

No. 804,818.

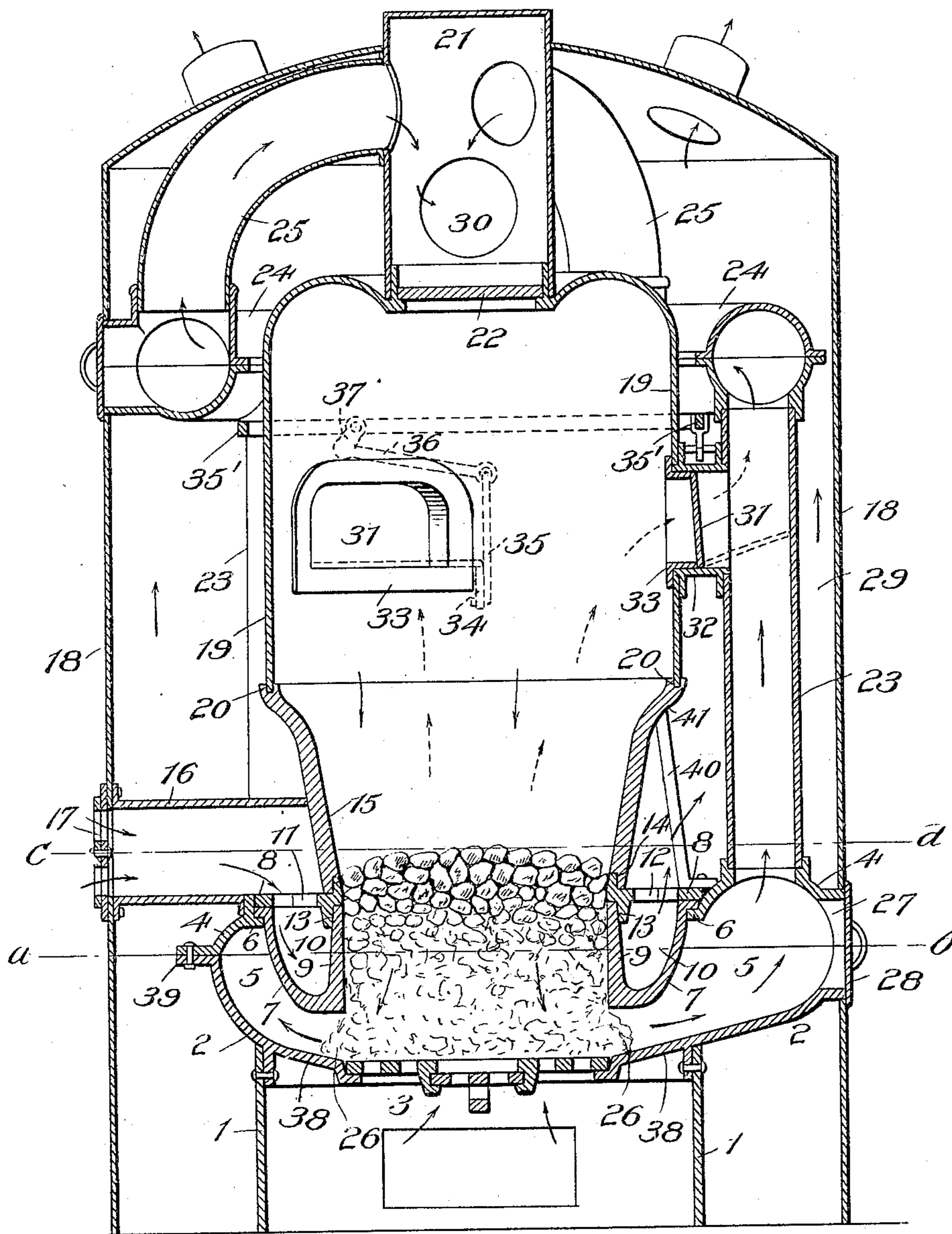
PATENTED NOV. 14, 1905.

C. F. A. RÖELL.
HOT AIR FURNACE, REVERTIBLE DRAFT.

APPLICATION FILED DEC. 28, 1904

3 SHEETS—SHEET 1.

Fig. 1.



Witnesses

Edwin L. Bradford
Anne B. Johnson.

