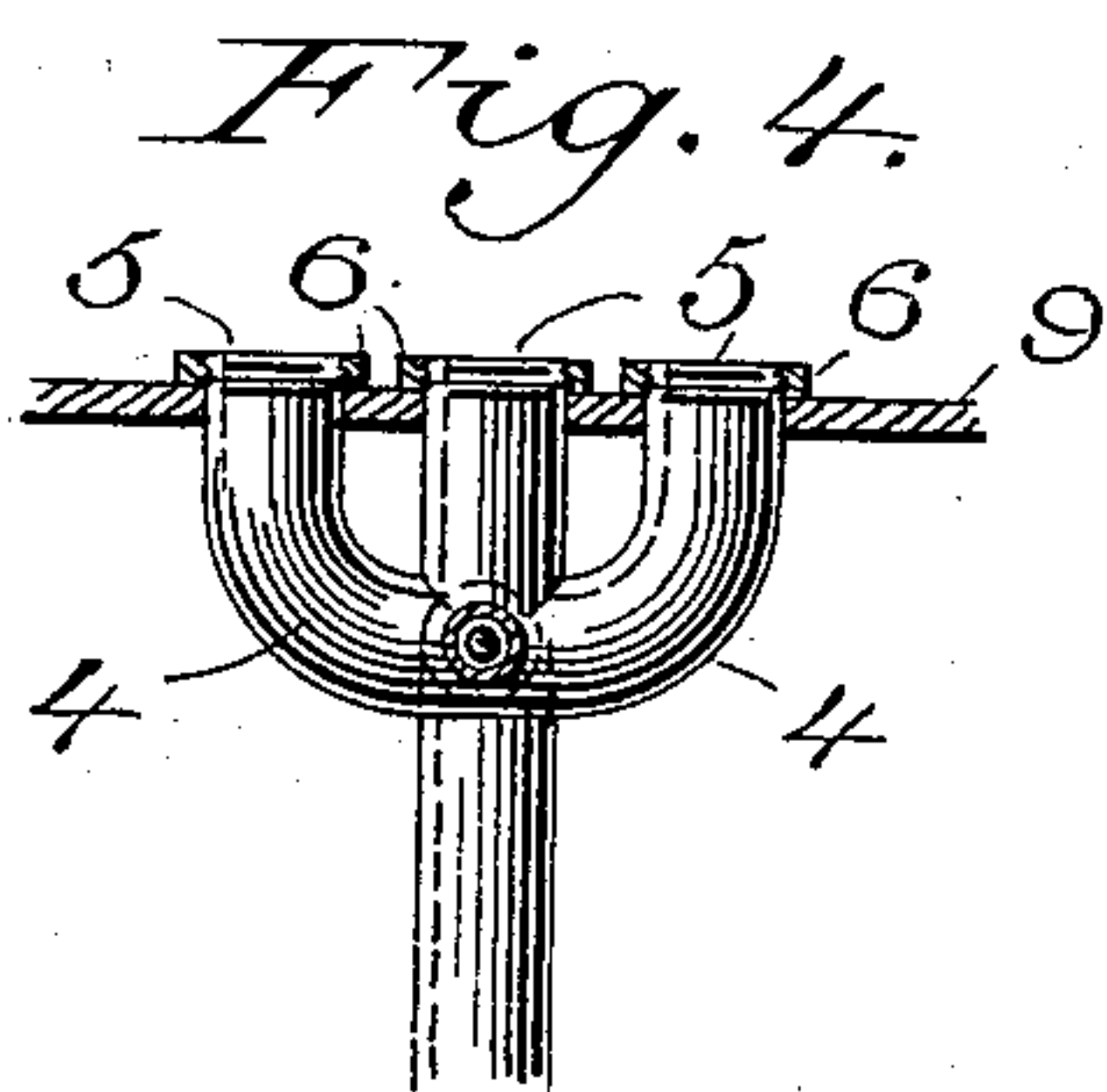
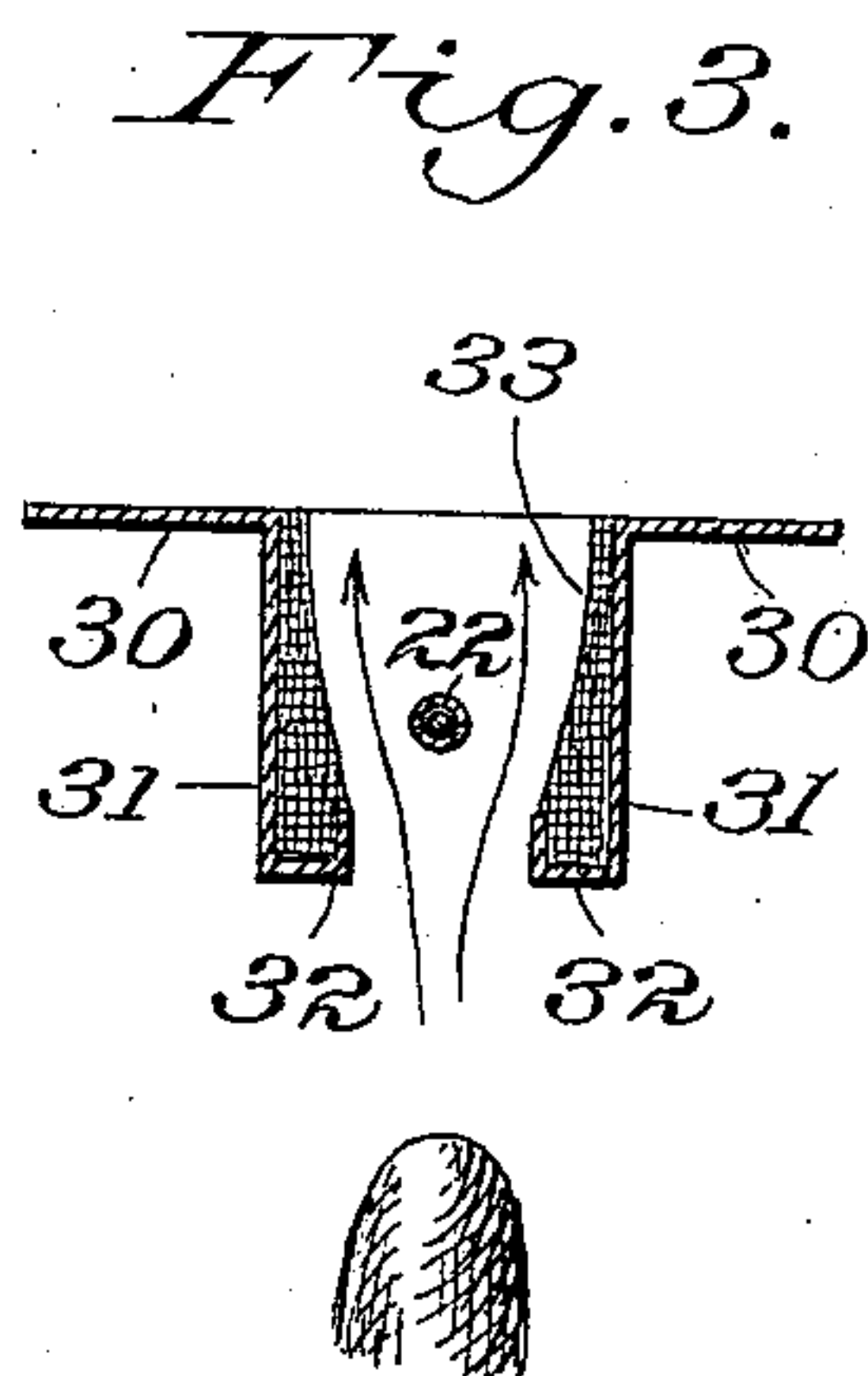
