(No Model.) 3 Sheets—Sheet 1.

J. P. GOVERTS.

VAPOR BURNER.

No. 386,534. Patented July 24, 1888.

Fig. 2.

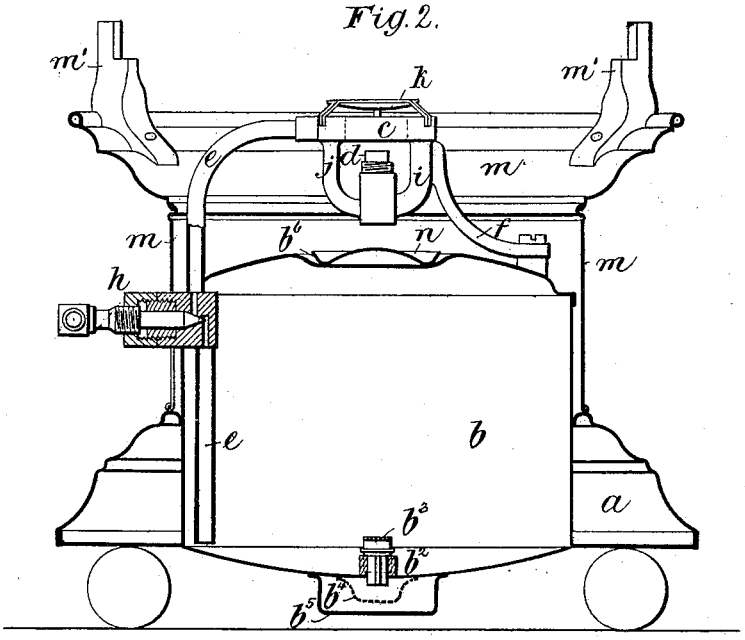
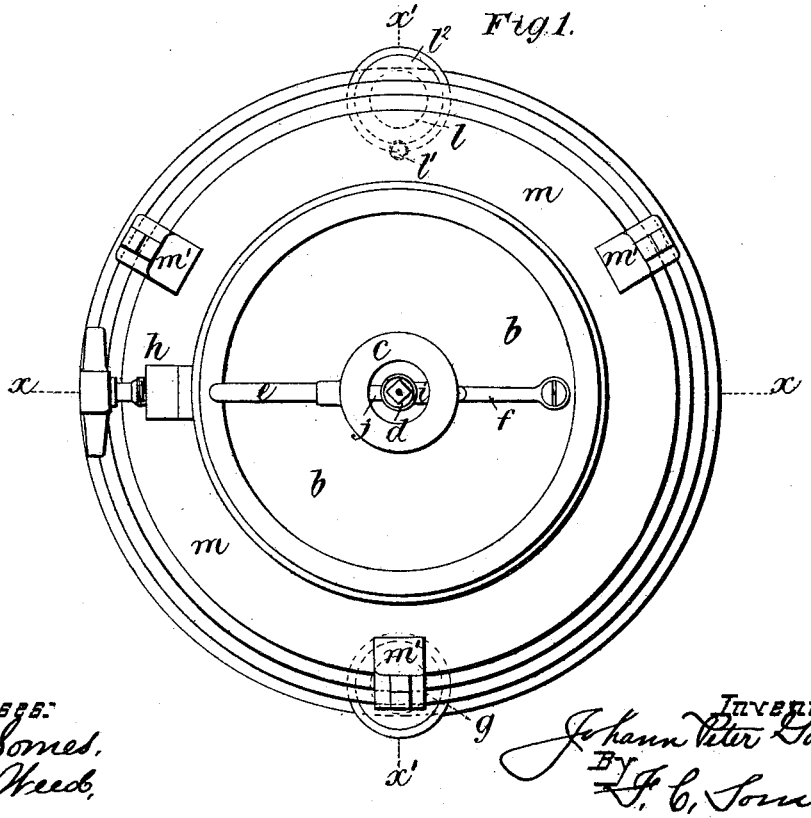


Fig. 1.



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(No Model.) 3 Sheets—Sheet 2.

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Fig. 3.

