

(No Model.)

F. CROCKER.  
APPARATUS FOR BURNING OIL.

No. 245,062.

Patented Aug. 2, 1881.

Fig. 1.

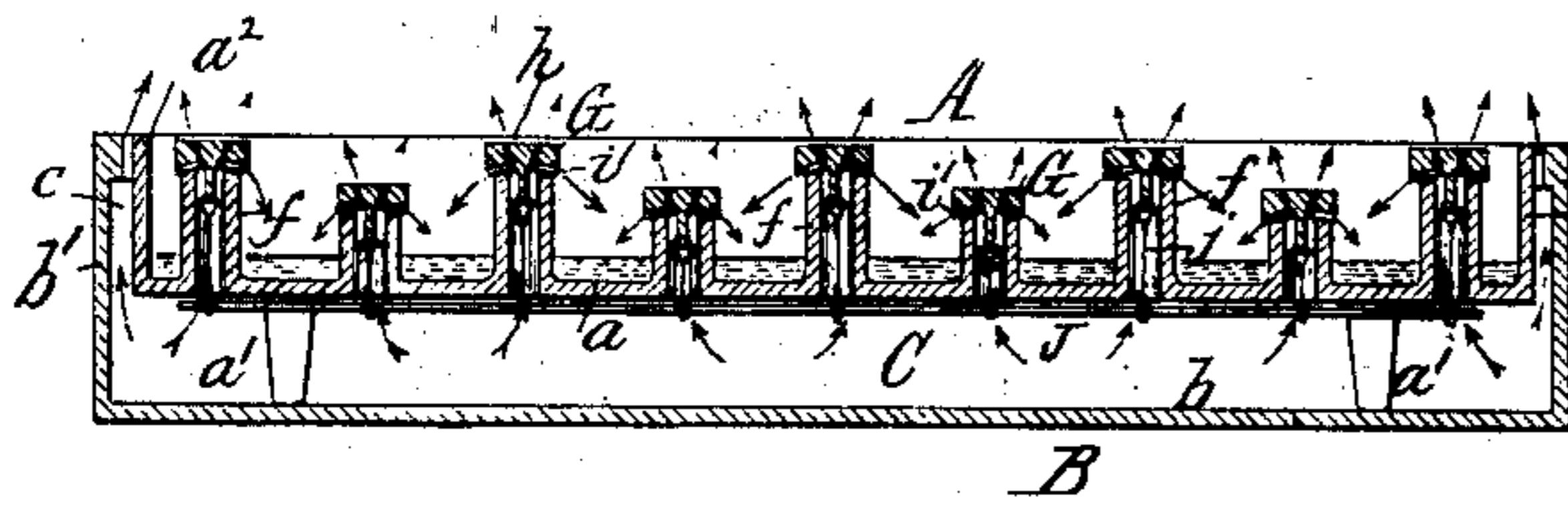


Fig. 2.

