(No Model.) 3 Sheets—Sheet 1.

# G. ROSE.

## SELF GENERATING STEAM SPRAY LAMP FOR LIGHTING AND HEATING PURPOSES.

No. 453,663. Patented June 9, 1891.

Fig. 3.

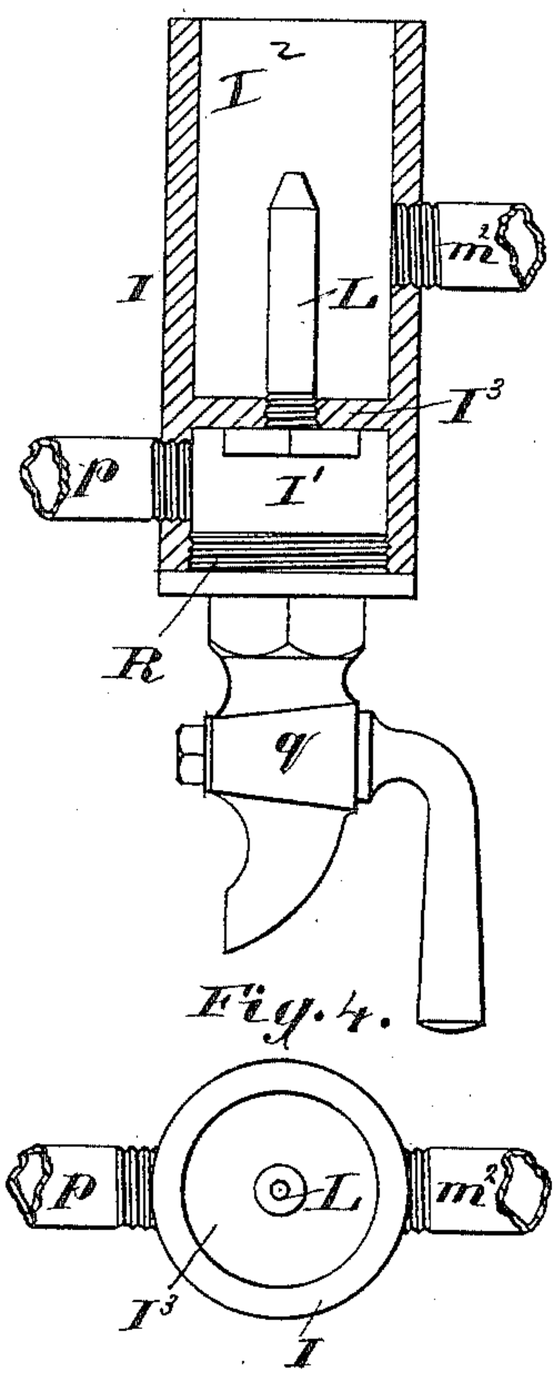



Fig. 4.




Fig. 5.

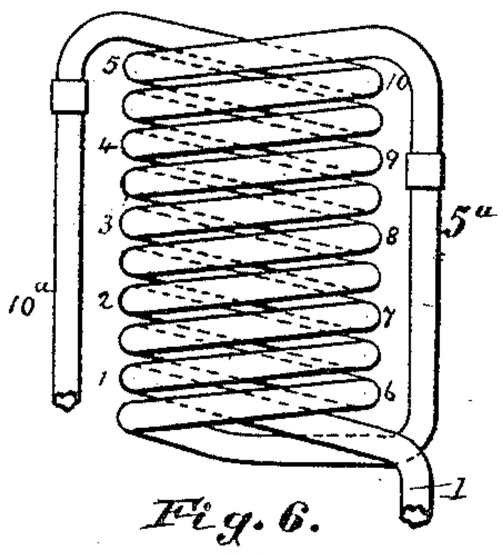



Fig. 6.

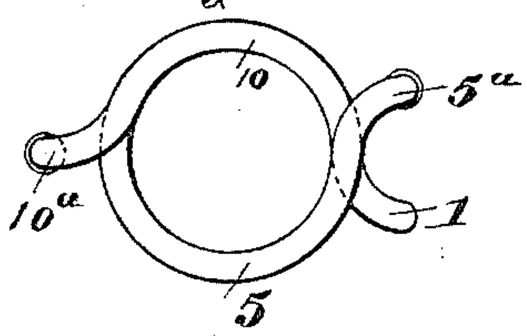



Fig. 7.

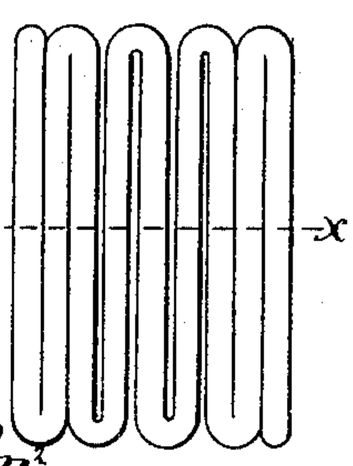



Fig. 8.

