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Patented July 22, 1902.

J. A. KLOEB.
HEATING APPARATUS.

(Application filed Apr. 17, 1901.)

(No Model.)

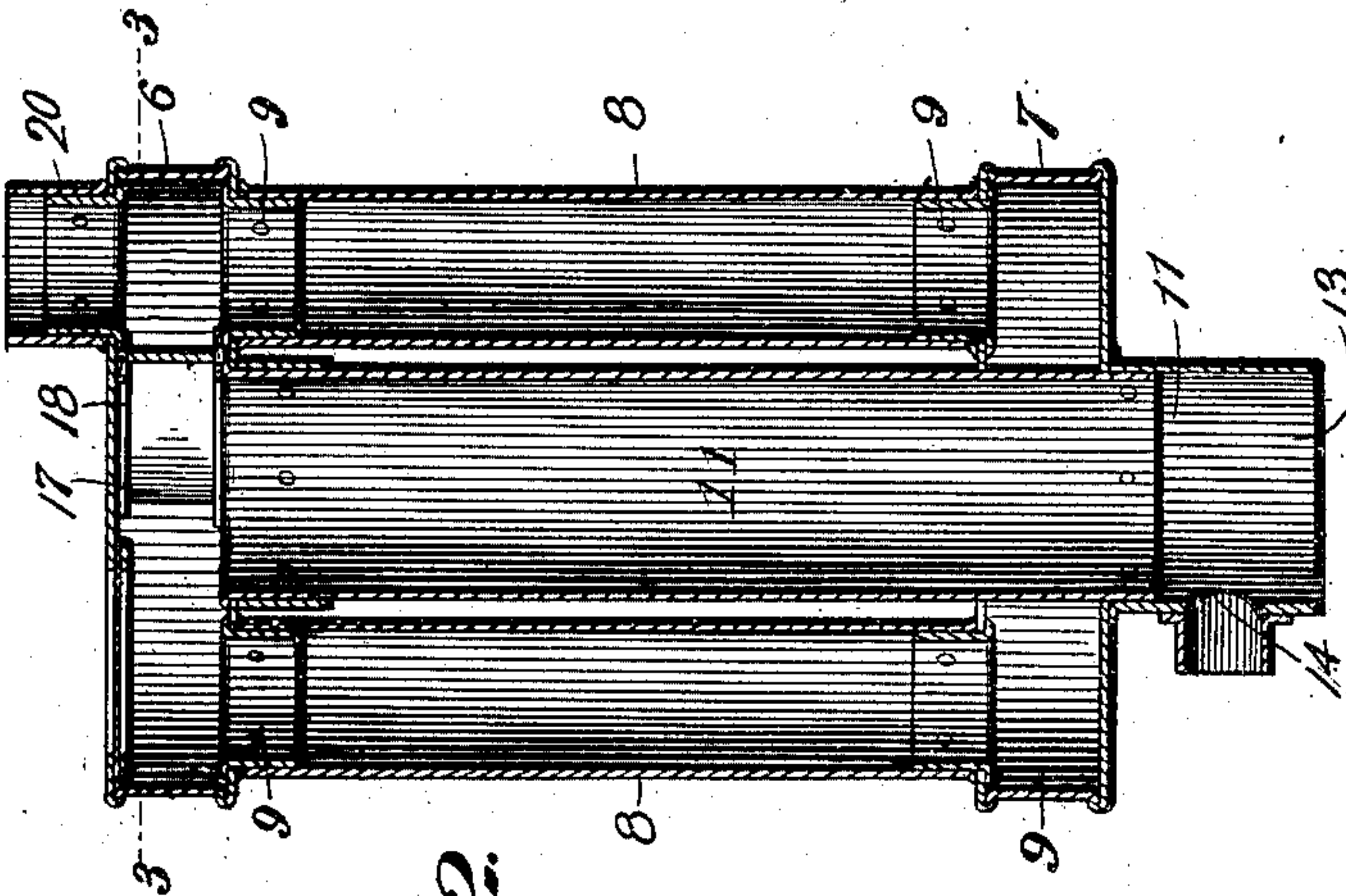


Fig. 2.