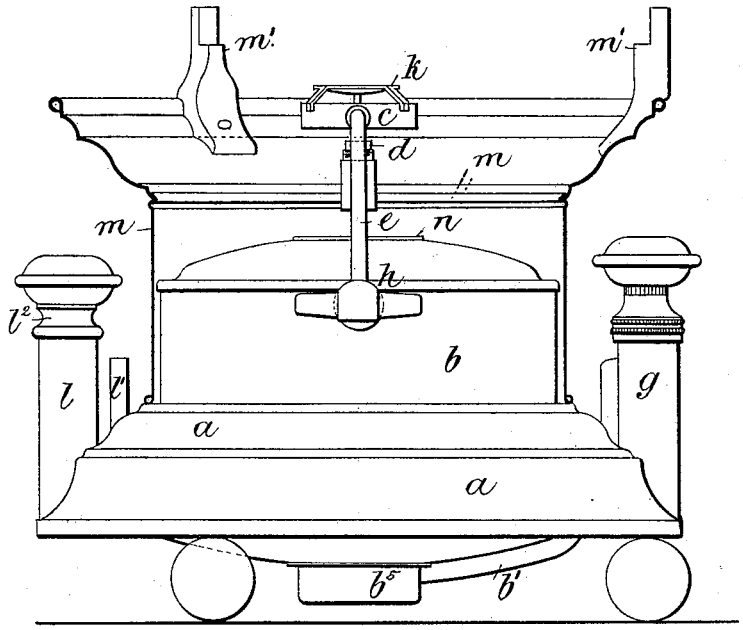
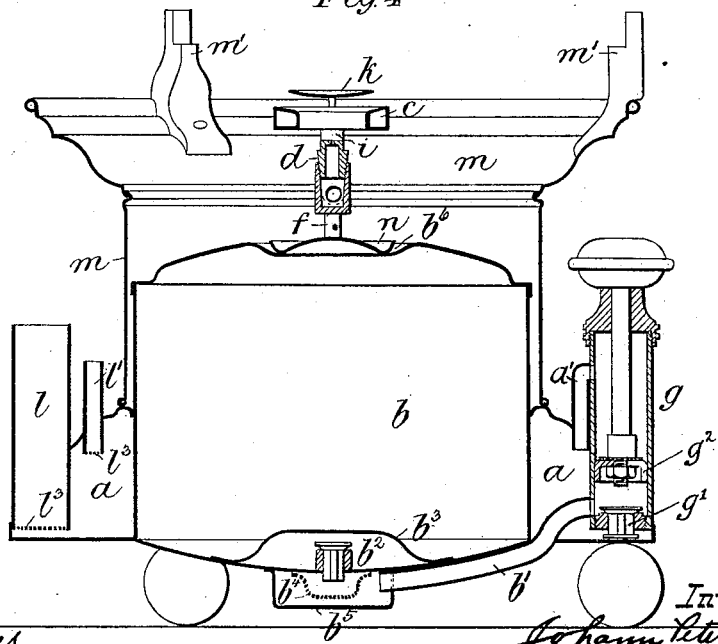


Fig 4



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(No Model.) 3 Sheets—Sheet 3.

J. P. GOVERTS.

VAPOR BURNER.

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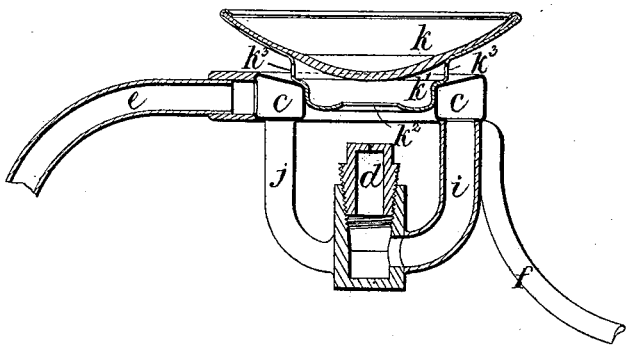
Fig. 5.



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UNITED STATES PATENT OFFICE.

JOHANN PETER GOVERTS, OF VIBORG, DENMARK, ASSIGNOR TO CARL QUITMANN, OF LONDON, ENGLAND.

VAPOR-BURNER.

SPECIFICATION forming part of Letters Patent No. 386,534, dated July 24, 1888.

Application filed January 28, 1887. Serial No. 225,804. (No model.) Patented in Germany December 14, 1883, No. 30,074; in Norway January 29, 1884; in England April 29, 1884, No. 6,958; in France May 6, 1884, No. 161,941; in Belgium May 31, 1884, No. 65,208, and in Austria-Hungary October 3, 1884.

To all whom it may concern:

Be it known that I, JOHANN PETER GOVERTS, a subject of the King of Denmark, and a resident of Viborg, Denmark, have invented new and useful Improvements in Vapor-Burners, (for which I have obtained patents in Great Britain, No. 6,958, dated April 29, 1884; France, No. 161,941, dated May 6, 1884; Austria-Hungary, dated October 3, 1884; Germany, No. 30,074, dated December 14, 1883; Belgium, No. 65,208, dated May 31, 1884, and Norway, dated January 29, 1884,) of which the following is a specification, reference being had to the accompanying drawings.