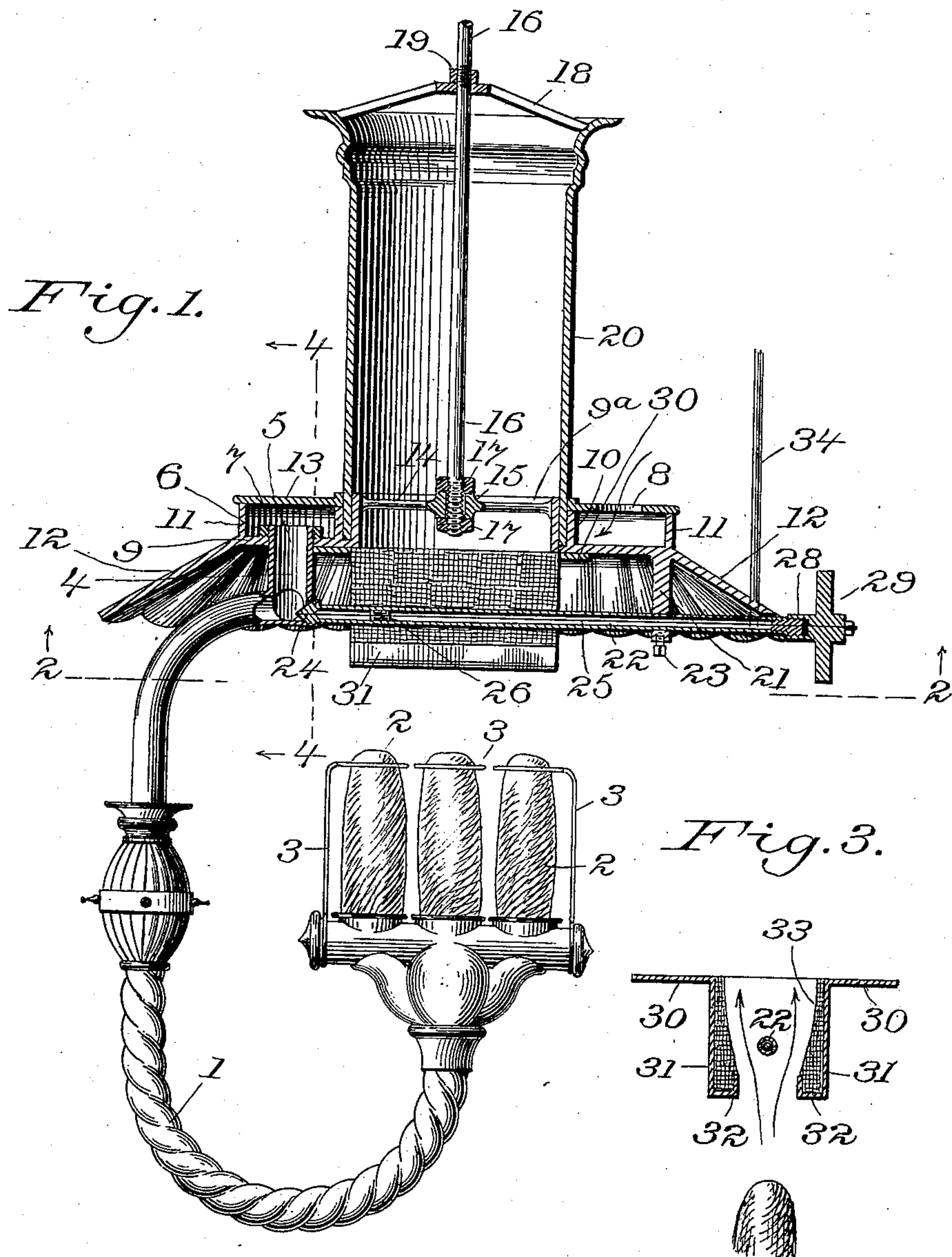


