

(No Model.)

3 Sheets—Sheet 1.

J. F. DONAHOE.  
RADIATOR.

No. 488,756.

Patented Dec. 27, 1892.

Fig. 5.

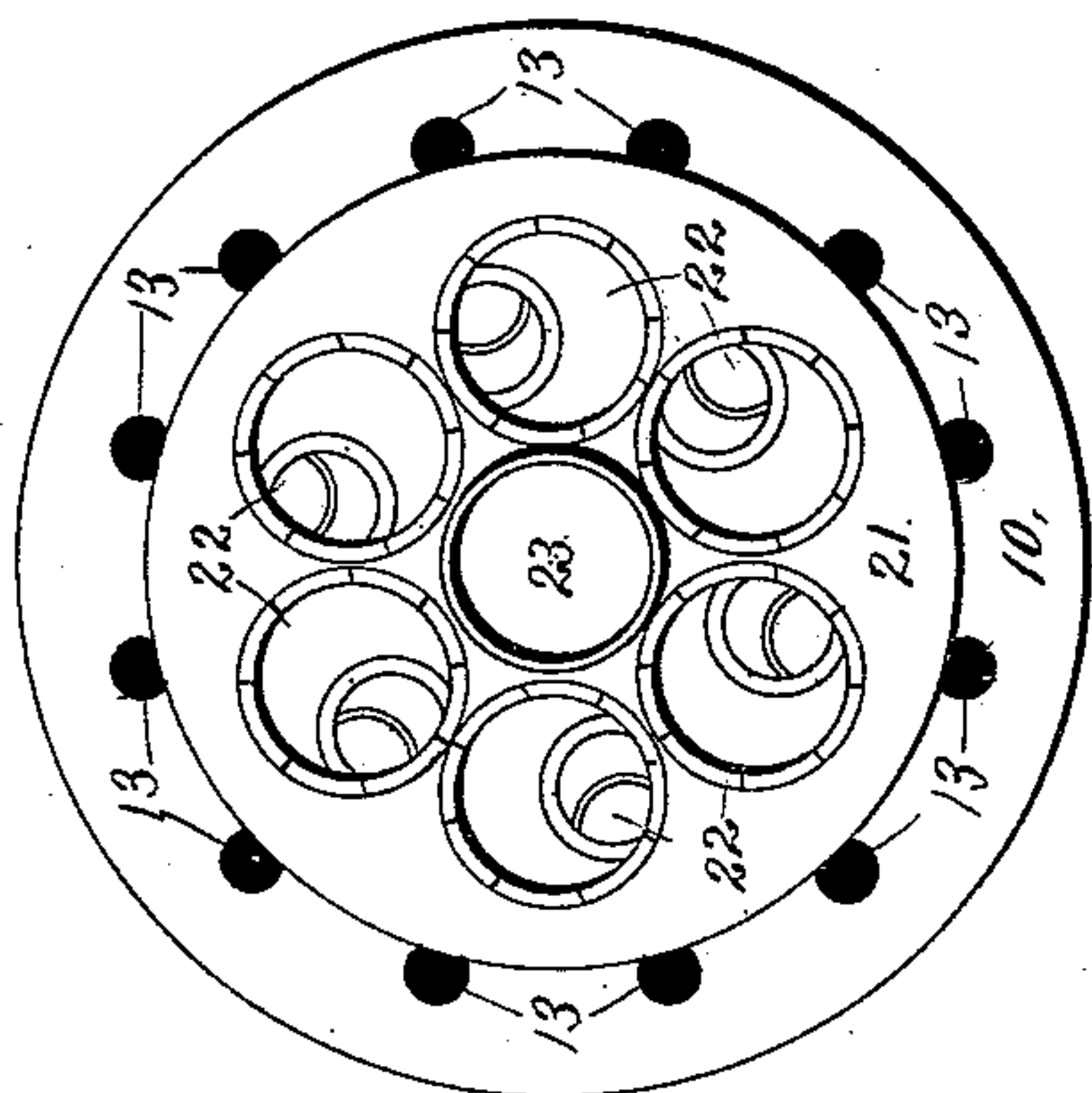


Fig. 6.

