

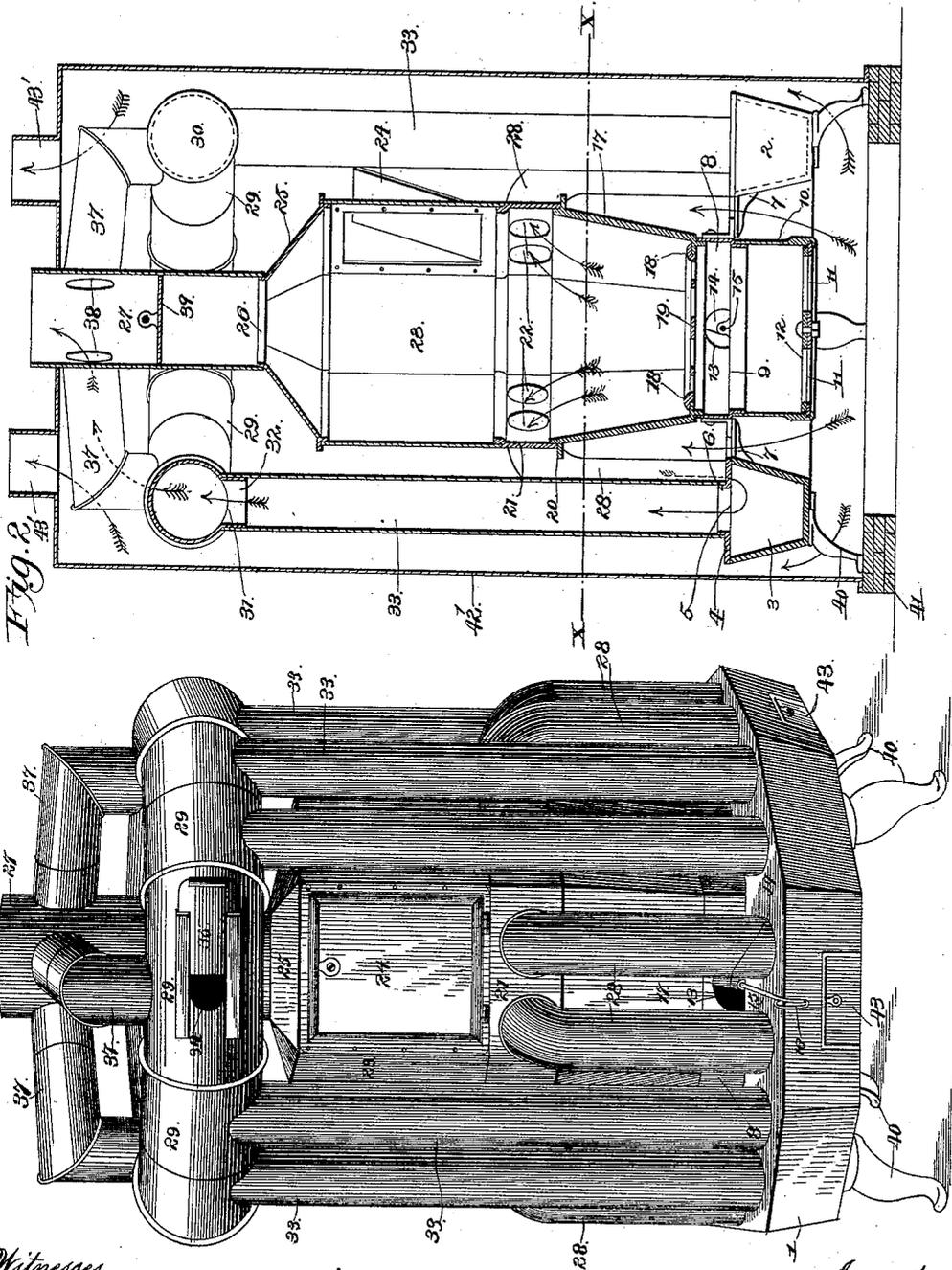
(No Model.)

4 Sheets—Sheet 1.

W. W. SWEETLAND. HOT AIR FURNACE.

No. 424,035.

