

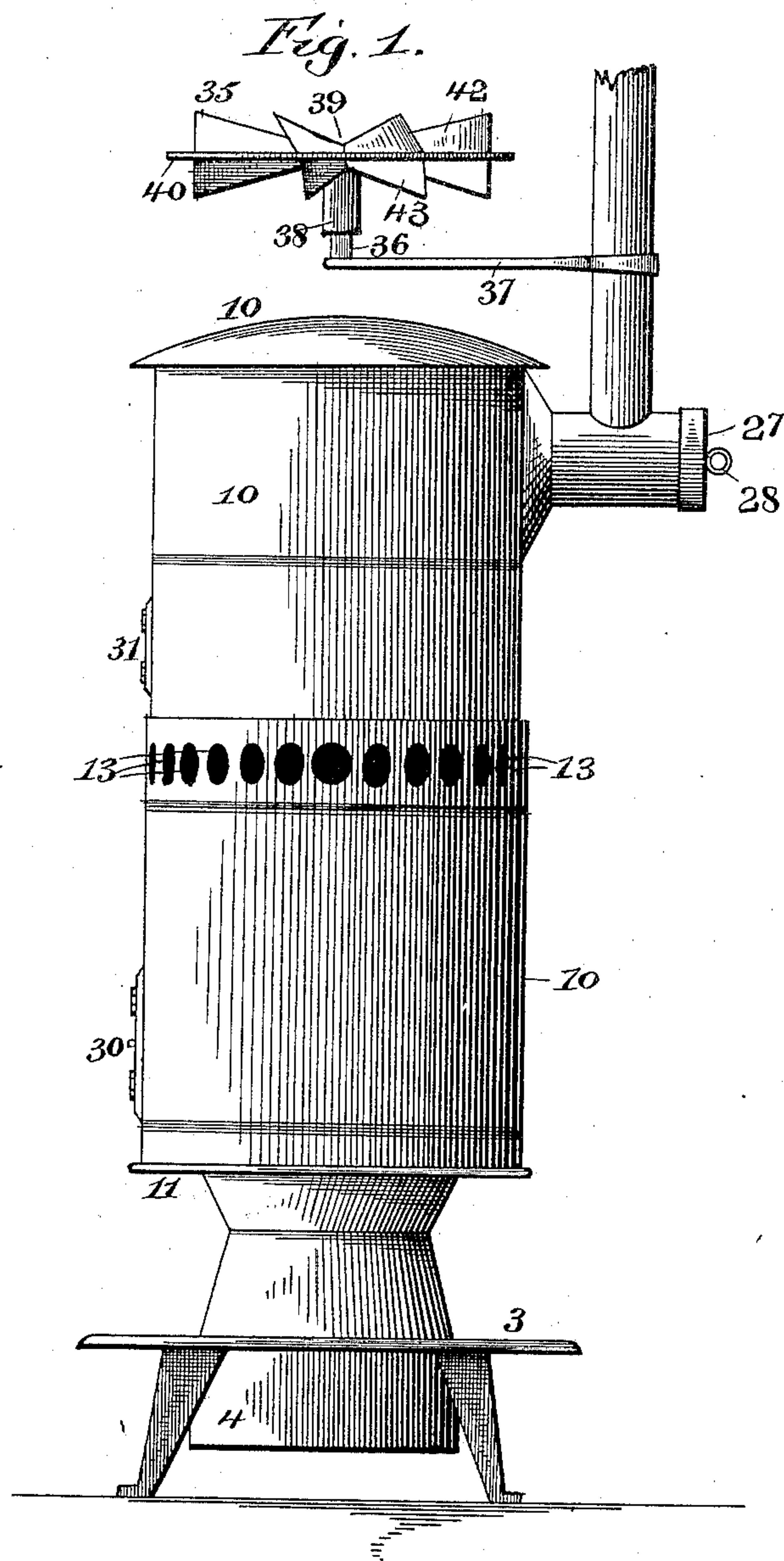
(No Model.)

3 Sheets—Sheet 1.

C. B. LOVELESS.  
HOT AIR VENTILATING HEATER.

No. 432,188.

Patented July 15, 1890.