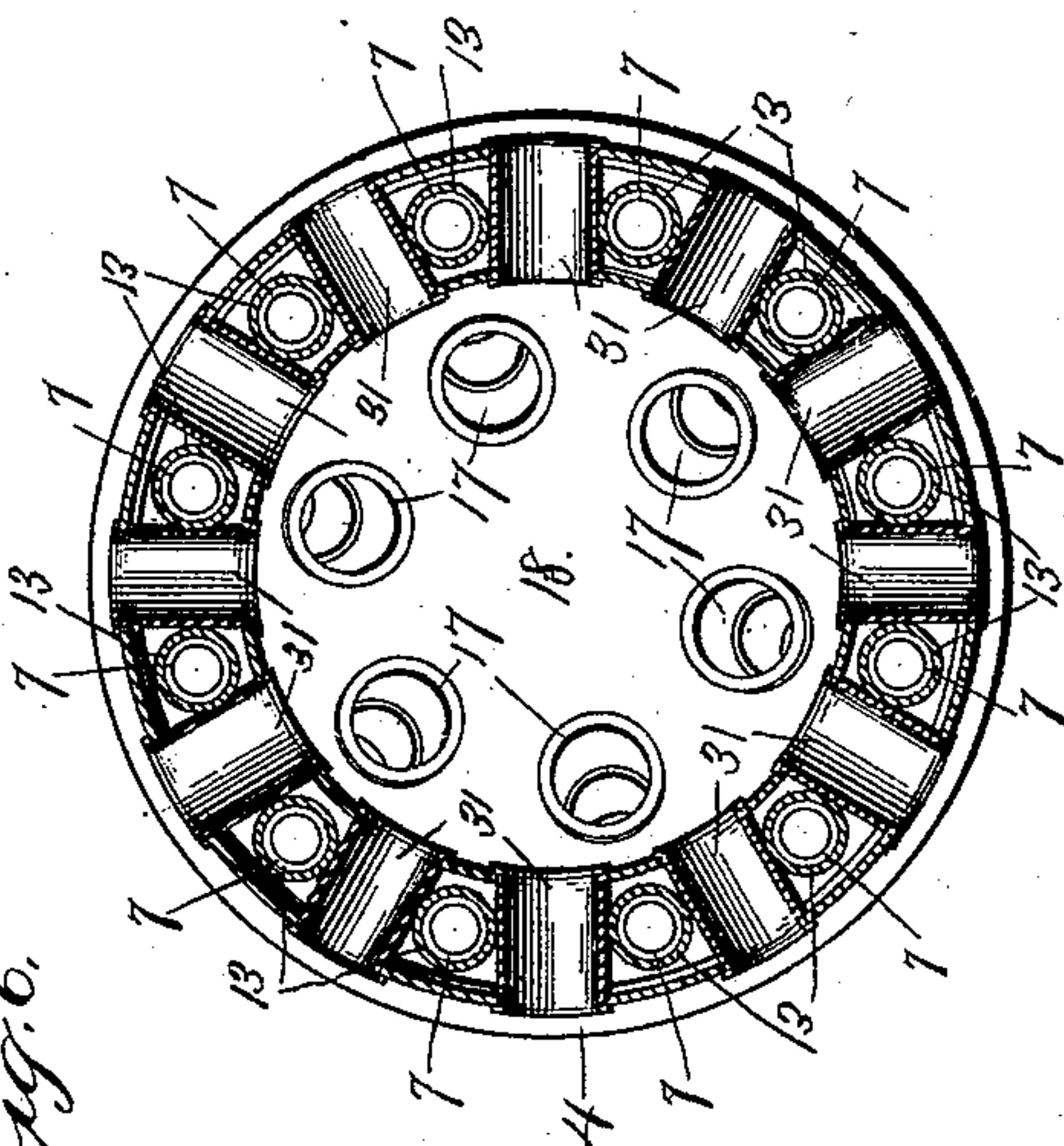
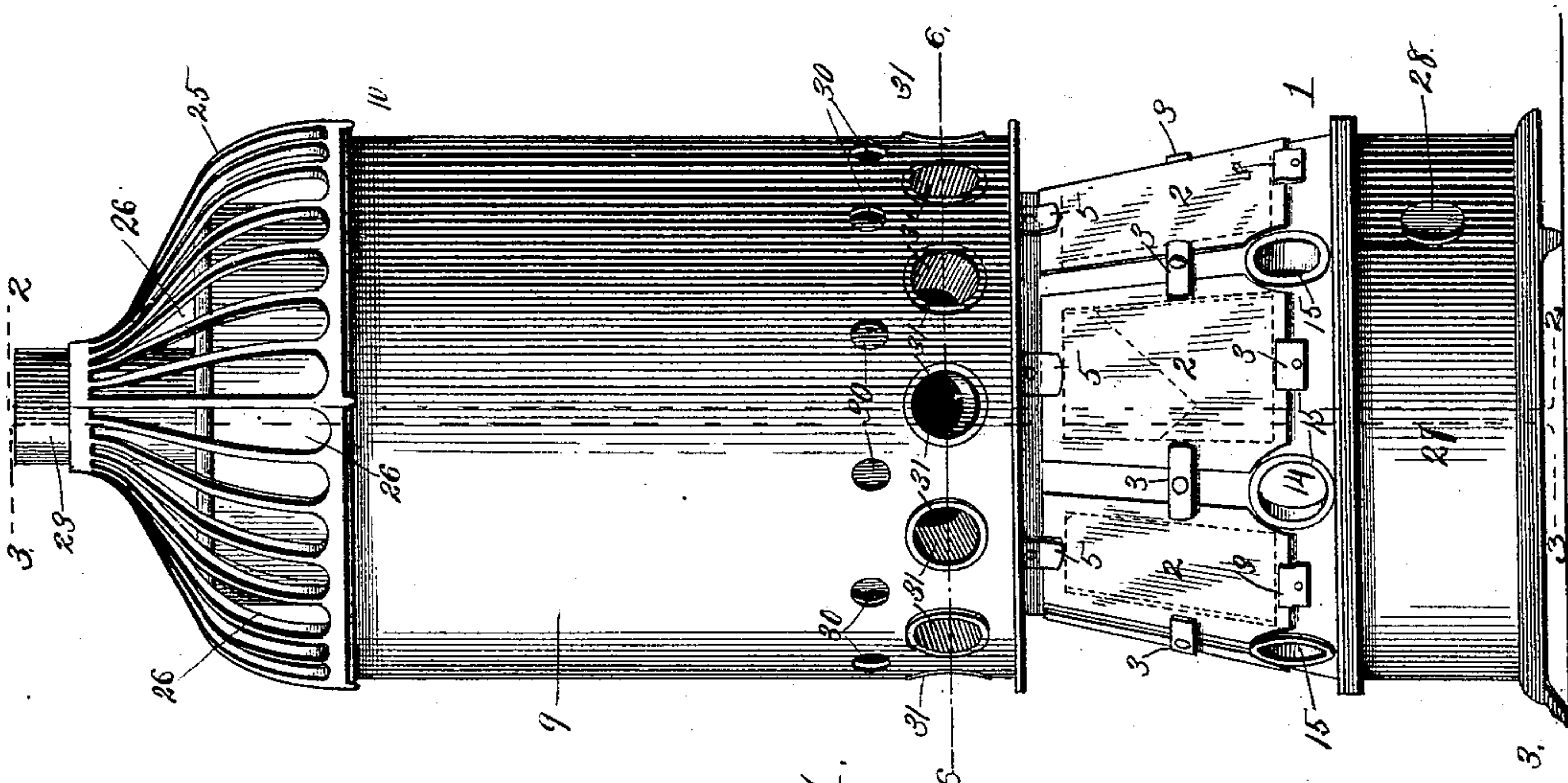


Fig. 1.