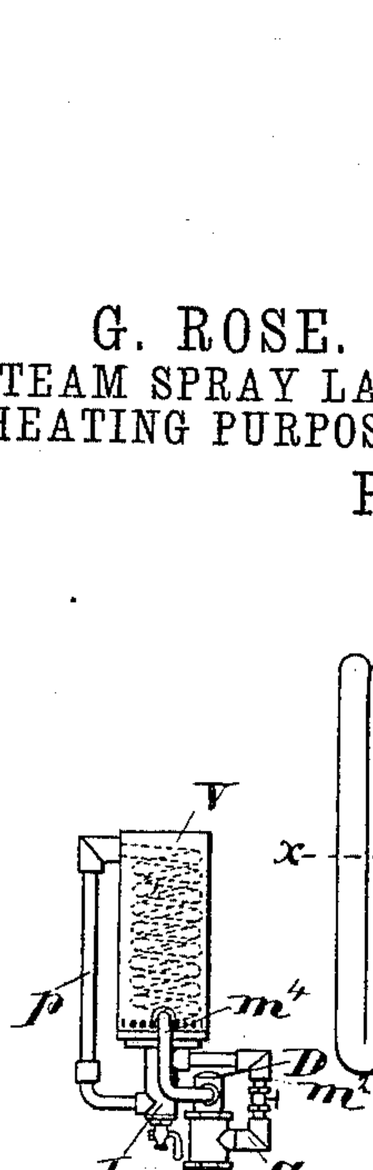



Fig. 1.

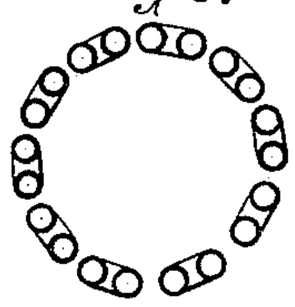


Fig. 9.

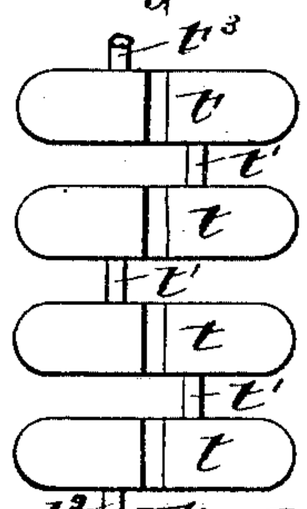
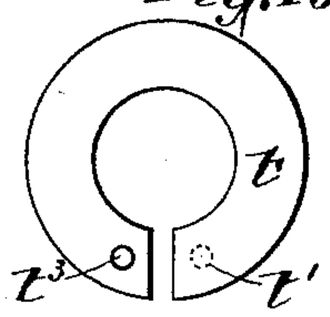



Fig. 10.



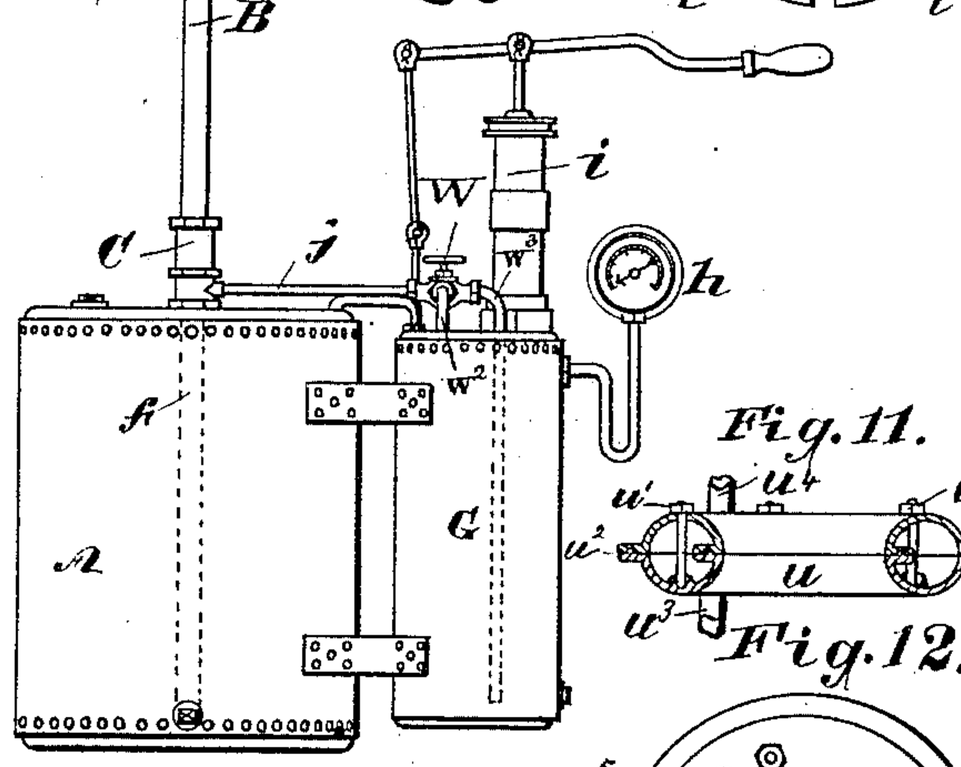
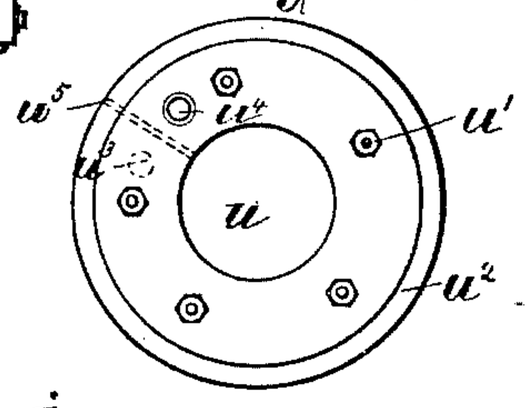