Patented Mar. 25, 1890.



Witnesses

M. Fowler
Wm. Bagger

Fig. 1.

Inventor

William W. Sweetland

By his Attorneys

C. Snowden

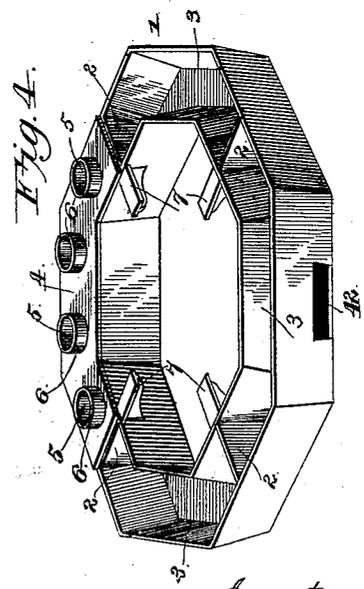
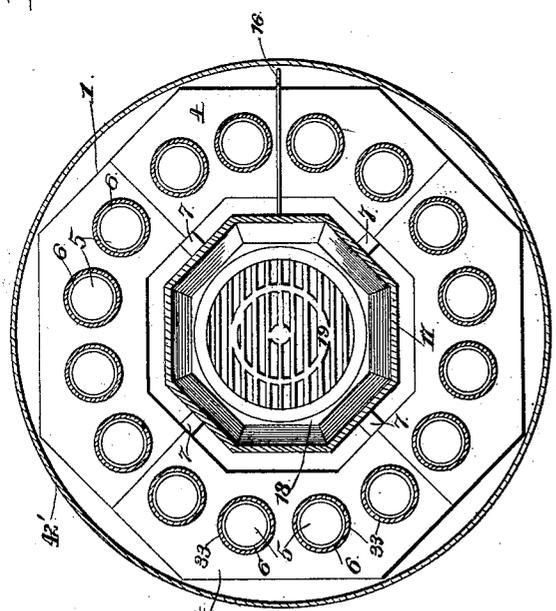
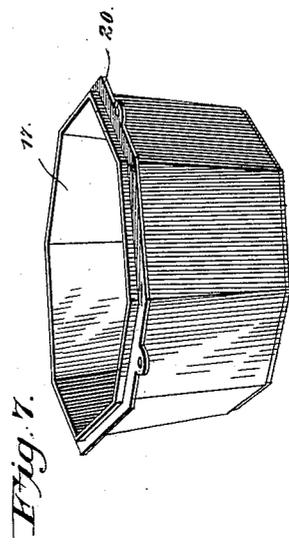
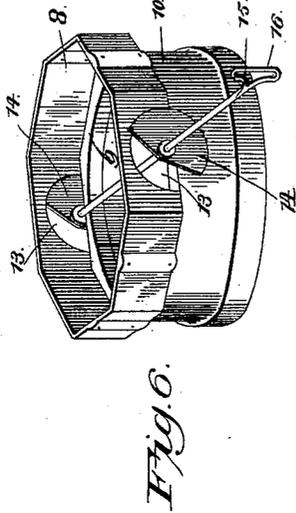
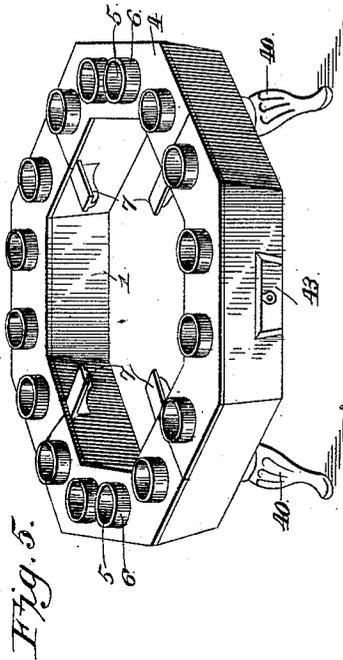
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(No Model.)

4 Sheets—Sheet 3.

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Fig. 10.

