

No. 842,917.

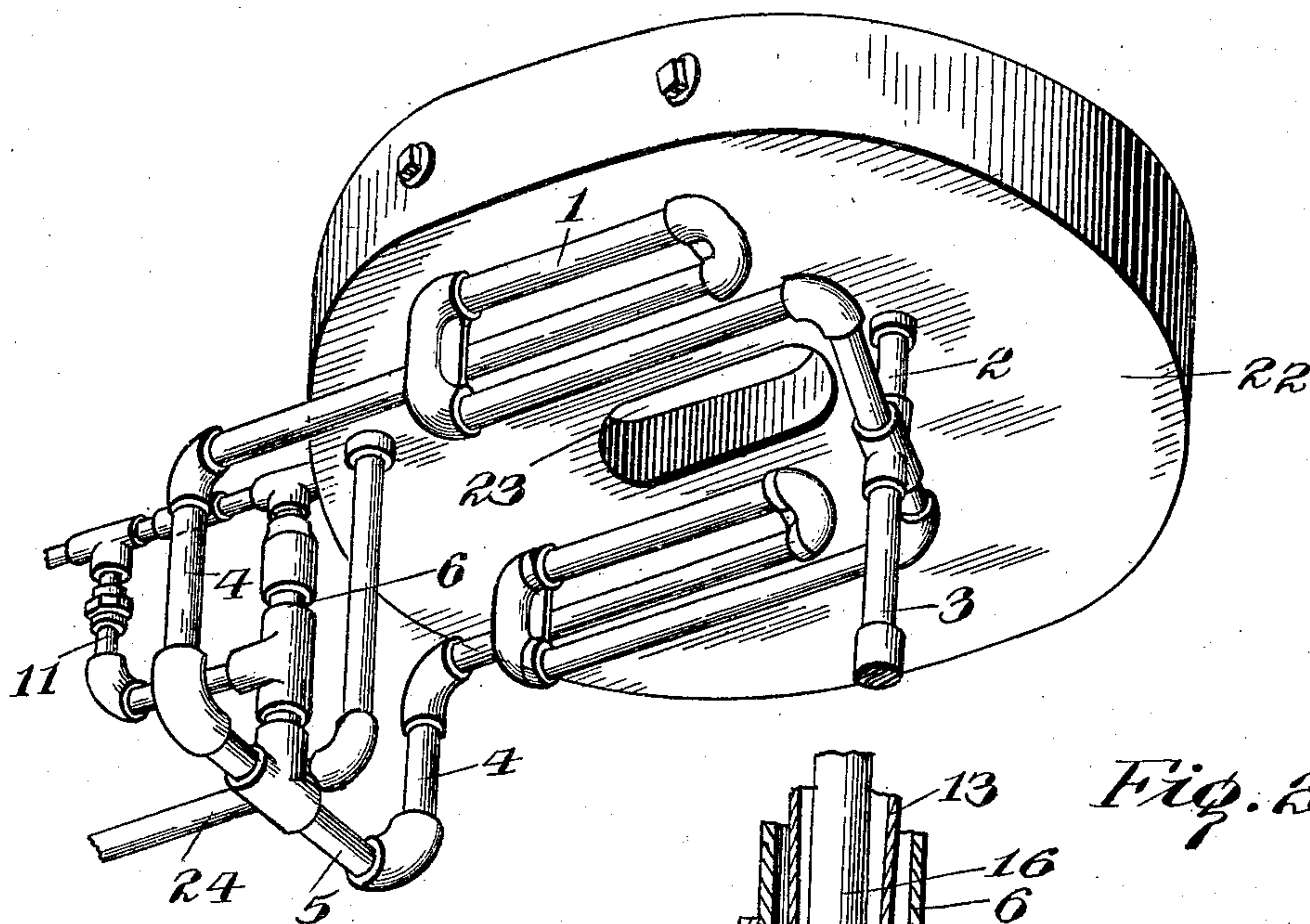
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HYDROCARBON OIL AND STEAM VAPOR BURNER AND STEAM GENERATOR  
COMBINED.

PATENTED FEB. 5, 1907.