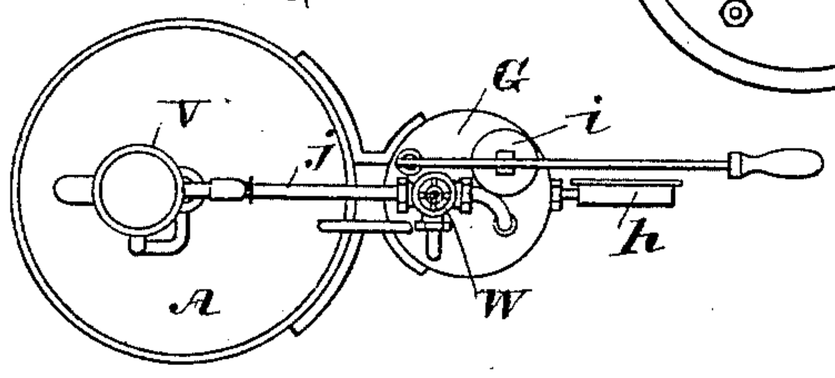

Fig. 11.




Fig. 12.

Fig. 2.




Inventor
George Rose
By Richards & Co.
his Attorney.

Witnesses:
E. B. Bolton
E. L. Richards

(No Model.) 3 Sheets—Sheet 2.

# G. ROSE.

## SELF GENERATING STEAM SPRAY LAMP FOR LIGHTING AND HEATING PURPOSES.

No. 453,663. Patented June 9, 1891.