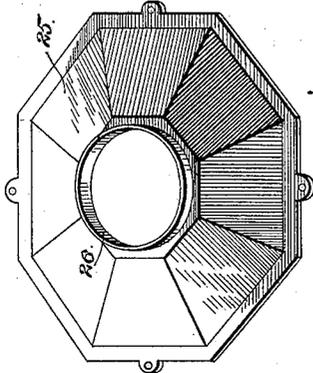


Fig. 11.

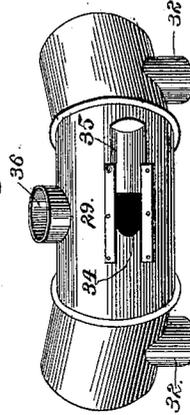


Fig. 12.

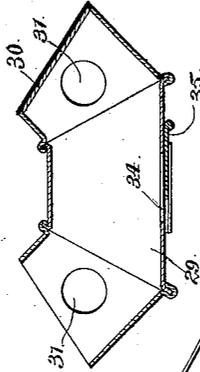


Fig. 8.

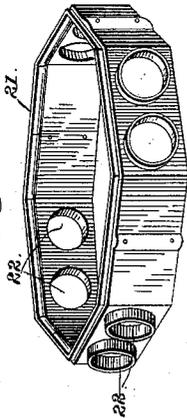
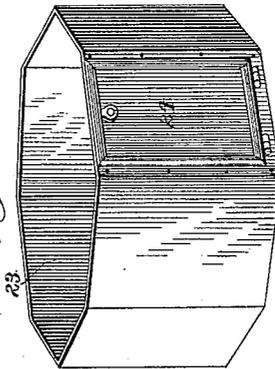


Fig. 9.



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(No Model.)

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Fig. 13

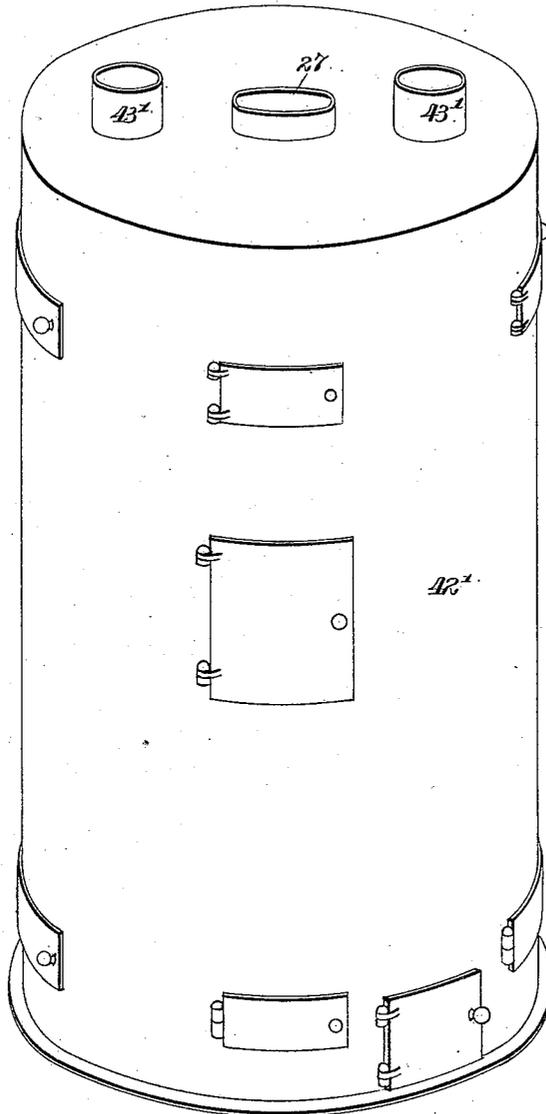
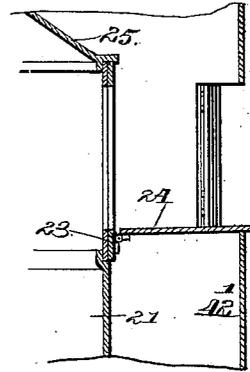


Fig. 14



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William W. Sweetland

UNITED STATES PATENT OFFICE.

