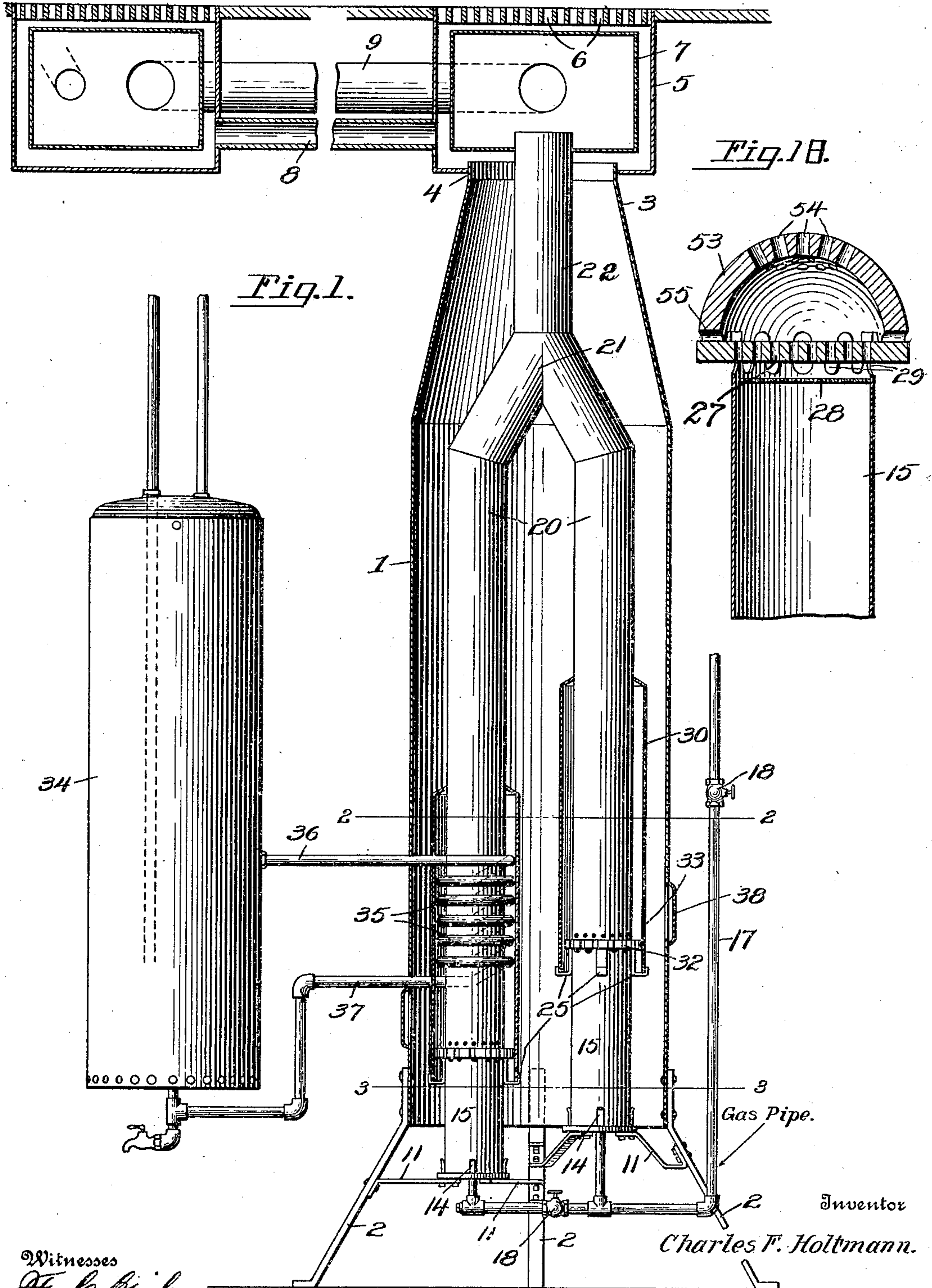


959,343.

C. F. HOLTSMANN.  
GAS BURNER OR HEATER.  
APPLICATION FILED MAY 22, 1908.

Patented May 24, 1910.

4 SHEETS—SHEET 1.



Witnesses  
F. L. Gibson.