Witnesses:

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Inventor:  
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*Higdon*  
By *Higdon* attys.

(No Model.)

3 Sheets—Sheet 2.

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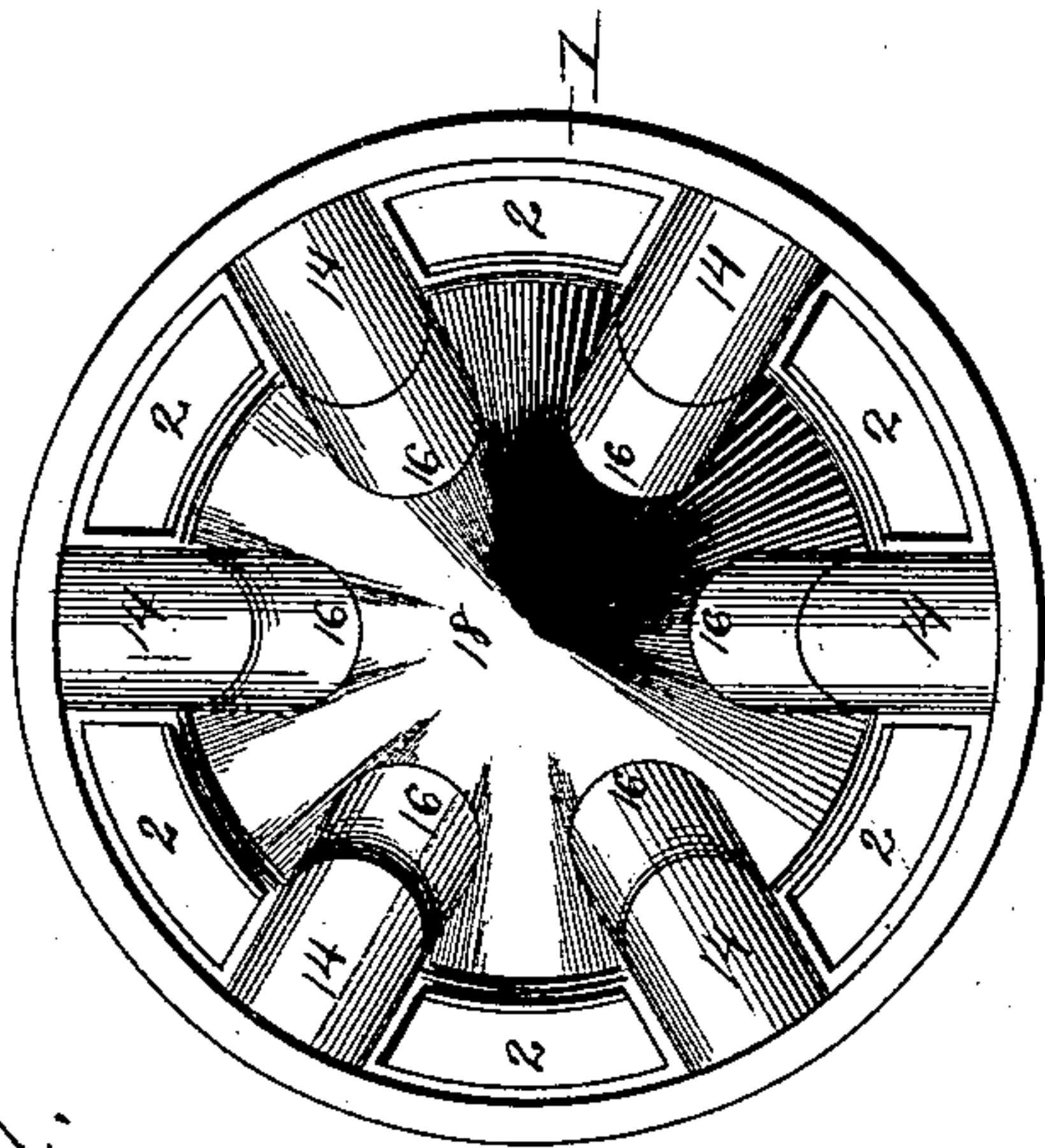


Fig. 4.