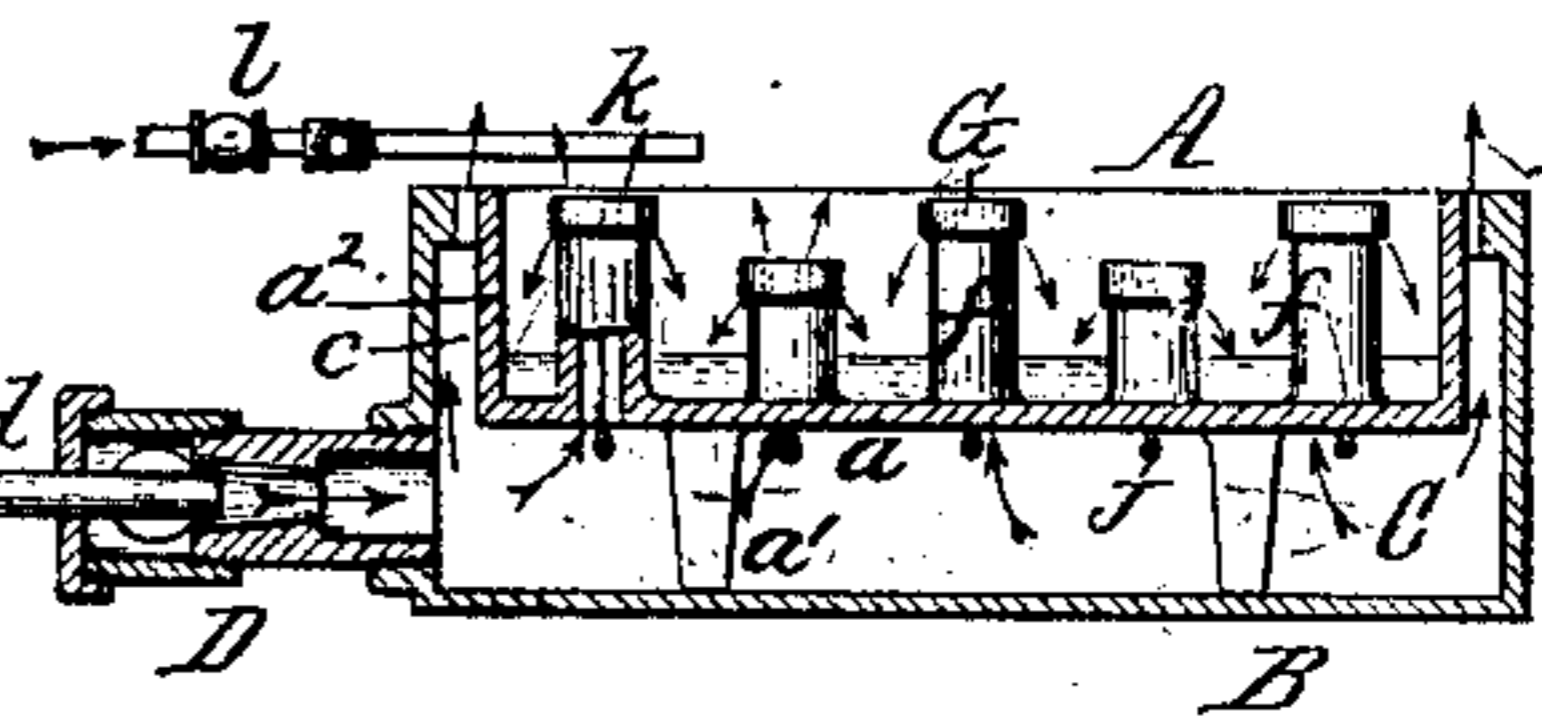


Fig. 3.