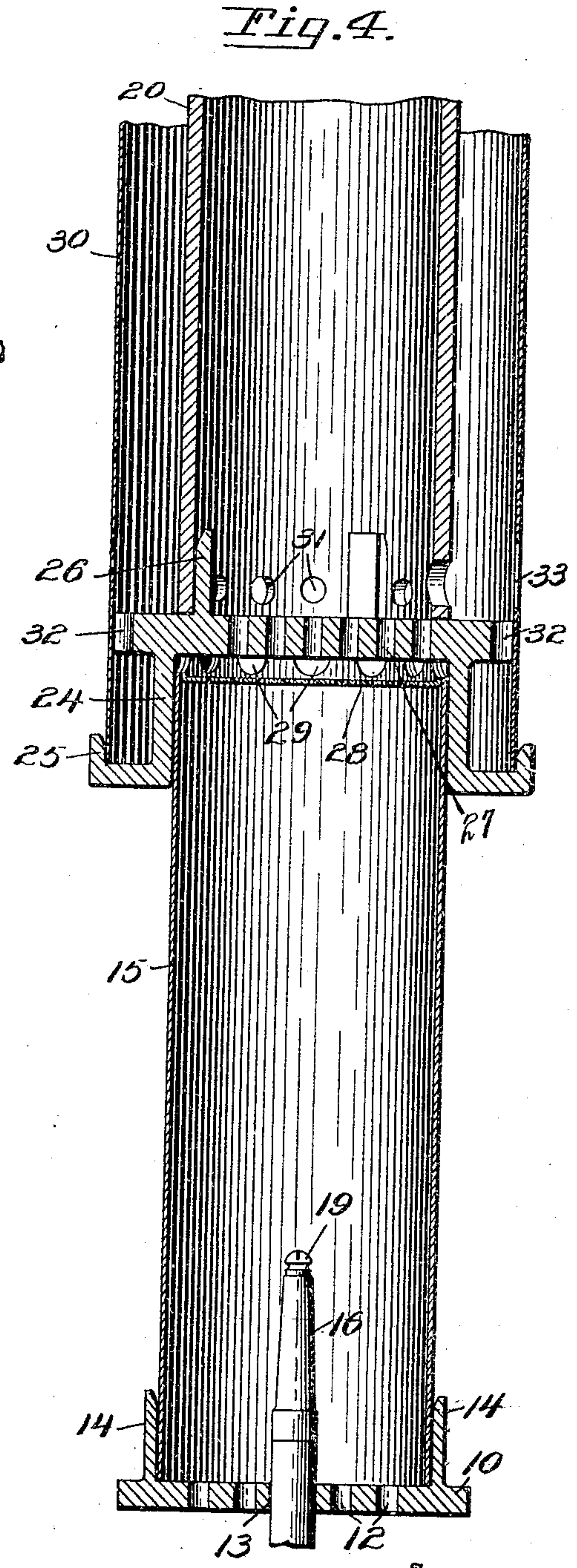
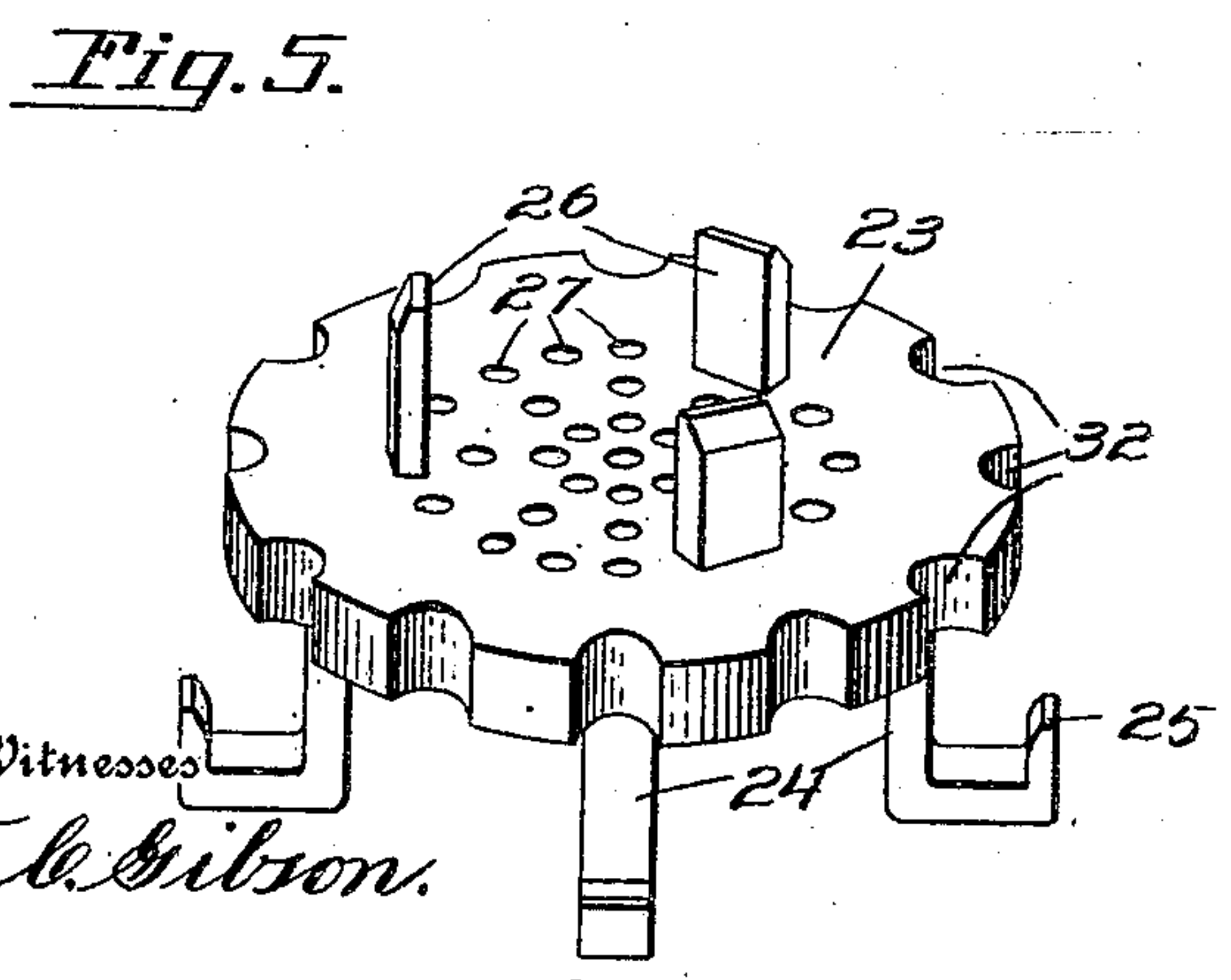
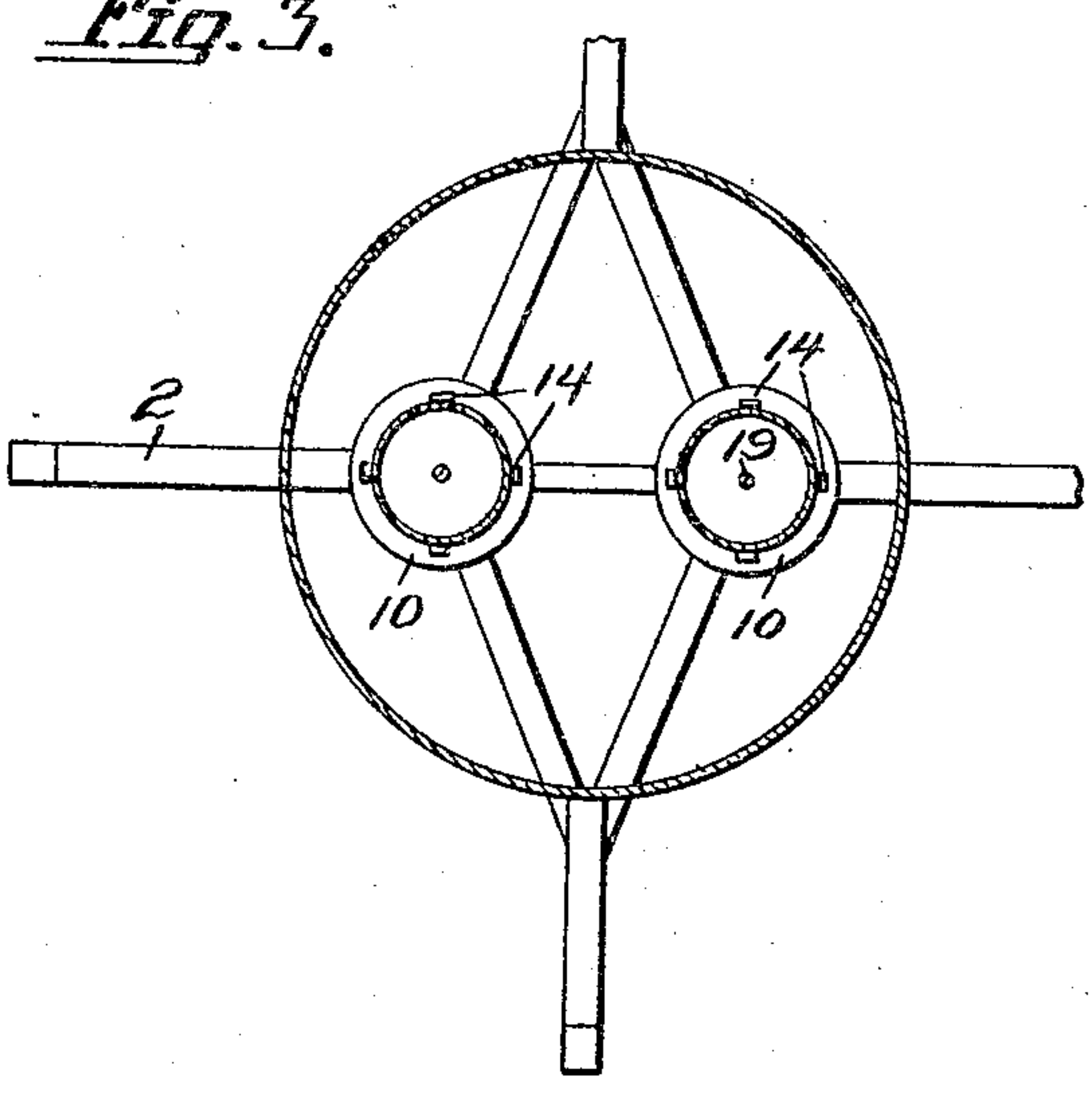