My invention relates to apparatus for vaporizing liquid hydrocarbons and burning the same for heating or other purposes.

The object of my said invention is to provide a vapor-burner or vapor-burning stove wherein compressed air is utilized for feeding the liquid hydrocarbon to the vaporizing-chamber and forcing the vapor therefrom through the discharge-nozzle.

My said invention comprises the combination, with a vaporizing-chamber and a discharge-nozzle, of a reservoir for containing the liquid hydrocarbon, a closed vessel or chamber connected with the said vaporizing-chamber and nozzle by a pipe provided with a stop-cock or valve, and a pump or other suitable means for forcing the liquid hydrocarbon from the said reservoir into the said closed chamber, and thus compressing the air in this chamber. In some instances, however, I dispense with the said reservoir and provide for the introduction first of liquid hydrocarbon and then of compressed air into the chamber connected with the vaporizing-chamber and discharge-nozzle.

My said invention also comprises improvements in the construction and arrangement of the vaporizing-chamber and discharge-nozzle, whereby I increase the efficiency of my burner as compared with vapor-burners heretofore employed.

My said invention further comprises the combination, with the vaporizing-chamber and discharge-nozzle, of means for deflecting the jet of vapor which issues from the said nozzle, and in some instances of means for insuring the mixture of air with the hydrocarbon vapor to produce a blue flame like that from a Bunsen burner.

In the accompanying drawings, Figure 1 is a plan of one form of my improved vapor-burner or vapor-burning stove, the deflecting-plate or deflector, hereinafter described, being removed. Fig. 2 is a vertical central section on the line x x, Fig. 1, the vaporizing-chamber and the discharge-nozzle being shown in side elevation. Fig. 3 is a front elevation, the outer casing being shown in section on the line x' x', Fig. 1. Fig. 4 is a vertical central section on the line x' x', Fig. 1. Fig. 5 is a vertical central section through the vaporizing-chamber and parts connected therewith, showing a modification of my invention.

Like letters indicate corresponding parts throughout the drawings.

a is an annular reservoir for the liquid hydrocarbon. b is a closed vessel or chamber firmly secured in the center of the said reservoir.

c is the vaporizing-chamber, and d is the discharge-nozzle. The said chamber c and discharge-nozzle d are connected with the vessel or chamber b by a pipe, e. They are, moreover, supported by an arm or bracket, f, firmly secured to the said chamber b.

g is a pump which is fixed in the reservoir a, at one side thereof, and which communicates with the chamber b through a pipe or passage, b', and a valve, b^2.

b^3 is a metal strip secured at its ends to the bottom of the chamber b, to limit the movement of the valve b^2.

b^4 is a piece of wire-gauze secured underneath the bottom of the chamber b and covering the aperture therein, to prevent the entrance of dust or the like into the said chamber.

b^5 is a casing also secured underneath the chamber b and inclosing the end of the pipe b' and the aperture in the said chamber.

The pump g is constructed and arranged as follows: The pump-cylinder is seated in and

extends nearly to the bottom of the chamber *a*, and at its lower end is provided with an upwardly-opening valve, *g'*. A tube, *a'*, leads from the top of said chamber to the upper end of said cylinder, and a pipe, *b'*, leads from said cylinder into the chamber *b*. When the piston g^2 is raised, the valve *g'* opens and liquid hydrocarbon is drawn into the pump-cylinder from the chamber *a* through said open valve, the valve b^2 closing and permitting the backward flow of the liquid. The downward movement of the piston effects the opposite action of both valves and forces the liquid through the pipe *b'* into the chamber *b*. The upper end of the pump *g* is closed, and the air in the pump-cylinder, displaced by the raising of the piston, is forced back into chamber *a* and passes out at *l'*. The liquid hydrocarbon may thereby be drawn from the reservoir *a* and delivered into the chamber *b*. The pipe *e* extends nearly to the bottom of the chamber *b*, and is provided with a stop-valve, *h*, for regulating or controlling the flow of liquid hydrocarbon from the said chamber *b* to the vaporizing-chamber *c*.

