(No Model.) 3 Sheets—Sheet 1.

R. WALLWORK & A. C. WELLS.

SELF GENERATING GAS OR VAPOR BURNER

No. 489,244. Patented Jan. 3, 1893.

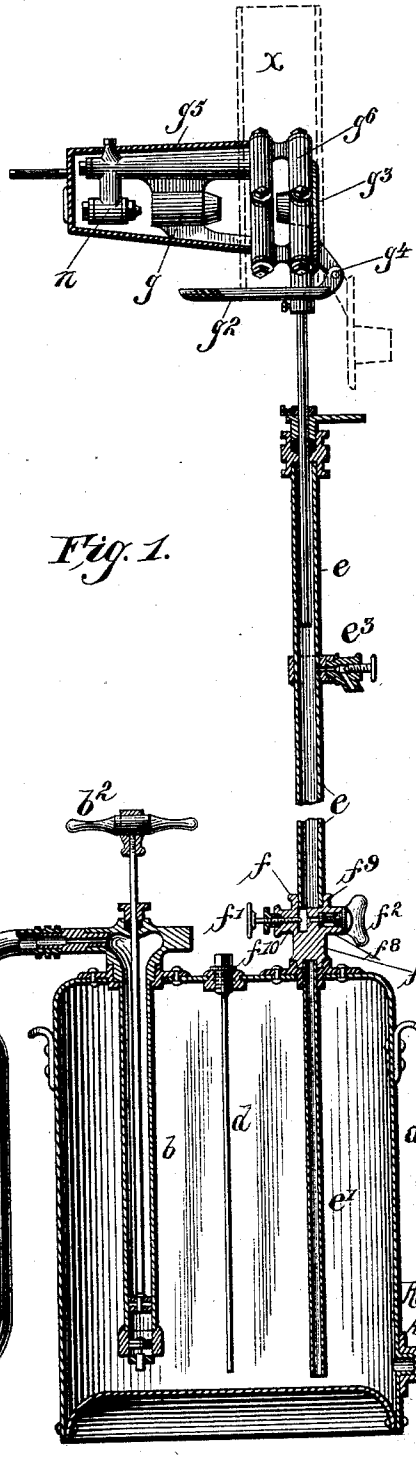

Fig. 1.

Witnesses:
H. G. Dieterich
P. W. Sommers

Inventors
Roughsedge Wallwork and
Arthur Coltings Wells
By Henry Mills
Atty

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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R. WALLWORK & A. C. WELLS.

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Fig. 2.

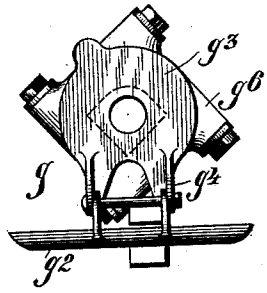
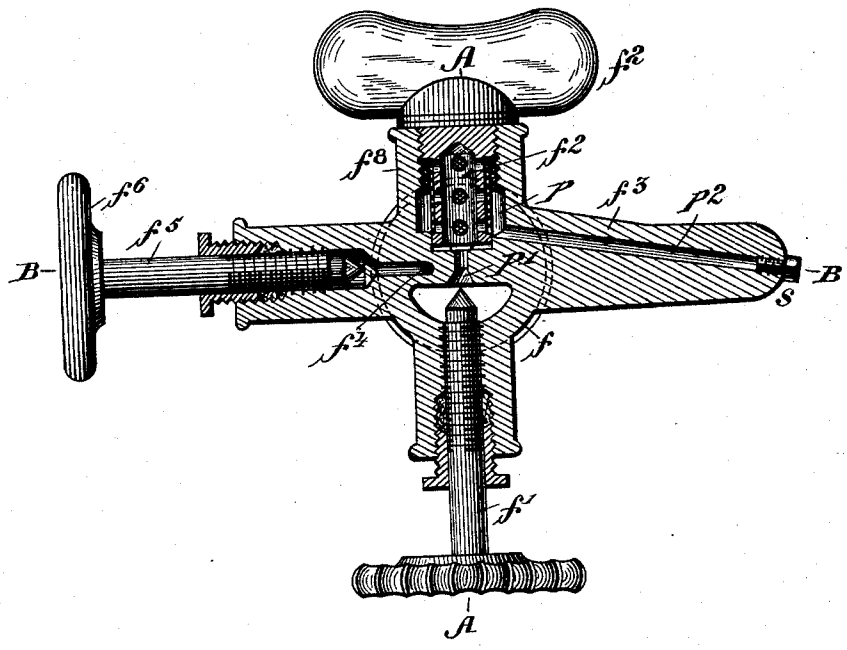


Fig. 3.