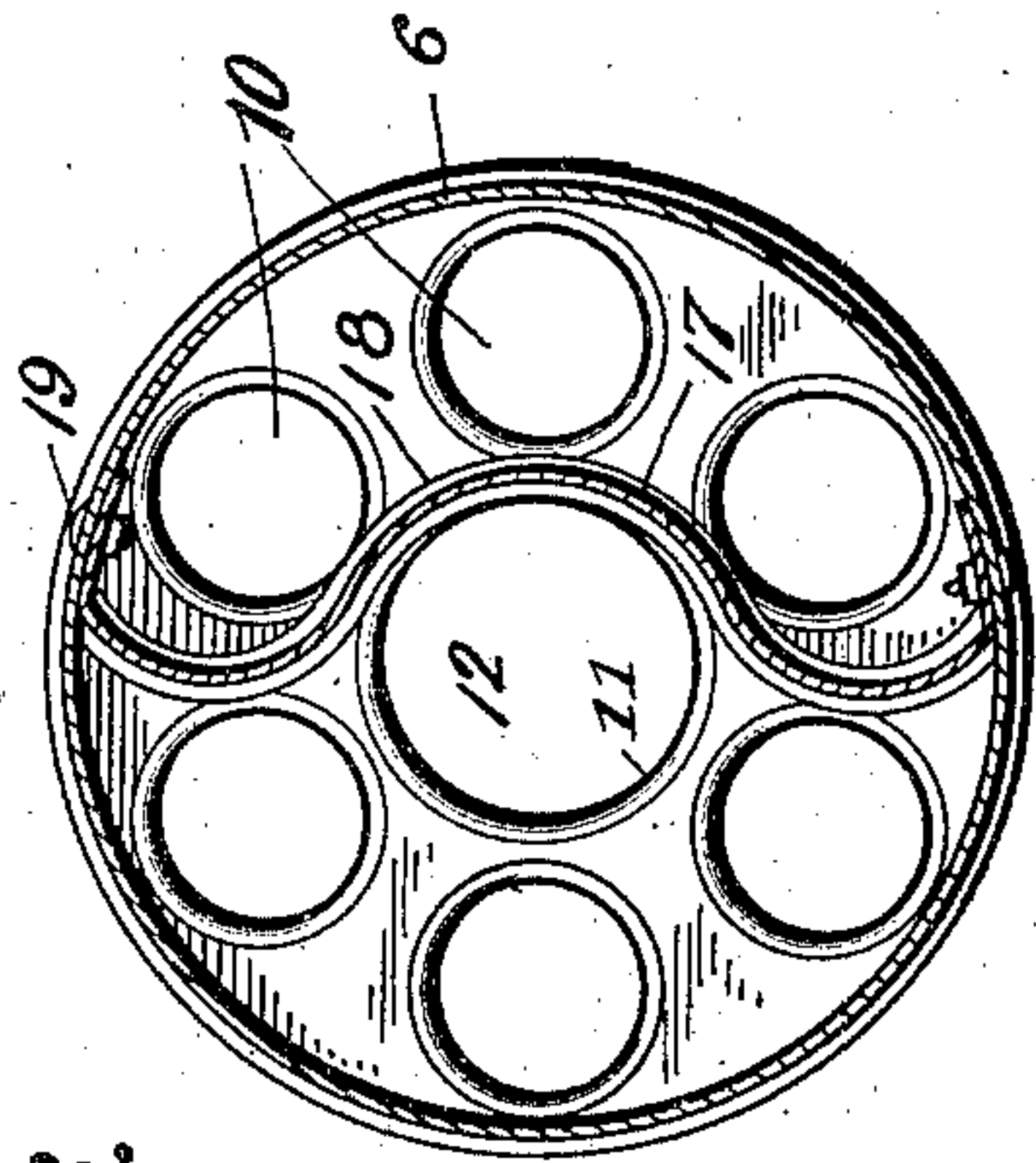


Fig. 3.

