No. 755,717. PATENTED MAR. 29, 1904.

A. J. SMITHSON.

HYDROCARBON BURNER.

APPLICATION FILED DEC. 1, 1902.

NO MODEL. 3 SHEETS—SHEET 1.

Fig. 1

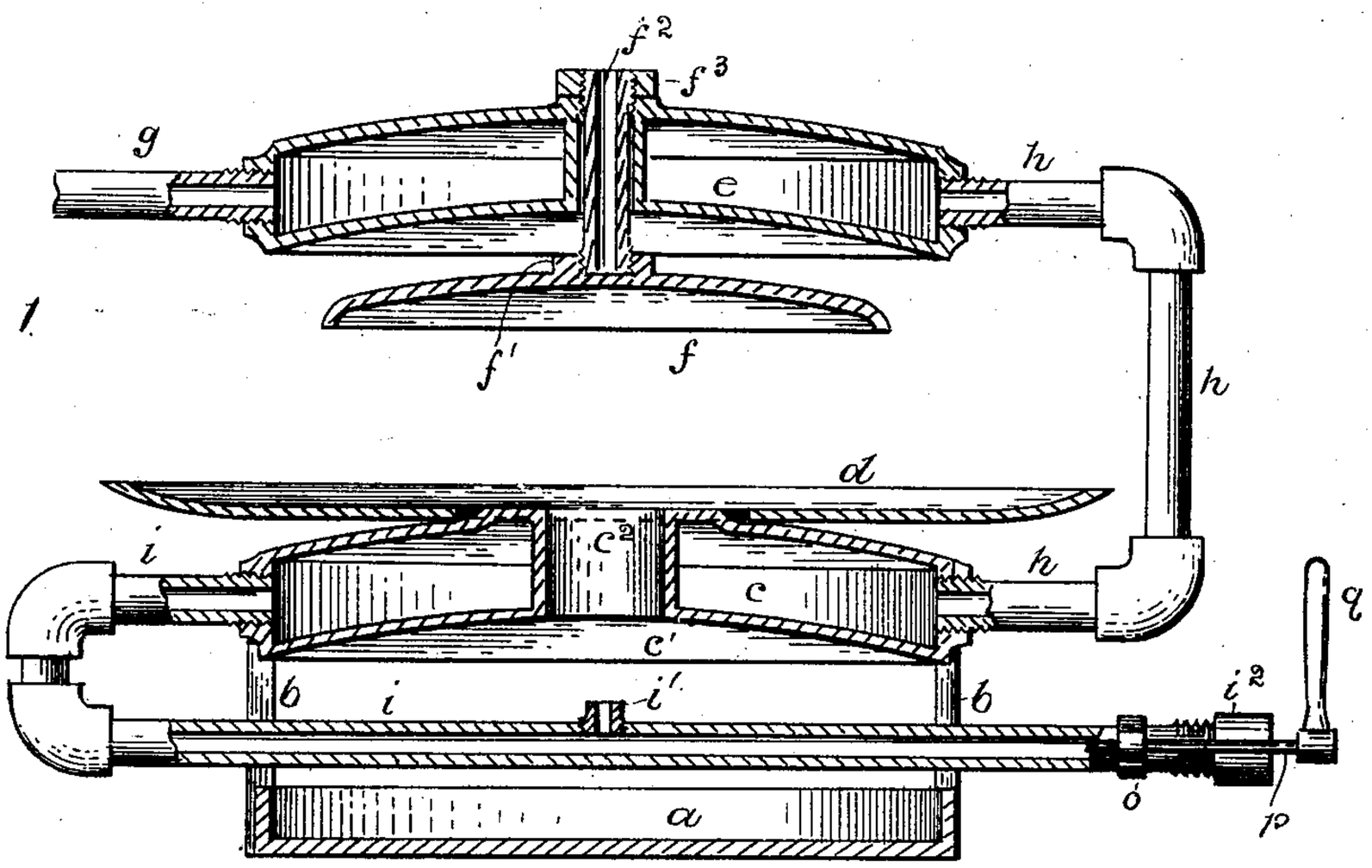
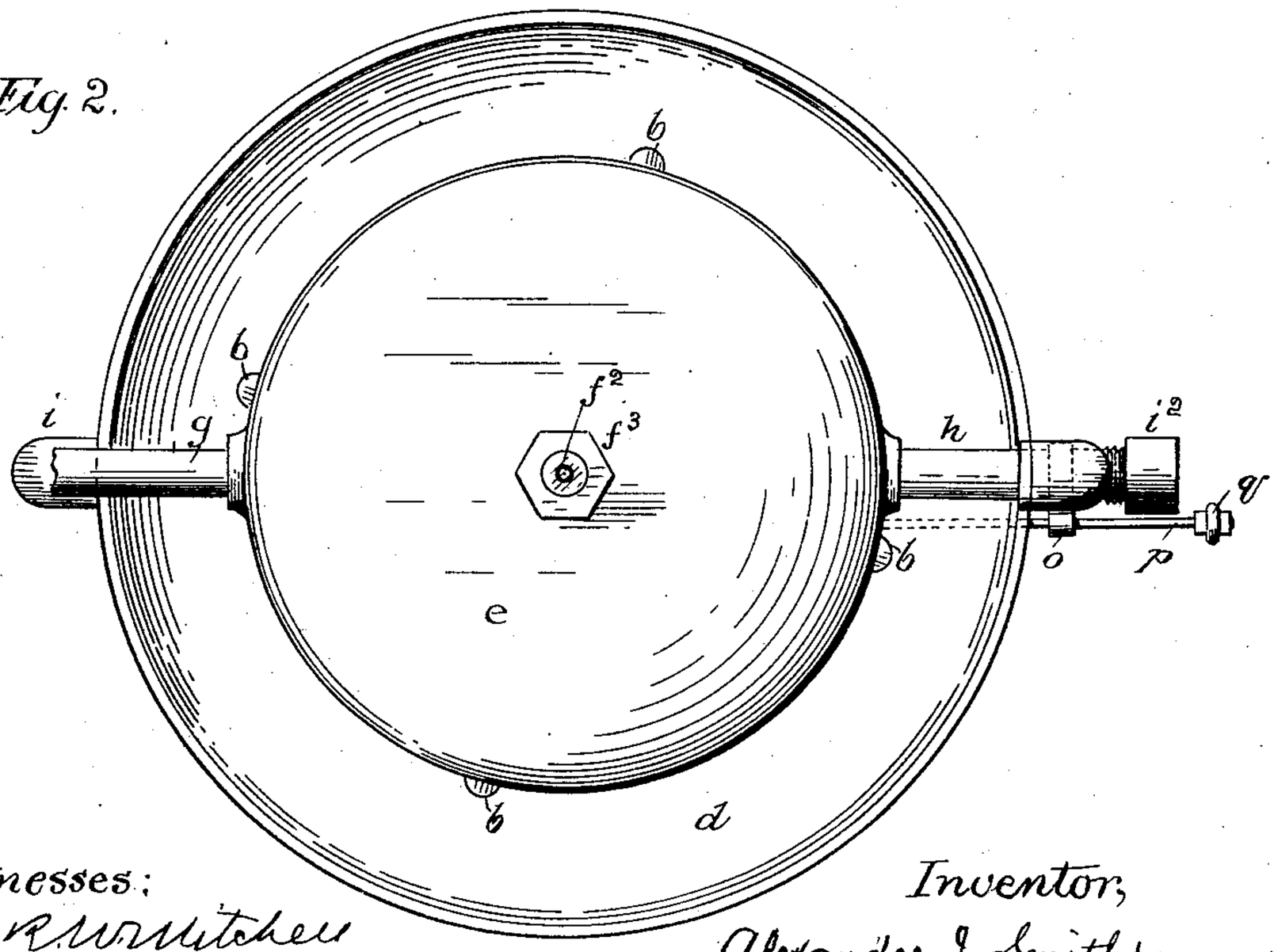



Fig. 2.