Witnesses:  
*J. B. McGirr.*  
*N. J. Beahm.*

Inventor.  
*Charles B. Loveless*  
By his Attorney,  
*Edson & Bros.*

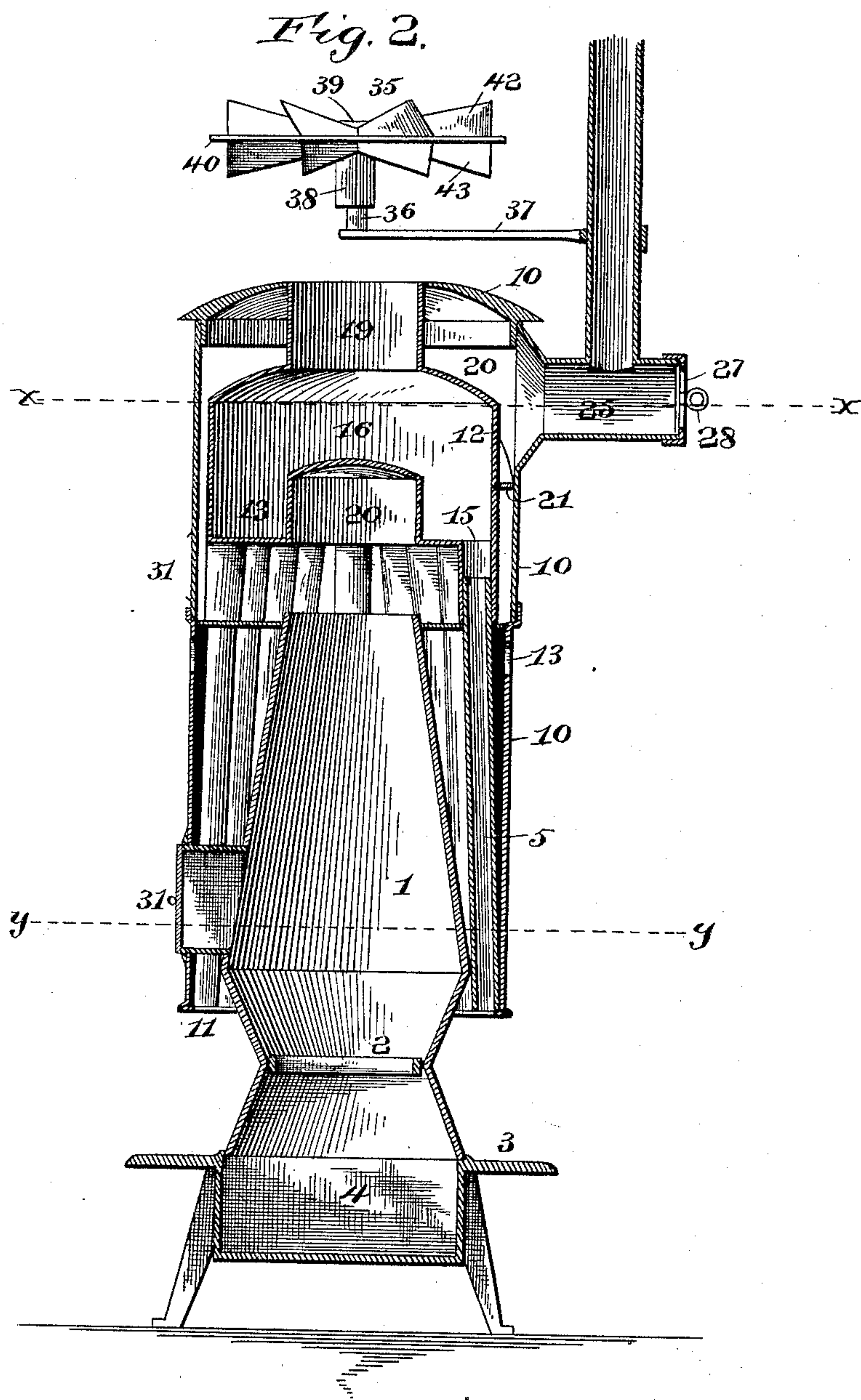
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(No Model.)