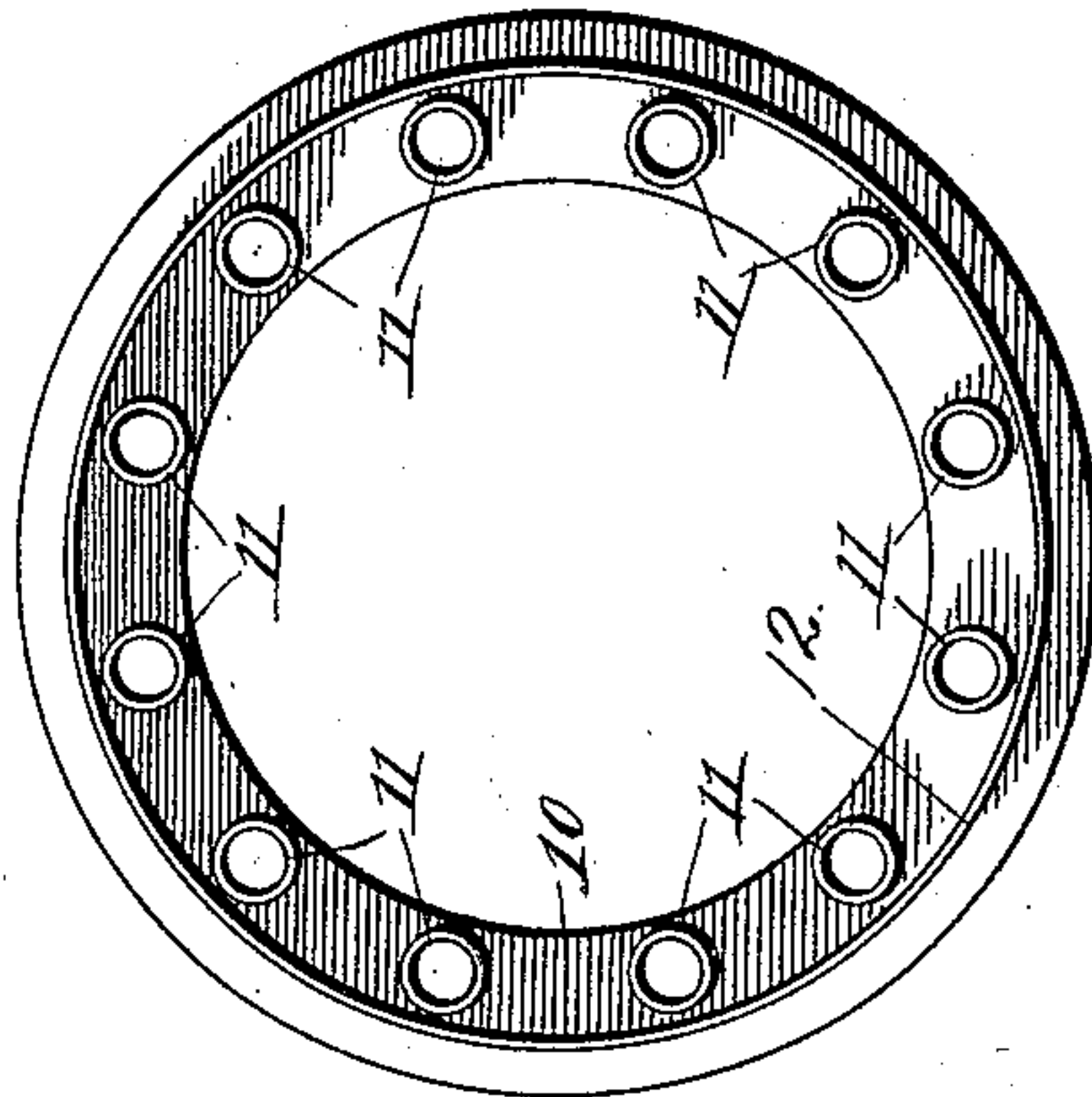


Fig. 5.