Witnesses:
R. W. Mitchell
E. L. Moses

Inventor;
Alexander J. Smithson
by Z. J. Geisler
Atty.

No. 755,717. PATENTED MAR. 29, 1904.

A. J. SMITHSON.

HYDROCARBON BURNER.

APPLICATION FILED DEC. 1, 1902.

NO MODEL. 3 SHEETS—SHEET 2.

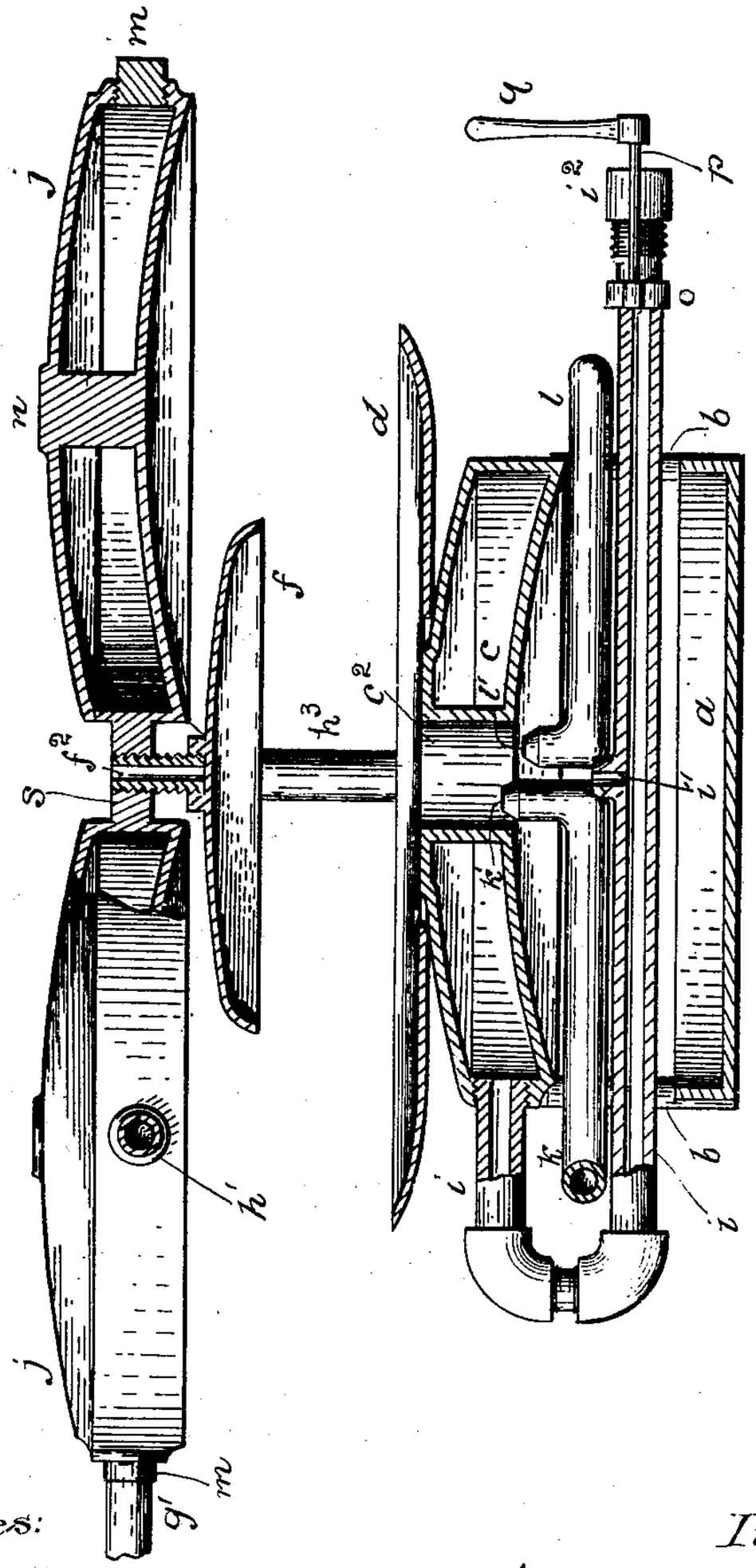



Fig. 3.