WILLIAM W. SWEETLAND, OF EDWARDSBURG, MICHIGAN.

HOT-AIR FURNACE.

SPECIFICATION forming part of Letters Patent No. 424,035, dated March 25, 1890.

Application filed April 6, 1889. Serial No. 306,218. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM W. SWEETLAND, a citizen of the United States, residing at Edwardsburg, in the county of Cass and State of Michigan, have invented a new and useful Hot-Air Furnace, of which the following is a specification.

This invention relates to hot-air furnaces; and it has for its object to provide a device of this class which shall be simple, durable, easily managed, and effective in operation.

My invention consists, essentially, in an improved construction and arrangement of parts to be hereinafter fully described, by which the flues of the furnace shall be subdivided into several sets or series, which, while entirely independent of each other, shall be used simultaneously and equally.

The invention further consists in an improved construction of parts, whereby draft shall be admitted simultaneously to opposite sides of the fire-box so as to equalize the combustion.

The invention further consists in the improved construction and arrangement of details, which will be hereinafter fully described, and particularly pointed out in the claims.

In the drawings, Figure 1 is a perspective view showing my improved furnace complete, but with the outer jacket or casing removed. Fig. 2 is a vertical sectional view of the furnace and the surrounding jacket or casing. Fig. 3 is a horizontal sectional view taken on the line *xx* of Fig. 2. Fig. 4 is a perspective view of the base of my improved furnace with one of the sections of the base-top in position. Fig. 5 is a perspective view showing the base mounted upon its legs and with the entire top in position. Fig. 6 is a perspective view of the ash-pit detached. Fig. 7 is a perspective view of the fire-pot. Fig. 8 is a perspective view of the flue-ring or casting which is mounted upon the fire-pot. Fig. 9 is a perspective detail view of the casing which forms the upper part of the combustion-chamber. Fig. 10 is a perspective detail view of the top or dome of the furnace. Fig. 11 is a perspective detail view of one of the sections of the radiator. Fig. 12 is a horizontal sectional view of the latter. Fig. 13 is a perspective view of the outer casing inclosing my improved hot-air furnace. Fig. 14 is a vertical sectional

view taken through the charging-doors and showing said doors open.

The same letters refer to the same parts in all the figures.

1 designates the base of my improved furnace, which consists of an annular box or casting, which, when desired, may be octagonal in shape, as shown in the drawings hereto annexed. The said base or chamber is divided by means of equidistant vertical partition-plates 2 into a series of four compartments of equal size, each of which is designated by 3. Each of said compartments is provided with a covering-plate 4, having four equidistant openings 5, each of which is surrounded by a rim or flange 6 for the attachment of flues or pipes, as will be hereinafter described.

The annular casting which constitutes the base of the furnace is provided with a series of four inwardly-extending lugs or brackets 7 for the purpose of supporting the ash-pit. The latter consists of a ring or casting which is of suitable size and shape to fit upon the inner wall of the annular casting which constitutes the base. Said ring, which is designated by 8, is provided with lugs or ears adapted to rest upon the lugs or brackets 7, and it has at its lower edge an inwardly-extending flange 9, to the inner edge of which is attached the downwardly-extending cylindrical sheet-metal drum or case 10, which forms the ash-pit proper, and the bottom of which is provided with radial openings 11, adapted to be covered by a centrally-pivoted valve 12, which may be rocked or reciprocated by means of a suitable shaker rod or handle, so as to uncover the said openings and permit the accumulated ashes to drop into a receiving-pan which may be temporarily placed under the ash-pit. The ring or casting 8 is provided on diametrically-opposite sides with semicircular openings 13, adapted to be covered by valves or dampers 14, mounted upon a suitable pivoted rod 15, one end of which extends in front of the furnace so as to form a handle 16, by means of which it may be conveniently manipulated. The upper side of the ring or casting 8 is provided with a shoulder, upon which is mounted the fire-pot 17, which consists of a suitably-shaped casting, which may be made with upwardly and outwardly flaring sides, and the

lower edge of which is provided with an inwardly-extending flange 18 to support the brake 19, which is of ordinary construction, and which is to be provided with suitable means (not shown in the drawings) for rocking or oscillating it upon its supporting-flange. The fire-pot, which is preferably cast in a single piece, may be provided with a suitable lining; but this is not essential to my invention.