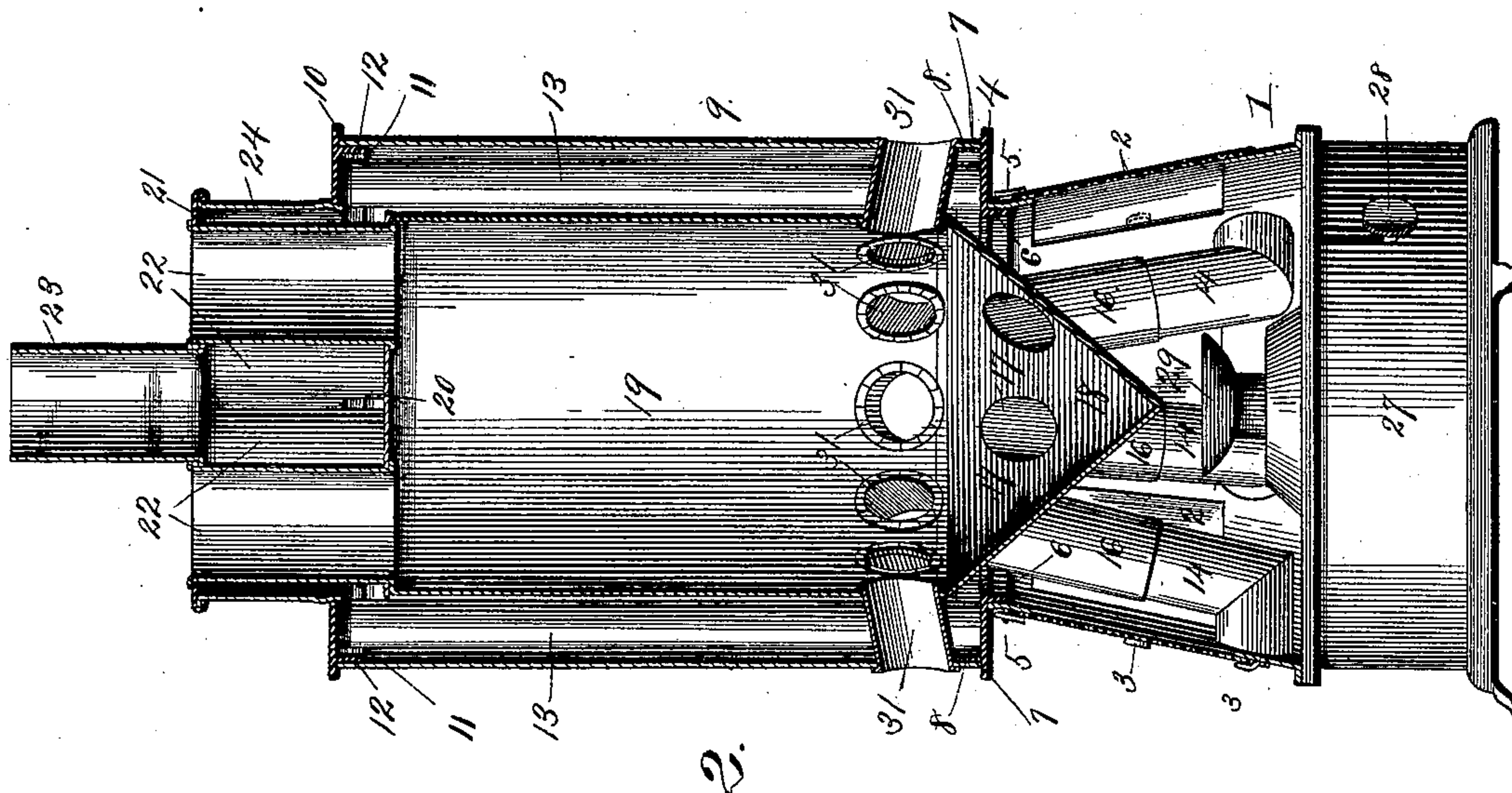


Fig. 6.

Witnesses.

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(No Model.)

3 Sheets—Sheet 3.

J. F. DONAHOE.  
RADIATOR.

No. 488,756.

Patented Dec. 27, 1892.

Fig. 1.

