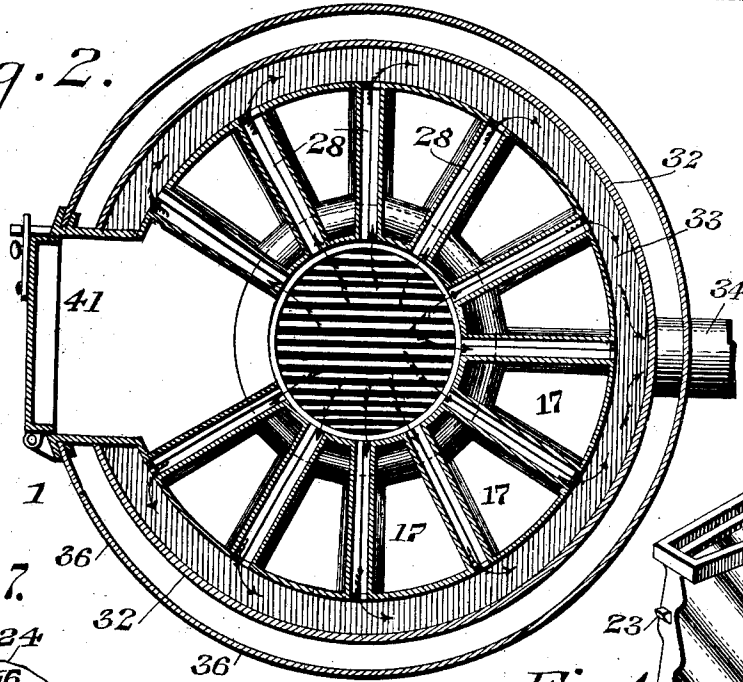


Fig. 7.

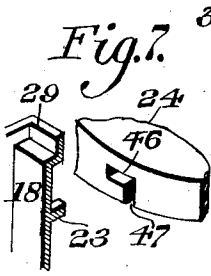


Fig. 4.

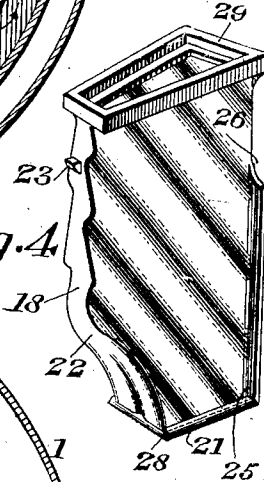
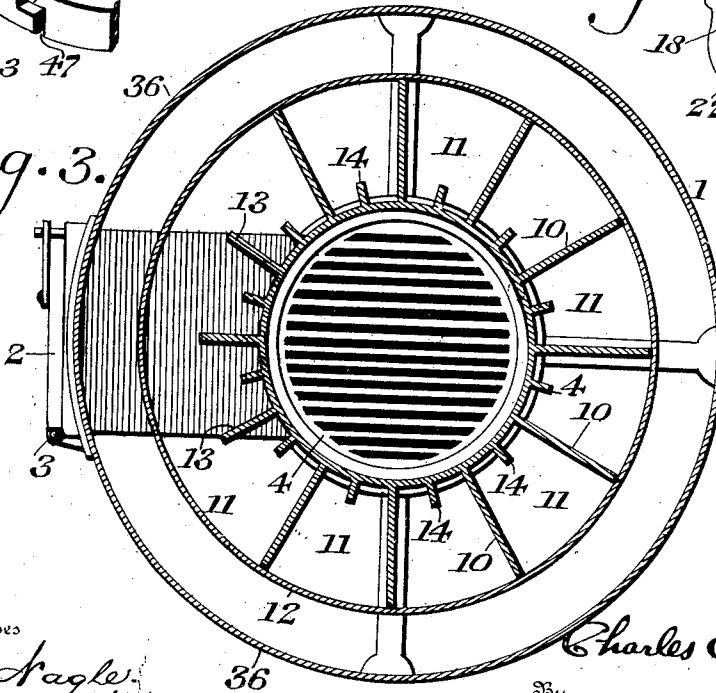


Fig. 3.



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HOT-AIR FURNACE.

No. 826,441.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, CHARLES E. OLDACRE, a citizen of the United States, residing in the city and county of Philadelphia, State of Pennsylvania, have invented a new and useful Hot-Air Furnace, of which the following is a specification.

My invention consists of a novel construction of a hot-air furnace in which the fuel is economized and the durability of the furnace increased.