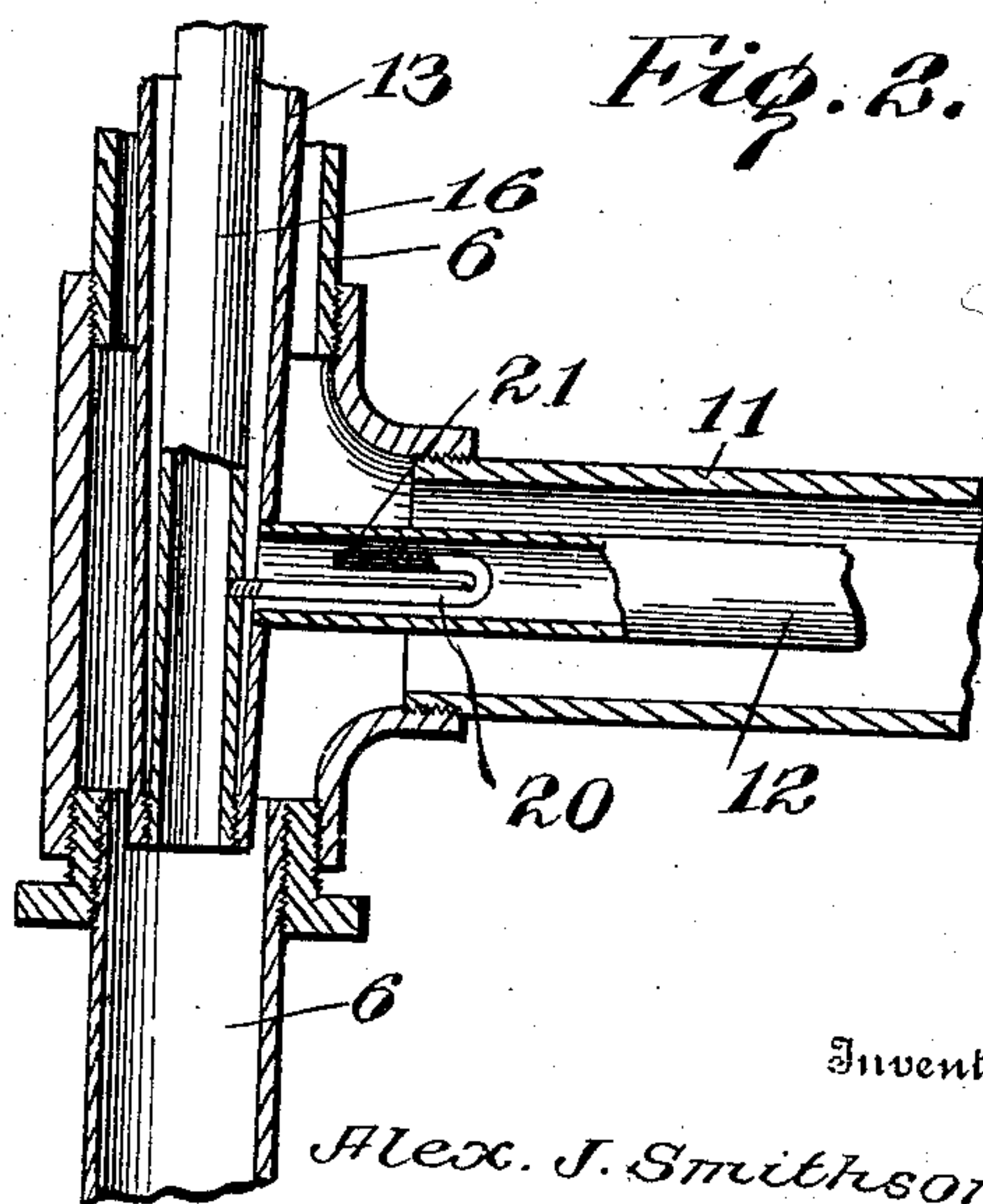
APPLICATION FILED OCT. 26, 1905.