Inventor

Cornelis F. A. Röell

By

Johnson & Johnson

Attorneys

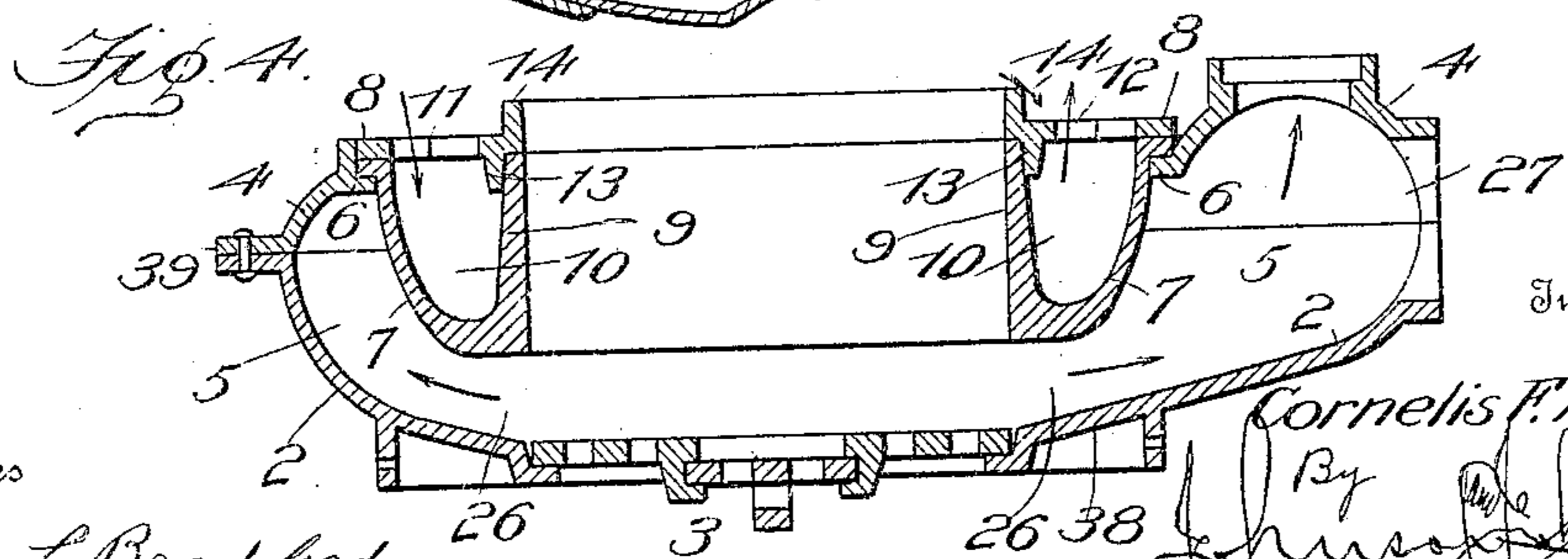