A. KITSON.
VAPOR BURNING APPARATUS.

No. 601,199.

Patented Mar. 22, 1898.



WITNESSES:

N. H. Humphrey.

O. H. H.

INVENTOR

Arthur Kitson

BY

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ATTORNEY

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Fig. 2.

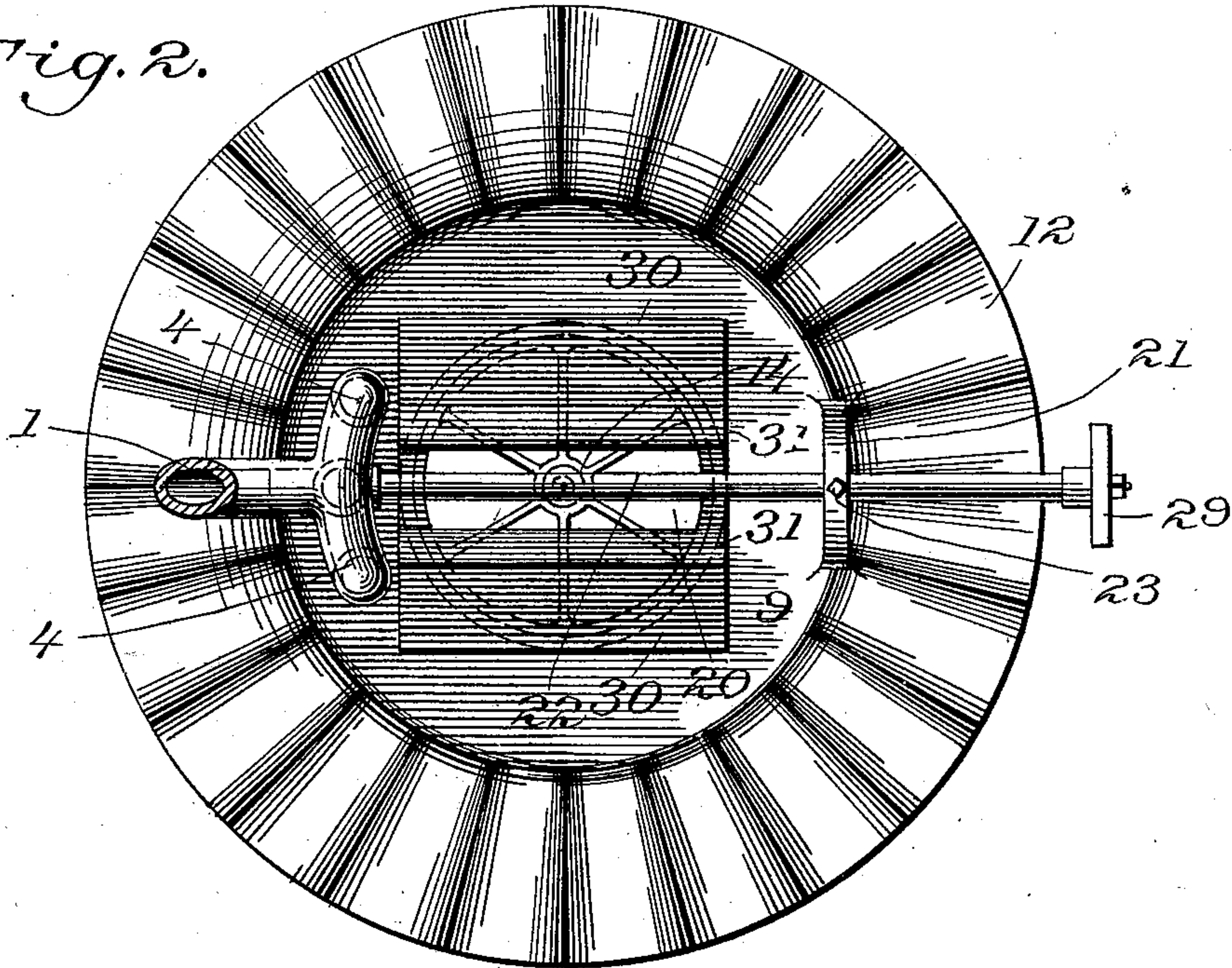


Fig. 5.