2 SHEETS—SHEET 1.

*Fig. 1.*



*Fig. 2.*



Witnesses

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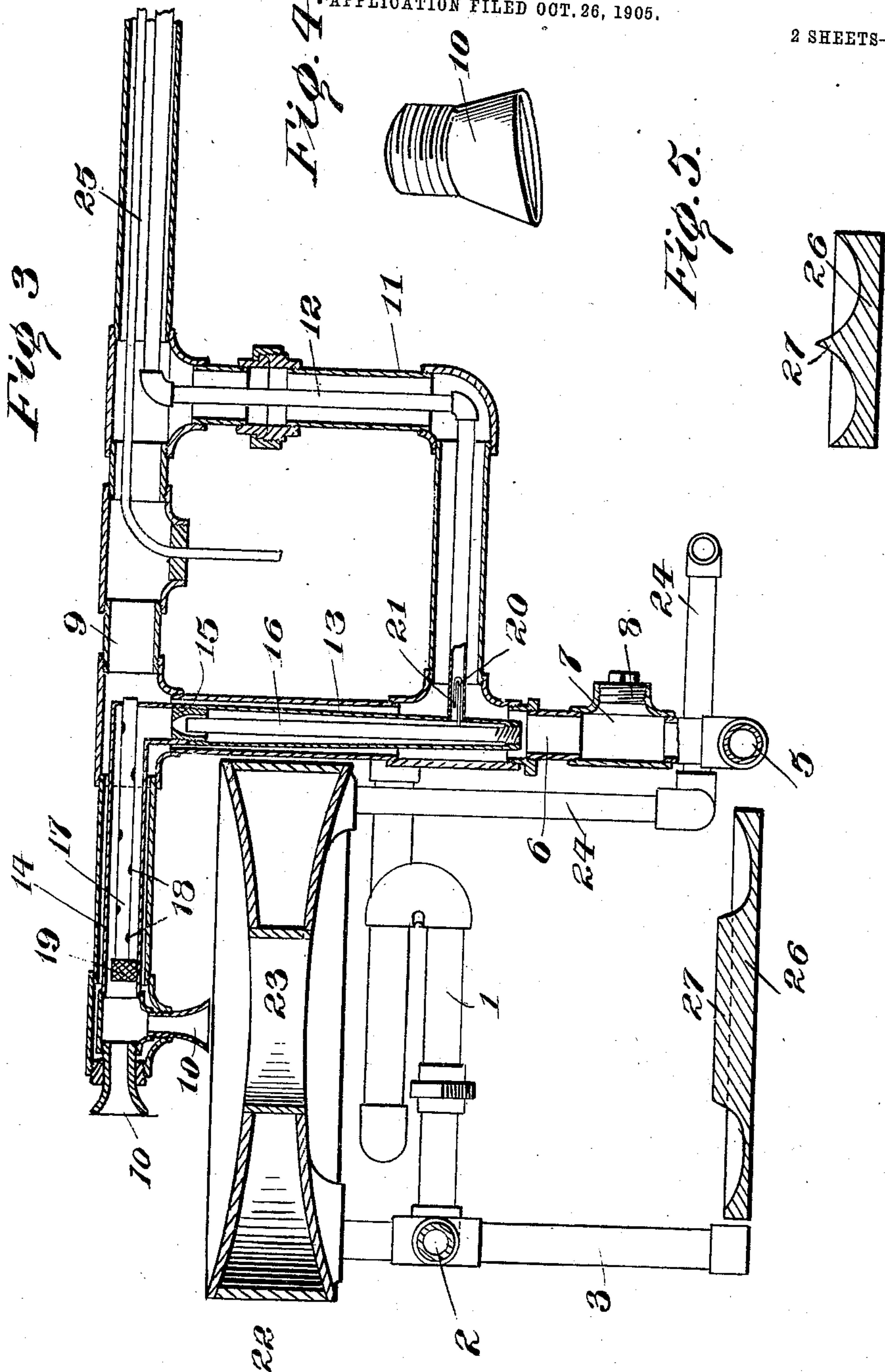
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Witnesses

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# UNITED STATES PATENT OFFICE.

ALEXANDER J. SMITHSON, OF PORTLAND, OREGON.

HYDROCARBON-OIL AND STEAM VAPOR BURNER AND STEAM-GENERATOR COMBINED.

No. 842,917.

Specification of Letters Patent.

Patented Feb. 5, 1907.

Application filed October 26, 1905. Serial No. 284,552.

*To all whom it may concern:*

Be it known that I, ALEXANDER J. SMITHSON, a citizen of the United States, residing at Portland, in the county of Multnomah and State of Oregon, have invented certain new and useful Improvements in a Hydrocarbon-Oil and Steam Vapor Burner and Steam-Generator Combined, of which the following is a specification.

This invention relates to a burner which may be advantageously used in connection with crude or refined petroleum and which will involve a structure admitting of the burner, generator, and adjunctive parts being readily and quickly cleaned and cheaply manufactured and assembled, hence resulting in the provision of a desirable and effective article.

The invention results in a device which may be used as a steam-generator, if so desired, and which presents a great amount of heating-surface and storage-space, both of which are essential in articles of the kind aforesaid.

The generating-pipes may or may not be incased, according to the design of the burner. It is preferable, however, to inclose the pipes and to protect the casing by a covering of asbestos or other refractory material. The burner may operate either as a hydrocarbon or an oil burner singly or jointly or combined and will operate successfully with either crude or refined petroleum or tar.

For a full description of the invention and the merits thereof and also to acquire a knowledge of the details of construction of the means for effecting the result reference is to be had to the following description and accompanying drawings.