3 Sheets—Sheet 3.

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Fig. 3

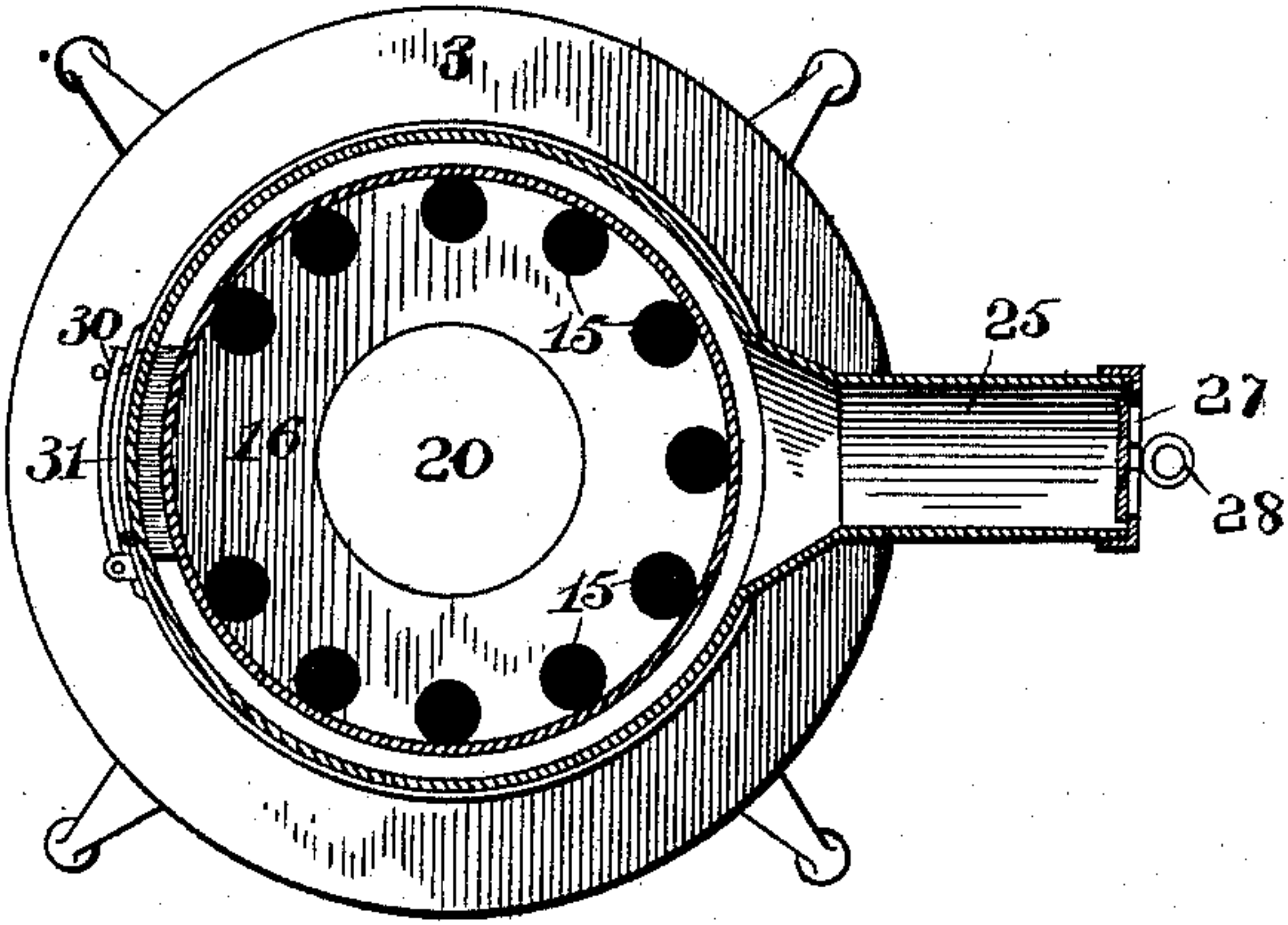


Fig. 4.

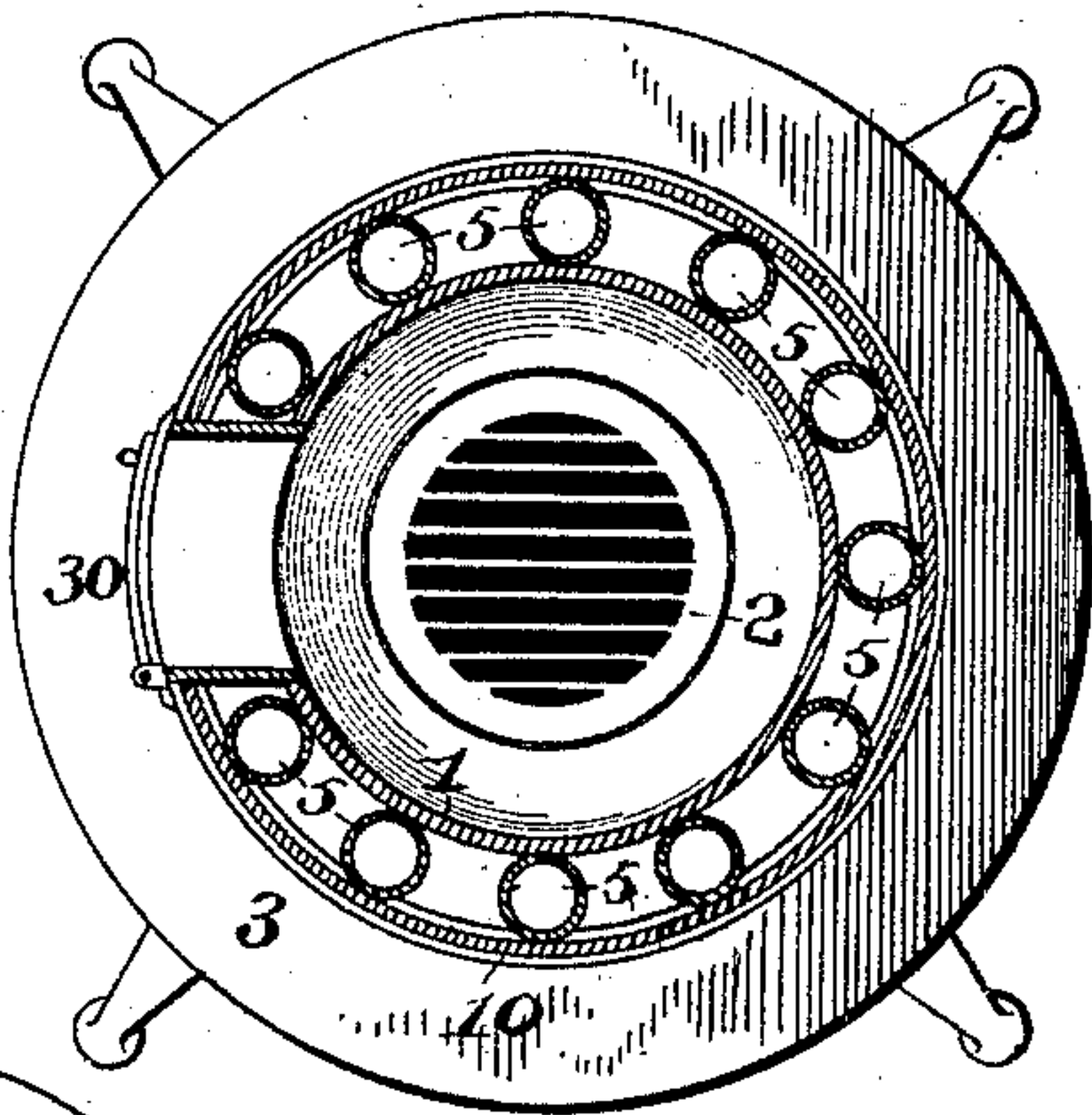


Fig. 5.