The upper edge of the fire-pot has an annular flange 20, serving to support the ring or casting 21, which may be octagonal in shape, as herein shown, and each alternate face of which is provided with two flue-openings 22 22, which may be surrounded by annular flanges or collars for the attachment of the flues or pipes, to be hereinafter described.

The ring or casting 21 may be formed in a single piece; but I prefer to make it in four separate sections, suitably connected or bolted together, as well as to the flange at the upper edge of the fire-box.

23 designates the combustion-chamber, which consists of a drum constructed of boiler-iron or other suitable sheet metal and of a contour corresponding with that of the flue ring or casting 21, upon which it is mounted and to which it may be secured in any suitable manner. One of the sides or faces of said combustion-chamber is provided with a charging-door 24, which is hinged at its lower edge, and which is located directly above one of the faces of the flue-rings 21, which is provided with the flue-openings 22. Suitably mounted upon the upper edge of said combustion-chamber is the dome 25, which is preferably constructed of cast-iron, and which is provided with a centrally-located flanged opening 26, to which the flue or pipe 27, for the escape of the products of combustion, is suitably connected.

Each of the openings 22 in the flue-ring 21 is connected by means of an elbow-pipe 28 with a correspondingly-located opening 5 in the top part of the base. It will thus be seen that each of the compartments 3 of said base is connected with the flue-ring by means of two elbow-pipes 28.

The radiator of my improved furnace is composed of a series of sections 29, consisting of horizontal pipes, each of which is closed at one end by means of a partition-plate 30, while the other end remains open for the admission of the closed end of the next adjoining section. Four of the said sections may be joined so as to form an annular chamber composed of four separate compartments, each of which is provided in its lower side with two openings 31, surrounded by flanges 32. Each of the said openings is connected by a vertical pipe 33 with one of the openings 5 in the top plate of the base intermediately between the elbow-pipes 28. There being 16 of these openings, as hereinbefore stated, eight of said openings are connected by the elbow-pipes 28 with the flue-ring 21, while the remaining openings are connected

by means of the vertical pipes 33 with the radiator. The partition-plates 30 in the latter are so disposed as to register with the partition-plates 2 in the base of the furnace, and it will thus be seen that each of the compartments in said base is connected by two pipes or flues with the combustion-chamber, and by two additional flues with one of the corresponding chambers of the radiator. Each of the sections or compartments of the latter is provided in its front side with an opening 34, adapted to be closed by means of a slide or cover 35, in order that any soot or obstructions which may accumulate in the said compartments may be conveniently reached and removed. Each of the said compartments of the radiator is further provided on its upper side with an opening 36, and is connected by means of an elbow-pipe 37 with an opening 38 in the flue or smoke-pipe 27. A damper 39 is arranged in the latter at a point below the openings 38, whereby the said smoke-pipe may be partially or entirely closed.

The base 1 of the furnace is in practice to be mounted upon suitable legs 40, and may be supported upon an annular foundation of masonry, as shown at 41. Each of the compartments 3 in the said base is provided in its outer wall with an opening 42, having a door or cover 43, in order that soot and ashes may be conveniently removed from the said compartments.

42 designates the jacket or casing of my improved furnace, which completely surrounds the latter, and which is provided with suitably-located doors registering with the charging-door of the furnace and with the doors in the base and in the radiator, which are provided, as described, for the removal of soot or obstructions. A door is also provided at the lower end of the jacket, through which access may be had to the ash-pit. A register is also to be provided for the admission of cold air into the space between the jacket and the furnace, and to the upper end of the jacket is connected the pipes 43, through which the heated air may be conveyed to the apartments which are to be heated.