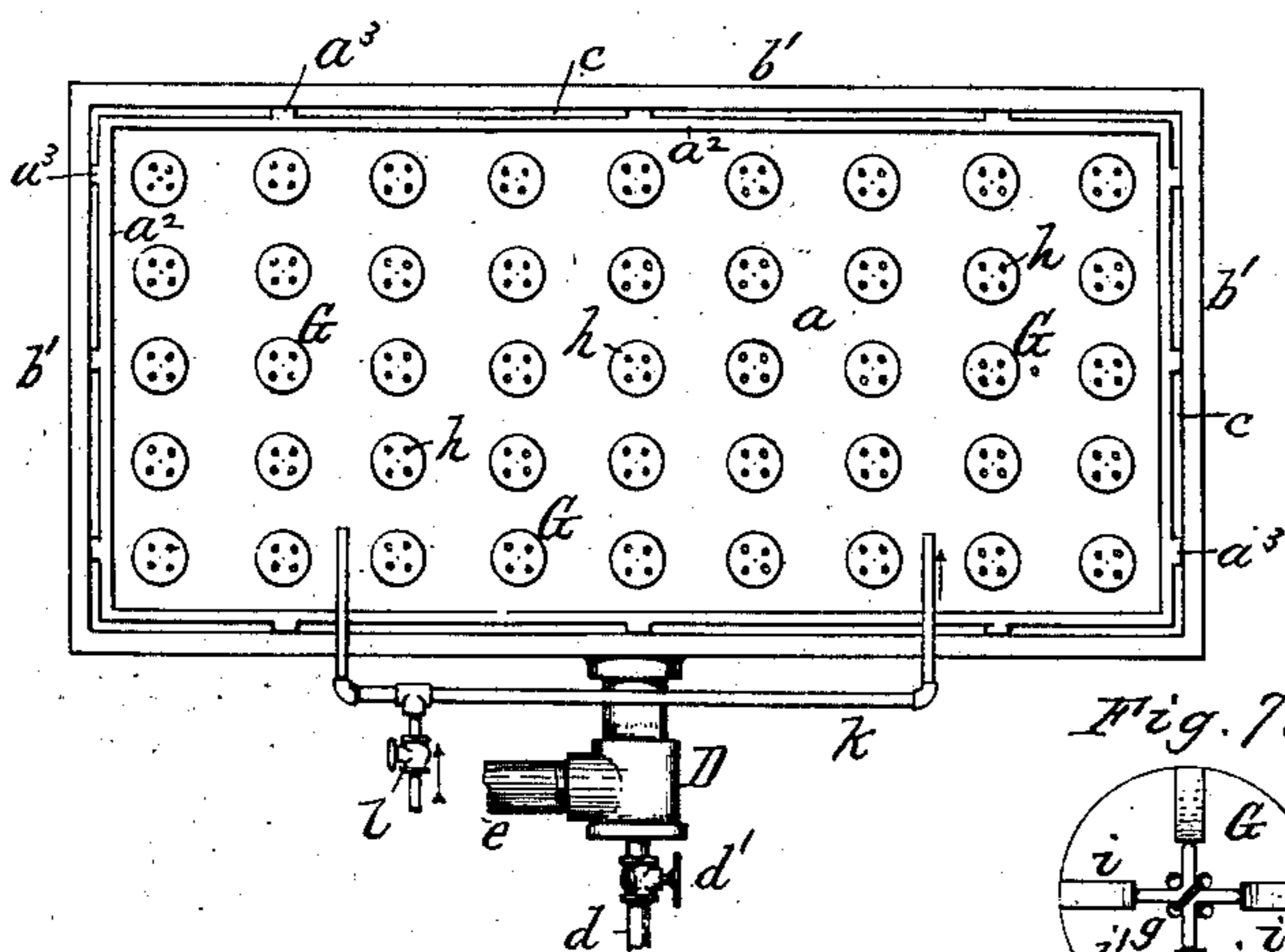


Fig. 4.