*Fig. 13.*

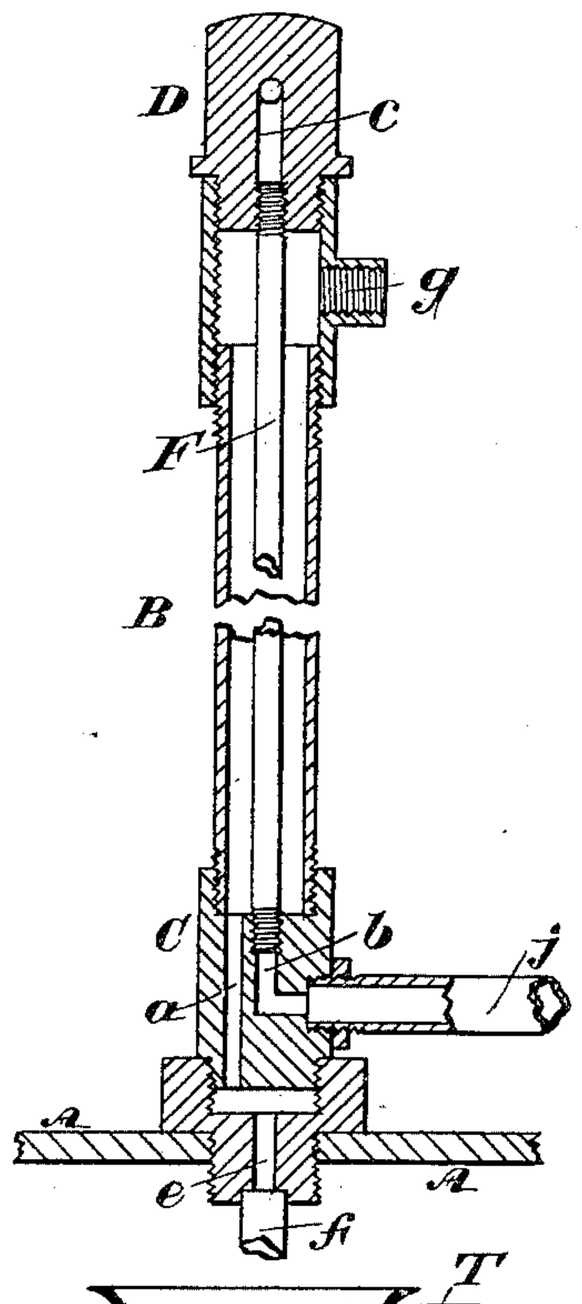



*Fig. 16.*

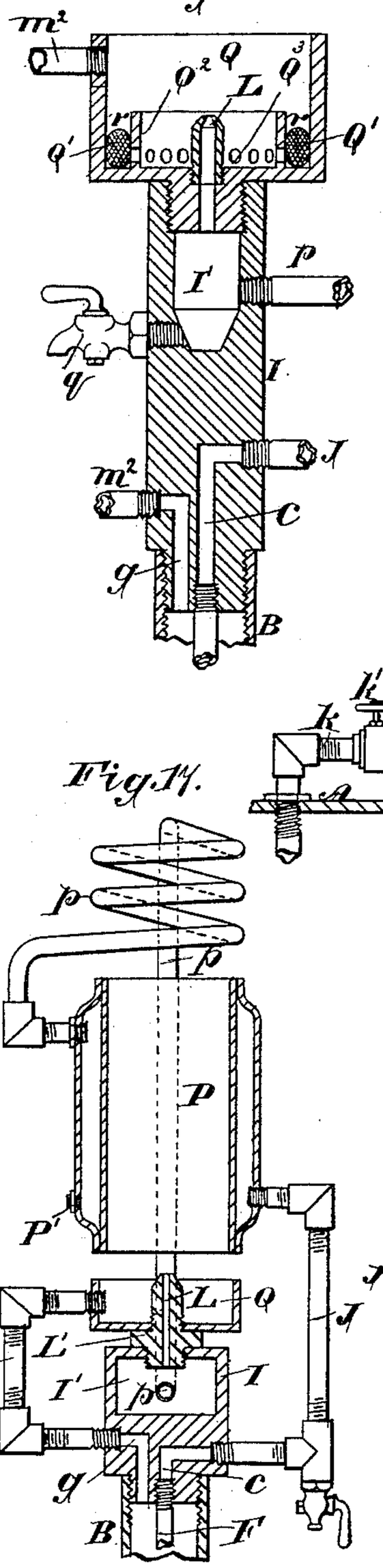



*Fig. 14.*

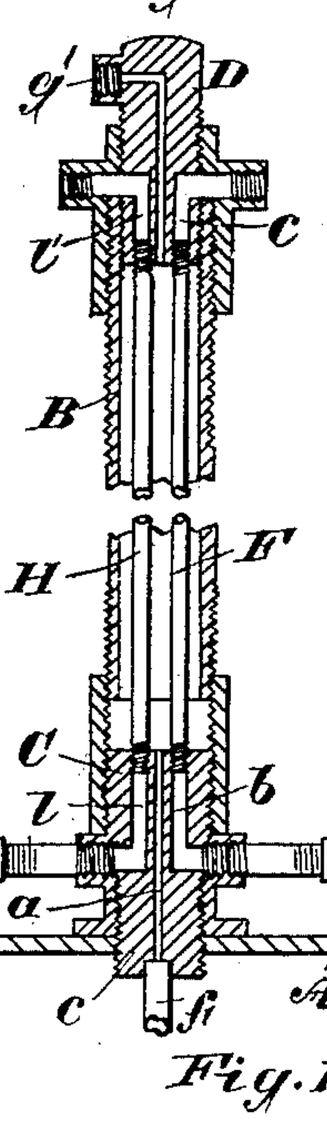


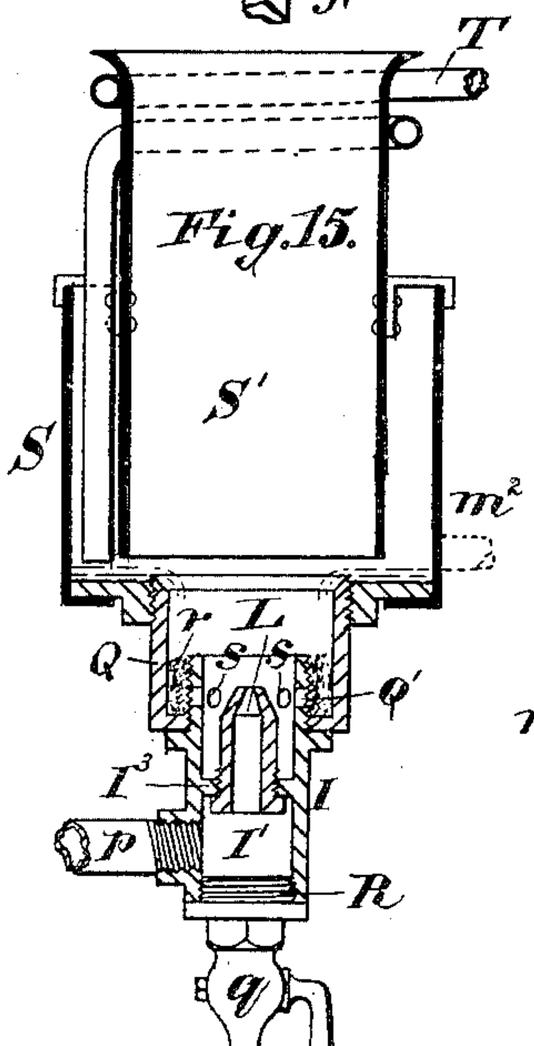

*Fig. 17.*



*Fig. 18.*




*Fig. 15.*




Witnesses:
E. B. Bolton
C. L. Richards

Inventor:
George Rose
By Richards & Co.
his Attorneys.

(No Model.) 3 Sheets—Sheet 3.

# G. ROSE.

## SELF GENERATING STEAM SPRAY LAMP FOR LIGHTING AND HEATING PURPOSES.

No. 453,663. Patented June 9, 1891.

Fig. 19.