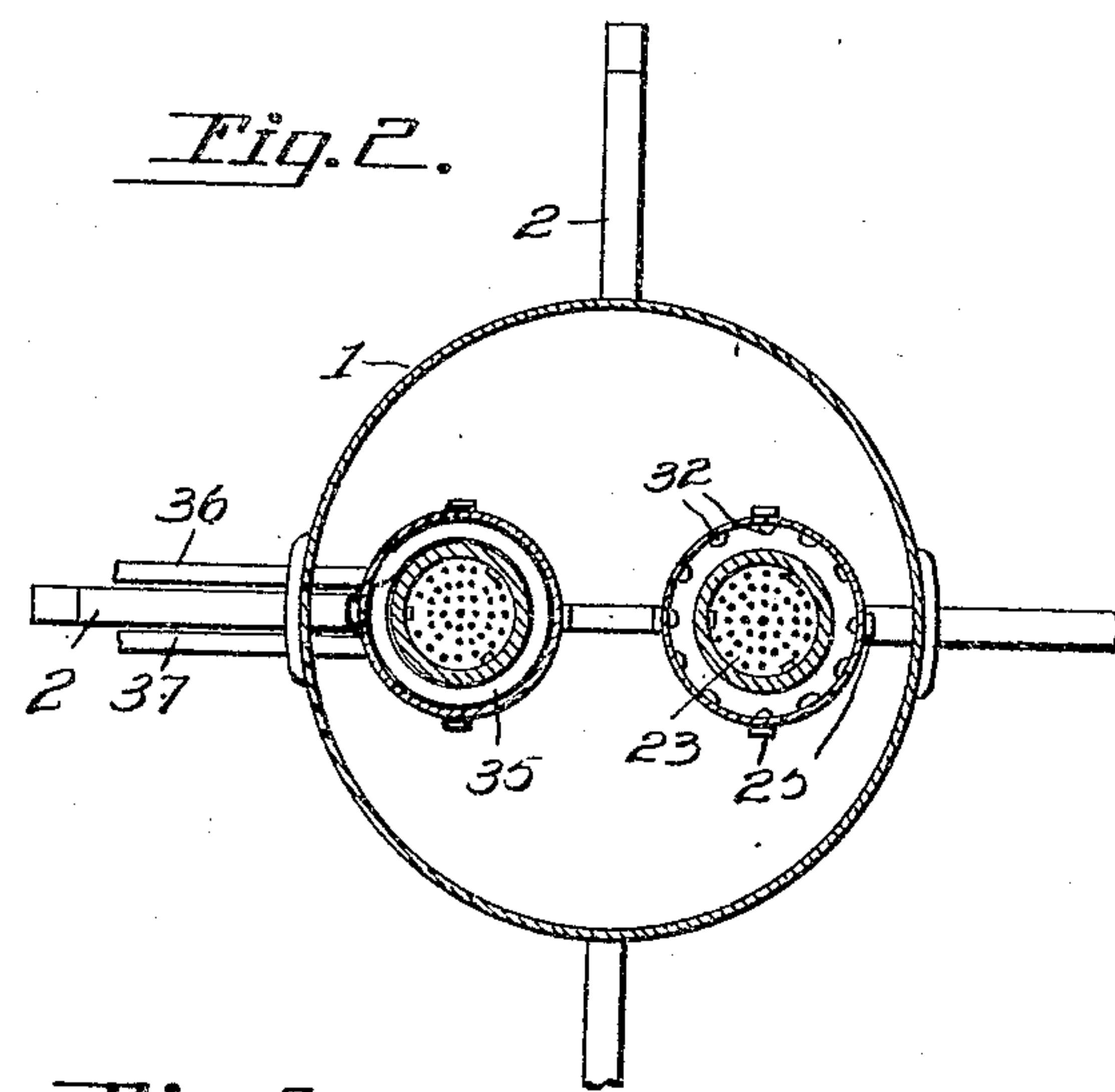
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4 SHEETS—SHEET 2.