The vaporizing-chamber *c* is of annular form. The nozzle *d* is placed concentric with, and preferably a short distance below, the said chamber, and is connected therewith by means of a pipe, *i*. This pipe communicates with the said chamber *c* on the side opposite the pipe *e*. Therefore the hydrocarbon must flow through the vaporizing-chamber in its passage from the pipe *e* to the nozzle *d*. The part *j* is solid and merely serves as a support for the nozzle *d*. *k* is a deflector for deflecting the jet of vapor as it issues from the said nozzle, and thus spreading the flame and insuring the proper heating of the vaporizing-chamber. This deflector is supported upon the said chamber in any convenient manner.

l is a pipe through which liquid hydrocarbon may be poured into the reservoir *a*, and *l'* is a pipe for permitting the escape of the air displaced from the said reservoir by the liquid poured therein. The pipe *l* is preferably provided with a cap or plug, l^2, for closing the same, and with a piece, l^3, of wire-gauze to prevent the entrance of dust into the reservoir *a*. *m* is an outer casing which preferably surrounds the reservoir *b*, and which is provided with arms or projections *m'*, for supporting a kettle, saucepan, or other cooking utensil. *n* is a cup or receptacle for containing spirits of wine for starting the apparatus, as hereinafter described. The top of the chamber *b* is preferably made with a recess or depression, b^6, in which the said cup may be placed, as shown, so that any spirits of wine which may overflow the said cup will be received in the said recess. The said cup may, however, be otherwise suitably arranged, if desired.

When my improved vapor-burner or stove is required for use, the reservoir *a* is first filled or partially filled with liquid hydrocarbon, which is then drawn from the reservoir *a* by means of the pump *g* and forced into the chamber *b*, thus compressing the air therein. A small quantity of spirits of wine is then poured into the cup *n* and ignited for the purpose of heating the vaporizing-chamber *c*. As soon as this chamber is heated sufficiently to vaporize any liquid hydrocarbon passing through it the valve *h* is opened. The compressed air in the chamber *b* then commences to expand, and thus forces the liquid hydrocarbon through the pipe *e* into and through the vaporizing-chamber *c*, wherein it is heated so that it issues from the nozzle *d* in the form of a jet of vapor. This jet of vapor is immediately ignited by the flame of the spirits of wine. The said jet is deflected and directed radially outward by the deflector *k*, so that an annular flame is produced. After the small quantity of spirits of wine has been all burned the vaporizing-chamber is kept hot by the flame of the hydrocarbon vapor. By reason of the improved construction of my vapor-burner complete combustion of the hydrocarbon is insured, so that no soot or lamp-black is deposited upon the kettle or other utensil placed over the said burner, and intense heat is generated by such combustion.

I sometimes modify the construction of the deflector, as shown in Fig. 5, in order to effectually prevent any hissing or other noise, which might otherwise be caused by the passage of air through the space inclosed or surrounded by the vaporizing-chamber. The deflector shown in this figure consists of a cup-shaped disk or deflecting-plate, *k*, and a casing, *k'*, formed or fixed on the under side thereof. This casing is adapted to fit into the vaporizing-chamber *c*, as shown, and is formed with an aperture, k^2, through which the jet of vapor from the nozzle *d* may pass to impinge against the disk or plate *k*. The said casing is also formed with holes k^3 in its periphery, through which the vapor will be directed in a series of jets after it has been deflected by the plate *k*.

I sometimes use two or more vaporizing-chambers and discharge-nozzles in combination with a single reservoir, compressed-air chamber, and pump. I apply my improved vapor-burner to cooking-ranges and other heating apparatus of different kinds. Moreover, the shape of the reservoir and of the compressed-air chamber will be varied according to the purpose for which the apparatus is required.

In some instances I arrange the reservoir *a* at a considerable distance from the compressed-air chamber *b*. When I apply my invention to cooking-ranges or the like, the reservoir and the pump may be arranged outside of the same in any suitable position, only the compressed-air chamber and the parts mounted thereon being inclosed in the said range; or I can use other suitable means for partially filling the chamber *b* and compressing the air therein.

What I claim is—

1. The combination of a closed chamber, a reservoir for containing liquid hydrocarbon, a pump for forcing said liquid hydrocarbon from said reservoir into said closed chamber and thus compressing the air therein, a vaporizing-chamber and discharge-nozzle located above said closed chamber, and a pipe for conducting said liquid hydrocarbon from said closed chamber to said vaporizing-chamber, said chamber having a depression in its top beneath said vaporizing-chamber adapted to receive inflammable liquid for effecting the preliminary heating of said vaporizing-chamber, substantially as described.

2. In a vapor-burner, the combination, with the annular vaporizing-chamber *c*, the discharge-nozzle *d*, concentric therewith, and a pipe, *i*, connecting said chamber and nozzle, of a deflector, *k*, provided on its under side with a casing, *k'*, fitting into said vaporizing-chamber, and having holes k^2 k^3, all substantially as and for the purpose set forth.

In testimony whereof I have hereunto signed my name in the presence of two subscribing witnesses.

JOHANN PETER GOVERTS.

Witnesses:

DAVID YOUNG,

C. JUNGE.