It further consists of a series of air-flues located above the fire-pot and having corrugations on both their inner and outer surfaces angularly disposed to the heat and the products of combustion coming from the fire-pot, said corrugations preferably converging upwardly.

It further consists of a series of radially-extending plates or flanges extending outwardly from the fire-pot and a casing or jacket surrounding said flanges in order to form separate air-passages which open into the corrugated flues above referred to.

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

Figure 1 represents a vertical sectional view, partly broken away, of a hot-air furnace embodying my invention. Fig. 2 represents a plan view on lines *xx*, Fig. 1. Fig. 3 represents a plan view on lines *yy*, Fig. 1. Fig. 4 represents a perspective view of one of the air-flues. Fig. 5 represents a rear elevation of two of the air-flues. Fig. 6 represents a perspective view of a portion of Fig. 1, showing the flues and their adjuncts. Fig. 7 represents a perspective view of a portion of a modification in detached position.

Similar numerals of reference indicate corresponding parts in the figures.

Referring to the drawings, 1 designates a hot-air furnace having an ash-pit of usual construction provided with a door 2, suitably hinged at 3.

4 designates the fire-pot or fire-box, which is formed by the walls 5 and 6, the lower end of the wall 6 resting on the shoulder 7 near the upper end of the wall 5. The upper end of the wall 6 has a flange 8 thereon, in which is an annular groove 9.

10 designates plates or wings which extend outwardly from the walls 5 and 6 and form air passages or flues 11 when the casing or jacket 12 is secured around said plates. Cer-

tain of the plates 10 above the ash-pit located at the front of the furnace are partly broken away, as at 13, as will be understood from Fig. 3, in order to permit the cold air to enter the air-flues which are directly above the ash-pit and permit said air to pass therefrom into the air-flues which are on each side of said ash-pit. This will permit the cold air to uniformly surround the fire-pot 4, which will tend to prevent the front parts of the fire-pot burning out sooner than the other parts, as has heretofore been the case when a closed space has been left above the ash-pit having no inlet for the cold air.

14 designates ribs extending outwardly from the fire-pot for the purpose of increasing the heating-surface.

15 designates an annular laterally-extending plate adapted to be placed above the fire-pot and having openings 16 therethrough, which register with the air-passages 11 and the air-passages 17 of the flues 18, one of the latter being shown in detached position in Fig. 4. The portion of the plate 15 surrounding the openings 16 has the flanges 19, which latter form the grooves 20, in which the bottom 21 of the air-flues 18 are held. The inner face of the latter curves upwardly and outwardly from the bottom, as seen at 22, afterward extending upwardly, substantially as seen in Fig. 4. The relative arrangements of the vertical plates 10 and the lateral plate 15 and their adjuncts will be understood from Fig. 6.

23 designates a lug or projection on the air-flues adapted to retain in place a fire-brick 24, the use of which will be hereinafter explained.

25 designates flanges on the rear face of the flue, which are broken away, as seen at 26, to form a passage 27, through which the smoke may escape. The flues are corrugated internally and externally; but instead of being corrugated in vertical planes they are corrugated so that the lines of the corrugations converge upwardly and inwardly when the parts are assembled, as seen in Fig. 1. This will cause the heat and products of combustion to contact more directly with a larger surface than is possible in the usual constructions of hot-air furnaces. The flues are broader on their rear face and gradually converge toward the combustion-chamber, thus forming between them passages 28 for the products of combustion. Each flue has a top

flange 29, on which is adapted to be seated a top plate 30, which has openings 31 therein, which register with the air-passages 17.

A casing 32 surrounds the air-flues, being connected at its top with the plate 30 and at the bottom with the plate 15, thus forming the chamber 33, into which the smoke and products of combustion pass through the openings 27.

34 designates a pipe or passage leading from the chamber 33 to the chimney.

35 designates a top or dome plate which is adapted to be placed on the plate 30 directly over the fire-pot, but may be made integral therewith, if desired.

36 designates an outer casing, which is joined to the base of the furnace at 37 and which has secured at 38 the dome 39.

40 designates openings in the dome, through which the heated air may be conducted through pipes in the ordinary manner to the desired place.

41 designates the fuel-inlet passage to the fire-pot having a suitable door therefor.

42 designates the chamber above the fire-box door, which has an inlet 43, through which the cool air may pass into the chamber 42.

44 designates the cold-air chamber having suitable inlets thereto for the admission of the cold air.

45 designates the combustion-chamber.