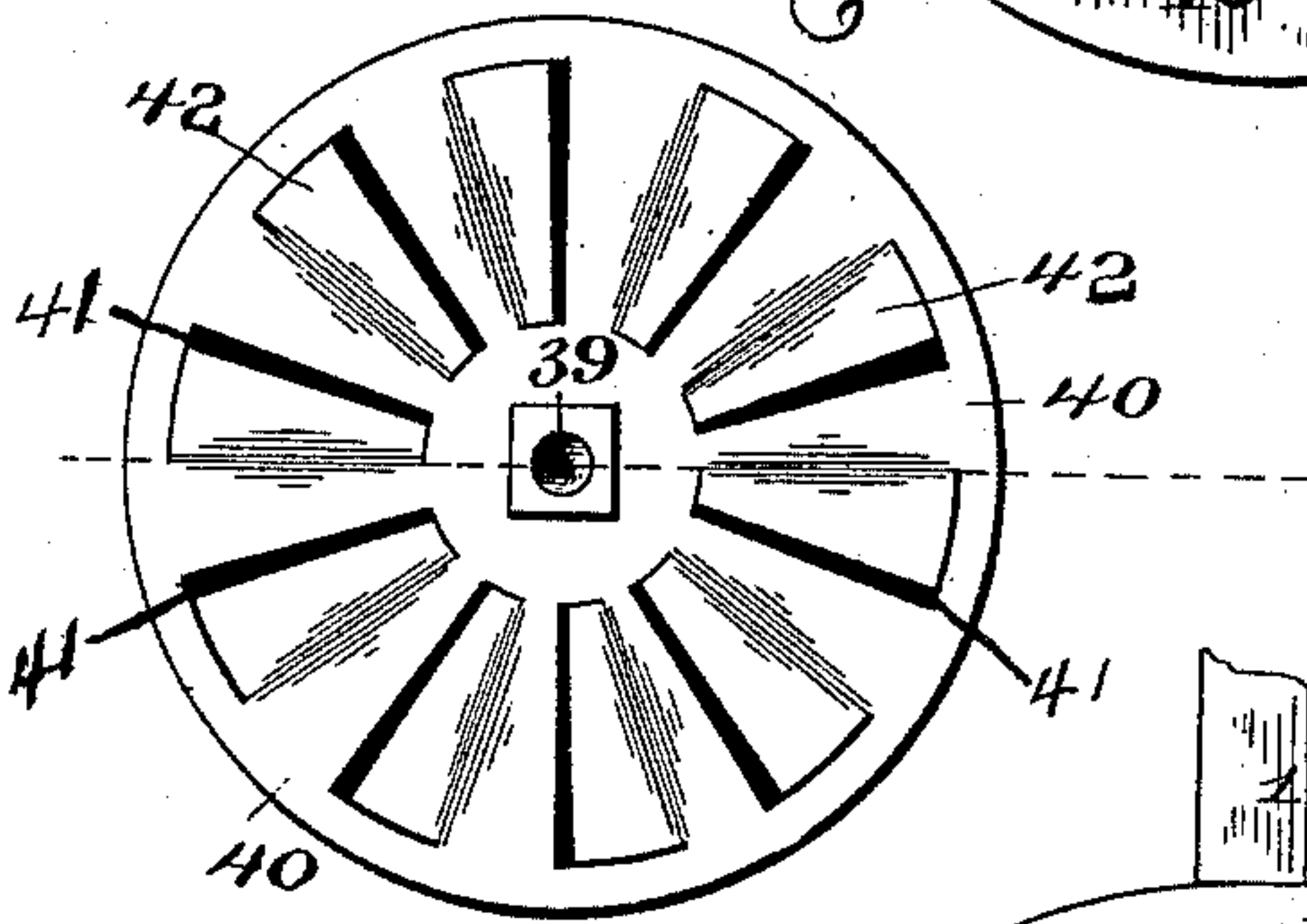


Fig. 6.