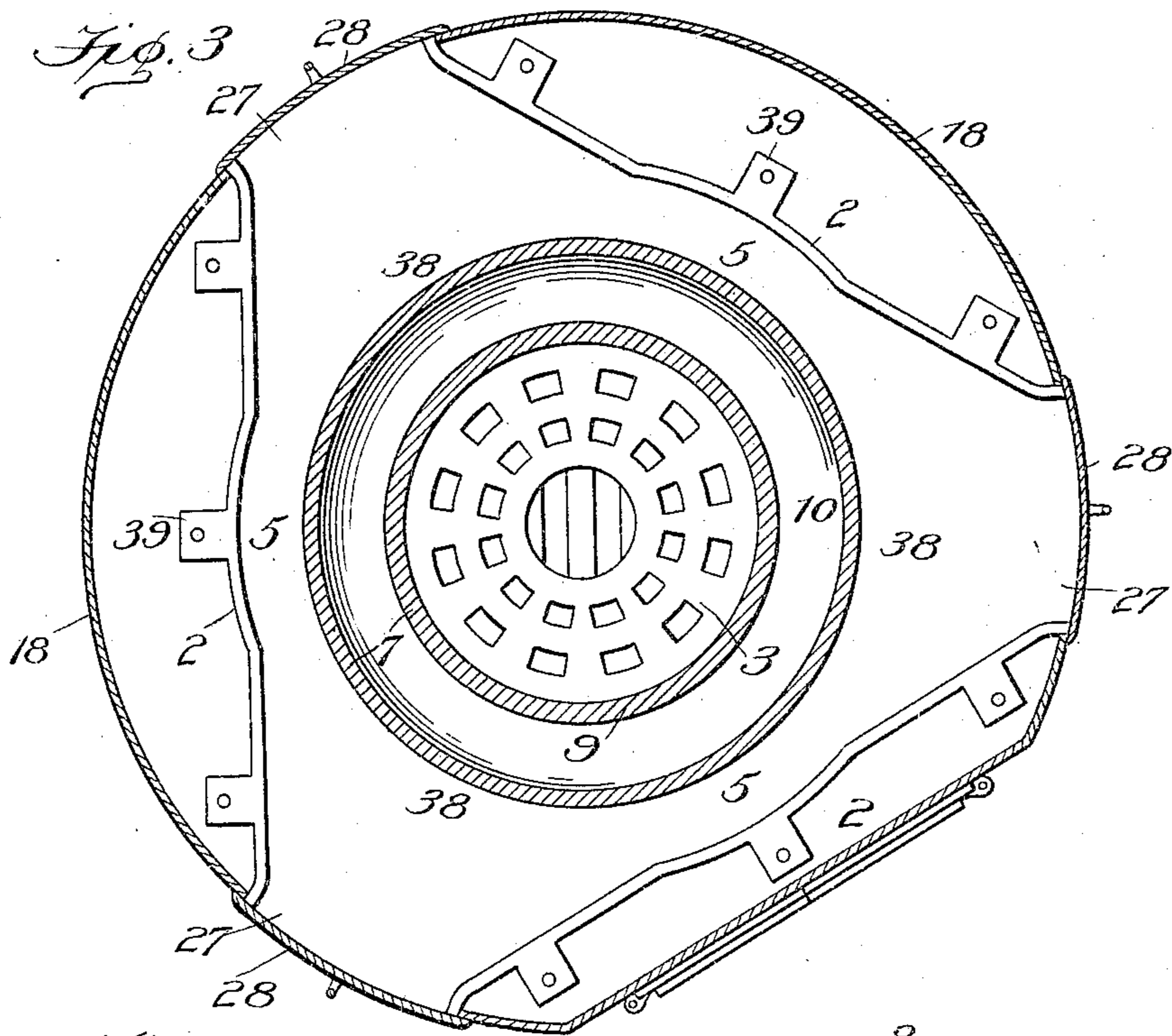
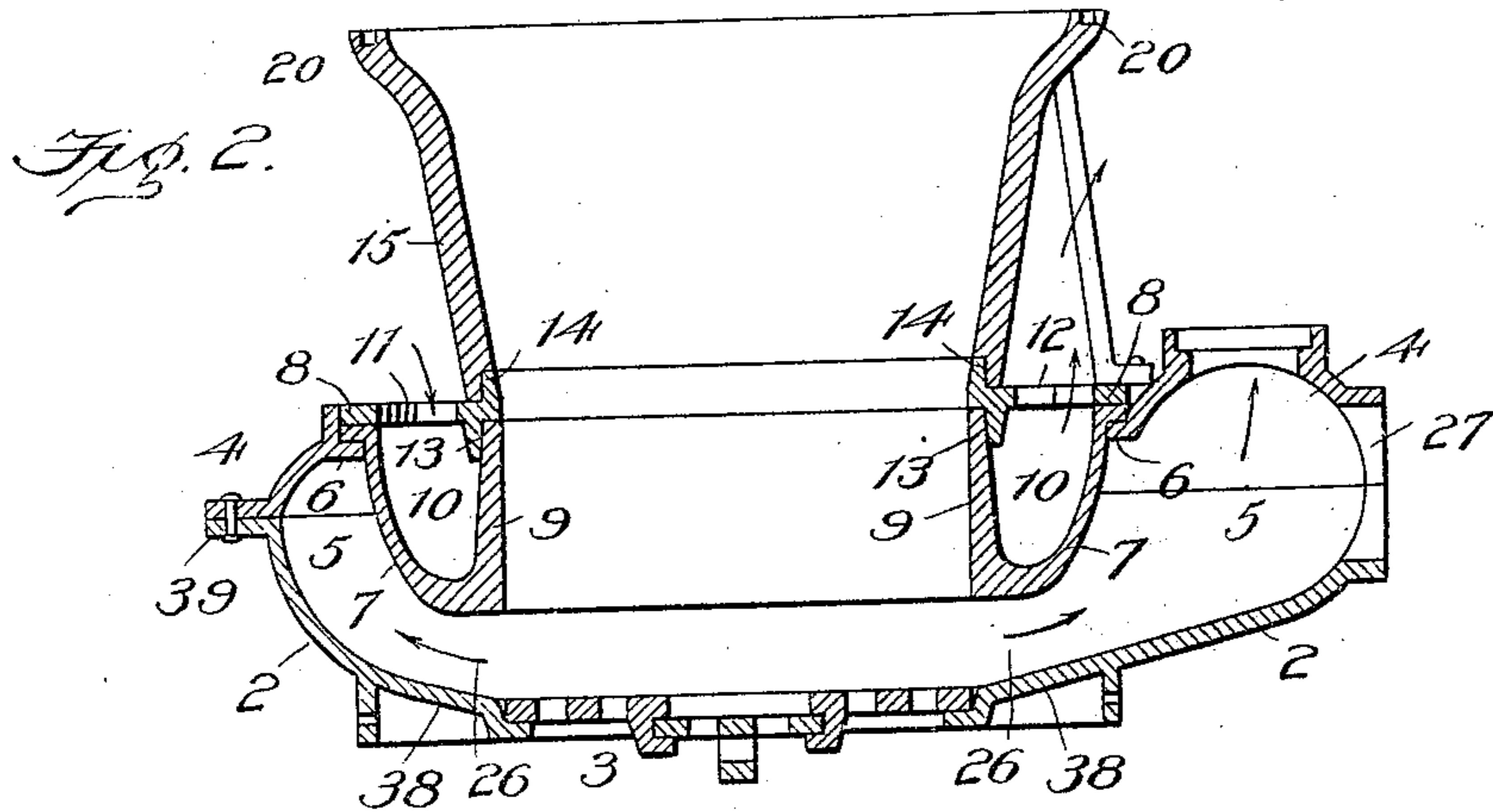
No. 804,818.