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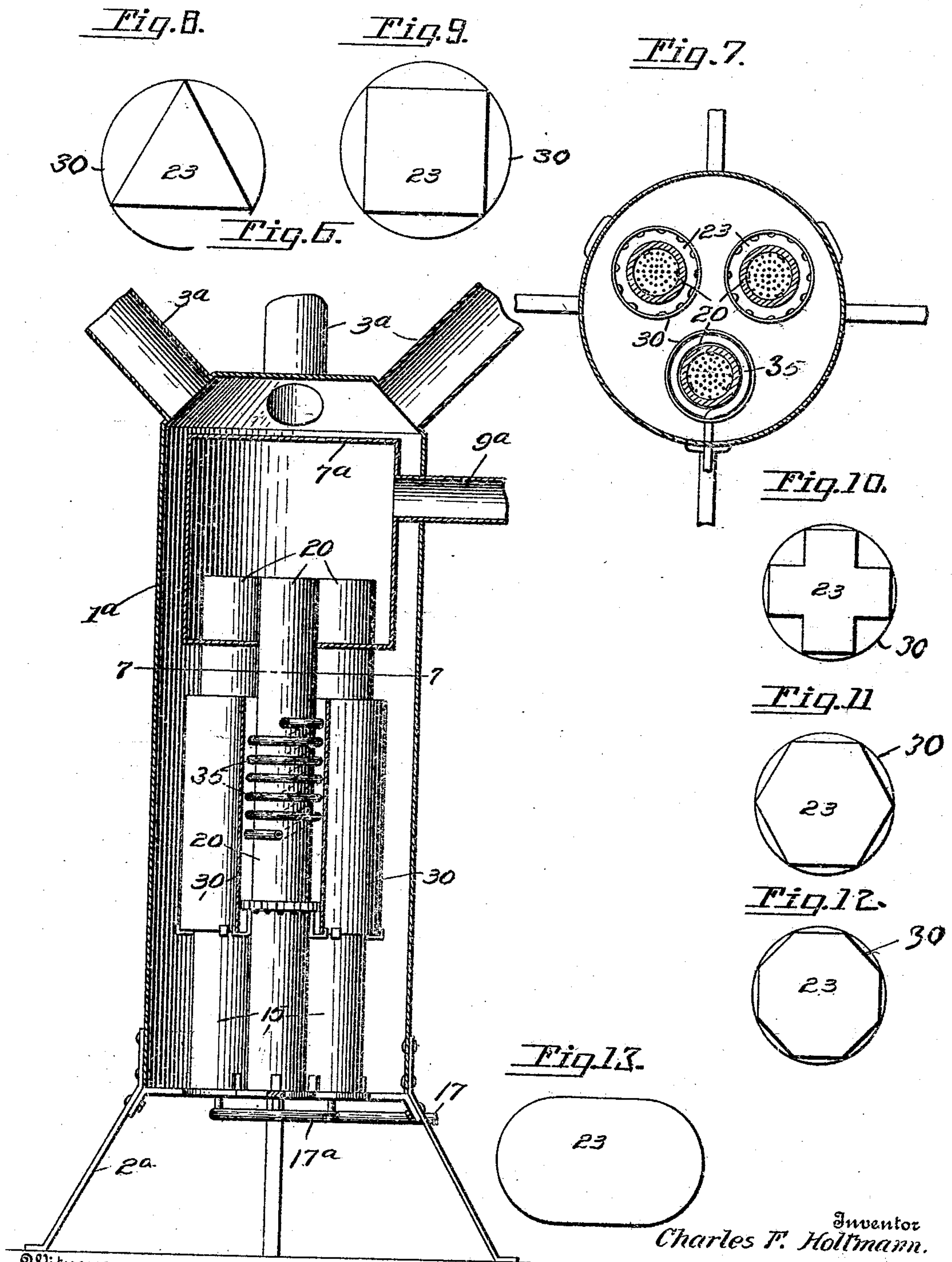