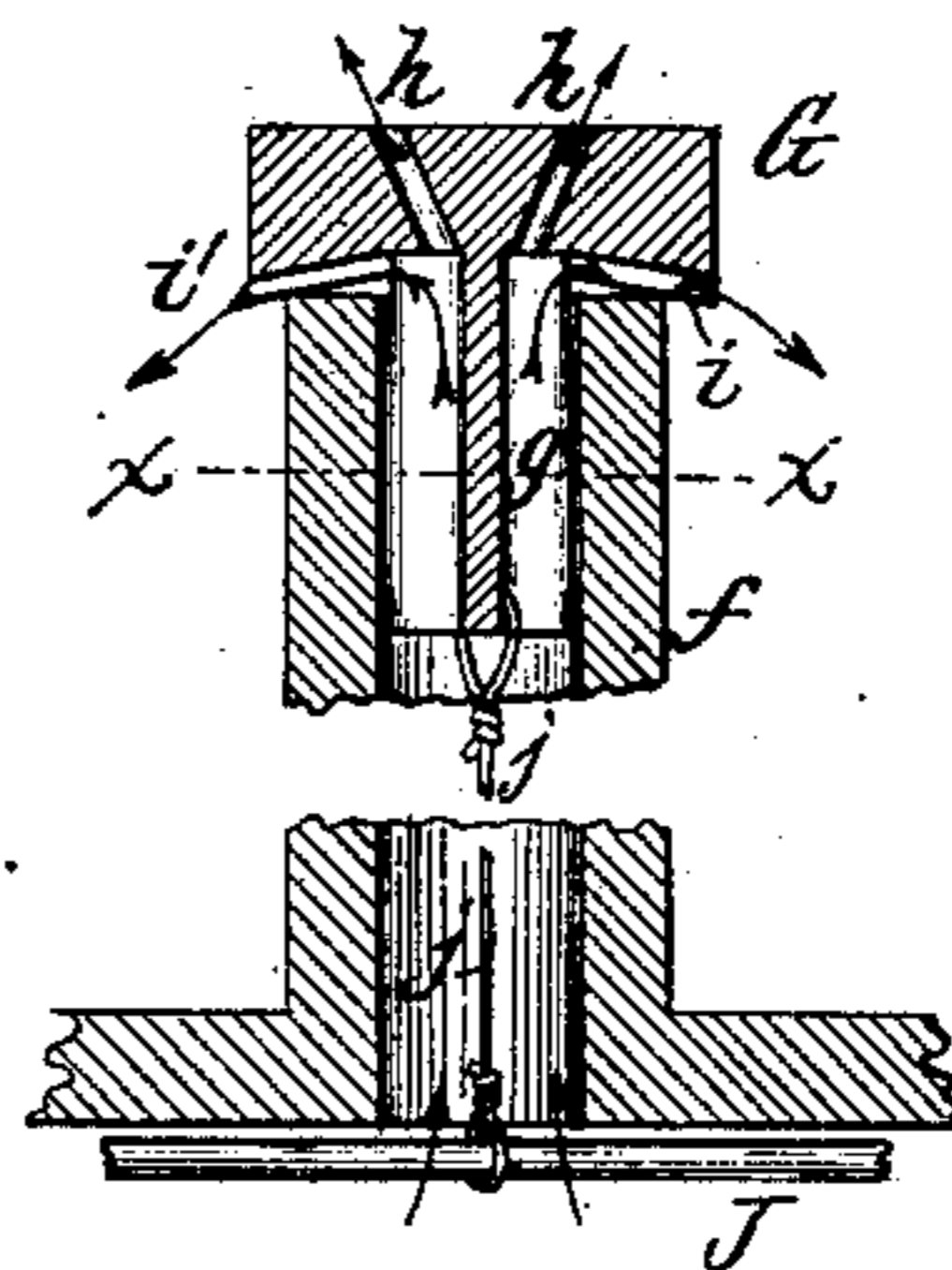


Fig. 5.

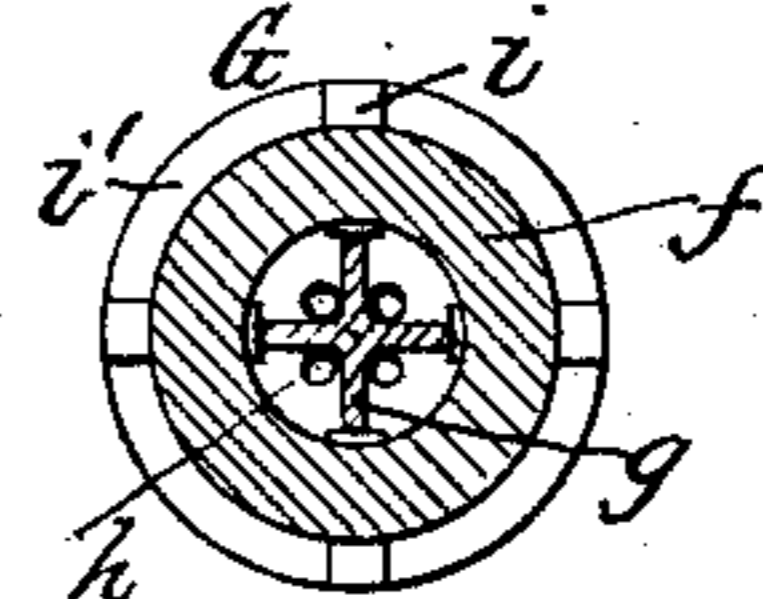


Fig. 6.