PATENTED NOV. 14, 1905.

C. F. A. RÖELL.
HOT AIR FURNACE, REVERTIBLE DRAFT.

APPLICATION FILED DEC. 28, 1904

3 SHEETS--SHEET 2.



Witnesses

Edwin L. Bradford
Anne B. Johnson

Inventor

Cornelis F. A. Röell

By

John A. Johnson
Attorneys.

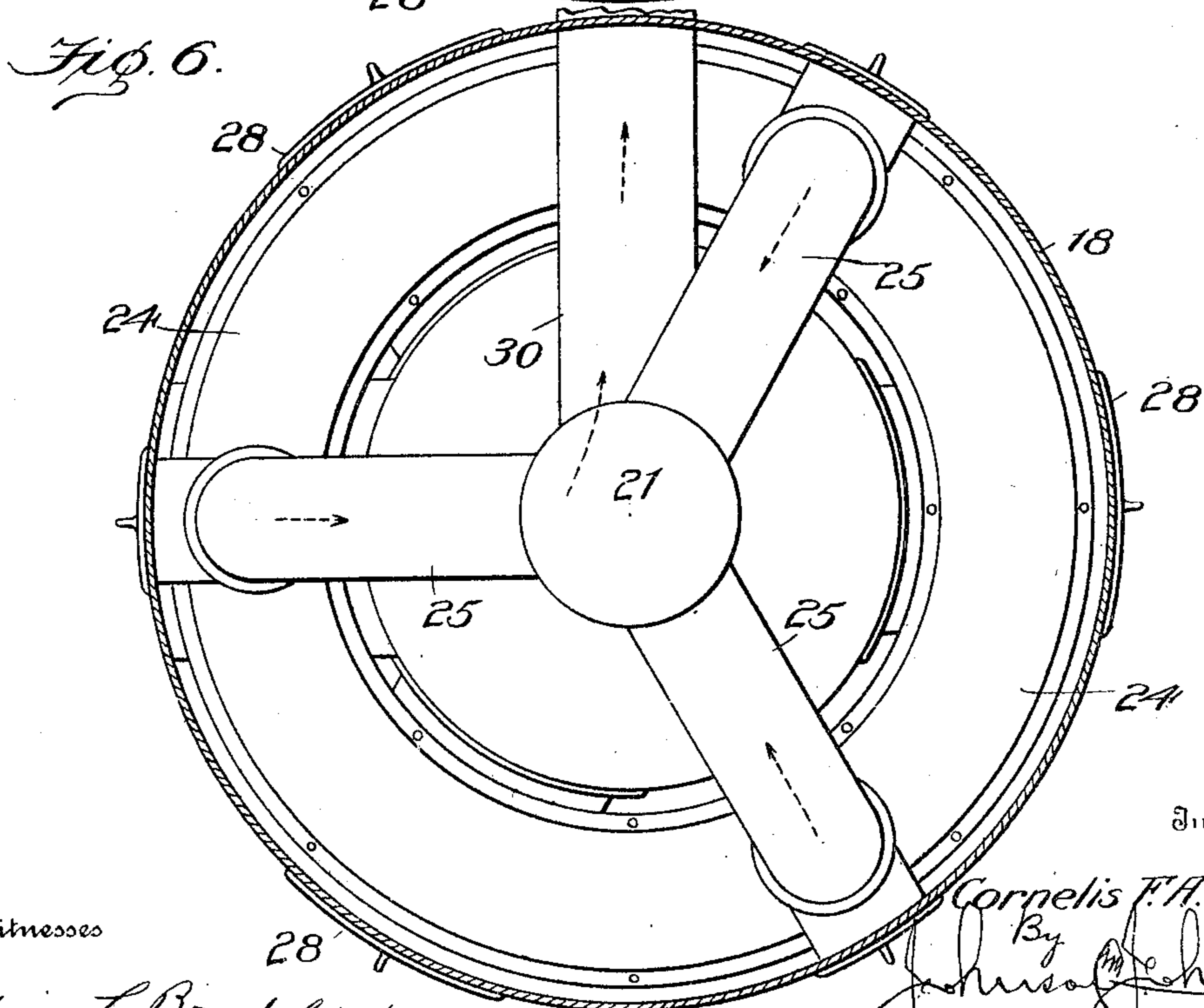
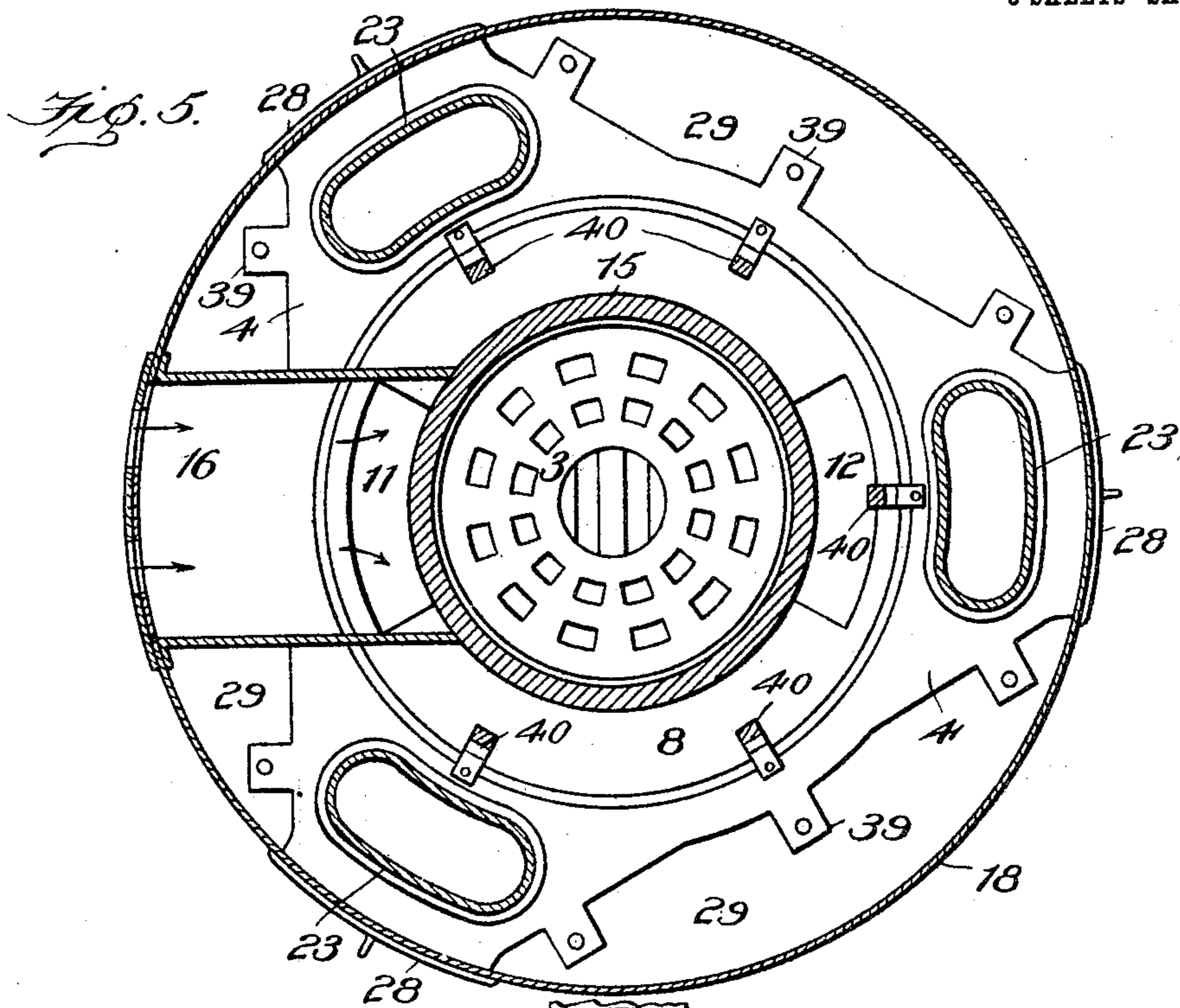
No. 804,818.

PATENTED NOV. 14, 1905.

C. F. A. RÖELL.
HOT AIR FURNACE, REVERTIBLE DRAFT.

APPLICATION FILED DEC. 28, 1904

3 SHEETS—SHEET 3.



Witnesses
Edwin L. Bradford
Anne B. Johnson.

Inventor
Cornelis F. A. Röell
By
John S. Johnson
Attorneys

UNITED STATES PATENT OFFICE.

CORNELIS F. A. RÖELL, OF INDEPENDENCE, MISSOURI.