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4 SHEETS—SHEET 3.



Witnesses

*F. L. Gibson.*

*C. C. Hines.*

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*Charles F. Holtmann.*

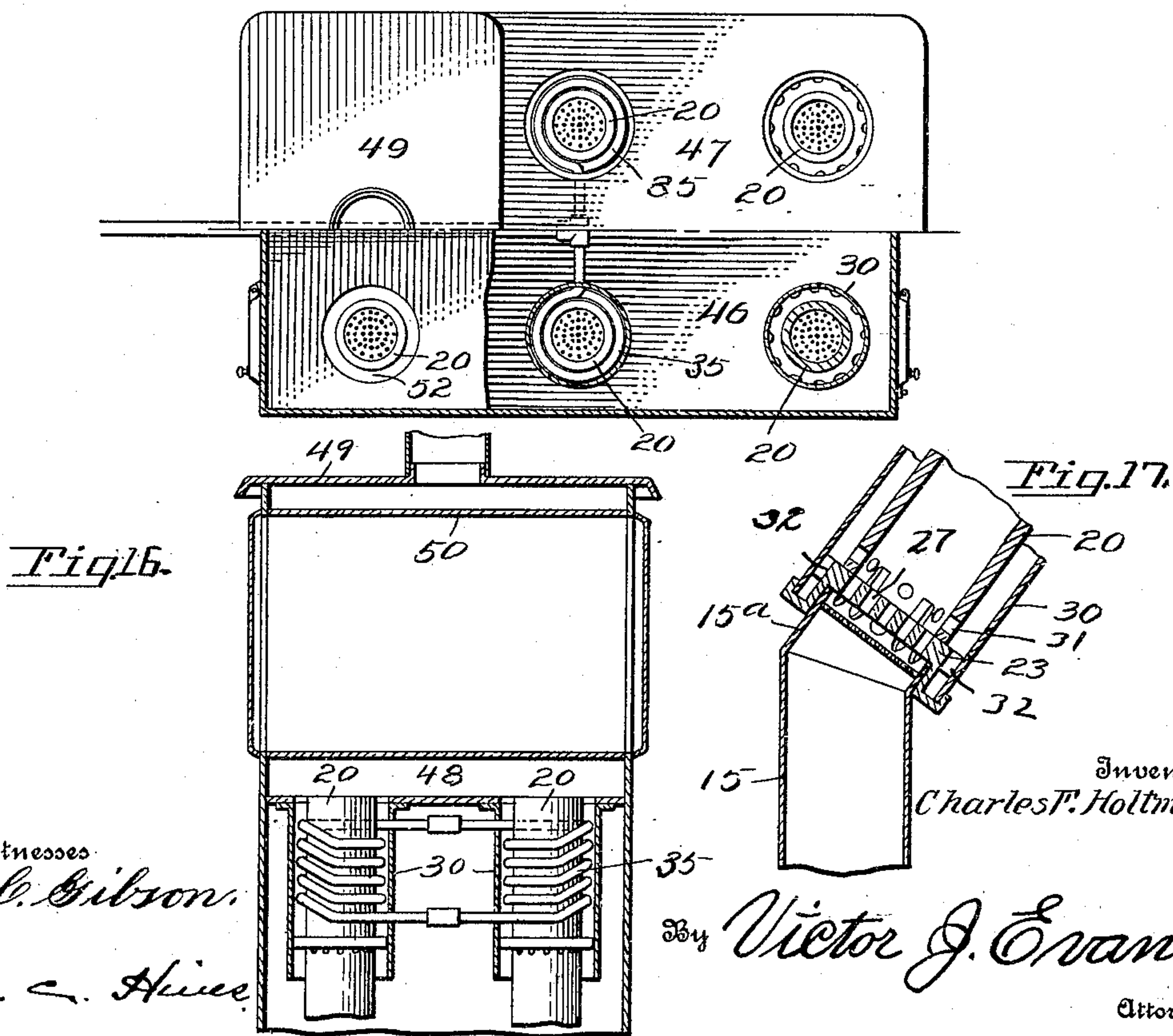
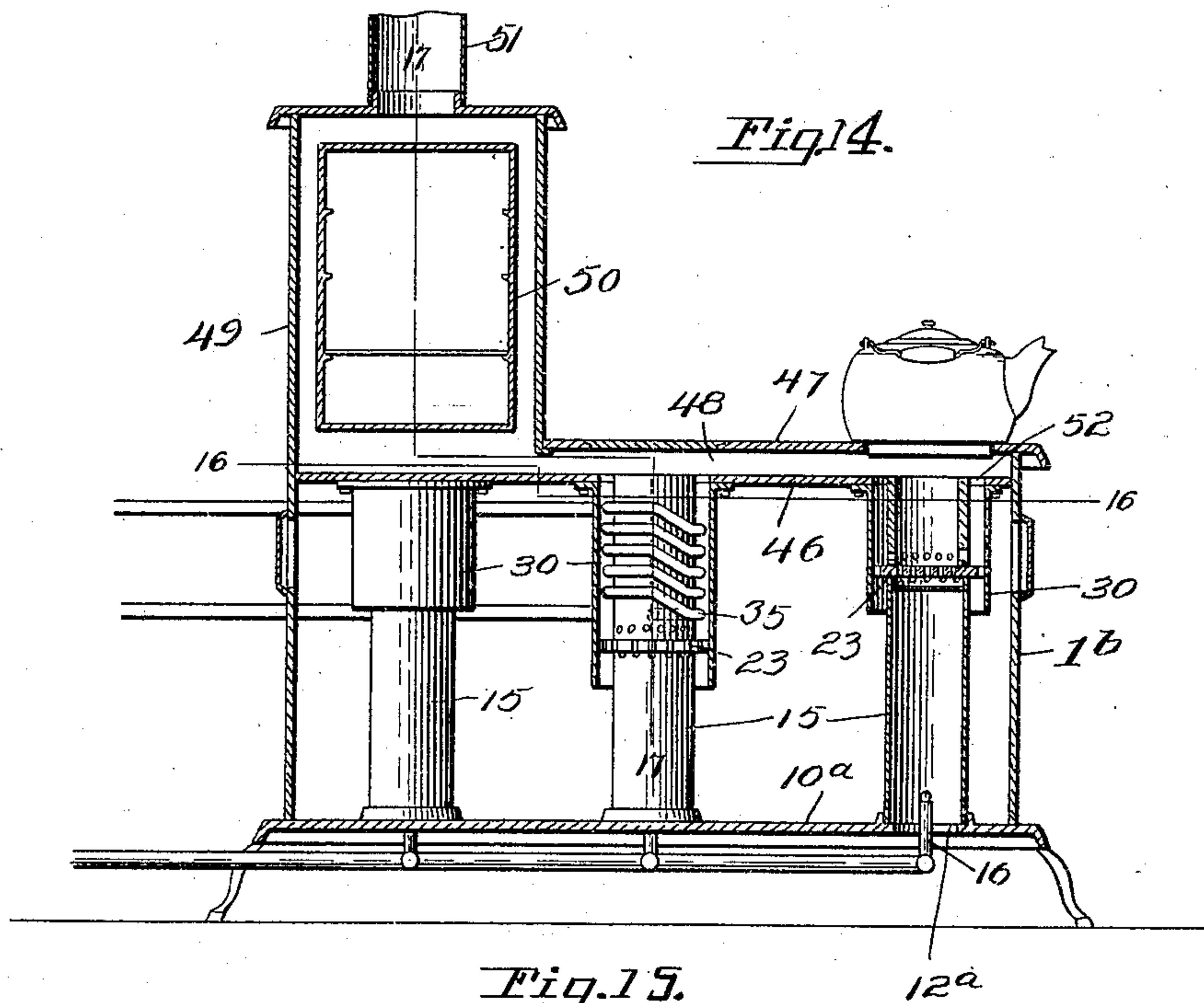
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4 SHEETS—SHEET 4.