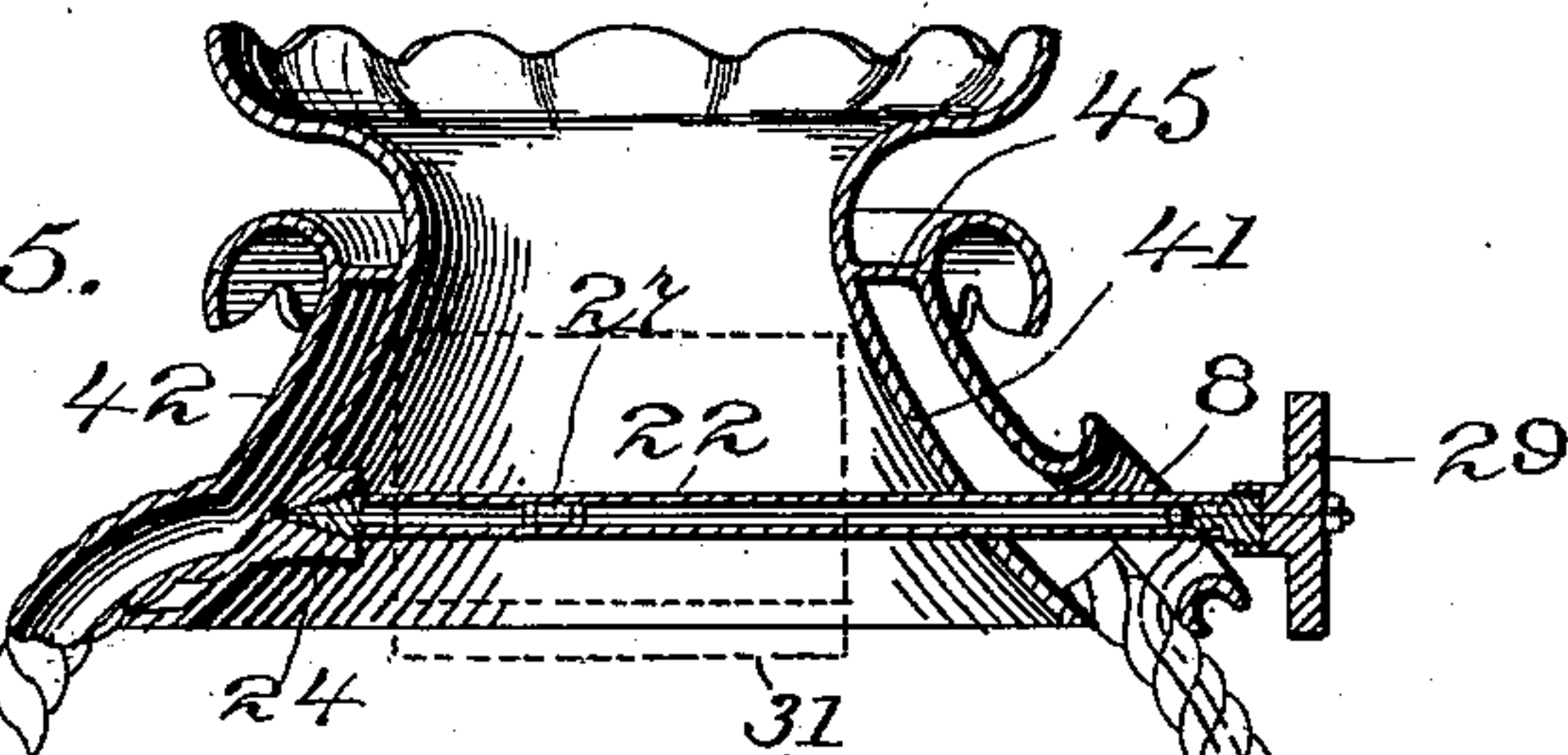
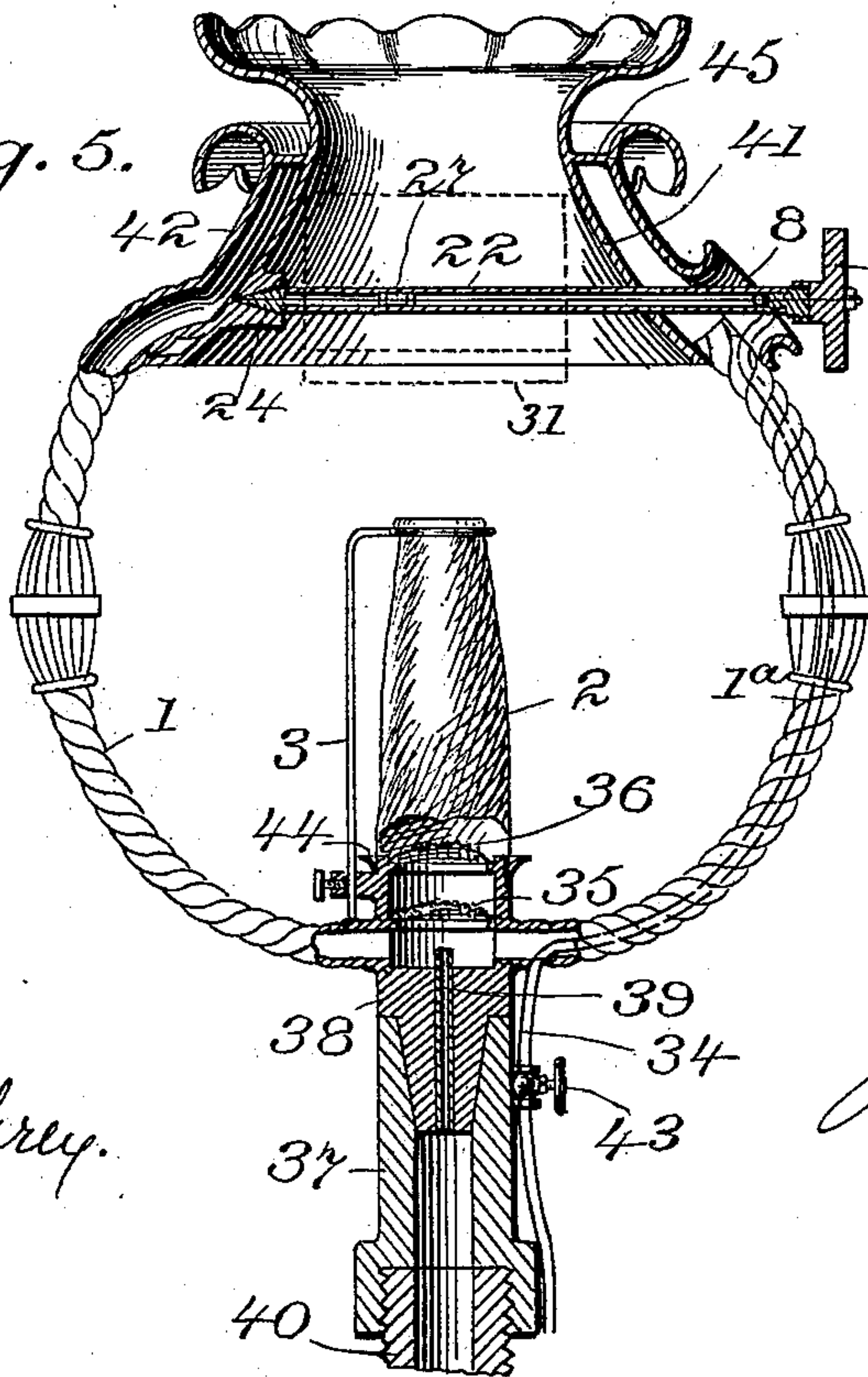
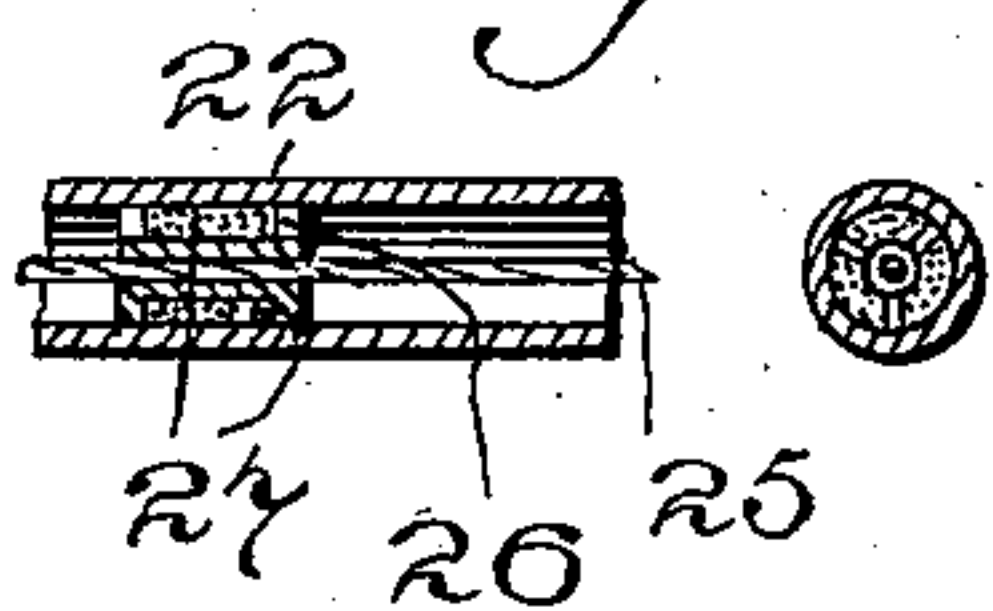