HOT-AIR FURNACE, REVERTIBLE DRAFT.

No. 804,818.

Specification of Letters Patent.

Patented Nov. 14, 1905.

Application filed December 28, 1904. Serial No. 238,565.

To all whom it may concern:

Be it known that I, CORNELIS F. A. RÖELL, a citizen of the United States, residing at Independence, in the county of Jackson and State of Missouri, have invented certain new and useful Improvements in Hot-Air Furnaces, Revertible Draft; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The invention herein is directed to improvements in hot-air furnaces known as "base-burner, revertible draft;" and the objects of my improvements are to produce a high degree of heat, to cause a complete combustion, to protect the fire-pot, and to provide an air-chamber depending within the fire zone, and in the claims appended hereto I will point out the features of construction which constitute my invention in connection with the accompanying drawings, in which—

Figure 1 shows a vertical central section of a hot-air furnace embodying my invention and in which the arrows show the course of the revertible draft. Fig. 2 is an enlarged vertical section showing the fire-pot, the fire zone, and the air-chamber-forming parts assembled without bolt-fastenings and the air-chamber depending within the fire zone. Fig. 3 is a horizontal section taken on the line *a b* of Fig. 1, showing the air-chamber around the fire-pot, the fire zone, and the clean-out openings therefor. Fig. 4 is an enlarged vertical section showing the fire zone and the air-chamber-forming casting depending from and forming a continuation of the fire-pot-supporting-ring seat. Fig. 5 is a horizontal section on the line *c d* of Fig. 1, showing the air-inlet openings of the air-chamber. Fig. 6 shows in top view the revertible flues, the crown of the hot-air-supplying casing being removed.

A cylindrical or ring casting 1 forms the ash-pit base and has the usual base-door, and upon the edge of this base-casting a circular plate 2 is seated, having a diameter greater than that of the ash-pit base, overhangs it, supports the grate 3 within the base-casting, and forms the lower half of the fire zone, and for this purpose the overhanging part has a concave formation around its circumference. The upper half of the fire zone is formed by a plate 4, having a similar inverted concave formation around its circumference, fits upon the concave circumference of the lower fire-

zone-forming plate, and forms a circular chamber 5, surrounding and communicating with the fire zone. These fire-zone-forming plates support the several parts of the furnace above the grate. The upper plate 4 of the fire zone has a circular opening of greater diameter than the fire-grate and has a shouldered formation 6 around the edge of said opening. Within this opening a chamber-forming ring-casting 7 depends, being formed of double walls closed at the bottom and with a circumferential lip seated upon said shouldered formation 6, and has a cross-section approximating a U form, and upon its sides 7 and 9 is seated a ring-plate 8, which forms an air-chamber 10 of the depending casting, and for that purpose is provided with an air-inlet opening 11 and an air-outlet opening 12, so that the inlet and the outlet are at the top of said chamber. This ring forms an under shouldered joint 13 with the inner wall 9 of the chamber-forming casting and an upper shouldered joint 14 for the seating thereon of the fire-pot 15. This construction provides an air-tight joining of the fire-zone and fire-pot and air-chamber forming parts, a firm support for the fire-pot, and the means of forming an air-chamber 10, depending from and forming a prolongation of the fire-pot. This construction also gives the advantage of arranging the U-shaped casting and its air-chamber directly within the fire zone and providing thereby a closed chambered nose directly within the fire zone.

The inlet for the air-chamber is shown in Figs. 1 and 2 and consists of a box 16, which joins the outer wall of the fire-pot and opens into the inlet-opening 11 of the ring-casting which forms the top of the air-chamber, and a register 17 at the outer casing-wall controls the inlet of the air, so that there is a full volume of air constantly passing into the air-chamber at one side of the fire-pot, above the chamber, around the chamber, and out of it at the other side of the fire-pot into the hot-air space of the casing, as indicated by the arrows.

The shell 19 of the furnace is seated within a groove 20 in the top of the fire-pot and forms the combustion-chamber, from the crown of which rises a central smoke-pipe 21, but which is closed by a plate 22 to the combustion-chamber. From the upper ring plate or cover 4 of the fire zone rise a plurality of pipes 23, which open into the fire zone outside of the fire-pot and open into a circular pipe 24, surrounding the upper portion of the

furnace-shell. From this top horizontal pipe rises a plurality of curved pipes 25, which open into the central vertical smoke-pipe 21, and these pipes constitute the revertible draft-flues from the fire zone.