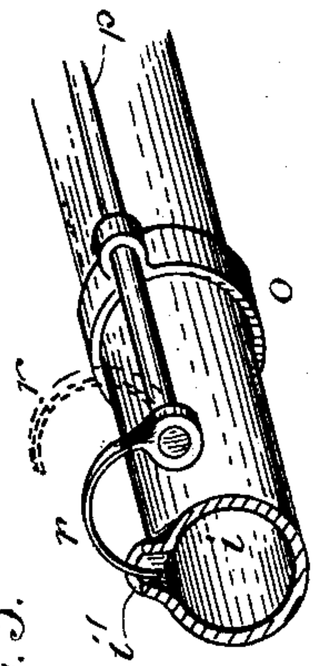



Fig. 5.

Witnesses:

R. M. Mitchell

E. L. Moses.

Inventor,

Alexander J. Smithson

by F. J. Geisler

Atty.

No. 755,717. PATENTED MAR. 29, 1904.

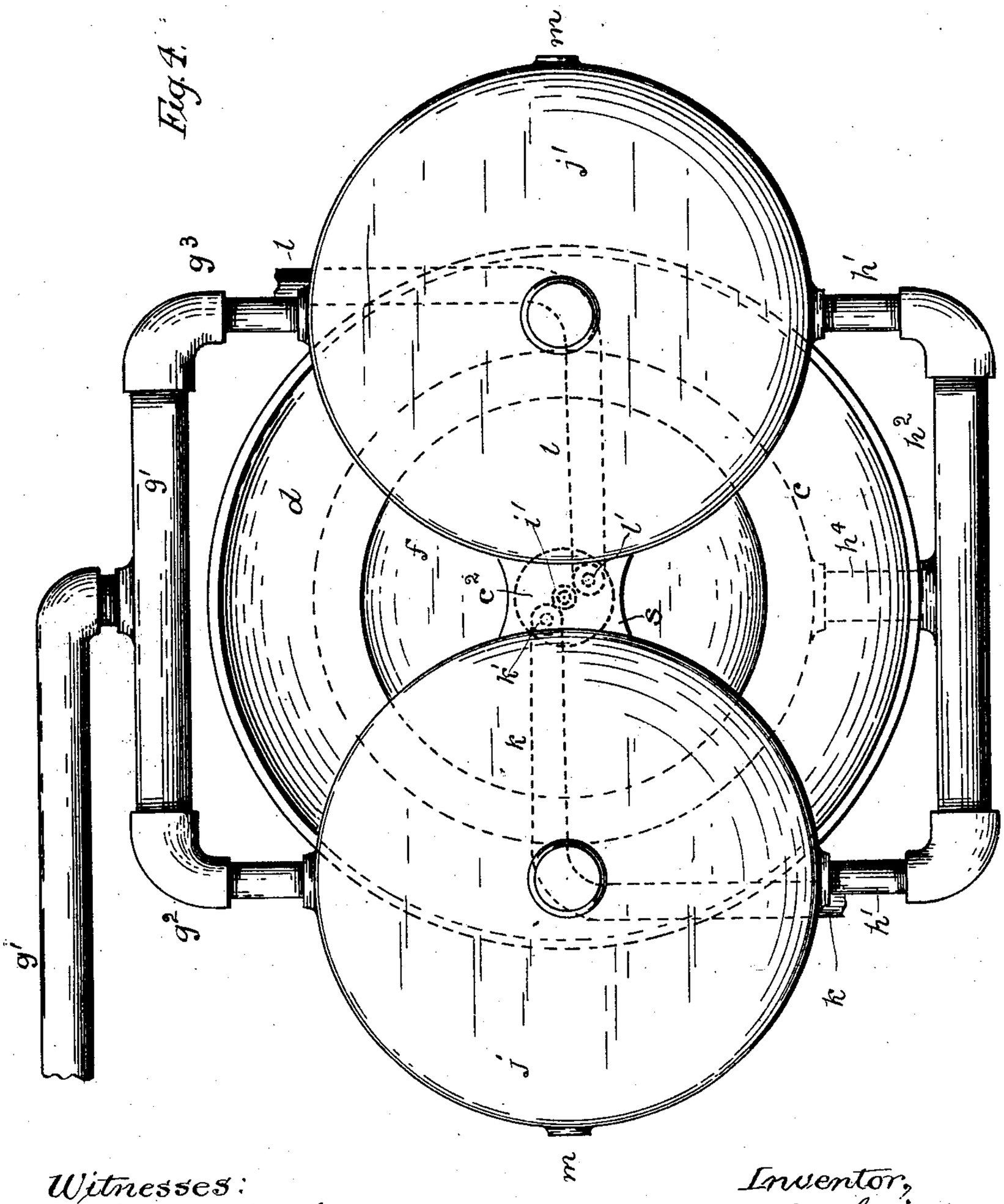
A. J. SMITHSON.