Witnesses  
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# UNITED STATES PATENT OFFICE.

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GAS BURNER OR HEATER.

959,343.

Specification of Letters Patent.

Patented May 24, 1910.

Application filed May 22, 1908. Serial No. 434,381.

To all whom it may concern:

Be it known that I, CHARLES F. HOLTMANN, a citizen of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented new and useful Improvements in Gas Burners or Heaters, of which the following is a specification.

This invention relates to gas burners or heaters of that particular type in which a fuel mixture of air and gas is employed, the object of the invention being to provide a burner of this character susceptible of general use and adapted to produce an intense heat with the consumption of a minimum amount of gas.

A further object of the invention is to provide a simple, inexpensive and efficient construction of burner embodying means for commingling air with the gas in an effective manner for the production of a blue flame of great intensity, such means being adapted to commingle air with gas during its flow to the burner as well as at the point or points of combustion, thus utilizing all the available fuel elements of the gas.

A further object of the invention is to provide a novel construction of parts for use in conjunction with the burner *per se*, whereby the latter may be effectively employed for general heating or for cooking purposes.

With these and other objects in view, the invention consists of the features of construction, combination and arrangement of parts hereinafter fully described and claimed, reference being had to the accompanying drawings, in which:—

Figure 1 is a sectional elevation of a hot air furnace embodying my invention, and showing the latter also adapted for heating water for domestic consumption. Figs. 2 and 3 are horizontal sections taken respectively on the lines 2—2 and 3—3 of Fig. 1. Fig. 4 is a central vertical section on an enlarged scale through the burner and associated parts of the apparatus. Fig. 5 is a perspective view of the burner *per se*. Fig. 6 is a sectional elevation of a hot air furnace of a modified construction. Fig. 7 is a horizontal section of the same, taken on lines 7—7 of Fig. 6. Figs. 8 to 13 inclusive are diagrammatic views of different forms of burners which may be employed. Fig. 14 is

a central vertical front to rear section through a cooking stove embodying the invention. Fig. 15 is a sectional plan view of the same, taken on the line 16—16 of Fig. 14. Fig. 16 is a vertical transverse section taken on the line 17—17 of Fig. 14. Fig. 17 is a section through the burner and associated parts disclosing a modification in which the combustion chamber is arranged at an angle to the mixing chamber. Fig. 18 is a sectional view through a modified form of burner adapted to be employed without an auxiliary combustion chamber.

Referring now more particularly to Figs. 1 to 5, inclusive, of the drawings, wherein the invention is shown embodied in a particular type of hot air furnace, 1 designates the furnace jacket or casing which is open at its lower end and is supported at a suitable elevation above the floor or foundation upon brackets or legs 2, so as to allow the air to be heated to enter the lower end of said casing. The upper end of the casing is formed to provide a tapered outlet 3 having a cylindrical extension 4 to fit within a receiving opening in a heating box or chamber 5 communicating through a register or hot air supply ports 6 formed or provided in the superposed floor with the room above, it being understood that the furnace may be arranged in the cellar or any other suitable portion of the house. Within the heating chamber 5 is a closed drum 7 to receive the heated fumes or products of combustion from the furnace, whereby the air contained within and passing through the chamber 5 is finally heated prior to its discharge through the register 6. Any number of these heating boxes or chambers may be employed and pipe connections may extend from one to another throughout the building to heat the different rooms or apartments thereof. In the present instance I have shown two of these boxes or chambers which are connected by an air feed pipe 8, while the drums contained therein are in communication through a connecting pipe 9. From the final heating chamber of the series the fumes or products of combustion may be discharged into the chimney or directly to the atmosphere in any preferred manner.

Within the lower portion of the casing 1 is arranged a pair of burners or heaters embodying my invention. Each of these comprises a base plate 10 supported by brackets



11 extending from the legs 2 and provided with a plurality of air passages 12 and a central opening 13. Projecting upwardly from said plate is an annular row or series of retaining lugs or fingers 14 between which fits the lower end of a vertically arranged mixing chamber 15. This chamber, which preferably comprises a tube or cylinder of sheet metal or other suitable material, rests at its lower end directly upon the base plate and is supplied with a definite quantity of air through the passages 12. A gas supply tube 16 extends upwardly into the lower end of the chamber 13 in the base plate and is connected at its lower end with a supply pipe 17 provided with valves 18 for regulating the supply of gas to the respective burners. The tube 16 carries at its upper end a tip 19 to regulate the feed of gas therethrough.

Disposed above and in axial alinement with the mixing chamber is a combustion tube or chamber 20, comprising a cylinder of cast iron or other suitable material, and the combustion chambers of the two burners are in common communication through a Y-connection 21 with an outlet pipe 22 communicating with the drum 7 of the adjacent heating chamber 5. The burner tip or burner member proper is arranged between the proximate ends of the mixing chamber and combustion chamber and comprises a disk or plate 23 which may be of circular form, as shown in Fig. 5, or of any other preferred geometrical form, as illustrated diagrammatically in Figs. 8 to 13 inclusive, for cooperation with different shapes of mixing and combustion chambers or to suit different exigencies of service. The burner plate rests directly upon the upper edge of the body of the mixing chamber and is provided with a downwardly extending series of retaining lugs 24 embracing and holding said chamber in proper relative position, the lower ends of said lugs being outwardly and upwardly bent or extended to provide hooked supporting members 25. The lower end of the combustion tube or chamber 20 rests upon the upper surface of the burner plate and surrounds and is retained in position by a series of holding lugs 26. Formed in the center of the burner plate are burner openings or passages 27, of which any desired number may be employed, through which openings the fuel mixture passes upwardly from the mixing chamber into the lower end of the combustion chamber, where it is ignited at the openings 27, forming a mass or group of flames within the lower portion of the combustion chamber whereby said chamber is heated, the fumes or products of combustion discharging therefrom through the pipe 22, whereby an effective circulation is afforded. A perforated plate or diaphragm 28 is preferably employed at

the top of the mixing chamber a short distance below the burner to break up the body of the mixture into a plurality of fine streams for flow to the burner, and in order to further supply air to commingle with the mixture the upper edge of the wall of the chamber is notched or recessed to form a plurality of air inlet openings 29 below the level of the burner, by which the gas previously admixed with a certain quantity of air is further enriched with oxygen before passing up through the burner openings 27.