The fire zone chamber is circular, has its greatest area at its connection with the revertible flues, and gives a free and direct outlet for the revertible draft from the fire zone, and to increase the force of the draft from the fire zone its circular chamber forming part 5 communicates with the grate by a narrow or funnel passage 26 directly beneath and formed by the nose of the depending hot-air chamber 10. In Fig. 3 the fire-zone chamber is seen as constructed with clean-out boxes 27, closed by caps 28, preferably at three equidistant points at openings in the walls of the furnace-inclosing casing, within which casing the air is heated and from which it is supplied by crown distributing-pipes, the air being admitted at the base of the furnace and passes up through the spaces 29 between the clean-out boxes and is heated by all the furnace radiating-surfaces. The placing of the circular pipe 24 around the upper part of the furnace-shell gives room for the arrangement of the pipes 25, which connect the circular pipe with the central outlet-pipe between the crown of the combustion-chamber and the crown of the air-supplying casing, and gives the advantage of carrying all the smoke-flues to the central flue. The closing of this central flue to the combustion-chamber allows the exit-flue 30 to connect the central flue within the hot-air space, which is advantageous for low ceilings. The closing of the central pipe avoids a direct draft, which would reduce the radiation, and as the closing-plate is loosely fitted it may be raised to clean the smoke-pipe. Provision is made for a direct draft up through the grate and from the combustion-chamber by dampers 31, arranged in the walls of the combustion-chamber to open into the revertible pipes. For this purpose these vertical pipes are connected with the walls of the combustion-chamber by short pipes 32, (seen in Fig. 1,) within which the dampers are pivoted, and which pipes open into the combustion-chamber and into the vertical revertible flues. These dampers are of a size and form to fit the flues, so that when the dampers are open to the combustion-chamber they will be turned into and across said flues against their walls, and thereby close the revertible draft. Closing the draft from the combustion-chamber opens the draft through the revertible flues. The dampers are of the flap form, being hinged at their lower edges; but they are only opened when starting the fire or when a direct draft is desired. It is important that when these dampers are closed with the combustion-chamber they should effectually stop the direct draft, and for this purpose the damper-openings are fitted with an open

flanged box 33, which is slid in the damper-opening with its flange secured against the inside wall of the combustion-chamber, with its inner edge against the hinged edge of said damper, thereby making a tight joint, and serves as a stop for the damper when closed. All these dampers should be operated at the same time under any conditions of the fire and of the draft, so that the heat will be always equally distributed and controlled. For this purpose I have provided means for automatically opening and closing the dampers. The damper-pivots project at one side of each damper-containing tube, and each pivot has a crank-arm 34, to which a link 35 is connected, the upper ends of which links are connected to a semicircular ring 35' by means of a two-armed lever pivoted to the shell of the combustion-chamber and having its long arm 36 connected to said link 35 and its short arm 37 connected to said band with a free movement, so that by moving the ring in one direction will open all the dampers to the combustion-chamber and close the ascending draft in all the vertical pipes and by moving the ring in the opposite direction will close all the dampers to the combustion-chamber and open all the revertible flues.

The grate-supporting ring 2 affords a solid surface 38, inclining down and inward, so that the grate is supported on its inner edge at a point vertically below the inner wall of the nose of the depending air-chamber, thereby preventing cold air from the ash-pit entering the fire-zone chamber 5 without first passing through the grate; otherwise it would take the draft away from the fire zone. As seen in Fig. 3, the front part of the furnace-inclosing case is flat, and on this flat front the doors for supplying the fire-pot and for the ash-pit are mounted. The upward draft through the grate will cause the fuel thereon and in the lower part of the fire-pot to remain ignited, while the upward and downward draft-currents meet in the fire-zone space between the grate and the lower end of the fire-pot to effect a total combustion of the fuel resting on the grate.

In assembling the parts the pair of fire-zone-forming ring-plates are secured together, and by lugs 39, secured to the base-ring, the U-shaped casting is seated by its outer shouldered edge upon the inner shouldered edge of the upper of the pair of ring-castings. The ring-plate 8 is then seated upon the upper edges of the walls of the chamber-forming casting, the fire-pot seated upon said ring-plate, and the shell forming the combustion-chamber seated upon the fire-pot. While the fire-pot has a firm shouldered seating upon the ring-plate, it is provided with lateral stays or braces 40, fastened to the outer edge of the ring-plate and abutting against a circumferential shoulder 41 at the upper edge of the fire-pot. The air-chamber, formed of a sepa-

rate casting and constituting an extension of the fire-pot, protects it from being burned out and puts the air-chamber entirely below the fire-pot and within the fire zone, and the air, intensely heated by both the walls of this chamber, passes directly therefrom into the hot-air space of the casing.

I claim—

1. In a hot-air furnace, an inclosing casing, a grate, a fire-pot, and a shell seated thereon forming the combustion-chamber, a circular casting of approximately trough shape in cross-section, its inner wall in alinement with and forming a prolongation of the fire-pot, top and bottom ring-plates connecting the grate and the top of the outer wall of said ring-casting, said top plate being the means for suspending said casting and forming a fire-zone space surrounding it, and a cover for said casting having an air-inlet and an air-outlet, the latter opening into the hot-air space of said casing, and pipes rising from said fire-zone top plate for the products of combustion.