HYDROCARBON BURNER.

APPLICATION FILED DEC. 1, 1902.

NO MODEL. 3 SHEETS—SHEET 3.

Fig. 4.




Witnesses:
R. Whitehead
E. F. Mann.

Inventor,
Alexander J. Smithson
by Y. J. Geisler
Atty.

No. 755,717. Patented March 29, 1904.

# UNITED STATES PATENT OFFICE.

ALEXANDER J. SMITHSON, OF PORTLAND, OREGON.

## HYDROCARBON-BURNER.

SPECIFICATION forming part of Letters Patent No. 755,717, dated March 29, 1904.

Application filed December 1, 1902. Serial No. 133,508. (No model.)

*To all whom it may concern:*

Be it known that I, ALEXANDER J. SMITHSON, a citizen of the United States, residing at Portland, Multnomah county, Oregon, have invented a new and useful Hydrocarbon-Burner, of which the following is a specification, reference being had to the accompanying drawings as a part thereof.

My invention relates generally to heating apparatus operated with fuel oils; and it has for its object the production of a hydrocarbon-burner of simple construction, possessing certain new and useful features which render the same capable of efficient use for all heating purposes, the plan of construction of my apparatus rendering the same equally serviceable for the family kitchen or for heating large boilers. Said features of my invention are herein fully described.

In the drawings, Figure 1 is a longitudinal vertical section of my smaller-sized burner. Fig. 2 is a plan view of the same. Fig. 3 is a longitudinal vertical section of a larger-sized burner. Fig. 4 is a plan of the latter; and Fig. 5 is a detail of the means provided for keeping the gas-vent clean.

The letters designate the parts referred to.

As shown in Fig. 1, my hydrocarbon-burner consists of a pan *a*, provided with peripheral vertical standards *b*, supporting the lower generator *c*. Such generator may be made of cast-iron and is preferably of the shape shown. It has a central gas and flame opening $C^2$. In one end of the said generator enters a pipe *i*, having a vent *i'*, and the end of such pipe is closed by a cap $i^2$. The gas-producing capacity of my burner being considerable, I preferably make the vent *i'* of larger size than usual. Such vent may be made of a diameter of one-tenth of an inch. I also provide means for keeping such vent well opened. Such means are illustrated more particularly in Fig. 5, and consist of a rod *p*, rotatably supported on the exterior of the pipe *i* by means of a pair of collars, like *o*, on one end of which rod *p* is a curved needle *r*, adapted to enter the vent *i'* upon turning the rod *p* by the handle *q*. Opposite to the pipe *i* a pipe *h* enters the generator *c*, such pipe extending upward and entering and also supporting the superimposed generator *e*. Into the generator *e* enters the oil-supply pipe *g*, which is connected with the oil-reservoir. The construction of the upper generator *e* is substantially like the lower one *c*. It has a central opening, the interior of the upper part of which is threaded to receive a pipe-stem $f^2$, secured further by a lock-nut $f^3$ and supporting the primary deflector *f*, the lower end of the stem $f^2$ being inserted in a threaded boss *f'*. Resting on top of the generator *c* is a secondary deflector *d*, consisting of a concaved plate having a central opening through which the top of the lower generator projects, as shown.