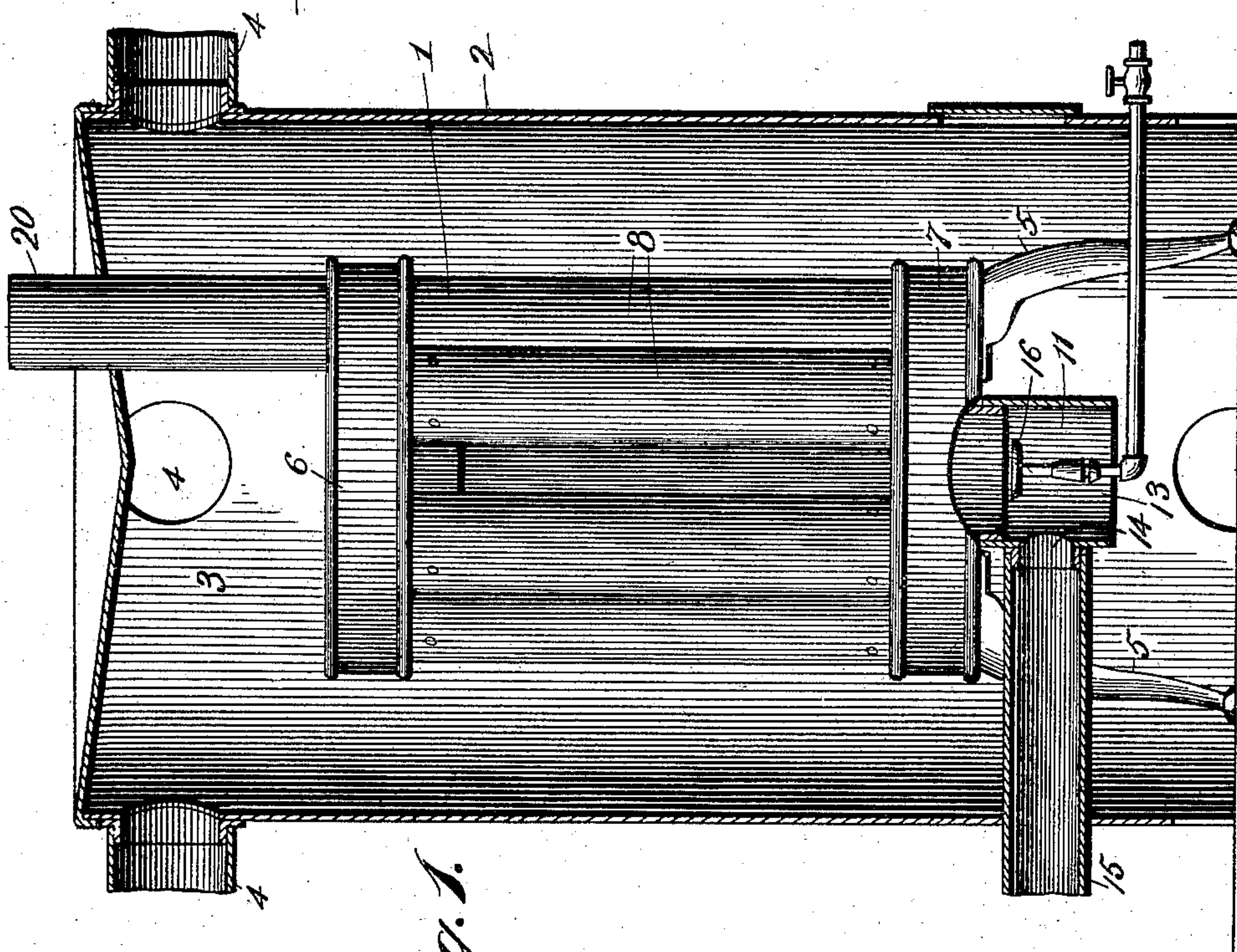


Fig. 1.

Witnesses

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HEATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 705,094, dated July 22, 1902.

Application filed April 17, 1901. Serial No. 56,272. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH A. KLOEB, a citizen of the United States, residing at Piqua, in the county of Miami and State of Ohio, have
5 invented certain new and useful Improvements in Heating Apparatus; 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
10 which it appertains to make and use the same.

This invention relates to heating apparatus particularly of the type associated with hot-air heating systems, and has for its object to provide an improved form of radiator constructed and arranged for use in such a way
15 as to insure a maximum heating capacity with a minimum amount of fuel.

To this end the invention contemplates a simple and practical construction of heating
20 apparatus or radiator especially designed for use in connection with suitable air-supplying means, and gas or liquid fuel burners to provide what might properly be termed a "gas-furnace" for heating purposes. In carrying out this object the invention has in
25 view the provision of novel means for supplying the apparatus with fire and air in such a way as to secure an intense heating up of the parts.