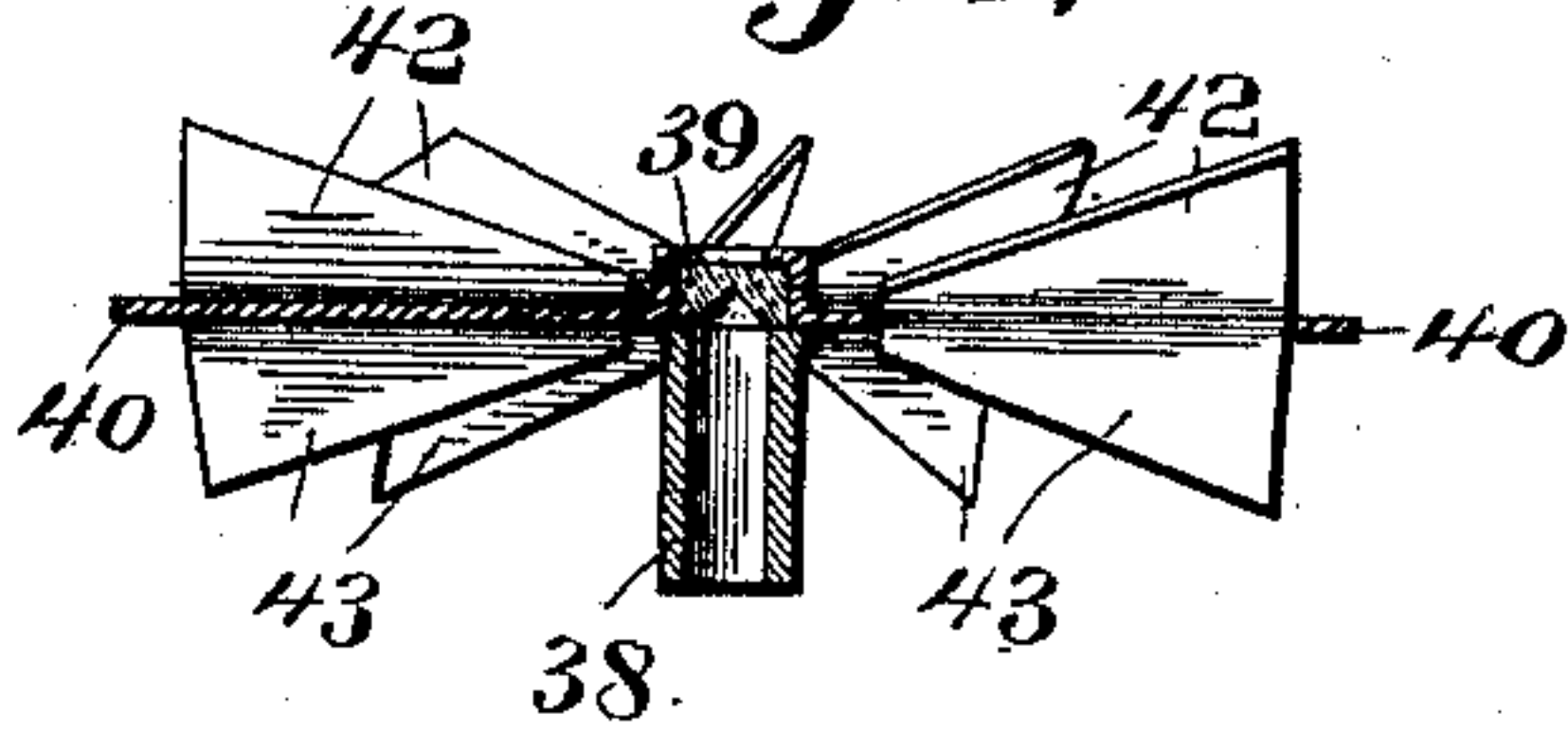
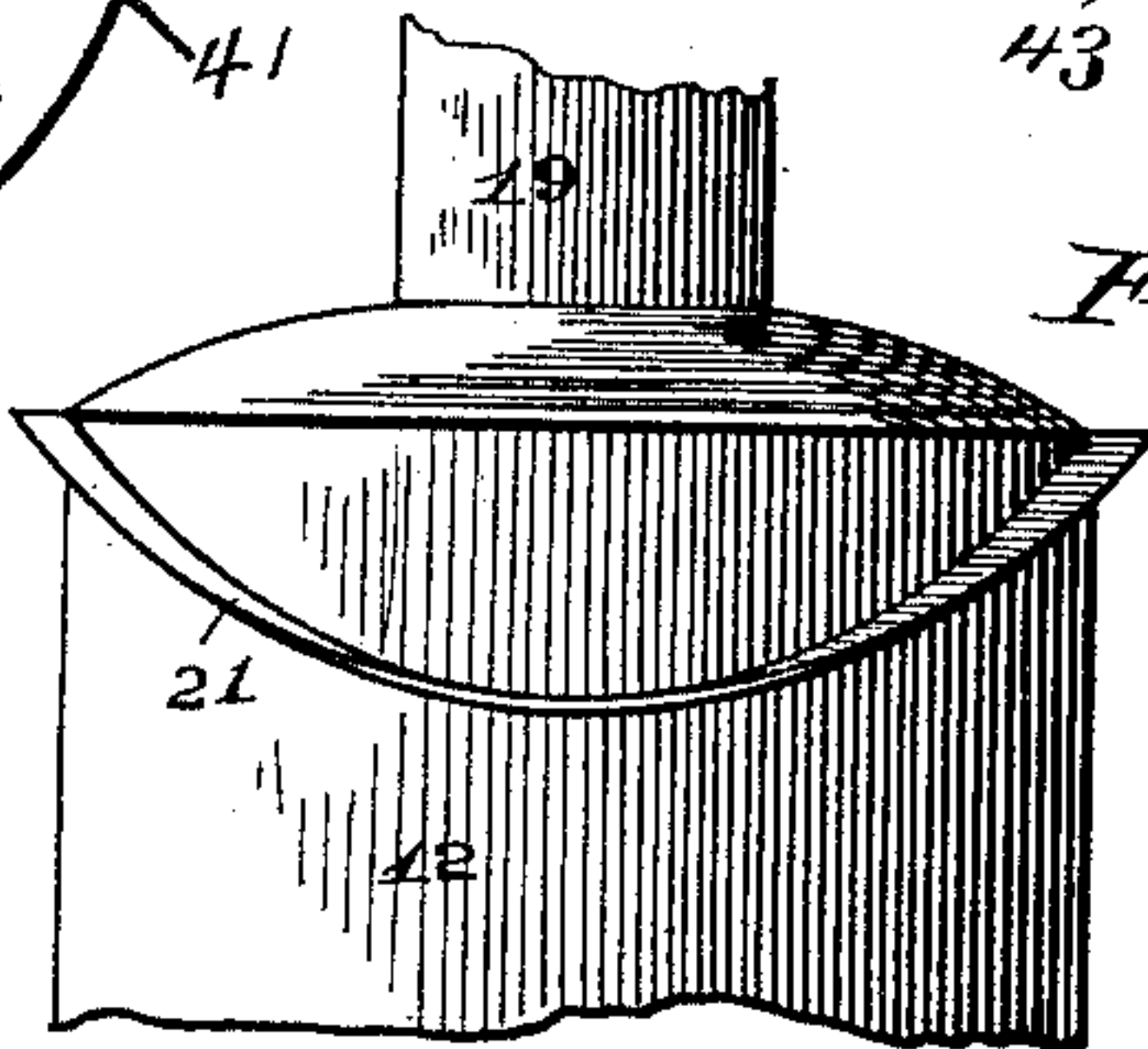