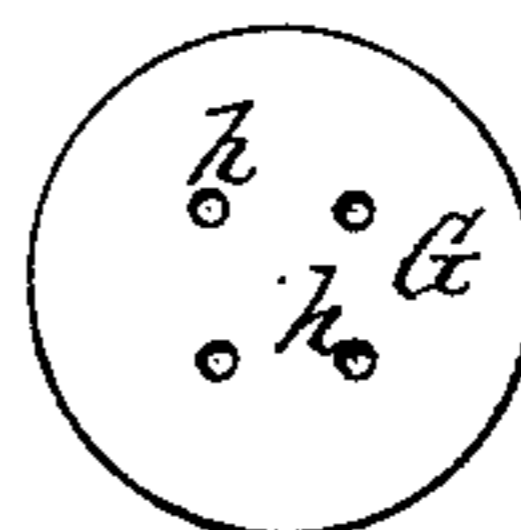


Fig. 7.

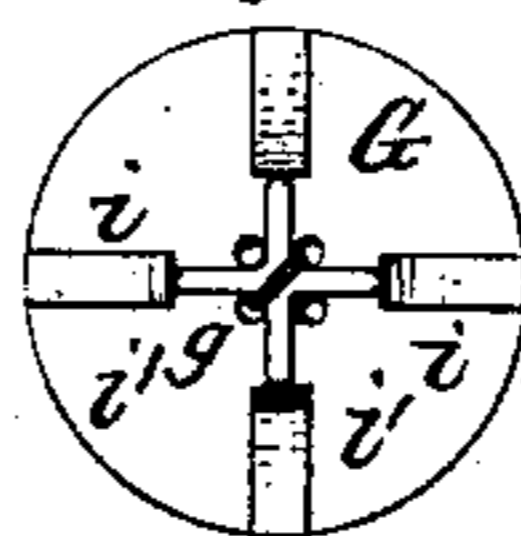
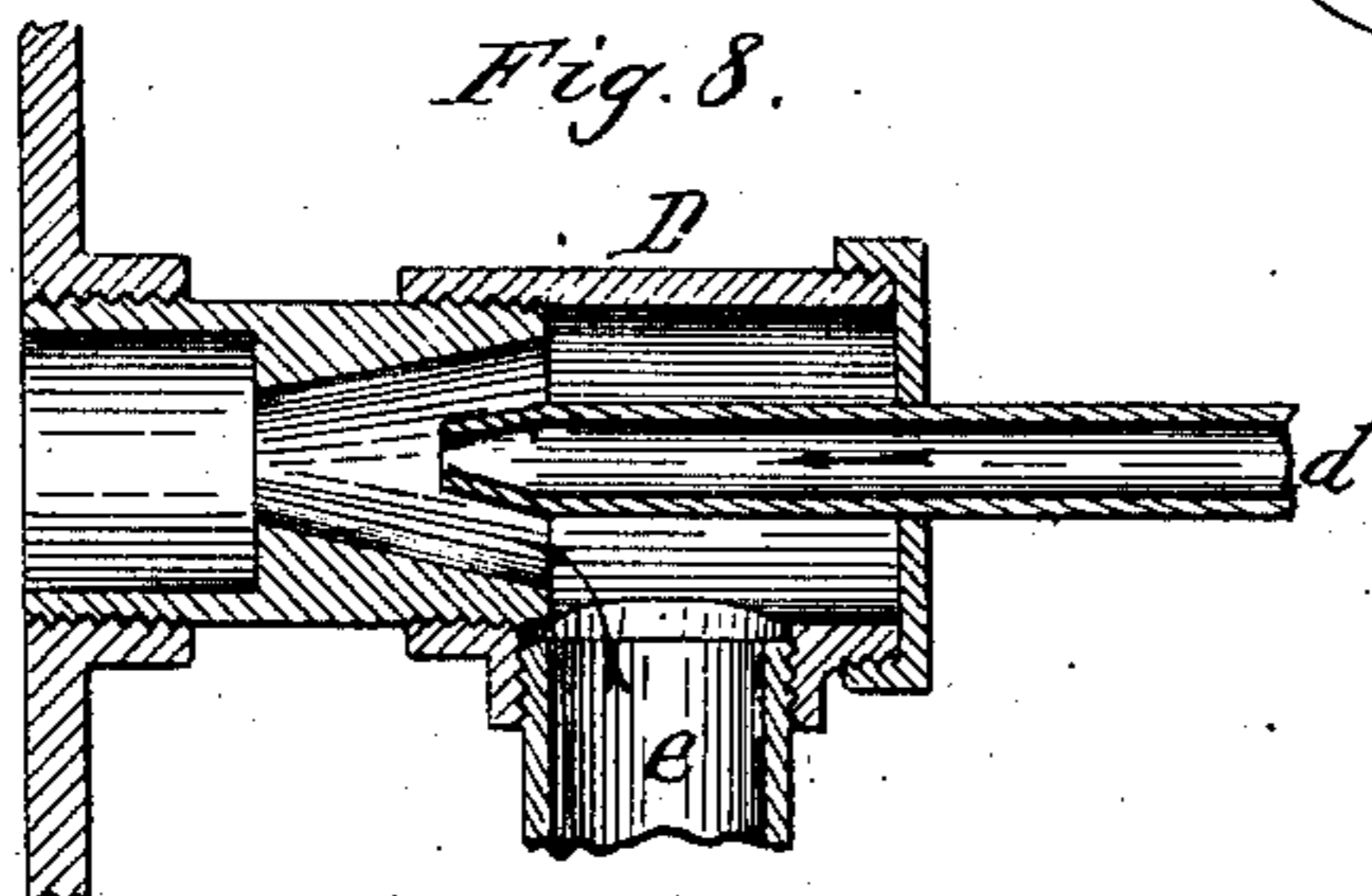