The operation of this invention will be readily understood from the foregoing description, taken in connection with the drawings hereto annexed. The fuel is supplied to the furnace through the charging-door, which, when opened, rests upon the lower edge of the corresponding door-opening in the jacket of the furnace in a slightly-inclined position, so as to convey the fuel directly to the combustion-chamber. The latter, as has been stated, receives draft equally from diametrically-opposite sides, thereby causing the combustion to be equalized, and doing away with the common objection of the fuel being consumed in the front part of the combustion-chamber only. When the damper 39 in the flue 27 is open, the draft will be directly upward through the said pipe or flue; but when the said damper is closed the products of

combustion will be forced to pass through the elbow-pipes 28, downwardly into the chambers or compartments 3 of the base, thence upward through the flues or pipes 33 to the compartments of the radiator, from whence they will finally pass through the pipes 37 into the vertical pipe 27, into which they will be delivered at a point above the damper. In this manner the products of combustion will be forced to make the circuit of all the radiating chambers and passages of the furnace, and the heat will be utilized to the greatest possible extent. It is obvious that by only partially closing the damper 39 only a portion of the products of combustion will be thus deflected, and the draft in the furnace may thus be regulated. Thus when the fire is started and a strong draft is required, the damper 39 may be opened wide; but after the combustion has been well started the said damper may be entirely or partially closed, thus reducing the draft and forcing the products of combustion to make the circuit of the radiating chambers and passages.

It will be seen that by the construction herein described the radiating chambers and passages of my improved furnace are subdivided into four sets or sections, which are entirely independent of each other. By this construction I am enabled to attain great strength and durability, and the successful operation of a furnace of this construction is made possible by the admission of air at opposite sides of the fire-box, it being obvious that if the draft were supplied to one side of the fire-box only it would not so certainly be distributed to all of the radiating chambers and passages. It will also be seen that the entire surface of the chamber, with the sole exception of the legs or supports, is a radiating-surface, by contact with which the air passing through the jacket becomes heated in the most rapid and economical manner. When the doors in the jacket are closed, cold air will be supplied to the said jacket or casing through the register only, which may be connected by cold-air pipes not only with the outer air, but also with the apartments which are to be heated, so that the cold and vitiated air may be taken from said apartments, conveyed to the casing of the furnace where it is heated and purified, and then returned to the apartments, thus keeping up the constant circulation of pure and wholesome hot air.

While I have herein described the preferred construction of my improved hot-air furnace, I would have it understood that I do not limit myself to the details of construction herein described, but reserve the privilege of making any changes or modifications which may be resorted to without departing from the spirit of my invention.

Having thus described my invention, I claim—

1. In a furnace, the herein-described base, consisting of an annular radiating-chamber, the inner wall of which is provided with in-

wardly-extending lugs or brackets to support the ash-box, substantially as set forth.

2. In a furnace, the herein-described base, consisting of an annular radiating-chamber subdivided by transverse partitions into a series of compartments, in combination with the top plate or cover for each of said compartments having annularly-flanged openings adapted to be connected with the radiating flues or pipes, substantially as set forth.

3. In a furnace, the base consisting of an annular radiating-chamber, the inner wall of which is provided with inwardly-extending lugs or brackets, in combination with the ash-box provided with outwardly-extending ears, by means of which it is supported upon said lugs or brackets, substantially as herein set forth.

4. In a furnace, the combination, with the base consisting of an annular radiating-chamber, the inner wall of which is provided with inwardly-extending lugs or brackets, of the ash-box supported upon said lugs or brackets and having draft-openings at diametrically-opposite sides, and a rod or shaft extending transversely through said ash-box, and having valves or dampers adapted to close the said draft-openings simultaneously, substantially as herein set forth.

5. In a furnace, the herein-described ash-box, comprising a ring or casting having draft-openings in diametrically-opposite sides, and provided at its lower edge with an inwardly-extending flange, an ash-pit or drum extending downwardly from said flange and having a bottom provided with radial openings, and a centrally-pivoted valve adapted to cover said openings, substantially as herein set forth.