Fig. 7.



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# UNITED STATES PATENT OFFICE.

CHARLES B. LOVELESS, OF WORTHINGTON, MINNESOTA.

## HOT-AIR VENTILATING HEATER.

SPECIFICATION forming part of Letters Patent No. 432,188, dated July 15, 1890.

Application filed February 14, 1890. Serial No. 340,427. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES B. LOVELESS, a citizen of the United States, residing at Worthington, in the county of Nobles and State of Minnesota, have invented certain new and useful Improvements in Hot-Air Ventilating Heaters; 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.

My invention relates to improvements in hot-air ventilating heaters adapted for use in offices, halls, stores, school-houses, and other places where the stove is located in the room or apartment to be heated; as well as in the basement of houses where the hot-air is conducted by pipes from the heater and distributed through the house to the various rooms.

One of the objects of my invention is to provide a heater with means whereby cold air is constantly supplied around the fire-pot or combustion-chamber to be heated and displaced by the same, thus providing for a continuous circulation, the arrangement being such that a large area of heating-surface is provided around the fire-pot, over which surface the air is constantly passing, so that the air takes up the excessive heat from the fire-pot and prevents the latter from becoming heated to excess, which is advantageous, in that a larger volume of air is heated, the circulation increased, and the temperature of the fire-pot is kept down to such a degree that the oxygen in the heated air is not destroyed.

Another object of my invention is to provide means whereby the hot air as it escapes from the heater is forcibly thrown out from the heater and distributed into the surrounding atmosphere, which is advantageous for two reasons—the air which passes through the heater is drawn by suction at an increased speed, and hence in increased volumes, so that the current of air moves with sufficient rapidity and force to operate the distributing and suction appliance, and hence a larger volume of cold air is drawn into the heater, is heated on its passage through the heater, and is rapidly and uniformly distributed into the surrounding atmosphere.

A further object of my invention is to pro-

vide means whereby the heater can be readily cleansed, the draft regulated, and to improve the parts in minor details with a view to promoting efficiency of operation and simplicity of construction.

With these ends in view my invention consists in the combinations of devices and peculiar construction and arrangement of parts, as will be hereinafter fully described and claimed.

To enable others to understand my invention, I will now proceed to a detailed description thereof in connection with the accompanying drawings, in which—

Figure I is an elevation of a hot-air heater embodying my invention. Fig. II is a vertical central sectional view on the line  $xx$  of Fig. III. Fig. III is a horizontal sectional view on the line  $yy$  of Fig. II. Fig. IV is a horizontal sectional view on the line  $zz$  of Fig. II. Fig. V is an enlarged detail view of the combined rotary air-distributor and suction-fan. Fig. VI is a central sectional view through said air-distributor and fan. Fig. VII is an elevation of the upper hot-air chamber to show the inclined deflecting-rib.

Like numerals of reference denote corresponding parts in all the figures of the drawings.

Referring by numerals to the drawings, 1 designates the fire-pot or combustion-chamber of a hot-air heater embodying my invention. This fire-pot is preferably tapered in the direction of its length, being gradually decreased in diameter from its upper end toward its lower end to form a long extended surface for the direct action of the heat, products of combustion, and fuel, and near the lower part of this fire-box is provided a grate 2 of the usual form. The lower part of the fire-pot, on a plane above the grate, is in the form of two cones placed base to base, and said lower part of the fire-box is united to a base 3 of the ordinary form and opens into an ash-pit 4, which ash-pit is located below the base and provided with an ordinary door for the admission of air and removal of ashes, as is usual. A series of air flues or tubes 5 is arranged at suitable intervals around the long fire-pot, said flues being arranged exteriorly of the fire-pot in the direction of the



length of the same, and being out of lateral contact therewith, except near their lower ends, where they come against the enlarged part or lower end of the fire-pot. These air  
 5 flues or tubes are housed or inclosed within the lower section or member of a jacket or casing 10, which incloses the tubes or flues and the fire-pot, the lower part of the jacket member or section and the air-tubes termi-  
 10 nating on the plane of the conical part of the fire-pot near the base of the heater. The lower part of the jacket and the air-flues are left open for the free admission of cold air, and said lower end of the jacket or casing is  
 15 provided with a collar or flange 11, which serves as the support for the lower extremities of the air flues or tubes.