Fig. 6.



WITNESSES:

N. H. Humphrey.

O. Platt

INVENTOR

Arthur Kitson

BY *A. Parker Smith*

ATTORNEY

UNITED STATES PATENT OFFICE.

ARTHUR KITSON, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO THE
KITSON HYDROCARBON HEATING AND INCANDESCENT LIGHTING COM-
PANY, OF CHARLESTOWN, WEST VIRGINIA.

VAPOR-BURNING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 601,199, dated March 22, 1898.

Application filed August 16, 1897. Serial No. 648,353. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR KITSON, a sub-
ject of the Queen of Great Britain, residing
at Philadelphia, in the county of Philadel-
phia and State of Pennsylvania, have invent-
ed a certain new and useful Vapor-Burning
Apparatus, of which the following is a speci-
fication.

My invention is designed to burn the vapor
of kerosene or other hydrocarbon oil mixed
with the proper quantity of air for the pro-
duction of heat or light, and is more specifi-
cally intended to apply to what are known as
"vapor-burning lamps," in which an intense
heat-producing flame is employed to heat to
incandescence a mantle of refractory mate-
rial.

It consists in an improvement on the gen-
eral type of lamp illustrated in my Patent
No. 385,673, of July 3, 1888, and the special
advantages of this form of apparatus are the
complete vaporization of the hydrocarbon and
the complete intermingling thereof with heat-
ed air, whereby an intense flame is produced,
and a special arrangement whereby the ac-
tion of the lamp is steadied, and novel means
for quickly producing the initial vaporization
necessary to start the lamp, so that its action
will become self-supporting, with other mat-
ters described in detail hereinafter.