Witnesses:
H. G. Dieterich
B. W. Sommers.

Inventors:
Roughsedge Wallwork and
Arthur Collings Wells:
By Munn & Co
Atty.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 3 Sheets—Sheet 3.

R. WALLWORK & A. C. WELLS.

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Fig. 4.

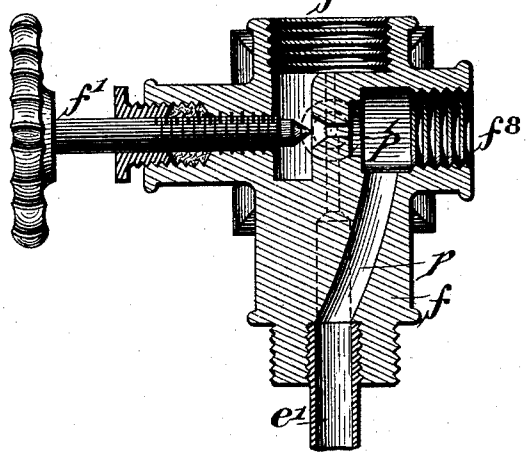
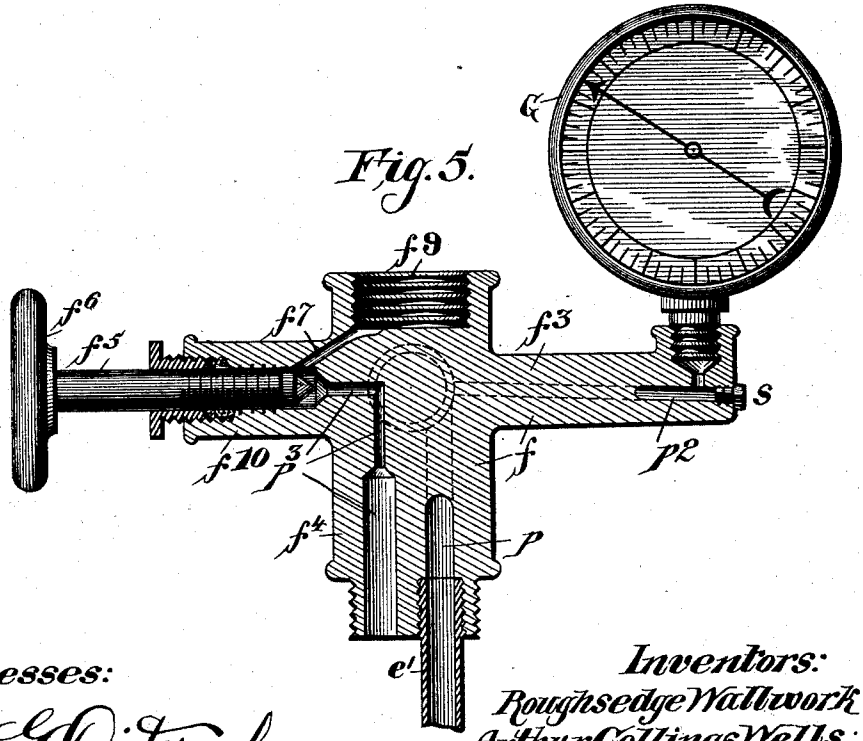


Fig. 5.



Witnesses:

H. G. Dieterich

B. W. Sommers.

Inventors:

Roughsedge Wallwork and

Arthur Collings Wells:

By Henry Orth

Atty.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

ROUGHSEDGE WALLWORK AND ARTHUR COLLINGS WELLS, OF MANCHESTER, ENGLAND.