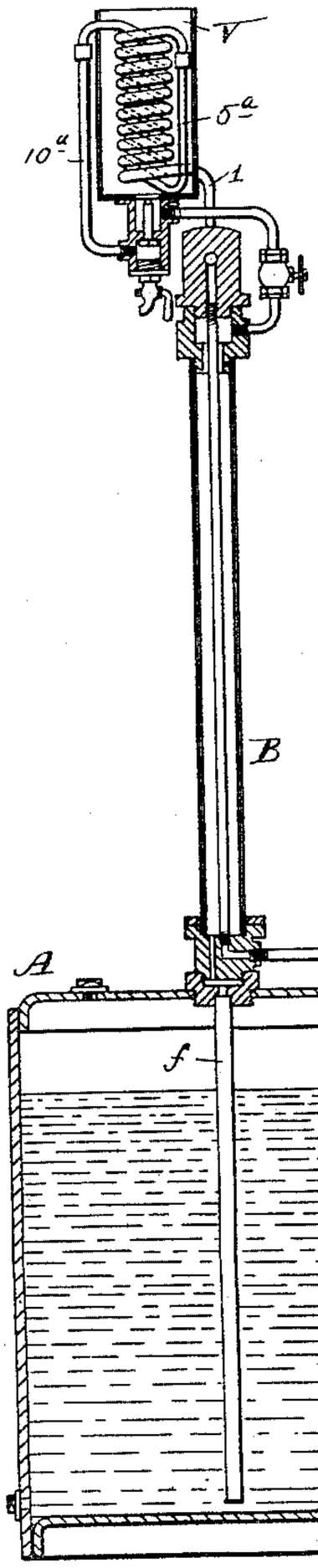



Fig. 21.

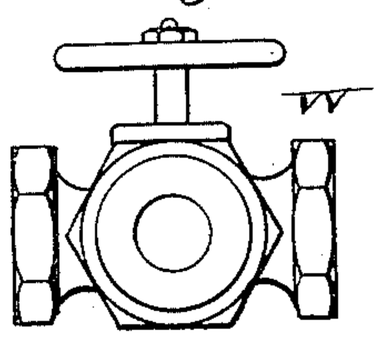



Fig. 22.

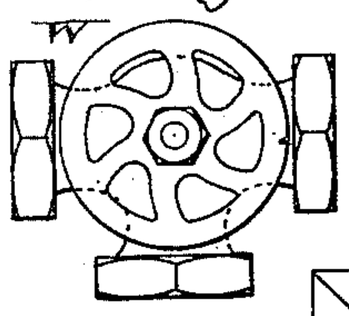



Fig. 20.




Fig. 23.

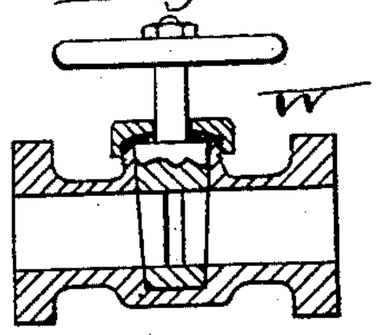



Fig. 24.






Witnesses:
E. A. Bond
H. E. Peeks

Inventor
George Rose
by Richards & Co.
attorneys.

# UNITED STATES PATENT OFFICE.

GEORGE ROSE, OF GLASGOW, SCOTLAND, ASSIGNOR OF TWO-THIRDS TO ARCHIBALD BAIRD AND MATTHEW BARR BAIRD, BOTH OF SAME PLACE.

## SELF-GENERATING STEAM-SPRAY LAMP FOR LIGHTING AND HEATING PURPOSES.

SPECIFICATION forming part of Letters Patent No. 453,663, dated June 9, 1891.

Application filed October 19, 1889. Serial No. 327,548. (No model.) Patented in England November 14, 1888, No. 16,497.

*To all whom it may concern:*

Be it known that I, GEORGE ROSE, a subject of the Queen of Great Britain, and a resident of the city of Glasgow, Scotland, have invented certain new and useful Improvements in and Connected with Self-Generating Steam-Spray Lamps for Lighting and Heating Purposes, (patented in Great Britain November 14, 1888, No. 16,497,) of which the following is a specification.

My said invention relates to certain improvements, hereinafter fully referred to, in the construction and arrangement of the parts of what are known as "spray-lamps"—that is, lamps wherein oil is burned in a fine spray-jet for lighting and heating purposes. The improvements are specially applicable to that class of spray-lamps wherein steam generated in a chamber heated by the flame issuing from the burner is used to spray the oil.

In order that my said invention may be properly understood, I have hereunto appended explanatory drawings.

On the drawings the reference-letters wherever repeated indicate similar or like parts.

Figure 1 of the drawings represents in side elevation, and Fig. 2 in plan, one form of my improved lamp. Fig. 3 is a sectional elevation, and Fig. 4 a plan, of the burner of same. Figs. 5, 6, 7, 8, 9, 10, 11, and 12 represent in elevation and plan different forms of steam-generating coils and chambers used with the lamp. Figs. 13 and 14 represent in vertical section stand-pipes for supporting the burner of the lamp. Figs. 15, 16, 17, and 18 represent in section different forms of burner and accessory parts. Fig. 19 is a sectional view showing the application of the generating-coil of Fig. 5 to the apparatus of Fig. 1. Fig. 20 is a sectional view showing the application of the stand-pipe of Fig. 14 to a burner—such, for instance, as the burner of Fig. 18. Figs. 21, 22, 23, and 24 illustrate by elevation, plan, vertical section, and horizontal section of valve-plug, the three-way valve I employ.