While the invention may be adapted to different forms and conditions by changes in the structure and minor details without departing from the spirit or essential features thereof, still the preferred embodiment is shown in the accompanying drawings, in which—

Figure 1 is a perspective view of a burner and generator combined embodying the invention. Fig. 2 is a sectional view of the juncture of the steam, oil, and vapor pipes, showing the parts on a larger scale. Fig. 3 is a vertical central longitudinal sectional view of the burner. Fig. 4 is a detail perspective view of a vent or burner-top. Fig. 5 is a transverse section of the deflector.

Corresponding and like parts are referred

to in the following description and indicated in all the views of the drawings by the same reference characters.

The device comprises one or more generators 1, each preferably consisting of a disk or disks or coil or coils of suitable form. In the event of a series of generators 1 being provided they are connected by means of a pipe 2, from which a leg 3 is pendent and closed at its lower end. This leg serves both as a support for the burner and provides additional space for storage of vapor or gas, so as to insure a substantially uniform flow of gas at the outlet.

One end of each generator is connected with a stand-pipe 4, and in the event of a series of stand-pipes and generators being employed a pipe 5 connects the same in series, and a vertical pipe 6 projects therefrom. The pipe 6 is provided near its lower end with an opening 7, through which steam may have free access in the event of the said pipe being incased and which opening is closed by a plug 8, as shown, when no casing is provided. A horizontal pipe 9 connects with the upper end of the pipe 6 and is provided at and near one end with vents or burner-tips 10, which form outlets for the gas. Each of the pipes 6 and 9 is composed of fittings and short lengths of pipe coupled by screw-thread joints in the ordinary way. Steam may be supplied to the pipe 9 from any suitable source when it is desired to mix the same with the vapor arising from heating the oil, so as to produce a water-gas. A branch pipe 11 connects the vertical pipe 6 at a point between its ends with the horizontal pipe 9 a short distance from the juncture of said pipes 6 and 9. An oil-pipe 12 passes through the pipe 11 and a portion of the pipe 9 and connects with a suitable source of oil-supply. (Not shown.) Within the upper portion of the pipe 6 is arranged a tube 13, which is closed at its lower end, so as to prevent steam or other vapor entering the same. The upper end of the tube 13 connects with a tube 14, arranged in the end portion of the pipe 9, located above the generators and provided with the outlets or burner-tip. The oil-pipe 12 connects with the lower portion of the tube 13. The upper portion of the tube 13 is contracted at 15 to form a nozzle, and by preference said nozzle constitutes a separate part, which is threaded into the tube 13 or otherwise connected thereto. A tube 16 is located within the tube 13 and is connected



at its lower end thereto and opens into the pipe 6, so as to receive steam therefrom. The upper end of the tube 16 terminates within the contracted or nozzle portion of the tube 13, whereby the steam passing upward through the tube 13 and around the tube 16 and out through the nozzle 15 creates a suction within the tube 16 and causes the oil to feed therethrough. The oil and steam commingle at the nozzle 15 and as they emerge therefrom in a jet are further mixed in their passage through the tube 14, which may be designated as a "mixing chamber or tube." The mixture escaping through one or more of the outlets or burner-tips connected with the mixing-tube 14 burns when ignited, and the resultant flame may be utilized in any way.

A pipe or tube 17 is arranged within the mixing chamber or tube 14 and is perforated at intervals in its length and is closed at the end nearer the outlets and is open at the opposite end and is in communication with the pipe 9, so as to receive steam directed therefrom, which steam escapes through openings 18 of the tube 17 and commingles with the gaseous mixture in the form of spray. The cap 19, closing the end of the tube 17, is thickened upon its lower side, so as to obstruct the lower portion of the mixing-chamber, and is made thin at its upper side to allow ample space for the free passage of the gaseous mixture thereby to the outlets. It will be observed that the cap 19 acts both as a support for the end of the pipe or tube 17 and serves as a deflector to cause the gas to pass to the upper portion of the mixing-chamber before reaching the outlet. The tube or pipe 17 by reason of its function may be referred to as a "sprayer," since the steam passing therethrough and escaping through the openings 18 is sprayed or injected into the mixing-chamber in minute jets.

The outlet or burner-tip 10 is somewhat flat at the end having the opening and flares at the mouth and is set into the supporting-pipe a distance to prevent the heat baking the oil therein. The burner-tips may be threaded or fitted into place by a slip-joint or attached in any manner found most advantageous, according to the particular use and adaptation of the burner.