30 With these and many other objects in view, which will more readily appear as the nature of the invention is better understood, the same consists in the novel construction, combination, and arrangement of parts hereinafter
35 more fully described, illustrated, and claimed.

The essential features of the invention involved in the peculiar construction of the radiator proper and the mode of using the same are necessarily susceptible to considerable
40 modification without departing from the spirit or scope of the invention; but the preferred embodiment of the improvements is shown in the accompanying drawings, in which—

Figure 1 is a perspective sectional view of a
45 complete heating apparatus embodying the improvements contemplated by the present invention. Fig. 2 is an enlarged vertical sectional view of the apparatus or radiator proper omitting the furnace-jacket. Fig. 3 is a horizontal sectional view through the upper heat-
50 drum, the section being taken on the line 3 3 of Fig. 2.

Like numerals of reference designate corresponding parts in each of the views of the drawings.

In carrying out the invention the heater or radiator proper may be utilized in any convenient or practical way in connection with hot-air systems or for other heating purposes; but the preferred embodiment of the invention
55 resides in associating the said heater or radiator proper with a furnace-jacket or ordinary type of furnace without a fire-box, whereby the entire apparatus constitutes what may properly be termed a "gas-furnace" admitting of the use of gas or liquid
60 fuel.

In employing the invention as above described the heater or radiator proper (designated by the numeral 1 in the drawings) is
65 designed to be housed within a suitable furnace jacket or casing 2, provided within the top portion thereof with a hot-air drum 3, receiving the air heated up by the heater or radiator and from which drum the hot air is
70 circulated through the pipes 4 throughout the building to the point of use. As thus used with the furnace jacket or casing the heater or radiator 1 is designed to be supported in
75 an elevated position above the floor of the furnace by means of suitable bottom-supporting legs or supports 5, which may be conveniently bolted or otherwise suitably attached to the bottom of the heater or radiator.

Referring particularly to the detail construction of the heater or radiator 1, the same
80 comprises in its general organization upper and lower heat-drums 6 and 7, respectively, which drums are arranged in vertical alignment and are preferably of a circular contour. The said vertically-aligned heat-drums 6 and
85 7 are preferably constructed of sheet-metal pieces seamed together at their meeting edges in the manner common to stove structures and the like, and said drums are of a sufficient depth and diameter to provide for the
90 free circulation therethrough of the heated products of combustion from the fire. In connection with the upper and lower vertically-aligned and spaced heat-drums 6 and 7 there is associated a circular group of circulating radiating flues 8, extending vertically
95 across the interval between the two heat-drums and preferably united thereto by hav-

ing their ends fitted over and secured to the short pipe-collars 9, held in the flue-openings 10, formed, respectively, in the lower side of the upper heat-drum and the upper side of the lower drum. Any number of the vertical circulating radiator-flues may be employed, and inside of the circle of the said flues is located the central tubular fire-chamber 11. The central tubular fire-chamber 11 is of a larger size than the flues encircling the same and is secured at its upper end within the central inlet-opening 12 in the bottom of the upper heat-drum 6. The lower portion of the central fire-chamber 11 extends entirely through the lower heat-drum 7 and projects to a point below said drum, having no communication directly with the interior of said lower drum. The lower projecting end of the fire-chamber 11 is preferably provided above the plane of the burner-opening 13 at the bottom thereof with a lateral air-port 14, with which communicates an air-supply pipe 15, extending through the wall of the furnace jacket or casing or in any other suitable manner leading to a point exterior to the furnace for the purpose of conducting a supply of air to the point of combustion for the gas as it issues from the burner 16, which is preferably arranged within the lower open end of the fire-chamber 11 and projects to a point slightly above the plane of the air-port 14.