SELF-GENERATING GAS OR VAPOR BURNER.

SPECIFICATION forming part of Letters Patent No. 489,244, dated January 3, 1893.

Application filed September 26, 1892. Serial No. 446,947. (No model.) Patented in England June 27, 1891, No. 11,001.

To all whom it may concern:

Be it known that we, ROUGHSEDGE WALLWORK and ARTHUR COLLINGS WELLS, subjects of the Queen of Great Britain, residing at Manchester, in the county of Lancaster, England, have invented certain new and useful Improvements in Self-Generating Gas or Vapor Burners, (for which we have obtained Letters Patent in Great Britain, dated June 27, 1891, No. 11,001;) and we 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 which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

Our present invention consists in certain improvements on that class of open air illuminating apparatuses, in which the illuminant is supplied to the burner by means of compressed air contained in the oil reservoir, and the invention consists more particularly in devices for starting the burner by means of carbureted air obtained from the apparatus itself, and in means for regulating the quantity or the height of the column of hydrocarbon oil through which the air is caused to pass before it reaches the burner.

The invention further consists in means for confining the starting flame about the generating tube or coil of the burner so as to more rapidly heat the same, and in structural features and combinations of co-operative elements as will hereinafter be more fully set forth, and as shown in the accompanying drawings, in which—

Figure 1 is a vertical sectional elevation of a light or lamp, embodying our improvements. Fig. 2 is a front elevation of the burner, showing the flame confining plate applied to cover the opening in the generator. Fig. 3 is a horizontal section of the main valve casting or casing taken in a plane passing through the axis of the regulating valves and the filter plug, and Figs. 4 and 5 are central sectional views of said valve casing taken on lines A, A, and B, B, respectively, of Fig. 3.

The apparatus to which our improvements are applied consists of an oil reservoir *a*, an air compressing and oil feed pump, *b*, whose plunger is provided with a suitable handle, b^2, and which pump has connected thereto the air and oil supply pipe, b'; and, *d*, indicates the rod by means of which the quantity of hydrocarbon illuminant contained in reservoir, *a*, may be ascertained.

The burner, *g*, is substantially of the construction shown for instance in Figs. 5 and 6 of the drawings forming a part of Letters Patent granted to us May 28, 1889, No. 404,064, said burner being adjustably connected to the upper end of the stand pipe, *e*, whose lower end is connected to the main valve casing, *f*, and, as shown in Fig. 1, the burner is provided with a shield or casing, g^5, such as shown in the patent aforesaid.

The reservoir, *a*, and pump, *b*, may be of any suitable construction, one form of which is shown in Letters Patent of the United States No. 417,761, granted to us December 24, 1889.

One part of our present invention has for its object certain improvements in the main valve casing, one form of which is shown in the patent last herein referred to, and consists essentially in the provision of a valved air passage whereby the compressed air in the reservoir, *a*, may be admitted to the stand pipe, *e*, and in connecting the pressure gage directly with said main valve casing, instead of connecting the same with the reservoir.

Referring more particularly to Figs. 3, 4, and 5, *f*, indicates the main valve casing provided with a passage, *p*, to the inlet end of which is connected the feed pipe, *e'*, that projects nearly to the bottom of the reservoir, *a*, the outlet of said passage, *p*, opening into a branch, f^8, in which is seated the filter plug, f^2, Fig. 3, whose open end encompasses the port or passage, *p'*, that leads from said branch into branch, f^9, to which the lower end of the stand pipe, *e*, is connected, said port, *p'*, having a conical seat for the corresponding end of a so-called needle-valve, f', by means of which the flow of illuminant to the stand pipe is controlled. From the passage, *p*, extends a passage, p^2, formed in a branch, f^3, of the valve casing, with which the pressure gage, G, is connected, said passage, p^2, as shown in Figs. 3 and 5, extending entirely through said branch, its outer end be-

ing closed by a screw plug *s*, so that access may be had thereto for the removal of any solid matter that may lodge therein. The branch, f^4, of valve casing, *f*, secured to the reservoir, *a*, has, besides the illuminant passage, *p*, an angular air passage, p^3, opening into the reservoir and having a conical valve seat formed in the end of its horizontal branch, which, together with a portion of its vertical branch is contracted, or of less diameter than the lower inlet portion, and said horizontal branch of the passage opens into a branch, f^{10}, in which works a needle valve, f^5, the conical end of which is adapted to seat in the conical bearing of passage, p^3, and serves to control the flow of air to the branch, f^9, and stand pipe, *e*, there being a passage, f^7, that connects the branches, f^9, and f^8, as shown in Fig. 5.