A tube 20 or small bore communicates at one end with the tube 16 and extends into the pipe 12 and in the operation of the burner delivers a minute jet of steam from the tube 16 in the said pipe 12, so as to facilitate the feed of the oil therefrom into the tube 13. The steam escaping from the tube 20 into the pipe 12 acts as a diluent and thins the oil to a certain extent and at the same time heats it, with the result that the passage of the oil from the pipe 12 into and upward through the tube 13 is accelerated. The delivery end of the tube 20 is recurved, as shown at 21,

with the result that the steam as it escapes from said pipe is directed toward the tube 13 and creates a suction which draws or causes the oil to follow in its wake. It will be understood that the oil as it emerges from the pipe 12 and enters the tube 13 is attenuated or thinned by the commingling therewith of steam and the heat absorbed from said steam, hence is prepared for more rapid admixture with the steam at the nozzle 15.

A generator 22 is located within the heating zone of a burner-outlet and is preferably arranged between the pipes 9 and 2. The generator has its upper and lower walls inwardly concaved or otherwise, as may be desired, and formed with an opening 23 in line with the lower outlet 10. This generator 22 is supported at one end by means of the hollow leg 3.

A water-pipe 24 connects with the generator 22 to supply the liquid to be converted into steam either for admixture with the gaseous vapor or to be used for any desired purpose. A pipe 25 has a portion passing through a part of the pipe 9 and is intended to supply water when it is required to use the device as a steam and oil vapor burner.

A deflector 26 is arranged below the generators and in vertical alinement with the lower outlet 10, and its upper side has its central portion 27 raised and made hollow around the part 27 to form a shallow receptacle for containing a quantity of oil when starting the burner. After the burner has been started the flame from the lower outlet or vent to burner 10 passes downward through the opening 23 and strikes the part 27 of the deflector and is spread thereby and reflects by the curved or concaved surface surrounding the part 27, so as to shoot upward and envelop the generators and keep the same hot sufficiently to convert the oil and water into vapor, which supplies the flame so long as the burner is in operation.

In practice the burner is susceptible of being used as a hydrocarbon-oil and steam vapor burner and steam-generator combined, water and oil being used and steam and oil being used, both working at the same time out of both vents or out of one vent, or out of the other vent. The vents may be closed by a plug or similar member in order to throw any one of them out of operation. I combine the two and use them as one. When there is no steam, I start the hydrocarbon oil and water vapor burner and get steam up, and then I turn on more oil and steam and make a very large flame, if needed. When a great amount of flame is not required, the steam and part of the oil is turned off. The hydrocarbon part then runs and keeps up steam until more heat is desired. The flame resulting from the water and oil is supposed to be continuous and does not go out until the supply of the gas-producing ma-



materials is shut off. If steam is supplied, steam and oil can be used and no water at all. It is noted that the burner can be used in any and all places where wood or coal is now used as fuel.

In the operation of the burner, to be more explicit, it may be stated that the vapors begin to mix in the pipes 12 and 20, and then at 15, and continue mixing in their passage through the pipes and tubes until they become a homogeneous gas which is burnt at the gas-outlet. It is preferred to use both vents unless a very small fire is needed in a heater or a cook-stove. Then either vent can be used, as desired. There is a big point gained by having a vent to impinge the oil and steam vapor down onto a deflector right at the furnace-door and have another vent making a big fire at the back end of the fire-box. In so doing there will be a big fire or an equal fire in every part of the fire-box. In a Scotch marine boiler it is very necessary to have the fire even and at all places all the time. In all the other burners they only have one vent and there is never any fire at the door in the fire-box. Hence the steam or heat is not equal in any part of the boiler. One part is very hot, the other is cold, hence will sooner or later blow up or give way, and there is another thing or point or claim to gain. It is utterly impossible for my

burner to ever burn a boiler or any part thereof when it is put in properly. The oil and steam vapor mixer may be used alone or jointly as a burner and may be arranged upon the inside or the outside of the furnace, as found most convenient.

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

1. In a device of the character specified, the combination of spaced tubes, an oil-tube in communication with the outer tube, means for supplying a fluid medium to the inner tube, and a tube leading from said inner tube through the outer tube and within said oil-pipe to facilitate the supply of the oil therefrom to said outer tube.

2. In a device of the class specified, the combination of spaced tubes, means for supplying a fluid medium to the inner tube, a pipe for supplying a liquid to the outer tube, and a tube leading from the inner tube through the outer tube and into said fluid-supply pipe and recurved to create a suction therethrough to facilitate the feed of said liquid.

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

ALEXANDER J. SMITHSON. [L s.]

Witnesses:

C. A. MANEY,

N. D. SIMON.