The upper part of the lower section of the jacket or casing has a diaphragm or crown-  
 20 sheet 12, which extends continuously over the space between the jacket or casing and the upper contracted end of the fire-pot, said diaphragm or crown-sheet 12 thus serving to close the upper part of the air-space between  
 25 the fire-pot and the lower member of the jacket; but the hot air confined within the lower part of the jacket below the crown-sheet is free to escape through lateral open-  
 30 ings 13, formed in the jacket below the crown-sheet, so that the air is free to enter the jacket at the lower open end thereof, be heated by circulating around the fire-pot and the hot-  
 air flues 5, and escapes through the openings 13 in the jacket.

35 The fire-pot opens centrally through the diaphragm or crown-sheet 12, and the upper ends of the flues 5 also open through the crown-sheet, said ends of the flues being supported in the crown-sheet in any suitable  
 40 manner; but the hot-air flues communicate with similar flues 15 on a superimposed hot-air dome or chamber 16, while the fire-pot opens directly into a smoke-chamber 20, into  
 45 of combustion from the fire-pot are discharged.

The hot-air chamber or dome 16 lies above and out of contact with the crown-sheet 12, so as to form the intermediate smoke-chamber 20, and the lower side of the hot-air chamber  
 50 or dome is closed by a bottom 17, so that the smoke, &c., is prevented from entering said chamber or dome. The dome or chamber 16 is cast in a single piece of metal, and it has the  
 55 integral hot-air flues 15 depending from the closed lower side thereof, said flues corresponding in number and arrangement with the flues 5, and forming a continuation of the  
 latter when the sections or parts of the heater are properly fitted together, the lower ex-  
 60 tremities of the flues 15 being joined to the flues 5 by any suitable form of smoke-tight joints.

The bottom of the hot-air chamber or dome is provided with a raised or elevated crown  
 65 18, which extends vertically and centrally into the chamber, and which is located directly over and above the outlet of the fire-

pot, so that the heat and products of combustion are free to enter and circulate in the  
 space formed by the raised central crown in 70 the hot-air chamber or dome, whereby an extended surface or area is provided for the action of the heat, &c. The upper flues 15 open directly through the bottom of and into  
 the hot-air chamber or drum at points around 75 the central elevated part thereof, and the upper part of said dome or chamber 16 has a contracted vertical neck 19, which projects through the closed top or crown of the upper  
 section or member of the jacket or shell 10. 80 This upper section or member of the shell or jacket surrounds the dome or chamber 16 and the depending flues 15 thereof, so as to provide the smoke-chamber 20 between the  
 dome and the crown-sheet 12 and a smoke- 85 passage around the flues 15 and the shell of said dome or chamber, as shown in Figs. 2 and 4.

The smoke and other products of combustion entering the smoke-chamber from the 90 fire-pot are prevented from escaping directly from said chamber into and through the exit-pipe 25 by an inclined deflector 21, which is located between the hot-air dome or chamber  
 and the surrounding jacket at the rear thereof. 95 This deflector is located at a point below the smoke-exit pipe 25, and it then follows partially around the hot-air dome and rises gradually until the ends thereof terminate at a  
 point where the cover of the dome joins the 100 vertical side thereof. Said inclined continuous deflector causes the smoke and products of combustion to pass to the front of the smoke-chamber and around the hot-air cham-  
 ber before the same can escape from the 105 smoke-chamber into the exit-pipe at the back of the heater, thereby securing an increased heating-surface for the action of the smoke and products of combustion.

In the base or elbow of the smoke-exit pipe 110 I provide a rearward extension 26, having the transverse apertures 27, which apertures are adapted to be closed or opened by an adjust-  
 able regulator 28, which is pivoted centrally 115 to the extension and is capable of being partially turned to cause the openings therein to coincide with the openings 27 or not, according as it is desired to decrease or increase  
 the draft or to clean the smoke-exit pipe of soot, &c. 120

The front of the heater is provided with a door 30 to introduce fuel into the fire-pot, and another door 31 at a point above the crown-  
 sheet 12 for the purpose of ready access to the smoke-chamber, in order to remove ashes, 125 soot, and other deposits which may accumulate in the chamber.

If it is desired to use the heater for supplying hot air to the various rooms of a dwell-  
 ing-house, &c., the heater is located in the 130 basement or other suitable apartment, and a distributing-pipe is coupled to the upper end of the heater, so as to communicate with the contracted neck of the hot-air dome or cham-



ber of the heater, and this distributing-pipe carries the pure hot air to the several branch pipes used for distributing the air through the various rooms.

5 If the heater is located in the room or apartment it is desired to heat, and my invention is especially well adapted for this use, which apartment may be a hall, office, store, school-room, or similar place of public or private assembly, I provide the heater with a combined  
10 air-distributor and suction-fan 35, which is rotated rapidly by the ascending current of heated air which escapes from the hot-air dome or chamber. Of course the distributing-pipe heretofore referred to is removed  
15 from the heater when the distributing and suction fan is employed. This distributing and suction fan is located, preferably, in a horizontal position and immediately over the outlet for the pure hot air from the dome or  
20 chamber, said fan being constructed with radial inclined and vertical blades, which are acted on by the current of hot air so as to propel the fan and operate to forcibly throw or radiate the hot air uniformly in all directions around the heater. The fan is mounted  
25 so as to turn very freely on a vertical pivot 36, which is carried by a horizontal arm 37, that is fixed to the smoke-exit pipe or any other suitable place, and this pivot is fitted  
30 in a glass or other anti-friction bearing 38 in the center of the fan, the upper terminal of the pivot being conical and the upper end of the bearing being closed by a glass cap 39, so that the fan is enabled to turn with great  
35 freedom and without creating any appreciable friction between the wearing-surfaces or the parts in contact.