2. In a hot-air furnace, an inclosing casing, a grate, a fire-pot, a shell seated thereon forming the combustion-chamber, a circular hollow casting closed at its bottom and provided with a top, its inner wall in alinement with, supporting and forming a prolongation of the fire-pot, a top ring-plate supporting the said casting and a bottom ring-plate connecting the grate, supporting said top plate and forming with it a fire-zone space surrounding said casting, the latter having an air-inlet and an air-outlet both at its top, the outlet opening into the hot-air space of said casing, and pipes rising from said top plate for the products of combustion.

3. In a hot-air furnace, an inclosing casing, a grate, a top and a bottom ring-plate the latter joining the grate and forming a fire-zone space, a circular double-walled ring-casting closed at its bottom, suspended within the fire-zone space from the inner edge of the top ring-plate, a separate ring-plate seated upon and covering said double-walled casting, a fire-pot seated upon said covering-plate in alinement with and forming a continuation of the inner wall of the suspended casting, the said ring-plate having an air-inlet and an air-outlet the latter opening into the hot-air space of said casing, and formed with shoulders lap-joining the casting and the fire-pot, pipes for the products of combustion rising from the fire-zone top plate and a shell seated upon the fire-pot and forming the combustion-chamber.

4. In a hot-air furnace, an inclosing casing, a fire-pot, a grate, a pair of ring-plates the bottom one joining the grate and with the upper plate forming a fire-zone space, a double-walled ring-casting closed at its bottom and provided with a top, suspended by its outer wall from the inner edge of the upper ring-plate, and having its inner wall in alinement with and forming a prolongation of the fire-

pot, the top of said double-walled casting having an air-inlet and an air-outlet the latter opening into the hot-air space of the casing, the top plate of the fire-zone space having a plurality of pipes for the products of combustion, the said fire-zone-forming plates having a plurality of clean-out openings, and a shell seated upon the fire-pot and forming the combustion-chamber.

5. In a hot-air furnace, an inclosing casing, a grate, a fire-pot, a shell seated thereon forming the combustion-chamber, a pair of ring-plates the bottom one joining the grate and with the upper plate forming a fire-zone space, a double-walled ring-casting, closed at its bottom, having its outer wall formed with an angle-shoulder suspending it on the inner edge of the upper ring-plate and depending within the fire zone forming thereby with said bottom plate a narrow passage to the fire-zone space, the inner wall of said casting in alinement with and forming a prolongation of the fire-pot, the top of said double-walled casting having an air-inlet and an air-outlet the latter opening into the hot-air space of the casing, and pipes for the products of combustion rising from the top plate of the fire-zone space.

6. In a hot-air furnace, an inclosing casing, a grate, a pair of ring-plates forming between them and with the grate a fire-zone space, a double-walled ring-casting closed at its bottom and provided with a top, supported by and depending from the inner edge of the upper of said pair of plates within the fire-zone space, a fire-pot seated upon the top of the inner wall of said depending casting in alinement therewith, a plurality of stays or braces fixed to the top of said casting and abutting the top of the fire-pot, the top of said ring-casting having an air-inlet and an air-outlet the latter opening into the hot-air space of the casing, pipes for the products of combustion rising from the top plate of the fire-zone space, and a shell seated upon the fire-pot and forming the combustion-chamber.

7. In a hot-air furnace, an inclosing casing, a grate, a fire-pot, a shell thereon forming the combustion-chamber, a pair of plates forming with the grate a fire-zone space, a plurality of pipes rising from the fire-zone-forming top plate, a horizontal pipe encircling the top of said shell, and connecting said vertical pipes, a central pipe mounted upon the crown of said shell, pipes connecting said central pipe with said horizontal pipe, and an exit-pipe connecting said central pipe.

8. In a hot-air furnace, an inclosing casing, a grate, a fire-pot, a shell thereon forming the combustion-chamber, a pair of plates forming with the grate a fire-zone space, a plurality of pipes rising from the fire-zone-forming top plate, a horizontal pipe encircling the top of said shell, and connecting said vertical pipes, a central pipe mounted upon the crown of said shell, pipes connecting said central pipe

with said horizontal pipe, an exit-pipe connecting said central pipe, tubes connecting the shell with said vertical pipes, and dampers within said tubes adapted to open communication between the combustion-chamber and the exit-pipe and to close the communication of said exit-pipe with the fire-zone space whereby to change the direction of the draft.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CORNELIS F. A. RÖELL.

Witnesses:

S. D. BENNETT,
E. PARRAD.