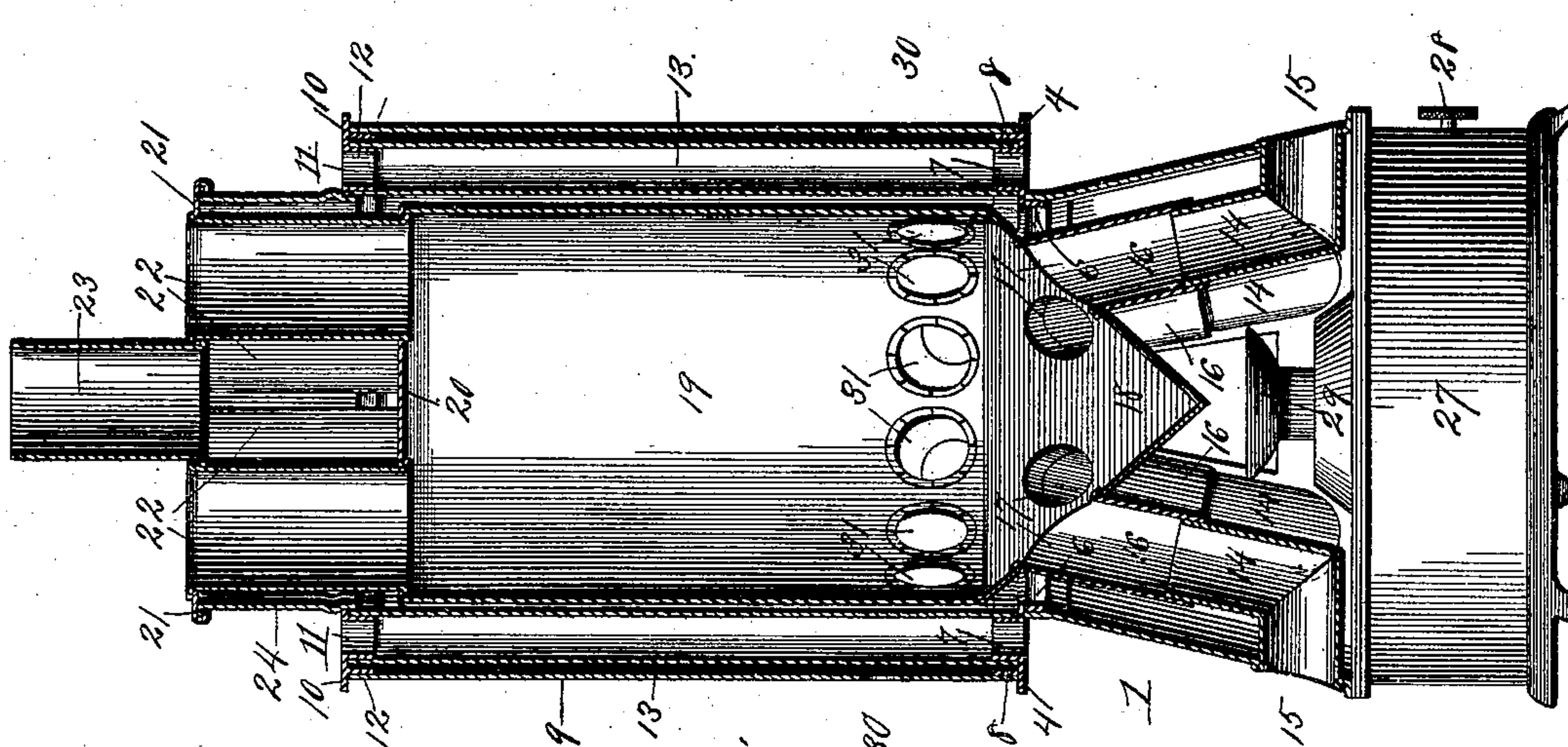
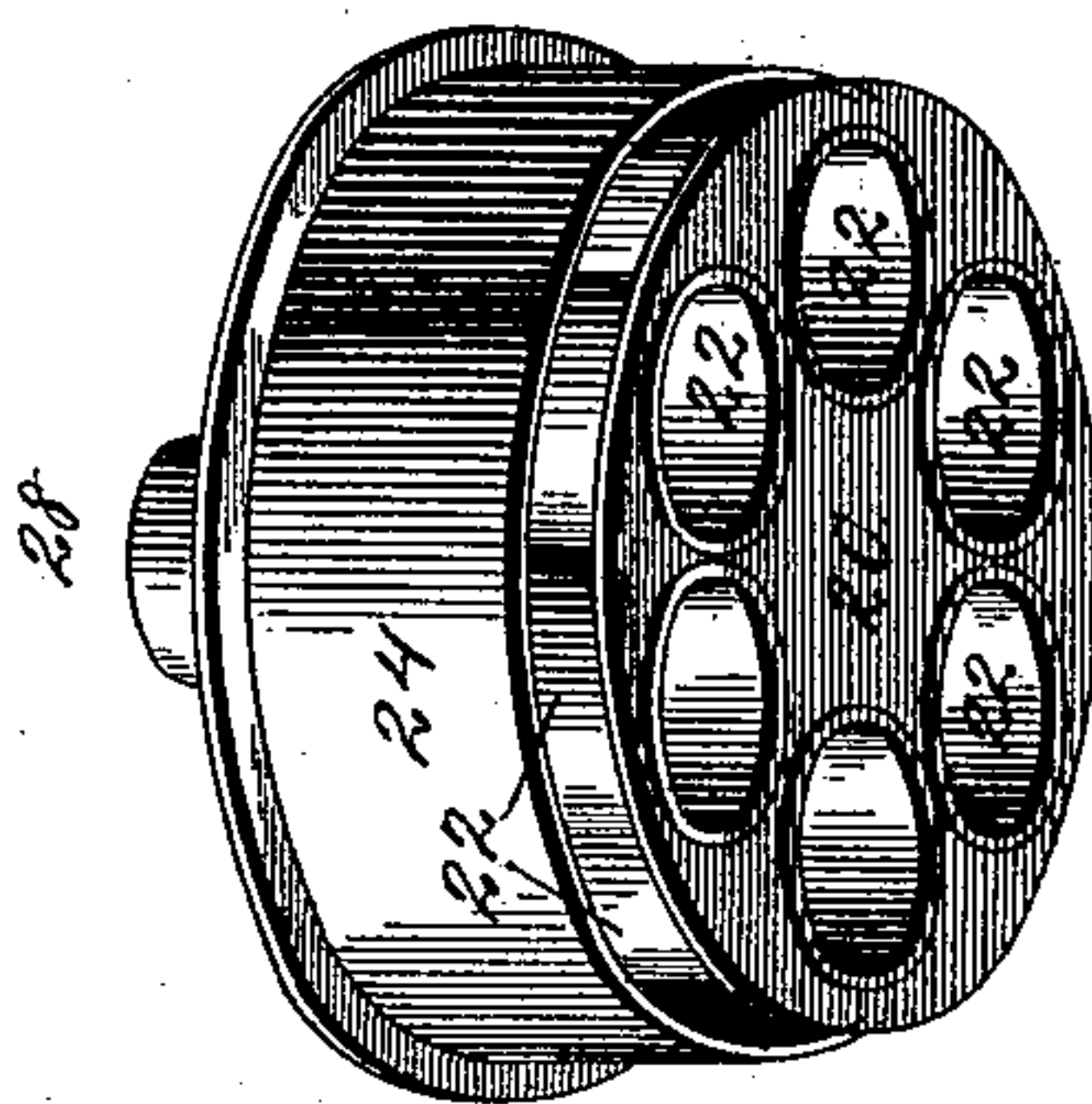


Fig. 3.

Witnesses:

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# UNITED STATES PATENT OFFICE.

JOHN F. DONAHOE, OF PAOLA, KANSAS.

## RADIATOR.

SPECIFICATION forming part of Letters Patent No. 488,756, dated December 27, 1892.

Application filed February 1, 1892. Serial No. 419,973. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN F. DONAHOE, of Paola, Miami county, Kansas, have invented certain new and useful Improvements in Radiators, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part hereof.

My invention relates to that class of appliances which are designed to be placed upon or attached to oil or vapor or gas burning stoves, or other types of heaters for the purpose of radiating the heat generated by the burners or heaters, and the objects of my invention are to produce a radiator which shall be simple, durable and inexpensive in construction, and by means of which the heat generated by the stove or heater shall be economically applied to the heating of the external air; thus materially lessening the consumption of fuel.

A further object of my invention is to produce a radiator, which, in addition to the advantages above enumerated, shall prevent all possibility of the external air becoming mixed with and contaminated by the ordors or other offensive products of combustion of the fuel, and furthermore, to produce a radiator which shall be sightly in appearance and capable of application to a great variety of heaters or burners.

To the above purposes, my invention consists in certain peculiar and novel features of construction and arrangement, as herein-after described and claimed.