The functions of the primary and of the auxiliary or secondary deflectors will appear in the description of the operation of my burner. Such operation is as follows: Supposing the burner to be used for burning refined oils, by opening the valve (not shown) controlling the inlet of oil from the reservoir through the supply-pipe *g* a small portion of oil is allowed to flow through the apparatus and into the pan *a* and is there ignited to heat up the generator *c*. As soon as the gasifying temperature has been reached oil may be allowed to enter the apparatus through the supply-pipe *g* in limited quantity at first, of course, and more after the apparatus has been sufficiently heated to perform its full capacity of work. The flame produced by the jet of gas issuing from the vent *i'* impinges upon the primary deflector *f* and is thrown back upon the secondary deflector *d*. The effect so obtained is to allow the unconsumed combustible gases to expand and become thoroughly intermixed with atmospheric air, and thus be rendered in a condition most favorable to complete combustion. At the same time the flame is spread and enlarged. Soon after the gasifying work of the lower generator has commenced the upper generator *e* will also become heated to the gasifying temperature, and after this it will become the principal gas-generator. Whatever liquid oil there may be at any time in the upper generator will collect on the bottom thereof below the mouth of the pipe *h*, and after the gas-generating process has once become well

started only gas will be admitted into the pipe *h* from the generator *c*. To completely convert into gas any oil-vapors that may enter the pipe *h* is now the particular function of the lower generator *c*. Consequently all the gas which issues from the lower generator *c* into the pipe *i* is absolutely dry, is heated to a high temperature, and is highly inflammable.

Another advantage obtained by the described arrangement and combination of devices is that a larger volume of oil may be heated, and thus a much larger volume of gas produced. Furthermore, the arrangement of the combined devices as a whole is in compact form, taking up no more space than the common hydrocarbon-burners.

To obtain a larger-flamed burner suitable for heating large boilers, I combine two or more upper generators with a lower generator, as illustrated in Figs. 3 and 4. The arrangement of the lower part of the burner is the same as in my small-sized burner, consisting of a pan *a*, provided with standards *b*, supporting the lower generator *c*, in which enters a gas-pipe *i*, having vent *i'* and provided with my described vent-cleaner. On top of the generator *c* rests the secondary deflector *d*. The arrangement of the upper part of this generator is readily understood from the plan Fig. 4. A pipe $h^4$ extends from the lower generator *c* and has branches $h^3$ $h^2$ $h'$ entering the upper generators *j j'*. The latter are rigidly connected by a bridge *s*. Said bridge *s* has a threaded central aperture in which is inserted a short stem $f^2$, holding the primary deflector *f*. Opposite to the pipe branches *h'* there enter into the upper generators the branches $g^2$ $g^3$ of the oil-supply pipe *g'*, which is supposed to be connected with the oil-reservoir, as usual.

The number of superimposed generators *j j'* may be increased to three and four in order to produce a large volume of gas. Whatever number of upper generators be employed, their disposition must in each instance be substantially as shown in Figs. 3 and 4—that is to say, the lower generator, the primary deflector *f*, and the secondary deflector *d* must each be centrally disposed with respect to the group of upper generators. Furthermore, the upper generators must be simultaneously supplied with oil from the reservoir and each upper generator must discharge into the lower generator.

In connection with my larger burners there may be used a jet of crude oil, supplied through a pipe *k*, and a jet of compressed air or steam, supplied through a pipe *l*, the nozzles *k' l'* of said pipes discharging within the flame-opening $c^2$ of the lower generator. A forced draft of steam or air may also be used alone in connection with my burner. Crude oil may also be used entirely in my burner, but in that case the burner will have to be heated up or started by refined oil or other readily-inflammable liquid poured into the pan *a*.

The air-space between the deflector *f* and the upper generator or generators is generally sufficient to protect the latter against being overheated by the former. If preferred, however, a packing of asbestos may be introduced between said parts.