In view of the special utility of the radiator or heater proper (designated by the numeral 1) in connection with a furnace jacket or casing the feature of providing the central fire-chamber 11 with a bottom opening 13 in direct communication with the bottom portion of the jacket or casing and also with an auxiliary lateral air-port 14, communicating with a fresh-air-supply pipe, is of material advantage. The cold air to be heated is admitted into the lower part of the furnace jacket or casing partly through the ordinary bottom door and mostly rises within the jacket or casing about the heater or radiator into the top portion of the former, from which it is distributed through the hot-air pipes 4 throughout the building to the point of use. The air thus admitted within the furnace jacket or casing is inadequate to also supply a proper volume of air for circulation through the heater or radiator, besides being insufficient for the thorough and complete combustion of the fuel utilized in connection with the burner 16. Consequently the auxiliary air-supply pipe 15, which leads to the outer air, circulates fresh air into the open lower end portion of the fire-chamber directly to the point of combustion for the gas as it issues from the burner. The necessary amount of oxygen is therefore supplied to the flame, insuring proper combustion, and besides the two inlets 13 and 14 for air into the fire-chamber insure a proper volume of air for circulation through the flue-body of the heater to provide for thoroughly heating up every portion thereof. Furthermore, the bottom opening 13 at

the extreme lower end of the central fire-chamber facilitates the introduction and removal of the burner and renders the same easily accessible.

To insure a very extensive circulation of the heated products of combustion throughout the heater or radiator, there is arranged within the upper heat-drum 6 a baffle-partition 17. This partition is arranged vertically and extends entirely across the interval between the top and bottom of the upper heat-drum 6, said partition preferably being packed at its edges by asbestos or equivalent packing 18 to provide tight joints, and, as plainly illustrated in Fig. 3 of the drawings, the baffle-partition is bolted or otherwise fastened at its ends, as at 19, to opposite sides of the rim of the drum 6 and is of a sigmoidal formation, so as to extend around the vertical plane of the central fire-chamber and also between opposite sets of the circulating-flues 8.

At one side of the vertical plane of the baffle-partition 17 the upper heat-drum 6 has connected therewith an escape-pipe 20, which may be extended directly through the top of the furnace jacket or casing.

In the use of the apparatus there is a thorough mixing of the gas and air at the point of ignition at the extreme lower end of the central fire-chamber, and an intense flame and heat is produced which passes upwardly throughout the entire length of the fire-chamber before passing into the upper heat-drum 6. The vertical baffle-partition 17 compels the heated products from the central fire-chamber to pass downwardly through one set of circulating-flues into the lower heat-drum 7 and thence upwardly through the remaining set of such flues before finding escape through the pipe 20. The heated products are thus compelled to traverse the length of the heater or radiator three times before passing off through the escape, thus securing an intense and thorough heating up of every part of the radiator. This necessarily provides for a maximum heating or radiating capacity which will cause a rapid and thorough heating of the air to be circulated through the pipes of the hot-air system.

There is preferably utilized with the heater or radiator described an extra heat-drum for the hot-air-pipe connections, although it will be understood that this and other elements may be utilized or omitted, and various changes in the form, proportion, and minor details of construction may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

Having thus described the invention, what is claimed as new, and desired to be secured by Letters Patent, is—

1. In a heating apparatus of the class described, the combination with the inclosing jacket or casing having means for admitting air therein, of a heater arranged within the jacket or casing and comprising an upright body consisting of spaced upper and lower

heating-drums, a plurality of circulating-flues connecting said drums, and a separate tubular fire-chamber communicating at its upper end with the interior of the upper drum
5 and extending entirely through the lower drum, said fire-chamber having an open bottom extension projecting below the plane of the lower drum and receiving therein a burner, the said bottom extension having
10 its lower end open and in direct communication with the interior of the jacket or casing, and also provided above the plane of its bottom opening with an auxiliary air-inlet port, and a fresh-air-supply pipe leading
15 from the said air-inlet port to the outer air.

2. In a heating apparatus, the heater comprising upper and lower spaced drums, a plurality of circulating-flues connecting said drums, a separate central tubular fire-chamber connected at its upper end with the bot-

tom of the upper drum and extending entirely through the lower drum, the lower projecting end of the fire-chamber forming a bottom extension for the fuel and provided with a bottom and side air-inlet openings, a
25 vertically-arranged baffle-partition confined between the upper and lower sides of the upper heat-drum and disposed at one side of the vertical plane of the fire-chamber between opposite sets of the circulating-flues,
30 and separate terminal fastenings detachably connecting diametrically opposite ends of the partition with the rim portion of the drum.

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

JOSEPH A. KLOEB.

Witnesses:

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A. C. BUCHANAN.