At Figs. 1 and 2 an improved construction of self-generating steam-spray lamp is shown. The lamp consists of a preferably portable base tank or reservoir A for containing the oil to be burned, upon which is mounted a stand pipe or tube B. This stand-pipe, which is screwed or fitted into the oil-tank A, has at its lower end a solid piece C, (see Fig. 13,) and also at its upper end another solid piece D. Through the piece C holes *a b* are bored, and through the piece D a hole or channel *c* is bored. The stand-pipe is preferably built up in the manner shown at Fig. 13. The oil to be burned passes from the tank A up the tube *f*, (indicated in dotted lines at Fig. 1,) and thence through the channels *e* and *a* into the stand-tube B, which it fills. From the stand-tube the oil passes, under this method of construction, through the branch *g* of a T-piece supporting the solid piece D and pipe $m^2$, to the burner I. (See Fig. 1.)

Inserted in the inside of the stand-tube B is another tube F of smaller diameter, into which the water to be converted into steam by the heat of the lamp-flame is led. This tube is screwed into the aforesaid solid pieces C D at each end of the stand-tube and communicates by the channel *b*, on the one hand, with the water-supply, and on the other hand by the channel *c* with the pipe $m^4$, Fig. 1, passing to the steam-generating coil or chamber placed above the burner. In the lamp as shown at Figs. 1 and 2 water from a small tank G, which is strapped, as shown, to the oil-tank A and has a pressure-gage *h* and pump *i* on it, passes by the tube connection *j*, Figs. 1, 2, and 13, to the tube F, and so to the aforesaid steam-generating coil or chamber surmounting the burner, wherein it is by the heat of the flame of the lamp converted into steam to spray the oil. In some cases I may insert a second tube H within the stand-tube B, as shown at Fig. 14. This tube is for the passage to the burner for a short period when starting the lamp of some of the compressed air from the upper part or air-space of the oil-tank A, or it may be the water-tank G, for the purpose of spraying the oil, and so enabling the lamp to be lighted instantly. After the lamp has been burning for a few minutes with this air-spray blast sufficient steam will be generated in the generating coil or chamber to admit of the air-blast being turned off and the flame being maintained by a steam-spray jet drawn from said generating coil or chamber. The method of constructing the stand-pipe shown in this figure, as will be

seen, is slightly different from that at Fig. 13. The air from the compressed-air space in the upper part of the oil-tank A is led by the pipe connection *k* through the channel *l* in the solid piece C to the tube H. From thence it passes by the channel *l'* to the burner of the lamp. The oil in this case instead of passing from the stand-pipe B to the burner through the branch *g* of a T-piece, as shown at Fig. 13, may pass directly up through the channel *g'*, and thence by a pipe connection to the burner. The water is led, as before, up the tube F.

The burner I may consist, as shown at Figs. 3 and 4, of a cylindrical casing divided by a partition $I^3$ into upper and lower compartments, the upper compartment being open and constituting an oil-well, (the oil being led thereinto by the branch $m^2$, Figs. 1, 3, and 4, from the stand-pipe B,) while the lower compartment is closed by a cock *q* and serves as a steam-expansion chamber. The steam-inlet is at *p*. The cock *q* may be made, as shown, with a screwed part R, which screws into and forms the base of the steam-chamber, or the cock *q* may be separate from and be screwed in the part R. A nipple L is fitted in the partition $I^3$.

By fitting a cock *q* in the under side of the burner, as shown, water of condensation or any dirt which may accumulate in the steam expansion chamber may be blown off.

A modified construction of burner from that shown at Figs. 3 and 4 is shown at Fig. 15. The burner I in this case has its upper end projecting into and surmounted by a cylindrical casing or cup Q, an annular space *r* being left between the casing or cup Q and the outside of the burner. This annular space *r* is filled or partially filled with a wick Q', made of asbestus or other non-combustible fiber. A number of holes or openings *s* are or may be bored through the upper part of the burner, said holes communicating with the annular space *r*. Surmounting the casing Q is a combustion-box S, which preferably has a cylindrical piece S' inserted in it. Air to support combustion passes down the annular space left between the box S and the cylindrical piece S' and is heated in its passage. In this arrangement the oil instead of being led directly to the oil-well of the burner passes by the pipe $m^2$ (indicated in dotted lines) into the bottom of the combustion-box. From thence it trickles over the edge of the casing Q into the annular space *r*, so saturating the asbestus or other fiber Q'. From the annular space *r* the oil trickles through the openings *s* into the oil-well, and is there sprayed. When the fibrous wick Q' is used, should the main flame of the lamp be suddenly blown out or go out through the presence of water in the oil, it is immediately relighted by the permanent flame of the wick.

Instead of making the burner with a partition dividing it into two compartments, as hereinbefore described, it may be made, as shown at Figs. 16 and 17, with the lower end solid and screwed into the top of the stand-tube B of the lamp. In the burner at Fig. 16 the oil casing or cup Q is shown as being screwed into the top of the steam-chamber I' of the burner and the nipple L as being screwed into the bottom of the cup Q, whereas in Fig. 17 the nipple L is made with a flange L' and is screwed into the top of the steam-chamber, while the cup Q surmounts it. In Fig. 16, as will be seen, a concentric wall or ridge $Q^2$ is cast in the cup Q, said wall having openings $Q^3$ in it. The annular space left between the wall $Q^2$ and the cup is filled with an asbestus wick Q'. In this case the oil passes into the cup at $m^2$, saturates the wick, and then passes through the openings $Q^3$ to the nipple L. With this arrangement it is found convenient to secure the burner directly on the stand-tube B and to bore the water-channel *c* and oil-channel *g* in the solid base, instead of using the solid pieces D, as before described with reference to Figs. 1, 13, and 14.