Surrounding the lower portion of the combustion chamber and upper portion of the mixing chamber is a drum 30 which snugly embraces the burner and is open and rests at its lower end upon the supporting members 25, the upper end of said drum being contracted and tightly fitted about the combustion chamber, as shown. The drum is heated by radiation from the combustion chamber and is of proper dimensions to form an intervening space or chamber surrounding said combustion chamber to receive and heat a determined amount of air for supply thereto, as hereinafter described.

By the construction described it will be seen that the air on its passage through the casing will be highly heated from the contained combustion chamber without being commingled with and contaminated by the gas or resulting fumes or unconsumed particles of combustion discharging through the pipe 22.

In order to promote combustion and to intensify the heat of the flames, the combustion chamber is formed at its lower end with an annular series of air inlets 31 for the passage of the heated air from the interior of the drum to the point of combustion. The air flows into the drum through air ports formed by notches or recesses 32 in the edge of the burner and the adjacent portions of the wall of the drum and is heated by radiation from the combustion chamber, as before described.

It will thus be seen that the gas primarily oxygenated to a certain extent in the mixing chamber 15 is divided into streams on its passage through the perforated diaphragm 28, further enriched or commingled with air entering through the openings 29 below the burner, thus placing it in condition to form Bunsen flames of great intensity upon ignition at the upper ends of the openings 27, and finally at the point of combustion supplied with heated air through the openings 31, being thus furnished with an ample supply of oxygen to promote combustion to the highest degree. As a result, the combustion chamber or retort is heated to an intensely high degree with obvious advantages in the operation of the apparatus in heating the air passing through the furnace. It has been found in practice



that a burner construction of this type will effectively heat a retort or combustion chamber of considerable area through the use of a comparatively small amount of gas, such as may be supplied through an ordinary burner tip 19, so that economy in the use of a burner of this type is insured while a number of flames of great intensity may be produced. An opening 33 is provided in the drum 30 in line with one of the openings 31 through which a match or torch may be introduced to ignite the burner.

If desired, the apparatus may also be employed for heating the water in an ordinary domestic boiler 34 for consumption. As shown, a water heating coil 35 surrounds the combustion tube of one of the burners and is inclosed by the drum thereof and connects with supply and return pipes 36 and 37 leading from and to the boiler. If desired, however, the coil may be arranged directly within the combustion tube and the supply and discharge pipes extended into the same for connection therewith. Suitable doors 38 are provided upon the casing 1 for the insertion of the matches or torches to be introduced through the igniting openings 33.

It will be understood that the different geometrical forms of burners illustrated diagrammatically in Figs. 8 to 13 inclusive, are to be employed in conjunction with different sizes of mixing chambers as well as different shapes thereof, and that I do not limit the invention accordingly to any particular shape of burner plate. In some cases the use of a circular burner having the notches or recesses 36 may be dispensed with and a non-circular burner employed to serve an equivalent purpose. It will be apparent that when a non-circular burner of any of the forms illustrated in said figures is employed within and in conjunction with a circular drum, air inlet spaces will be formed between portions of the periphery of the burner and the wall of the drum.

In the embodiment of the invention disclosed in Figs. 6 and 7, the casing 1<sup>a</sup> of the furnace is of a conventional type and is provided at its upper end with a plurality of circulating pipes 3<sup>a</sup> for conducting the heated air to the various rooms or apartments of a building. Within this casing are disposed a number of burners of the construction heretofore described arranged in a group—a group of three being illustrated in the present instance, said burners having their gas inlet pipes extending upwardly from a ring or annular pipe 17<sup>a</sup> connected with the supply pipe 17. The water coil in this construction surrounds the combustion chamber of the central burner, and the upper ends of the combustion chambers of all three burners extend into a fume box 7<sup>a</sup> forming an auxiliary drum in the upper portion of

the casing and having an outlet pipe 9<sup>a</sup> leading therefrom to a chimney or the atmosphere. The burner construction in general is the same as that heretofore described.

In Figs. 14 to 16, inclusive, I have shown the adaptation of my invention to a cooking stove or range, in which the body portion or casing 1<sup>b</sup> of the stove rests upon a base plate 10<sup>a</sup> which is equivalent of the base plate shown in the preceding construction and supports the mixing chambers which are arranged in alinement with air inlet openings 12<sup>a</sup> in said base, through which openings the gas supply pipes extend upwardly into the mixing chambers. The combustion tubes or chambers and the drums are connected at their upper ends with a horizontal partition plate 46 spaced from and forming with the top plate 47 of the stove a passage 48 through which the hot air as well as the hot gases or fumes discharging from the burners pass into an upright rear box or chamber 49 and circulate around and heat an oven 50 contained therein and thence exhaust to the chimney through an outlet pipe 51. As shown, the plate 46 is provided with openings 52 affording communication between the drums and passage 48 and, of desired, the combustion chambers of the respective burners may be supported solely by the burner body and extend at their upper ends into said openings without being connected with said plate 46. Some of the burners are arranged below the usual pot holes in the top plate of the stove and others beneath the oven chamber, thus providing for the effective distribution of the heat and the use of the stove for general cooking purposes. Where the stove is also employed for heating the water in a domestic boiler, one or more water heating coils may be employed, as shown. The other features of construction common to this and the other heaters before described are indicated by the same reference characters.

In Fig. 17 I have shown a modification in the form of the mixing chamber, which is here provided at its upper end with an elbow or angularly disposed portion 15<sup>a</sup> to support the parts of the burner in an inclined position.