The cold air entering the chamber 44 passes into the separate air-passages 11, where it will be partially heated, thence into the air-flues 18. Here it will be still further heated, it being evident that the flues are surrounded on all sides by the heat and products of combustion. There is no dead-space around the fire-box or the combustion-chamber, for the flanges 10, which are broken away, as seen at 13, will permit the air to enter the passage formed directly above the ash-pit door.

In the preferred embodiment of my invention, as seen in Fig. 1, the casing which forms the fuel-inlet passage is supported upon the apertured plate 15. Supported on this fuel-inlet casing is another casing having the chamber 42 therein, the top of which is open, as well as the front side, and as the flanges 10 are broken away, as seen at 13, the air below the fuel-inlet will be permitted to pass around the inlet-casing and into the chamber 42, and thence into the dome 39.

The fire-brick 24 may, if so desired, be so constructed that it will slip over the lugs 23 and on being slightly turned will cover them, so as to prevent the undue heating of said lugs, which might occur, owing to the intense heat coming from the fire.

The chamber formed between the casings 12 and 32 and 36 will permit the cold air to pass through inlet 43 into chamber 42 and thence into the dome 39. I have found in practice that the intense heat sometimes

causes the top plate 35 to bend and crack. In order to overcome this, I preferably place a fire-brick 24 on the lugs 23, so that the heat will be reflected back against the corrugated flues, although said brick may be dispensed with, if desired. By having the corrugations of the flues angularly disposed with reference to the combustion-chamber a greater resistance is afforded to the passage of the heat and products of combustion, and the air in the flues is much more readily heated. The air-passages formed by the outwardly-extending plates from the fire-pot increase the heating-surface. The ribs 14 also serve to increase the heating-surface. The great advantage in having the air-flues above the fire-pot is the ease with which they may be replaced if one is burned out. As ordinarily constructed the part near the fire-pot changes its shape, owing to the intense heat, and if the same is to be replaced a large amount of time and labor must be spent in fitting the new flue in place in case the flues and the fire-pot are made integral. By the use of my novel invention all this waste of time and labor is avoided and a much larger percentage of air heated.

It will be evident that various changes may be made by those skilled in the art which will come within the scope of my invention, and I do not, therefore, desire to be limited in every instance to the exact construction herein shown and described.

As I have already explained, the fire-brick 24 may or may not be employed as the exigencies of the case may require, and it will be apparent that said fire-brick may rest directly upon the lugs 23, as shown in Fig. 1, or, if desired, the construction seen in Fig. 7 may be employed, wherein I have shown the outer periphery of the brick as provided with an angular-shaped recess having the lateral portion 46 and the downwardly-extending portion 47, which, in conjunction with the lug 23, forms a species of bayonet-joint, the brick being placed in position by first causing the recesses 47 to register with the lugs 23, after which the brick is pressed downwardly till said lugs are in line with the portions 46, the brick being then turned so that it is securely held in place by the engagement of the lugs with said recesses 46, and the lugs 23 will be protected from the intense heat.

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

1. In a furnace, a fire-pot having upright plates extending radially therefrom, a jacket inclosing said plates, a laterally-extending apertured plate located at the upper portion of the fire-pot, a series of open-ended flue-sections supported on said plate, said sections having corrugations converging upwardly and inwardly, the exterior walls of said sec-

tions forming fire-passages, and an inclosing casing.

2. In a furnace, a fire-pot having upright plates extending radially therefrom, a jacket inclosing said plates, a laterally-extending apertured plate located at the upper portion of the fire-pot, a series of open-ended flue-sections supported on said plate, said apertured plate being provided with radial grooves adapted to receive the lower end of said sections, said sections having corrugations converging upwardly and inwardly, the exterior walls of said sections forming fire-passages, and an inclosing casing.

3. In a furnace, a fire-pot having upright plates extending radially therefrom, a jacket inclosing said plates, a laterally-extending apertured plate located at the upper portion of the fire-pot, a series of open-ended flue-sections supported on said plate, said apertured plate being provided with radial grooves adapted to receive the lower end of said sections, the latter having corrugations converging upwardly and inwardly, the exterior walls of said sections forming fire-passages, a top plate located at the upper portion of said flues, and an inclosing casing.

4. In a furnace, a sectional fire-pot having wings extending from said sections and in alinement when assembled, a jacket inclosing said wings, a laterally-extending apertured plate located at the upper portion of the fire-pot, a series of open-ended flue-sections supported on said plate, said apertured plate being provided with radial grooves adapted to receive the lower end of said sections, the latter having corrugations converging upwardly and inwardly, the exterior walls of said sections forming fire-passages, a top plate located at the upper end of said flues, and an inclosing casing.