The preferred form of apparatus embody-
ing the principles of my invention is illus-
trated in the accompanying two sheets of
drawings, in which—

Figure 1 is a side view and partial section
of the preferred form of hanging lamp. Fig.
2 is a horizontal section and plan view on the
line 2 2 of Fig. 1, looking in the direction
of the arrow. Fig. 3 is a detailed cross-sec-
tion of the vaporizing-tube and its surround-
ing heater. Fig. 4 is a detail of the air-inlets,
section on line 4 4 of Fig. 1. Fig. 5 is a side
view and partial section of a modified form
of lamp to be attached to gas-fixtures; and
Fig. 6 is a detailed cross-section and longi-
tudinal section of a portion of the vaporizing-
tube, showing the vapor-strainer therein.

Throughout the drawings like reference-
figures refer to like parts.

1 is a hollow tube which serves as a mix-
ing-tube for the air and vapor, as a conduct-
ing-tube to conduct said mixture to the burn-
ers, and as a supporting-bracket for said
burners, of which there are preferably two or
more arranged in a straight line, each having
an incandescent mantle 2 2, supported over
it in any convenient manner, as by the wires
3 3, &c. (Shown in Fig. 1.) The mixing-tube
has two or more branches 4 4 at its upper end,
which, together with the tube proper, have
openings 5 5, &c., which project through the
plate 9 and are held by any suitable means,
such as the nuts 6 6, &c. These openings 5
5 admit air from the annular regenerating-
chamber 7, to which the outer air is admitted
by openings 8 8 at the opposite side of the
lamp.

The upper portion of the lamp is composed
of the annular plate 9, having ring-flanges 9^a
10 11, projecting upward, and the conical
skirt or flange 12, projecting downward, which
I line on the under side with white porcelain
or other reflecting-coating for the purpose of
reflecting the heat radiated from the burners
inward upon the vaporizing-tube and the
mixing-tube, as well as for the purpose of re-
flecting the light-rays outward and down-
ward. I may also line the under side of the
plate 9 with such reflecting material, and this,
in combination with the skirt 12, forms a re-
flecting-hood for the lamp, which assists ma-
terially in completing the vaporization of the
oil and the heating of the mixture of oil and
air by reason of the fact that a portion of the
vaporizing-tube and mixing-tube are within
the focus of such reflecting-hood.

13 is a ring-shaped plate which fits down
upon the ring-shaped flanges 10 11, thereby
forming the inclosed annular regenerating-
chamber 7.

Between the ring-shaped flanges 9^a and 10
is inserted the chimney 20, which is held in
place by means of the spider 18, pressing
down upon its upper end, said spider being
held in place by the nut 19 on the hanging
rod 16, which passes through the boss 15 in
the spider 14, cast integrally with the flange
9^a. The hanging rod is held fast in said

spider 14 by means of the nuts 17 17, and by this hanging rod the entire lamp is suspended.

The depending lug 21, cast integrally with the plate 9, is perforated to receive and support the vaporizing-tube 22, which is held in place by the set-screw 23. The other end of the vaporizing-tube has a conical nozzle 24, supported in the opening in the mixing-tube 1. A wire 25 passes through said tube and the opening of the nozzle 24 thereof, forming a needle-valve in conjunction therewith. This wire 21 is preferably supported at a point some distance from said nozzle by the skeleton spool 26, which is wrapped around with a thread of asbestos 27, or other fibrous mineral substance. On the other end of the vaporizing-tube 22 is mounted a stuffing-box 28, which has its outer enlarged portions screw-threaded, as shown, to mesh with the screw-thread on the inside of the hollow sleeve cast integrally with the valve-wheel 29. To this valve-wheel 29 the wire 25 is rigidly attached after passing through the stuffing-box 28.

The vaporizing-tube is arranged parallel to the line on which the series of burners are arranged and preferably directly over them, and it also passes under the chimney 20, so that the hot gases of combustion passing upward will heat the tube and vaporize its contents; but to increase this vaporizing action and steady the same and facilitate its starting by artificial means I cover a portion of the opening to the chimney 20 with plates 30 30, which have depending parallel flanges 31, with their lower portions bent in, as shown at 32, so as to leave a somewhat narrow slit parallel to the vaporizing-tube 22, through which the said hot gases must pass. In this chamber thus formed I prefer to arrange a mass of asbestos fiber or other non-conducting refractory absorbent material, which is supported by the bent flanges 32 32 on either side of and in proximity to the vaporizing-tube 22.

In the modification shown in Fig. 5 I illustrate a lamp designed to be mounted on an ordinary gas-bracket, (represented at 40.) The ordinary pillar and tip of such gas-fixtue is removed and pillar 37 substituted. In this is the perforated nozzle 38, having the fine central passage-way 39. This tip or nozzle 38 is continued up to form the ordinary vapor-burner, in which is mounted one or more pieces of gauze 35 36 and over which is supported the incandescent mantle 2 by the wire 3 or other convenient apparatus.

The mixing-tube 1 discharges the vapor and air into the tip 38, above the opening of the passage-way 39, and a corresponding opposite bracket 1^a is formed, through which passes the oil-supply tube 34, which connects with the vaporizing-tube 22 in the same way, as shown in Fig. 1.

The construction of vaporizing-tube 22 and needle-valve 25, vapor-strainer 27, and valve-wheel 29 is the same as in Fig. 1; but the an-

nular regenerating-chamber is formed by the concentric globes 41 42, and the air heated therein is drawn down the mixing-tube 1 by the jet of vapor from the nozzle 24 of the mixing-tube, as in the other construction.