Fig. 8.



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# UNITED STATES PATENT OFFICE.

FREDERICK CROCKER, OF OLEAN, ASSIGNOR OF ONE-HALF TO CHARLES D. ROBBINS, OF BUFFALO, NEW YORK.

## APPARATUS FOR BURNING OIL.

SPECIFICATION forming part of Letters Patent No. 245,062, dated August 2, 1881.

Application filed March 14, 1881. (No model.)

*To all whom it may concern:*

Be it known that I, FREDERICK CROCKER, of Olean, in the county of Cattaraugus and State of New York, have invented new and useful Improvements in Apparatus for Burning Oil, of which the following is a specification, reference being had to the accompanying drawings.

This invention relates to an apparatus for burning crude petroleum and similar liquid fuel in furnaces for the purpose of generating heat.

The invention relates more particularly to an oil-burning apparatus in which the liquid fuel is burned in a shallow pan, and it has for its object to produce a complete combustion of the liquid fuel by an even distribution of the air-supply over the surface of the fuel which is contained in the pan, and to so construct the apparatus that its operation can be easily regulated and controlled.

The invention consists of the construction and arrangement of the device whereby these results are attained, as will be hereinafter fully set forth.

In the accompanying drawings, Figure 1 is a longitudinal section, and Fig. 2 a cross-section, of my improved apparatus. Fig. 3 is a top-plan view thereof. Fig. 4 is a sectional elevation, on an enlarged scale, of one of the air-distributing pipes. Fig. 5 is a horizontal section in line *x x*, Fig. 4. Fig. 6 is a top-plan view, and Fig. 7 a bottom-plan view, of the movable head of one of the air-distributing pipes. Fig. 8 is a sectional elevation of the air-supply apparatus.

Like letters of reference refer to like parts in the several figures.

A represents the pan in which the liquid fuel is burned, and B a larger pan, in which the pan A is arranged so as to leave an air-chamber, C, between the bottoms and side plates of both pans. The bottom *a* of the upper pan is provided with legs *a'*, which rest on the bottom *b* of the lower pan and serve to keep the two bottom plates at the proper distance apart.

The vertical side plates, *a''*, of the upper pan, A, are provided with lugs or projections *a'''*, which bear against the vertical side plates, *b'*,

of the lower pan and serve to form air-passages *c* between the side walls of the two pans, whereby the overheating of these side walls is prevented.

D represents a siphon, whereby a mixture of steam and air is injected into the chamber C.

*d* represents the steam-pipe of the siphon, which is provided with a stop cock or valve, *d'*, whereby the force of the steam-jet is regulated.

*e* represents one or more openings through which the external air is drawn into the siphon by the steam-jet and driven into the chamber C.