5. In a furnace, a fire-pot having upright plates extending radially therefrom, a jacket inclosing said plates, a laterally-extending apertured plate located at the upper portion of the fire-pot, a series of open-ended flue-sections supported on said plate, said sections having corrugations converging upwardly and inwardly, the exterior walls of said sections forming fire-passages, the inner walls of said sections being provided with lugs, a fire-brick supported on said lugs, and an inclosing casing.

6. In a furnace, a fire-pot having upright plates extending radially therefrom, a jacket inclosing said plates, a laterally-extending apertured plate located at the upper portion of the fire-pot, a series of open-ended flue-sections supported on said plate, said sections having corrugations converging upwardly and inwardly, the exterior walls of said sections forming fire-passages, a casing supported on said apertured plate forming a fuel-inlet, a casing having a chamber therein supported on said fuel-inlet casing, said chamber

having an open top and open front side, means for permitting air to pass from below around said fuel-inlet and into said chamber, and an inclosing casing.

7. In a furnace, a flue-section having a chamber therethrough open at both ends, internal and external corrugations thereon converging inwardly and upwardly, said section having a bottom flange on which it is adapted to be supported, the outer wall of said flue having laterally-extending flanges thereon which are broken away near the upper end to form a fire and smoke passage, the inner wall curving outwardly and upwardly from the bottom flange and then extending upwardly substantially vertical, and said section having a top flange at the upper end of the section.

8. In a hot-air furnace, a fire-pot composed of walls having plates extending outwardly and forming air-passages and having ribs extending outwardly from said walls for increasing the heating-surface, a series of flues corrugated internally and externally in planes extending inwardly and upwardly, said flues having fire-passages therebetween and around the outer walls thereof, which flues gradually converge toward the central portion of the combustion-chamber and a dome into which said flues open.

9. In a hot-air furnace, a fire-pot having plates extending outwardly therefrom forming air-passages and having ribs extending outwardly from said fire-pot, air-flues located above said air-passages and registering therewith, the inner face of said flues curving outwardly from the bottom and then extending upwardly, the outer faces having flanges thereon which are broken away near their upper end to form a fire and smoke passage, internal and external corrugations extending inwardly and upwardly on said flues, the walls of which latter converge toward the center of the combustion-chamber, said flues having fire-passages therebetween and around the outer walls thereof, an outer casing and a dome secured thereto into which said air-flues open.

10. In a hot-air furnace, a fire-pot having plates extending outwardly therefrom forming air-passages and having ribs extending outwardly from said fire-pot, air-flues located above said air-passages and registering therewith the inner face of said flues curving outwardly from the bottom and then extending upwardly, the outer faces having flanges thereon which are broken away near their upper end to form a fire and smoke passage, internal and external corrugations extending inwardly and upwardly on said flues, the walls of which latter converge toward the center of the combustion-chamber, said flues having fire-passages therebetween and around the outer walls thereof, a smoke connection leading therefrom, an outer casing a dome secured thereto into which said air-

flues open, the upper end of the inner walls of said flues being provided with lugs, a fire-brick secured thereon for reflecting the heat against said flues, and pipes leading into said dome for conducting the heated air therefrom.

11. In a furnace, a fire-pot composed of walls having plates extending therefrom forming air-passages, a jacket surrounding said plates and having ribs extending outwardly from said walls for increasing the heating-surface, a plate supported on said fire-pot and having openings therein registering with said air-passages, air-flues provided with center walls supported on said plate, corrugated internally and externally, said corrugations extending inwardly and upwardly and the side walls of which converge toward the combustion-chamber, the center walls having flanges thereon forming a contiguous surface but having near their upper end a portion broken away forming a fire-passage, said flues having fire-passages therebetween and around the outer walls thereof, a top plate above said flues having openings

therein which register with said flues, a casing around said flues forming a smoke and fire chamber, a smoke-pipe leading from said chamber, an outer casing, a dome secured thereto into which said flues open, a fuel-inlet casing supported on the air-flue-supporting plate and having an air-chamber above and below said inlet, means for permitting the air to pass through each of the chambers located above and below the fuel-inlet passage and means for conducting the heated air from said dome.

12. In a furnace, a fire-pot having upright plates extending radially therefrom, a laterally-extending apertured plate located at the upper portion of the fire-pot, a series of open-ended flue-sections supported on said plate, said sections having corrugations converging upwardly and inwardly, the exterior walls of said sections forming fire-passages, and an inclosing casing.

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