43 represents a valve in the oil-supply tube 34 by which the flow of oil may be cut off or controlled, if such additional means of control over and above that afforded by the needle-valve are needed.

The operation of my invention is as follows: In starting the lamp a small amount of alcohol, naphtha, or other inflammable fluid is squirted into the absorbent refractory material 33, arranged in proximity to the vaporizing-tube 22, and the same is lighted by a match. The heat thus generated around the vaporizing-tube soon raises said tube to the temperature necessary to vaporize the oil, which is then, by opening a valve, (not shown,) delivered by the fine tube 34 to the vaporizing-tube 22, and the vapor passes through the vapor-strainer 27 and out through the nozzle 24 into the mixing-tube 1, the jet of vapor entraining a necessary amount of air from the annular regenerating-chamber 7. The combustible mixture passes into the burners, where it may be ignited by a match, and a blue flame is produced of great heat-producing power, which heats the mantles 2 2 to incandescence and gives a powerful light. The hot gases of combustion rushing up from the burner pass through the passage-way surrounding the vaporizing-tube 22 and heat the same, so that when the alcohol is exhausted the action of the lamp continues self-sustaining. The needle-valve is adjusted by turning the valve-wheel 29 to right or left. The vaporizing-tube 22 may be removed readily by releasing the set-screw 23. The annular plate 13 may be removed at any time to clean the regenerating-chamber 7 and is held in place by gravity or by any ordinary fastening means. The chimney may be removed from the lamp at any time by loosening the nut 17. The portion of the products of combustion not passing up through the chamber surrounding the vaporizing-tube collects under the skirt 12 of the lamp-top and under the plate 9 thereof, heating the same to a high degree and imparting a large proportion of said heat to the air which is being drawn through the annular regenerating-chamber 7. This heating of the air I find to be most important in producing complete combustion.

The modification illustrated in Fig. 5 operates in similar manner to that above described, except that no alcohol or similar fluid is needed to start the lamp. In starting, the valve in the ordinary gas-bracket is opened, and a fine stream of gas passes up through the passage-way 39 and acts as an injector to draw the necessary air through the mixing-tube 1, thereby producing a Bunsen burner, which when ignited immediately heats the mantle 2 to the point of incandescence and sends the volume of heated gases of combustion upward

to heat the vaporizing-tube 22 and vaporize the oil contained therein, which on the opening of the needle-valve passes out through the nozzle 24. The gas is then shut off, and the lamp burns oil-vapor in the same manner as before described, and its action becomes self-supporting.

The broad feature of a construction embodying a vapor-burning apparatus mounted on a gas-bracket and provided with suitable connections for supplying gas for preliminary heating is not herein claimed, but is shown, described, and claimed in my pending application, Serial No. 649,008, filed August 21, 1897.

A feature of construction which I embody in both forms of lamp and which I have only illustrated for the sake of clearness in Fig. 5 consists of the annular lip 44, surrounding the outside of the burner-tip and forming an upwardly-flaring annular chamber, into which the lower end of the mantle 2 is inserted and rests. The advantage of this construction consists in affording an ample support to the lower end of the mantle, and, furthermore and most important, of cutting off all passage of air under the end of said mantle, whereby in the ordinary construction said mantle is frequently unevenly contracted and expanded by the passage of cold currents of air and even mechanically displaced or fractured thereby.

The commercial advantage of the lamp of Fig. 5 of course consists in the production of a given quantity of light with the consumption of a quantity of oil which would cost much less than a quantity of gas necessary to produce the same result, the gas being used only to start the lamp.

Of course various changes could be made in the details of my invention so long as the relative arrangement of parts and principle of operation are preserved. The point to be sought after in the first form of the invention is always the surrounding of the vaporizing-tube with a mass of non-conducting absorbent refractory material arranged adjacent to it, but so as to leave space for the passage of the gases of combustion around said tube. The non-conducting refractory material thus becomes red-hot and constitutes an incandescent mass which is continually giving out heat to the vaporizing-tube and steadies the action thereof in cases where the amount of hot gases passing around the tube is varied or momentarily cut off by air-currents or other causes. Furthermore, the said vaporizing-tube and its surrounding mass of non-conducting refractory material may be located anywhere in the heating-zone of the burners; but I prefer to arrange it, as shown, directly over said burners and on a line parallel therewith, as by this I secure the greatest possible heating effect from said burners and also the greatest amount of light from them. Where burners are arranged in a circle, as is customary, they interfere with one an-

other, whereas when arranged in a line the greatest possible portion of the surface of their incandescent mantles is available for the radiation of heat and light rays. The adjustment of the vaporizing-tube 22, rendered possible by the manner in which it is mounted in the lug 21 by means of the set-screw 23, is also an important point, as an experimental adjustment of the nozzle 24 is required to give the best results in the way of entraining the proper quantity of air into the mixing-tube. The incandescent material 33 may also be used in the construction shown in Fig. 5, if desired, for the purpose of increasing and steadying the vaporizing action of the tube 22; but as it is not necessary for the purpose of starting the lamp I have not shown it. The vaporizing-tube in that construction is supported at the right-hand end by fitting tightly into the hole made for it in the inner shell 41. The outer shell 42 has a large opening 8 around said tube for the purpose of acting as an air-inlet to the annular regenerating-chamber formed by the concentric shells 41 42, and closed at the top by the partition 45, which preserves said concentric shells in their proper relative position. It is understood, of course, that the arranging of the mass of refractory absorbent material 33 in immediate proximity and preferably on both sides of the vaporizing-tube 22 enables me to start my lamp into action in much less time than is possible with prior constructions, in which the igniting-cup has been placed below said vaporizing-tube or at some intermediate point on a vertical tube, so that when a small portion of said tube is then subjected to the action of the alcohol-flame in my construction of the mass of flame immediately and entirely surrounds the vaporizing-tube, and ample draft is supplied to create intense combustion. Moreover, the radiant heat of the incandescent mass of non-conducting refractory material is directed against the tube at right angles thereto, whereby it is enabled to absorb the greatest possible percentage of the heat generated.