The distributing and suction fan is extremely light in construction, and as it is mounted on an anti-friction bearing it is evident that it will easily and rapidly rotate when a current of hot air impinges against the same.

45 My preferred embodiment of fan, as shown in Figs. V and VI of the drawings, consists of a flat disk of metal 40, having a series of radial tapering apertures 41, formed therein by punching or stamping out the metal to form  
50 a series of radial inclined wings 42, against which the ascending current of heat acts to propel and rotate the fan, and on the lower side of the disk-shaped fan are a series of depending blades 43, which, as the fan rotates, operate against the air to distribute or  
55 throw the same uniformly into the surrounding atmosphere. The rotary fan is thus operated by the ascending current of hot air, which current of air is augmented both in volume and rapidity of motion by the action  
60 of the fan, whereby the volume of air drawn through and heated by the heater is increased, the hot air uniformly distributed, and the air suction and distributing appliance operated  
65 by the current of air that is drawn through the heater.

The operation and advantages of my in-

vention will be readily understood from the foregoing description, taken in connection with the drawings.

I am aware that changes and alterations in the details of construction and form and proportion of parts can be made in the mechanisms herein shown and described as embodiments of my invention, and I would therefore have it understood that I reserve the  
75 right to make such modifications as fairly fall within the scope of my invention.

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

1. In a hot-air heater, the combination of a jacket or casing having the crown-sheet or diaphragm at an intermediate point of its length, the fire-pot located within and concentric with the lower part of the casing and opening at its upper end through the crown-sheet or diaphragm, the hot-air dome or chamber situated above the crown-sheet within the jacket or casing and forming a smoke-chamber between itself, the external casing,  
85 the crown-sheet or diaphragm, and the series of vertical hot-air flues located within the annular space between the fire-pot and casing and extending through the smoke-chamber  
90 and communicating with the hot-air dome, the lower ends of said hot-air flues being open for the admission of air, all arranged and combined as set forth, for the purpose described.

2. In a hot-air heater, the combination of the external bottomless jacket or casing having a diaphragm at an intermediate point of its length, the fire-pot arranged within and concentric with the lower part of said jacket or casing and opening through the diaphragm,  
105 the series of hot-air flues arranged in the annular space between the fire-pot and the jacket and open at their lower ends for the admission of air, and the upper dome or hot-air chamber located in the upper part of the jacket or casing above the crown-sheet, to form an annular smoke-chamber between itself, the diaphragm, and the jacket, and having the  
110 integral depending tubes, which are joined to and form a continuation of the hot-air flues in the lower part of the heater, for the purpose described, substantially as set forth.

3. In a hot-air heater, the combination of the external casing having a diaphragm at an intermediate point of its length, a fire-pot located within the lower part of said casing and opening through the diaphragm, the upper hot-air chamber or dome arranged within the external casing above the diaphragm to form  
120 the smoke-chamber, and having the central raised portion in its bottom located immediately over the outlet from the fire-pot, and the hot-air flues arranged between the fire-pot and casing, extending through the smoke-chamber and opening into the dome at points  
125 around the central raised portion in the bottom of said dome, as and for the purpose described.



4. In a hot-air heater, the combination of a casing or jacket having a diaphragm at a point intermediate of its length and a smoke-outlet above said diaphragm, a fire-pot, a hot-air dome or chamber within the casing and  
5 above the diaphragm, the flues which open into the hot-air dome, and the inclined deflector rigid with said dome and located between the jacket and the dome, said deflector  
10 closing the smoke space or chamber below the exit in the external casing, and having the ends thereof extended upwardly and around the dome, for the purpose described, substantially as set forth.

15 5. A heater having an outlet for hot air, combined with a rotary horizontal fan located immediately above said outlet in the path of the ascending current of hot air and provided with the distributing and propelling blades,  
20 as and for the purpose described.

6. A heater having an outlet for hot air, combined with a rotary fan located immediately above said outlet in the path of the ascending current of air and provided with the  
25 radial inclined propeller-blades and the de-

pending distributing-blades, substantially as described.

7. A heater having an outlet for hot air, combined with a rotary fan located in the path of the ascending current of hot air and  
30 provided with a central anti-friction bearing and a fixed post or pivot fitted in said bearing for the fan to rotate freely thereon, substantially as and for the purpose described.

8. A heater having an outlet for hot air, 35 combined with a rigid arm or support carrying a vertical fixed post or pivot and a rotary fan located in the path of the ascending current of hot air, which issues from the outlet in the heater, said fan being provided with  
40 the distributing and propelling blades and a central anti-friction bearing having its upper end closed, for the purpose described, substantially as set forth.

In testimony whereof I affix my signature 45 in presence of two witnesses.

CHARLES B. LOVELESS.

Witnesses:

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A. C. ALTMAN.