Instead of using a burner constructed as hereinbefore described, a burner such as shown at Fig. 18 may be employed. In this arrangement the casing or chamber I is, as before, divided into two compartments I' $I^2$ by the partition $I^3$; but instead of using the lower compartment as a steam-expansion chamber it may be used for water. The lower end of the chamber $I^2$ may be made with a screwed part, as shown, for fitting into the stand-tube of the lamp. Water passes from the chamber $I^2$ by the branch J into the steam-generating vessel K, where it is converted into steam by the flame of the lamp. The steam is led from the chamber K by the connection K' to the chamber I', which in this case serves as a steam-expansion chamber. The chamber I' is in this arrangement closed, and it has a nipple L screwed into its roof or cover. Above the nipple L a nozzle-shaped cap M, made with a number of small air-induction holes $m^3$ and a number of oil-inlet holes *m'*, is or may be fitted. The bottom of the steam-generating chamber K is with this arrangement, as hereinafter described, made to serve as the oil chamber or well.

The steam-generating device may, as indicated in dotted lines at Fig. 1, be a simple coil-pipe or a coil-pipe made as shown in side elevation at Fig. 5 and in plan at Fig. 6. The coil as here shown is doubled—that is to say, it is first coiled to the top in the turns 1, 2, 3, 4, and 5, then passes down again by the straight part $5^a$, and is again coiled upward in the alternate turns 6, 7, 8, 9, and 10, and finally passes to the straight part $10^a$. The water passes from the source of supply into the coil at 1, and after being converted into steam therein is led to the burner-nipple by the pipe $10^a$.

A different construction of generator is shown in elevation at Fig. 7 and in section on the line *x x*, Fig. 7, at Fig. 8. The pipe in

this instance is bent in a serpentine form, the water passing alternately up one bend and down the next until it eventually escapes to the burner, being converted into steam in its passage.

In elevation in Fig. 9 and in plan at Fig. 10 a generator formed of a number of **C**-shaped rings *t* is shown. The **C**-shaped rings are placed one above the other and are connected together by short vertical pipe connections *t'*. The water enters the lowermost ring at $t^2$, circulates around it, and passes by the connection *t'* into the next higher ring, circulates around it, and into the one above, and so on until the top one is reached, the superheated steam from which passes out by the pipe $t^3$ and is led downward to the burner below the rings.

Instead of having split rings of **C** shape, hereinbefore described, rings formed in two halves bolted together or cast in one piece may be used. This arrangement is illustrated in cross-section and in plan at Figs. 11 and 12. As will be seen, the rings *u* are made in two halves secured together by studs *u'*, or bolts passing right through both halves may be used. Flanges $u^2$ are preferably cast on the halves for the purpose of enabling them to be fitted more tightly together. The joints are filled with asbestus or other suitable packing. Water enters the ring at $u^3$, circulates right around it, and escapes by the outlet $u^4$. To cause the water to circulate around the ring, a division or partition $u^5$ (shown in dotted lines) is preferably cast in it. When employing this arrangement, three or more rings connected together in the same manner as the **C** rings, Fig. 9, are preferably used. Instead of using the hereinbefore-described constructions of generator, an annular generating vessel or chamber K, constructed as shown at Fig. 18, may be used. This chamber K, which surrounds and incloses the burner-nipple L, is made conical, being formed of an inner pipe or piece expanded at each end and fitting into an outer pipe or piece of larger diameter. The chamber has its lower end bolted or riveted to a base-plate *o*, screwed on top of the burner-nipple, as shown. In this annular chamber, which may have screw-plugs fitted in it for cleaning, the water is evaporated by the heat of the flame issuing from the nipple L. The water from the chamber $I^2$ of the burner enters the bottom of the chamber by the pipe J, and the superheated steam passes therefrom by a branch K', provided with a blow-off cock *m*, down to the top compartment I' of the burner I, from whence it passes up through the burner-nipple L to spray the oil. The oil, which may be supplied by gravitation or otherwise, is led or forced through the pipe $m^2$ into the inside of the annular generating-vessel, at the bottom of which it lies, being thence drawn or sucked up through the holes *m'* in the cap M and sprayed by the steam-jet. Air to support combustion is supplied through two or more air-induction tubes *n*, passing up through the bottom or base-plate *o* of the chamber K or through its sides, or through both.

In Fig. 17 another form of annular generating-chamber P is shown. This chamber is of somewhat similar construction to the chamber K, Fig. 18, except that it is of cylindrical shape, being formed of a short inner pipe fixed at its upper and lower ends into contracted parts of an outer inclosing pipe. This chamber, which may be provided with cleaning-screws P', has or may have a coil-tube *p* for superheating the steam placed above and in connection with its upper end. The water from the pipe F in the stand-tube passes through the connection J into the generator, is there converted into steam, and subsequently passes off to the superheating-coil *p*, from whence it passes to the hollow chamber I', constituting the base of the burner, and so to the burner-nipple L, in the same manner as described under my prior arrangement. In this arrangement the oil which lies in the cup Q is sucked up and sprayed by the inductive action of the steam-jet issuing from the nipple.