The deflector *d* protects the lower generator against being overheated; but a packing of asbestos may also be here introduced.

The pipe *i* of my larger burners is necessarily provided with a large vent, so as to allow a sufficient escape to the large volume of gas produced. There is no danger of oil being discharged through such large gas-vent, because the increased heating-surfaces of the generators insures that all oil will be completely vaporized before reaching the vent.

To strengthen the generators *j j'*, they are cast with central supports *n*.

*m* represents plugs to facilitate removal of sand core.

The large volume of gas which I obtain by the combination of lower and upper generators associated with the action of the open deflectors *f* and *d* causes the apparatus to be clean in its action. It does not become clogged, and whatever soot may be temporarily deposited on the deflectors is soon removed by the blast of flame produced when the burner is acting normally.

What I claim is—

1. In a hydrocarbon-burner, the combination of a lower generator having a central vertical flame-opening $c^2$; a superimposed generator; a pipe connected between the upper generator and the lower generator; an oil-supply pipe entering the upper generator; a discharge-pipe leading from and underneath the lower generator, and having a gas-vent discharging through the said central flame-opening of the latter; a primary convexed deflector under the upper generator and centrally positioned over said flame-opening, and a secondary convexed deflector on the lower generator of larger diameter than the primary deflector, substantially as described.

2. In a hydrocarbon-burner, the combination of a lower generator having a central vertical flame-opening $c^2$; a group of superimposed generators; a pipe connection between the group of upper generators and the lower generator; an oil-supply pipe entering the group of upper generators, a discharge-pipe leading from and underneath the lower generator, and having a gas-vent discharging through the said central flame-opening of the latter; a primary convexed deflector under the group of upper generators and centrally positioned over said flame-opening; and a secondary convexed deflector on the lower generator of larger diameter than the primary deflector, substantially as described.

3. In a hydrocarbon-burner, the combina-

tion of a lower generator having a central flame-opening $c^2$, and a superimposed generator, each of said generators comprising a crowning bottom and top; a pipe connection between the upper generator and the lower generator; an oil-supply pipe entering the upper generator; a discharge-pipe leading from and underneath the lower generator, and having a gas-vent discharging through said flame-opening of the latter; a primary convexed deflector under the upper generator and centrally positioned over said flame-opening, and a secondary convexed deflector on the lower generator of larger diameter than the primary deflector, substantially as described.

4. In a hydrocarbon-burner, the combination of a lower generator having a central flame-opening $c^2$, and a group of superimposed generators, each of said generators comprising a crowning bottom and top; a pipe connection between the group of upper generators and the lower generator; an oil-supply pipe entering the group of upper generators, a discharge-pipe leading from and underneath the lower generator, and having a gas-vent discharging through the said flame-opening of the latter; a primary convexed deflector under the group of upper generators; and a secondary convexed deflector on the lower generator of larger diameter than the primary deflector, substantially as described.

5. A hydrocarbon-burner comprising a pan, a lower generator supported centrally over such pan, and having a central flame-opening $c^2$; a superimposed generator; a pipe connection between the upper generator and the lower generator; an oil-supply pipe entering the upper generator; a discharge-pipe leading from and underneath the lower generator, and having a gas-vent discharging through the said flame-opening of the latter; a primary deflector convexed under the upper generator and centrally positioned over said flame-opening and a secondary convexed deflector on the lower generator of larger diameter than the primary deflector, substantially as described.

6. A hydrocarbon-burner comprising a pan; a lower generator supported over such pan, and having a central flame-opening $c^2$; a group of superimposed generators; a pipe connection between the group of upper generators and the lower generator; an oil-supply pipe entering the group of upper generators; a discharge-pipe leading from and underneath said lower generator, and having a gas-vent discharging through said flame-opening of the latter; a primary convexed deflector under the group of upper generators and centrally positioned over said flame-opening; and a secondary deflector on the lower generator, substantially as described.

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

ALEXANDER J. SMITHSON.

Witnesses:
T. J. GEISLER,
R. U. MITCHELL.