*f* represents vertical air-distributing pipes or nozzles, whereby the air is delivered in numerous fine streams upon the surface of the burning oil in the pan A. The pipes *f* rise from the bottom *a* of the pan A and extend above the level of the oil in the same. Their lower ends communicate with the chamber C below the pan A, and their upper ends are covered with a disk, G, whereby the air-current is divided and distributed.

The disk G is provided with a stem, *g*, having four or any other suitable number of wings, which fit snugly in the bore of the pipe *f* and divide the air-current into a corresponding number of streams. The disk G is provided with a corresponding number of fine openings, *h*, extending upwardly through the disk, and with a corresponding number of ribs, *i*, formed on the under side of the disk and resting on the upper end of the pipe *f*. The ribs *i* form shallow openings *i'* between them, from which the air issues in a lateral direction. The lower side of the disk G is preferably inclined downwardly to give these air-currents a downward direction toward the surface of the burning liquid. The disks G rest upon the open upper ends of the pipes *f*, and are secured in place by wires *j*, which are attached to rods J under the bottom of the pan A.

The discharge-apertures of the air-distributing pipes *f* are alternately placed at a higher and lower level, to prevent the lateral air-currents issuing from the same from interfering with each other, and to prevent the accumulation of coke upon the air-pipes by directing the air-currents upon the heads of the pipes in various directions.

The crude petroleum or other liquid fuel is supplied to the pan A by means of a suitable pipe, *k*, and the supply is regulated by means of a stop-cock, *l*.

5 It is obvious that any other suitable air-propelling mechanism—such as a rotary fan or an air-pump—may be employed instead of the steam-siphon for injecting air into the chamber C; but I prefer to employ a steam-siphon, 10 as shown, for the reason that a mixture of steam and air is conducive to the production of a high temperature.

My improved apparatus is arranged in the furnace in any suitable and convenient manner 15 if the furnace is a stationary structure or a movable structure which does not materially change the horizontal position of the pan when in use; but when the apparatus is employed for heating marine steam-boilers, for instance, 20 the apparatus is suspended by a universal joint in the manner of a mariner's compass, so that the pan will always retain a horizontal position. When the apparatus is so arranged the air and oil supply pipes are connected 25 with their respective pans by flexible tubes or by pipes so jointed as to permit of the free movement of the apparatus. The air and steam which are injected into the apparatus are distributed by the chamber C to the different pipes *f*, and the current passing through 30 each pipe is again subdivided and delivered upon the surface of the oil in several fine streams. This secures an even and uniform distribution of the air-supply over the entire 35 surface of the burning liquid and insures a complete combustion of the gases which are generated. The intense heat generated above the burning liquid vaporizes the upper stratum of the liquid, and the air-jets commingle with 40 this vapor or gas and cause a complete combustion thereof. The oil in the pan is generally kept at a height not exceeding a quarter of an inch.

I claim as my invention—

1. The combination, with a pan, A, of air 45 pipes or nozzles *f*, provided in their sides with air-discharge openings *i'*, which deliver the air downwardly upon the surface of the burning liquid, and having their tops provided with openings *h*, which discharge currents of air 50 upwardly, where they commingle with and burn the combustible gases which escape from the burning liquid, substantially as set forth.

2. The combination, with an air-delivery pipe, *f*, of the disk G, provided with a winged 55 stem, *g*, and air-openings *i'* below its overlapping head, between the wings of the stem, substantially as set forth.

3. The combination, with an air-delivery pipe, *f*, of the disk G, provided with ribs *i*, air- 60 openings *i'* between the wings, and air-openings *h*, extending upwardly through the disk, substantially as set forth.

4. The combination, with the inclosing-pan B, of the inclosed pan A, provided with legs 65 *a'*, resting on the pan B, and forming an air-space, C, and having upturned sides provided with ribs *a''*, which fit against the upturned sides of the pan B and form air-passages *c*, and air-nozzles *f*, formed with the pan A and 70 communicating with the air-space C, substantially as set forth.

5. In an oil-burning apparatus, the combination, with a pan, A, of air-delivery pipes *f*, 75 having their discharge-openings arranged alternately at a higher and lower level, whereby the lateral air-currents are prevented from interfering with each other and the deposit of coke is prevented, substantially as set forth.

FREDERICK CROCKER.

Witnesses:

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