When heavy hydrocarbons—such as tar-oil and the like—are burned with my improved arrangement of lamp, such heavy hydrocarbons would be preferably first heated by being passed through a coil, such as T, Fig. 15, surrounding the combustion-box or annular superheating-chamber. The heavy tar-oil becoming highly heated runs down into the combustion-box S, and is there sucked up and sprayed.

In applying the lamp or burner for heating purposes I so arrange it that the flame is projected into the furnace or heating-chamber in a horizontal or inclined direction above the bottom or hearth.

The burner and superheating coil or chamber may be surrounded by a casing V, Figs. 1 and 2, to prevent chilling by cold air.

When it is found advantageous, the water for the lamp may be supplied by gravitation instead of being forced up to the burner by an air-pump.

In working with the lamp, Figs. 1 and 2, oil is allowed to flow from the tank A up the stand-pipe B to the oil-cup of the burner. A jet of air from the air-space in the water-tank G is then turned on by the three-way valve W. This valve, as will be seen, communicates by the way $W^2$ with the air-space in the tank G, by the way $W^3$ with the water in the tank, and by the way *j* with the tube F leading to the burner. The air-blast passes up the pipe F, Fig. 13, through the coil (shown in dotted lines at Fig. 1) to the steam-chamber I' of the burner I, (see Fig. 3,) and then to the burner-nipple L. The air-jet issuing therefrom sucks up and sprays the oil and oil-vapor in the oil-cup, and so enables the lamp to be lighted instantaneously. After the self-generating steam coil or chamber has been heated by the air-spray flame to such a tem-

perature as shall convert the water into steam the air-blast is turned off by the three-way cock W and the water-supply turned on, when the lamp works continuously with a steam-spray.

In the arrangement shown at Fig. 14 the three-way cock is not used, the air-supply from the tank A being regulated by the valve *k'*, while the water-supply is regulated by the valve *j'*.

In some cases I may introduce a jet of compressed air from the pipe H, Fig. 14, into the steam-generating vessel or coil-pipe and pass the same along with the steam to the burner.

If desired, the oil-tank may be used for the water-reservoir and the water-tank for oil, and also the tube F of the stand-pipe B, Fig. 13, may be used for oil and the tube B for water.

Instead of using two tanks A G strapped together, as shown at Figs. 1 and 2, two semicircular tanks bolted together may be used in lieu thereof.

The several structural details of my improved lamp may be slightly altered without departing from my invention.

I do not in this application claim such of the described devices as are the subject in part of my application, Serial No. 317,981, filed July 19, 1889, namely, the divided burner having its lower compartment closed by a removable screw-plug and having a removable steam-nipple, the said burner combined with a coil-pipe for producing steam, and the connected oil and water tanks combined with their necessary pipes, valves, and burner; nor do I claim herein the particular form of burner shown in Figs. 15 and 16, the same forming the subject in part of my application, Serial No. 341,651, filed February 25, 1890.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is—

1. In self-generating steam-spray lamps for lighting and heating purposes, the combination of a burner having a steam-generating chamber, a stand-pipe consisting of an outer inclosing tube of large diameter and an inner tube of small diameter fitted at its ends in solid pieces secured in said outer tube and connected with said chamber, and a connection between said chamber and the burner-nozzle, the one tube being for the passage of oil to the burner and the other for the passage of water to the steam-generating chamber of the lamp, substantially as hereinbefore set forth.

2. In self-generating steam-spray lamps for lighting and heating purposes, the combination of a burner having a steam-generating chamber, a stand tube or pipe wherein are combined an outer oil-tube B of large diameter and two inner tubes of smaller diameter inclosed in said outer tube and connected with said chamber, and a connection between said chamber and the burner-nozzle, the one F for the passage of water and the other H for the passage of an air-blast from the oil or water tank, substantially as set forth.

3. The combination, with the double-chambered burner I and an outer pipe, of the annular steam-generating chamber formed of a short pipe fitted within the ends of said larger outer pipe, said chamber being above and heated by the flame issuing from the burner, substantially as hereinbefore set forth.

4. The combination, with the double-chambered burner I and an outer pipe, of the annular steam-generating chamber made conical and formed of an inner pipe expanded at each end and fitting into said outer pipe of larger diameter, said chamber being above and heated by the flame issuing from the burner, substantially as hereinbefore set forth.

5. In self-generating steam-spray lamps, the combination of a steam-generating chamber, a burner having an open-top oil-chamber, a chamber I, divided into two compartments I' $I^2$ by a partition $I^3$, a nipple L, fitted on top of the compartment I', connections J and K, and a cap M, fitted on top of said nipple, substantially as hereinbefore set forth.

6. The combination, with the oil-tank A and the water-tank G, strapped to said oil-tank, of the three-way controlling-valve W, fitted on top of the water-tank, the pipe *j*, leading from said valve to the stand-tube B of the lamp, the air connection $W^2$, and the water connection $W^3$, substantially as and for the purposes set forth.

In witness whereof I have hereunto set my hand in presence of two witnesses.

GEORGE ROSE.

Witnesses:

HUGH FITZPATRICK,
*Patent Agent, Glasgow.*

JOHN BAXTER,
*Clerk, Glasgow.*