I prefer to employ the masses of non-conducting refractory material arranged in proximity to the vaporizing-tube, in contradistinction to locating the vaporizing-tube beside the incandescent mantle itself, as has been proposed by others, for a number of reasons, which all conduce to the improved operation of the lamp. By so doing I can much more completely surround the tube with the heat-giving mass than is possible in the other case, where the tube is largely exposed to the rush of cold air coming up alongside of and between the mantles to supply the partial vacuum constantly being created by the upward flow of air heated by said mantles. Moreover, in my construction the vaporizing-tube is subjected to the full heating action of such hot air, as well as to that of the gases of combustion themselves, and this more than makes up for the loss of the direct action of the radiant heat from said mantles,

the utilization of which is the only object of placing the vaporizing-tube beside said mantles. I do not utilize this radiant heat directly, but rely entirely on the heat of convection carried up by the hot air and gases of combustion. Thus my apparatus will operate equally well, so far as the perfection of the vaporizing process is concerned and the attainment of complete combustion, whether the incandescent mantles 2 2 are employed or not. Their use is merely for the purpose of converting the heat energy of the flame into light energy. By using the mantle, however, I am able to employ the blue or oxidizing flame, which gives the greatest amount of heat and most completely vaporizes the oil in the vaporizing-tube, located wholly above the mantle and transversely to the upward flow of hot air and gases from said burner. By this arrangement the vaporizing-tube absorbs the greatest possible quantity of heat from the burner and the mantle turns a large portion of the intense heat generated by the blue and otherwise invisible flame of said burner into light. Furthermore, my construction does not interpose a vaporizing-tube between the mantle and the space to be lighted, which absorbs and cuts off a portion of the rays of light therefrom, as is the case in the other construction referred to. It also enables all the heat carried by the air and gas currents from the burners and that radiated from incandescent mass 33 to strike the tube at right angles instead of sliding along the same parallel thereto and at a greater or less distance therefrom, as is the case in such other construction referred to.

The object of making the refractory material non-conducting is of course to prevent it from conducting a portion of the heat received to the metal parts which support it. Being of a non-conducting nature, it holds and radiates nearly all of the heat from the surface exposed thereto and adjacent to the vaporizing-tube.

The broad feature of the combination of a vapor-burner, an incandescent mantle therefor, and a vaporizing-tube with proper connections to the burner and located within the heating-zone of the burner-flame I do not claim herein, as the same is shown, described, and claimed in my pending application, Serial No. 663,495, filed December 27, 1897.

Having therefore described my invention, what I claim as new, and desire to protect by Letters Patent, is—

1. In a vapor-burning apparatus, the combination of the burner, vaporizing-tube and connections, the vaporizing-tube being located within the heating-zone of the burner, together with a mass of absorbent non-con-

ducting refractory material arranged adjacent to the vaporizing-tube, but leaving space for the passage of the gases of combustion around said tube, and between it and the refractory material, substantially as described.

2. In a vapor-burning apparatus, a vaporizing-tube and connections, and a mass of absorbent non-conducting refractory material arranged on opposite sides of said tube, and along a considerable portion of the length of said tube, so as to leave space between it and the refractory material for the passage of hot gases, substantially as described.

3. In combination with the lamp-hood and the central opening therein, of the plates which partly close said opening and have depending parallel flanges supporting masses of non-conducting refractory fibrous material, and the vaporizing-tube located between said flanges and parallel thereto, substantially as described.

4. A vapor-burning attachment for gas-fixtures, consisting of the combination of a vaporizing-tube supported over said fixture, a mixing-tube extending from a point in front of the end of the vaporizing-tube to the burner, the burner mounted on a gas-fixture, and a passage-way discharging gas into said burner, together with the air-regenerating chamber over said fixture, and communicating with the mixing-tube, substantially as described.

5. A vapor-burning attachment for gas-fixtures, consisting of the combination of a vaporizing-tube supported over said fixture, a mixing-tube extending from a point in front of the end of the vaporizing-tube to the burner, the burner mounted on the gas-fixture, and a passage-way discharging gas into said burner, together with the air-regenerating chamber over said fixture, and communicating with the mixing-tube, and the incandescent mantle supported over said burner, substantially as described.

6. A vapor-burning attachment for gas-fixtures composed of the burner mounted on the fixture, the vaporizing-tube above, the two oppositely-arranged upwardly-extending tubes supporting the same, one of which tubes conducts the oil to the vaporizing-tube, while the other serves as a mixing-tube conducting air and vapor to the burner, and the passage-way in said burner for gas, substantially as described.

In testimony whereof I have hereunto affixed my signature in the presence of two witnesses.

ARTHUR KITSON.

Witnesses:

CHARLES A. LAGEN,
PHOEBE A. REED.