In order that my invention may be fully understood, I will proceed to describe it with reference to the accompanying drawings in which:

Figure 1 is a side elevation of a radiator embodying my invention in position upon an oil or vapor burning stove or heater. Fig. 2 is a transverse vertical section of the same, on the line 2—2 of Fig. 1, the cap or dome being removed. Fig. 3 is a similar view of the same, on the line 3—3 of Fig. 1, the cap or dome being removed. Fig. 4 is an inverted or under side plan view of the radiator. Fig. 5 is a top plan view of the same; the dome or cap of the radiator being removed. Fig. 6 is a horizontal section of the radiator, on the

line 6—6 of Fig. 1. Fig. 7 is a detached perspective view of the upper removable section of the radiator. Fig. 8 is an inverted plan view of the upper circular plate of the radiator.

In the said drawings, 1 designates the lower portion or base of the radiator, the said lower portion or base being of frusto-conical form and also of open or skeleton structure, and being, furthermore, preferably of sheet-iron or other suitable sheet-metal or in the form of a casting if desired. The lower and upper ends of this lower portion or base are left entirely open, and its sides are formed with a number of openings which are covered by plates 2 of mica, or other suitable transparent material, which permit the burner of the heater to be readily observed. These plates are shown as retained in position by lower and side strips 3 of sheet-metal which are riveted upon the outer surface of the lower portion or base 1, and which overlie the lower and side margins of the plates 2. It is to be understood however, that the plates 2 may be retained in position by any other usual or preferred means.

Upon the upper end of the lower or base portion 1 rests the lower plate 4 of the radiator, said plate being of circular form and having a central opening of very considerable diameter, as shown. This plate 4 is retained in position upon the upper end of the lower or base portion 1 by any desired number of inverted L-shaped strips or pieces 5, preferably of sheet-metal, the upper ends of which are riveted or otherwise suitably secured to the under side of the plate 4, while the lower end of the said strips are similarly secured to the outer surface of the upper end of the lower or base portion 1. The under side or surface of the plate 4 is also formed with a pendent vertically extending circular flange 6 which is closely surrounded by the upper end of the lower or base portion 1 of the radiator, and which thus serves to further retain the plate in proper position upon the said lower or base portion. The upper surface of this plate 4 is formed with a number of vertically extending thimbles 7 which are arranged in circular order, and the purpose of which will be hereinafter explained, and



the upper surface of the plate 4 is further formed with a circular upwardly extending flange 8. This flange 8 is closely embraced by the lower end of the body-portion 9 of the radiator; the said body-portion being of vertical cylindrical form and of sheet-iron or other suitable sheet-metal. Upon the upper end of this cylindrical body-portion rests an upper plate 10, which like the plate 4, above described, is of circular form and which may differ from the said plate 4 principally in having its central opening of somewhat greater diameter than that of the central opening of the plate 4, as shown, or these two central openings may be of equal diameter if preferred. Plates 4 and 10 are preferably each in the form of a casting, and the under surface of the said plate 10 is formed with a number of thimbles 11 which are arranged in circular order and which are, furthermore, pendent from the plate. This plate 10 is furthermore, formed on its under surface with a circular pendent flange 12 which is closely embraced by the upper end of the body-portion 9 of the radiator. Between the lower and upper plates 4 and 10 are interposed a number of vertical air-heating pipes 13, the lower ends of which closely surround the thimbles 7 and the upper ends of which similarly surround the thimbles 11; the pipes being thus arranged in circular order, and communicating at their lower and upper ends respectively through the openings of the thimbles 7 and 11, with the external air.

Within the lower part of the base or lower portion 1 of the radiator are placed a number of auxiliary air-heating pipes 14 each of which is in the form of a bend or elbow, or in other words, each of these pipes is of approximately L-form. The lower part of these pipes extend horizontally and radially outward from the center of the radiator, and their lower ends are connected to a number of openings 15 which are formed in the lower part of the base or lower portion 1. The upper ends of these pipes 14 are embraced by the lower ends of short sections 16 of pipe the upper ends of which are connected to a number of openings 17 in an inverted conical deflector 18. The apex or point of this deflector depends within the lower or base portion 1, about midway of the height of the latter, and its upper or larger end extends above the opening in the plate 4; the external diameter of the upper portion of the deflector 18 being less than the diameter of the opening of plate 4, so that said opening is not wholly closed by said deflector. The upper end of this deflector is closely embraced by the lower end of an internal vertical cylinder 19, which is of sheet-iron or other suitable sheet-metal, and of less diameter than the outer or body-portion 9. The inner cylindrical portion 19 is concentric with the outer or body-portion 9, so that a circular space intervenes between said cylinders, within which space are located the air-heating pipes 13. In the lower part of the space between the

outer or body-portion 9 and the inner cylinder 19 are located a number of short air-heating pipes 31 which are circularly arranged, and each of which opens at its outer end through the body-portion 9 and at its inner end through the cylinder 19; the said pipes preferably being inclined inwardly and upwardly, as shown. This inner cylinder 19 is of less height than the outer or body-portion 9, and the upper end of the inner cylinder 19 is left open for a purpose to be hereinafter described.

The upper end of the radiator is provided with a removable portion or section which is shown detached in Fig. 7, and which is constructed as follows: 20 designates the lower head or bottom of this removable portion or section, the said head being either of sheet-metal as shown or in the form of a casting, as preferred, and being of circular marginal contour. The diameter of this lower head 20 is slightly greater than the diameter of the upper end of the inner cylinder 19, so that said lower head shall rest upon said upper end of the cylinder 19.