The stand pipe, *e*, at a point intermediate of its terminals is provided with a stop-cock, e^3, which determines the height of the column of illuminant within the pipe. The position of the stop cock, e^3, that is to say its distance from the inlet end of the stand pipe, may be varied according to the volatility of the illuminating fluid employed, which, when heavy hydrocarbons or the products of distillation of hydrocarbon oils are used, may be placed about twenty inches, more or less, above the main valve casing.

It will readily be seen that if the port, *p'*, and stop-cock, e^3, are both open, the illuminant under the pressure of the air in reservoir, *a*, will be forced into the stand pipe, *e*, and as soon as the illuminant discharges through said stop-cock, e^3, the port, *p'*, is first closed by means of the valve, *f'*, and then stop-cock, e^3, is also closed, so that there will be a column of illuminant in the stand pipe, *e*. If now, the valve, f^5, is opened, air under pressure will be forced into the stand pipe through passages, p^3, f^7, and through the more or less volatile illuminant in the stand pipe, *e*, whereby said air is carbureted, and taking up more or less of the illuminant flows to the nozzle, *n*, of the burner, where it can be ignited by any suitable means.

In order to confine the starting flame so as to more rapidly heat the generator tube or coil, g^6, of the burner, *g*, we hinge to its front end, either at or near its lower edge or to the drip pan or dish g^2, as shown at g^4, Figs. 1 and 2 or at any other desired point, a guard or baffle plate, g^3, Figs. 1 and 2, which has a comparatively small central aperture for the passage of the flame. As the air supplied to the stand pipe, *e*, is under pressure, the illuminant carried along with it will be sprayed as the jet of air rushes out of the burner nozzle, *n*, and may be ignited by any means, as for instance, an ignited fibrous material saturated with a hydrocarbon oil placed into the casing, g^5, near the burner nozzle, *n*, an intense heat being developed within a comparatively short time, not more than three or four minutes, after which the air valve, f^5, is closed and the main valve, *f'*, is opened to supply oil to the generator tube or coil which is vaporized therein, and as soon as the flame is clear and smokeless, the confining or baffle plate, g^3, is turned down to the position shown in dotted lines in Fig. 1.

When the burner is exposed to high winds a chimney, *x*, constructed substantially as described in our Letters Patent No. 404,064, and shown in Fig. 4 of the drawings thereof, can be used, which is removed after the burner is started.

The confining or baffle plate, g^3, may also be used should the burner during use become cool or discharge unburned oil, either by reason of an obstruction in the burner nozzle or in the generating tube or coil, to heat the burner, while said plate reduces the velocity of the jet by obstructing it, causing the oil carried along to drop into the dish, g^2.

When the burner is at such an elevation as to be beyond convenient reach, the plate, g^3, may be turned up or lowered by means of a rod or wire, and a suitable arm or arms on the generator.

Our improvement may also be used when the lamp is to be put out, for removing or reducing carbon deposits in the burner nozzle or in the generator, by stopping the supply of oil to the burner, then drawing off through stop-cock, e^3, all the oil that will flow out of it into a suitable vessel, and then opening the air-valve, f^6, slightly to blow out the remainder of the oil in the stand pipe, *e*, at the cock, e^3, and when the pipe is empty (care being taken that it is empty of oil) the valve, e^3, is closed and the remainder of the air in the reservoir, *a*, will pass out of the burner, issuing from the jet nozzle in a blue cloud. The spray at the burner nozzle, *n*, may also be produced without passing it through a column of oil in the stand pipe, or using the stop cock, e^3, by supplying oil and air simultaneously to the stand pipe and burner in such quantities that the air under pressure will take up the oil and convert it into spray as the jet issues at the burner nozzle, *n*. Or, air may be first supplied to the burner and then oil, or vice versa, the quantity of either being regulated by means of the air and oil valves in the main valve casing.