In Fig. 18 I have shown a modification in the construction of the burner *per se*. In this modification the burner body is provided with a dome top 53 provided in its crown portion with passages 54 for the passage of the fuel mixture which is ignited at the top of the crown. At its base the dome is formed with an annular series of air inlets 55 for the entrance of air to commingle with the gas issuing from the passages 27. This type of burner is employed for general heating purposes where the use of an independent combustion tube and direct fume outlet connected therewith is unimportant.



From the foregoing description, taken in connection with the drawings, it will be seen that my invention provides a burner construction adapted for general use, and its advantages in effecting a thorough admixture of air with the fuel gas will be apparent. The construction and arrangement of parts may, of course, be varied or modified within the scope of the invention as defined in the appended claims.

Having thus fully described the invention, what is claimed as new is:—

1. A burner comprising a flat disk or plate having vertical fuel passages, and a drum supported by said plate, the edge of the plate being formed to provide an annular series of spaced air inlet passages between the drum and periphery of the plate.

2. A burner comprising a flat disk or plate having vertical fuel passages, and a drum or casing supported by the plate, an annular series of spaced air inlet ports being formed between the edge of the plate and the adjacent surface of said drum or casing.

3. A burner tip comprising a flat disk or plate, having vertical fuel passages and peripheral cut away portions or recesses, retaining lugs projecting upwardly from the plate, and retaining lugs projecting downwardly therefrom and having laterally extending supporting members.

4. A burner tip comprising a flat disk or plate having vertical fuel passages and peripheral cut away portions or recesses, retaining lugs projecting upwardly from the plate, and retaining lugs projecting downwardly from the plate and having laterally extending lower ends provided with upturned extremities.

5. A burner tip comprising a flat disk or plate having vertical fuel passages and upwardly and downwardly projecting retaining members, and a casing inclosing said disk or plate, the peripheral edge of said disk or plate being formed to provide a series of air passages between said plate and said casing or chamber.

6. A burner tip comprising a disk or plate having vertical fuel passages and peripheral cut away portions or recesses, retaining members extending upwardly from the plate, retaining members extending downwardly from the plate, and outwardly projecting supporting portions carried by said downwardly projecting retaining members.

7. In a gas burner or heater, the combination of a burner plate having vertical gas passages, a mixing chamber disposed below the burner plate and provided with air inlets below said passages, and a drum extending above and below and surrounding said burner plate and the upper portion of the mixing chamber and provided with an air inlet below the burner plate, the peripheral

edge of the latter being formed to provide air passages between said plate and the inclosing portion of the drum.

8. A burner comprising a flat disk or plate provided with vertical fuel passages, retaining lugs projecting upwardly from the plate, supporting members projecting downwardly from the plate, a combustion tube resting on the plate about said lugs and provided with air inlets, a mixing chamber extending upwardly between said supporting members and provided with air inlets, and a drum inclosing the plate, lower end of the combustion tube and upper end of the mixing chamber and resting on said supporting members, the edge of the plate being formed with recesses providing vertical air passages between the drum and plate.

9. In a gas burner or heater, the combination of a burner plate having gas passages, a mixing chamber arranged below the burner plate and in open communication with said passages, a tube resting on and extending above the burner plate, and a drum surrounding said tube and burner plate and upper portion of the mixing chamber and provided below the burner plate with an air inlet, the edge of the burner plate and inclosing portion of the drum being constructed and arranged to provide passages for the supply of air to the drum above the burner plate.

10. In a gas burner or heater, the combination of a burner plate having vertical fuel passages, a mixing chamber below the burner plate and provided with lateral air inlets immediately below the same, a combustion chamber above the burner plate having lateral air inlets at its base above said plate, and a drum surrounding the combustion chamber, burner plate and upper portion of the mixing chamber and having an air inlet below the burner plate, the edge of the latter being formed to provide air passages between the same and the drum for the upward flow of air from said inlet to the portion of the drum above the burner plate.

11. In a gas burner or heater, the combination of a burner plate having vertical gas passages, upwardly extending retaining lugs and downwardly extending retaining lugs, the latter being provided with outwardly and laterally projecting supporting portions, a mixing chamber having its upper end fitted between the downwardly retaining lugs and provided with lateral air inlets below the burner plate, a combustion chamber engaging the upper retaining lugs and provided with lateral air inlets, and a drum inclosing the combustion chamber, burner plate and upper portion of the mixing chamber and resting at its lower end upon the supporting portions of the downwardly projecting retaining lugs, said drum having an air inlet at its lower end and the peripheral edge of



the burner plate and the inclosing portion of the drum being constructed and arranged to form air passages for the feed of air from the lower portion to the upper portion of the drum.

12. In a gas burner or heater, the combination of a burner plate provided with gas passages and peripheral recesses, a mixing chamber disposed below the burner plate and provided below the burner passages with air inlets, a screen diaphragm within the mixing chamber below the inlets, a combustion chamber above the burner plate and provided at its base with air inlets, and a drum surrounding the combustion chamber, burner plate and upper portion of the mixing chamber, said drum being provided with an air inlet below the burner plate and cooperating with the peripheral recesses of the burner plate to form passages for the feed of air to the inlets in the combustion chamber.

13. In a gas burner or heater, the combination of a burner plate provided with gas passages and peripheral recesses, a mixing chamber disposed below the burner plate and provided below the burner passages with air inlets, a combustion chamber above the burner plate and provided at its base with

air inlets, and a drum surrounding the combustion chamber, burner plate and upper portion of the mixing chamber, said drum being provided with an air inlet below the burner plate and cooperating with the peripheral recesses of the burner plate to form passages for the feed of air to the inlets in the combustion chamber.

14. A gas burner comprising a burner plate having gas passages and peripheral recesses, mixing and combustion chambers arranged respectively above and below the burner plate and provided with air inlets, and a drum surrounding the aforesaid parts and provided with an air inlet at its lower end and with an igniting aperture in line with one of the inlets in the combustion chamber, said drum being arranged to cooperate with the peripheral recesses in the burner plate to form passages for the feed of air to said inlets in the combustion chamber.

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

CHARLES F. HOLTMANN.

Witnesses:

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JOHN L. FLETCHER.