21 designates the upper head or top of this removable portion or section, the said head or top being either of sheet-metal, as shown, or in the form of a casting as preferred. This upper head or top is of circular form in marginal contour, and is preferably of somewhat greater diameter than the lower head or bottom 20. The lower head 20 is connected to the head 21 by a number of short vertical air-heating pipes 22 the lower end of each of which is connected to an opening in the lower head, and the upper end of each of which is similarly connected to a similar opening in the upper head. Thus it will be seen that these pipes 22 communicate at their lower ends with the space within the inner cylinder 19, and at their upper ends with the outer air, and said pipes are arranged in circular order as shown. From the middle of the upper head or top 21 extends upward a pipe 23, the lower end of which is connected to the margin of a central opening in said upper head, and thus communicates with the space between the two heads; this pipe being designed to be connected to a suitable flue or chimney. From the under side of the margin of the upper head or top 21 depends a cylindrical casing 24, which surrounds the pipes 22, but which is of less length than said pipes, and the diameter of this casing is slightly greater than that of the central opening in the upper plate 10. Thus when the removable section is in proper position, the lower margin of the casing 24 rests upon the upper side of the plate 10, adjacent to its inner margin, as shown. This upper removable section is covered by a suitable cast or sheet-metal dome 25 which is provided at its top with an opening through which the pipe 23 passes, and also at its sides with a number of elongated radial openings 26 for the escape of the heated air; the said openings extending preferably from near the top of the



cap or dome, nearly to its lower margin, so as to afford free exit for the air and the lower margin of this dome resting upon the upper side of the plate 10 near its outer margin.

5 The radiator is shown as mounted upon an oil or vapor burning stove or heater 27, which may be of any suitable or preferred type, and which may be either a vapor burning heater, or a gas heater, or any other type of heater,  
10 as desired. As shown, however, the stove or heater 27 is provided with a horizontal wick, or valve adjusting rod 28, and the burner 29 of the stove or burner is immediately below the apex of the deflector 18; the lower margin of the base-portion 1 of the radiator resting upon the top of the body of the stove or heater.

From the above description, it will be seen that the heat and products of combustion  
20 from the burner first impinge upon the outer surface of the deflector 18 and are directed thereby into the space between the outer portion 9 and the inner cylinder 19, so as to envelop the pipes 13 14, 16, and 31 in said space.  
25 From this space the heat and products of combustion flow into the space between the heads 20 and 21 and inclosed by the casing 24, and escape out through the pipe 23, enveloping the pipes 22 in said space. Meanwhile, the outer or cold air is drawn inward through the lower ends of the pipes 13, and being heated therein, rises and escapes from the outer ends of said pipes. Additional quantities of air are drawn into the outer  
35 ends of the pipes 14 and flow thence upward through the pipes 16 into the cylinder 19, where it is heated, and, rising, flow through the pipes 22, and escape out of the radiator through the holes or openings 26 of the dome  
40 25. Meantime, also, the outer air is being drawn into the outer ends of the pipes 31 and flowing through said pipes enters the space within the cylinder 19 and mingling with the air entering through the pipes 14 and 16, flows  
45 upward and passes out of the radiator through the pipes 22. If desired a circular series of openings 30 may be formed in the lower part of the central or body portion 9 of the radiator; the air entering said openings mingling  
50 with the products of combustion in the space between the body portion 9 and the inner cylinder 19.

From the above description, it will be further seen that I have produced a radiator  
55 which is simple, durable, and inexpensive in construction, and very effective in its action. Also that I have produced a radiator which is capable of application to a great variety of stoves, burners, or heaters, and which avoids  
60 all possibility of the heated air being mingled with and contaminated by the odors or other objectionable products of combustion.

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

1. A radiator comprising an outer vertical cylindrical body portion or casing, an inner

vertical cylindrical portion of less diameter than the outer portion, a number of vertical air-heating pipes interposed between said  
70 cylindrical portions, a base-plate for said cylindrical portions having a central opening, and an inverted frusto-conical deflector depending below the base-plate, and extending  
75 upward through the opening thereof; the said deflector being of less diameter at its point of passage through the base-plate than the opening of said plate, substantially as set forth.

2. A radiator, comprising an outer vertical  
80 cylindrical body portion or casing, an inner cylindrical portion of less diameter than the outer portion, a number of vertical air-heating pipes interposed between the said cylindrical portions, a base-plate for said cylindrical portions having a central opening, an  
85 inverted frusto-conical deflector depending below the base-plate and extending upward through the opening thereof, the said deflector being of less diameter than the opening at its point of passage through the same,  
90 a base upon which the base-plate is supported, and a number of air-heating pipes located within said base and opening through the latter and also through the deflector, substantially as set forth.  
95

3. A radiator, comprising an outer vertical cylindrical body-portion or casing, an inner vertical cylindrical portion of less diameter than the outer portion, a number of vertical  
100 air-heating pipes interposed between the said cylindrical portions, a base-plate for said cylindrical portions having a central opening, an inverted frusto-conical deflector depending below the base-plate and extending upward through the opening thereof, the said  
105 deflector being of less diameter than the opening, at its point of passage through the same, a top-plate having a central opening and resting upon the cylindrical portions of the  
110 radiator, and a top-casing having a number of vertical pipes communicating with the interior of the inner cylindrical portion, and having also at its top an outlet-pipe communicating with the space between the inner  
115 and outer cylindrical portions of the radiator, substantially as set forth.

4. A radiator, comprising an inner and an outer vertical cylinder, a circular plate resting upon the upper end of the outer cylinder  
120 and having a central opening, and a removable upper section comprising a lower and an upper head, a number of vertical air-heating tubes connecting and opening through said heads, an outlet-pipe opening from the upper  
125 head, and a cylindrical casing pendent from the upper head and surrounding the said air-heating pipes, substantially as set forth.

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

JOHN F. DONAHOE.

Witnesses:

S. D. CONDON,  
J. W. SPONALD.