When the burner and generator are sufficiently heated to generate vapor the supply of air is cut off and the supply of oil to the burner is regulated as may be necessary to produce the desired light.

When starting the burner the reservoir, *a*, should only be about half full, in order that the necessary supply of compressed air may be obtained, the pressure of air in the reservoir, *a*, found to give the best results being about thirty pounds to the square inch, and should said pressure fall below ten pounds to the square inch, more air should be pumped into said reservoir. After the burner is started the pressure in the reservoir need not exceed twenty pounds per square inch.

Having thus described our invention, what we claim as new therein and desire to secure by Letters Patent, is:—

1. An illuminating apparatus comprising an oil and compressed air reservoir, a self-generating vapor burner, a valved oil supply pipe connected with the burner and with the oil space of the reservoir, and a valved air duct connected with the air space of the reservoir and with the oil supply pipe whereby carbureted air or oil or both may be supplied to the burner from the reservoir through the oil supply pipe, for the purpose set forth.

2. An illuminating apparatus comprising an oil and compressed air reservoir, a self-generating vapor burner, a valved supply pipe connected with the burner and with the oil space of the reservoir, a valved outlet interposed in the supply pipe between the burner and reservoir, and a valved air duct connected with the said supply pipe and the air space of the reservoir, for the purpose set forth.

3. In an illuminating apparatus, the combination with an oil reservoir, a self-generating vapor burner, an oil supply pipe connected with the burner and reservoir, and a regulating valve for controlling the supply of oil to the supply pipe, of a valved outlet connected with the supply pipe at a point intermediate of its terminals, and means for supplying air under pressure to the supply pipe below the valved outlet, for the purpose set forth.

4. In an illuminating apparatus, the combination with a self-generating vapor burner, an oil and compressed air reservoir, and a supply pipe connected with the burner and reservoir, of a valve casing interposed in the supply pipe and provided with valved air and oil supply passages whereby either oil or air or both may be admitted to the supply pipe from the reservoir, for the purpose set forth.

5. In an illuminating apparatus, the combination with a self-generating vapor burner, a compressed air and oil reservoir, and a supply pipe connected with the burner and oil space of the reservoir, of a valve casing in said supply pipe provided with a valve for controlling the supply of oil to the pipe, and with a valved air duct connecting said pipe with the air space of the reservoir, for the purpose set forth.

6. In an illuminating apparatus, the combination with a self-generating vapor burner, an oil and compressed air reservoir, and a supply pipe connected with the burner and provided with a valved outlet branch intermediate of its terminals, of a valve casing provided with a valved oil duct connected with the supply pipe and extending nearly to the bottom of the reservoir, and with a valved air duct also connected with said supply pipe and opening into the upper part of said reservoir, substantially as and for the purpose set forth.

7. In an illuminating apparatus provided with a self-generating vapor burner, the combination with said burner of a flame confining or baffle plate adapted to be applied to the flame exit passage of the burner, a casing encompassing the jet or burner nozzle and its connections with the generator, and a chimney encompassing the said generator, substantially as and for the purpose set forth.

8. In an illuminating apparatus, the combination with an oil and compressed air reservoir, a self-generating vapor burner, means for baffling or confining the flame of the burner about the generator, and a valved oil supply pipe connected with the burner and reservoir, of a valved air supply passage connected with said reservoir and supply pipe, for the purpose set forth.

9. In an illuminating apparatus, the combination with an oil and compressed air reservoir, a self-generating vapor burner, means for baffling or confining the flame of the burner about the generator, and a valved oil supply pipe connected with the burner and reservoir and provided with a valved outlet duct at a point between the burner and the oil controlling valve in said pipe, of a valved air supply passage connected with said reservoir and supply pipe, for the purpose set forth.

ROUGHSEDGE WALLWORK.
ARTHUR COLLINGS WELLS.

Witnesses:
PETER J. LEVSEY,
WILLIAM FAULKNER.