6. In a furnace, the combination of the base consisting of an annular radiating-chamber having inwardly-extending lugs or brackets, the ash-box having lugs or ears resting upon said brackets, the fire-pot mounted upon the upper edge of the ash-box, and provided at its lower edge with an inwardly-extending flange supporting the grate, the combustion-chamber, the radiator, the connecting-flues, and flues for carrying away the products of combustion, substantially as herein set forth.

7. In a furnace, the combination of the base consisting of an annular radiating-chamber, the top plates or cover for the same having annularly-flanged openings, the ash-box supported upon brackets extending inwardly from the inner wall of the base, the fire-pot mounted upon the ash-box, and the flue-ring supported upon the upper edge of the fire-pot, and having flanged openings connected by suitable elbow-pipes with certain openings in the top plate of the base, substantially as herein described, and for the purpose set forth.

8. In a furnace, the combination, with the base consisting of an annular radiating-chamber having lugs or brackets projecting inwardly from its inner walls, of the ash-box

mounted upon said lugs or brackets, the fire-pot supported upon the ash-box, the flue-ring resting upon the upper edge of the fire-box, the annular casing or combustion-chamber mounted upon the upper edge of the flue-ring, the dome or top having the centrally-located upwardly-extending smoke-pipe, the radiator, and the connecting-flue, substantially as and for the purpose herein set forth.

9. In a furnace, the combination of the base consisting of an annular radiating-chamber having inwardly-extending brackets, the top plates or covers for the same having annularly-flanged openings, the furnace-casing comprising the ash-box, having ears or lugs supporting it upon the brackets of the base, the fire-pot, the flue-ring, the annular casing or combustion-chamber, and the dome having centrally-located upwardly-extending smoke-pipe, the annular radiating-chamber composed of pipe-sections suitably connected and surrounding the smoke pipe or flue, vertical flues connecting said radiating-chamber with certain of the openings in the top plate of the base, elbow-pipes connecting the remaining openings in the top plate of the base with the openings in the flue-ring, elbow-pipes connecting the upper side of the radiating-chamber with the exit-flue, and a damper arranged in the latter below said elbow-pipes, substantially as and for the purpose herein shown and specified.

10. In a furnace, the combination of the base consisting of an annular radiating-chamber, the furnace-casing supported upon lugs or brackets extending inwardly from the inner wall of said base, and having the flue-ring constructed and arranged as herein described, and the top or dome provided with a centrally-located upwardly-extending smoke-pipe or exit-flue, the annular radiating-chamber surrounding said flue, vertical pipes connecting said radiating-chamber with the top of the radiating-base, elbow-pipes connecting the latter with the flue-ring of the furnace-casing, elbow-pipes connecting the upper radiator with the exit-flue, a damper arranged in the

latter below said elbow-pipes, and transverse partitions arranged, respectively, in the base and in the upper radiator and subdividing them into compartments, each of the compartments in the base being connected with the flue-ring of the furnace-casing and also with the upper radiator, substantially as and for the purpose herein set forth.

11. In a furnace, the herein-described annular radiator, composed of a series of pipe-sections suitably joined or connected together, each of said pipe-sections having one end closed and the other end open for the admission of the closed end of the next adjoining pipe-section, substantially as and for the purpose herein shown and specified.

12. The annular radiator composed of pipe-sections suitably connected or joined together, each of said sections having one end closed and the other end open for the admission of the closed end of the next adjoining section, and each section being further provided with a door through which soot and obstructions may be removed, substantially as set forth.

13. In a furnace, the combination of an annular radiating chamber or base divided into independent compartments, so as to leave an open space for the passage of air between the inner wall of said base and the furnace-casing, an annular radiating-chamber surrounding the exit-flue, vertical pipes connecting said annular radiator with the compartments of the radiating-base, pipes connecting the compartments of the latter with the furnace-casing, pipes connecting the upper annular radiator with the exit-flue, and a damper arranged in the latter below said pipes, all combined and arranged substantially as and for the purpose herein set forth.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in presence of two witnesses.

WILLIAM W. SWEETLAND.

Witnesses:

D. S. MINIER,
LEVI ALDRICH.