

M. WILLIAMS.
Apparatus for Burning Liquid-Fuel.
 No. 148,270. Patented March 3, 1874.

FIG. 2.

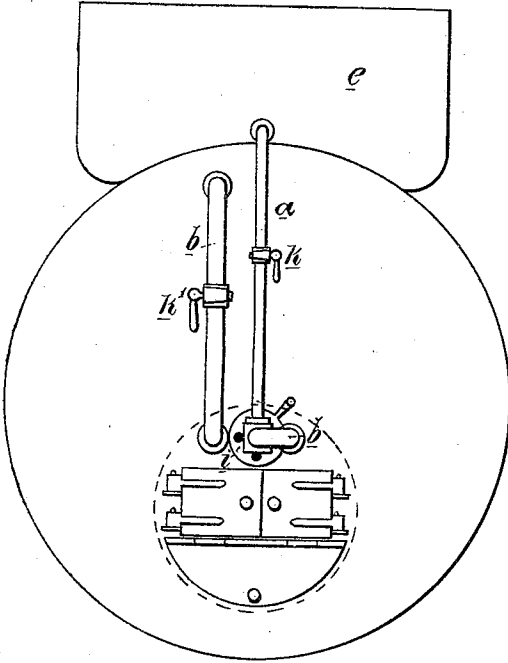


FIG. 3.

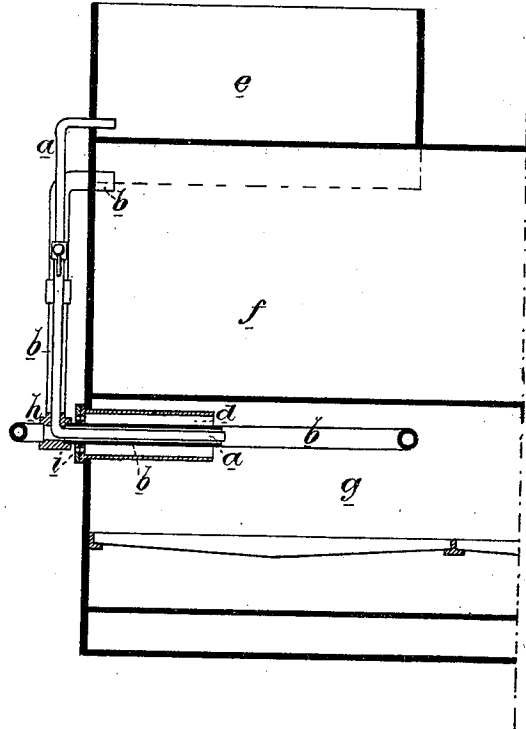
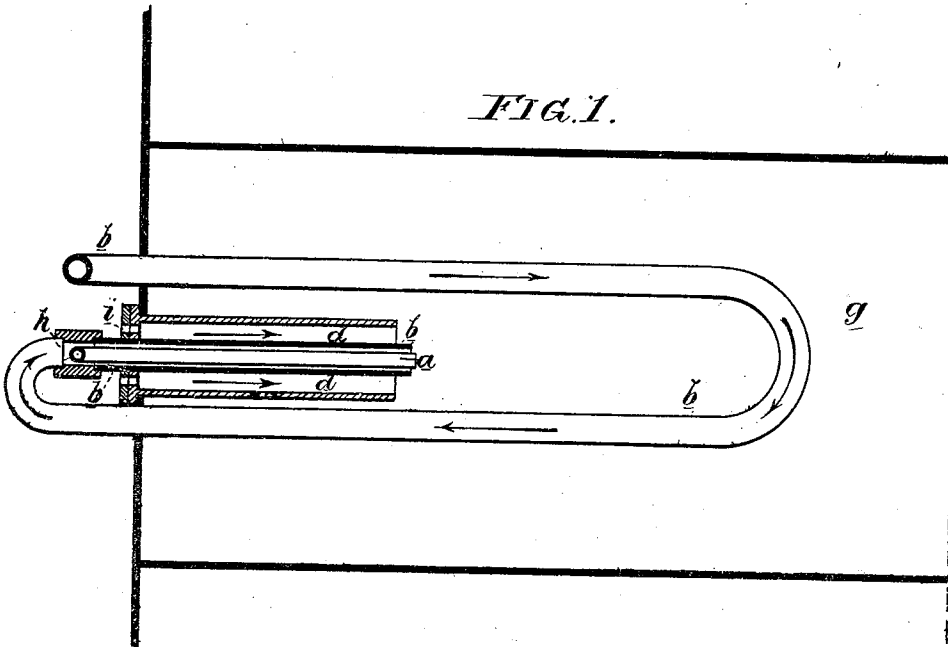


FIG. 1.



Witnesses, Hubert Howson
 Harry Smith

Wiles Williams
 By his Atty
 Howson and Son.

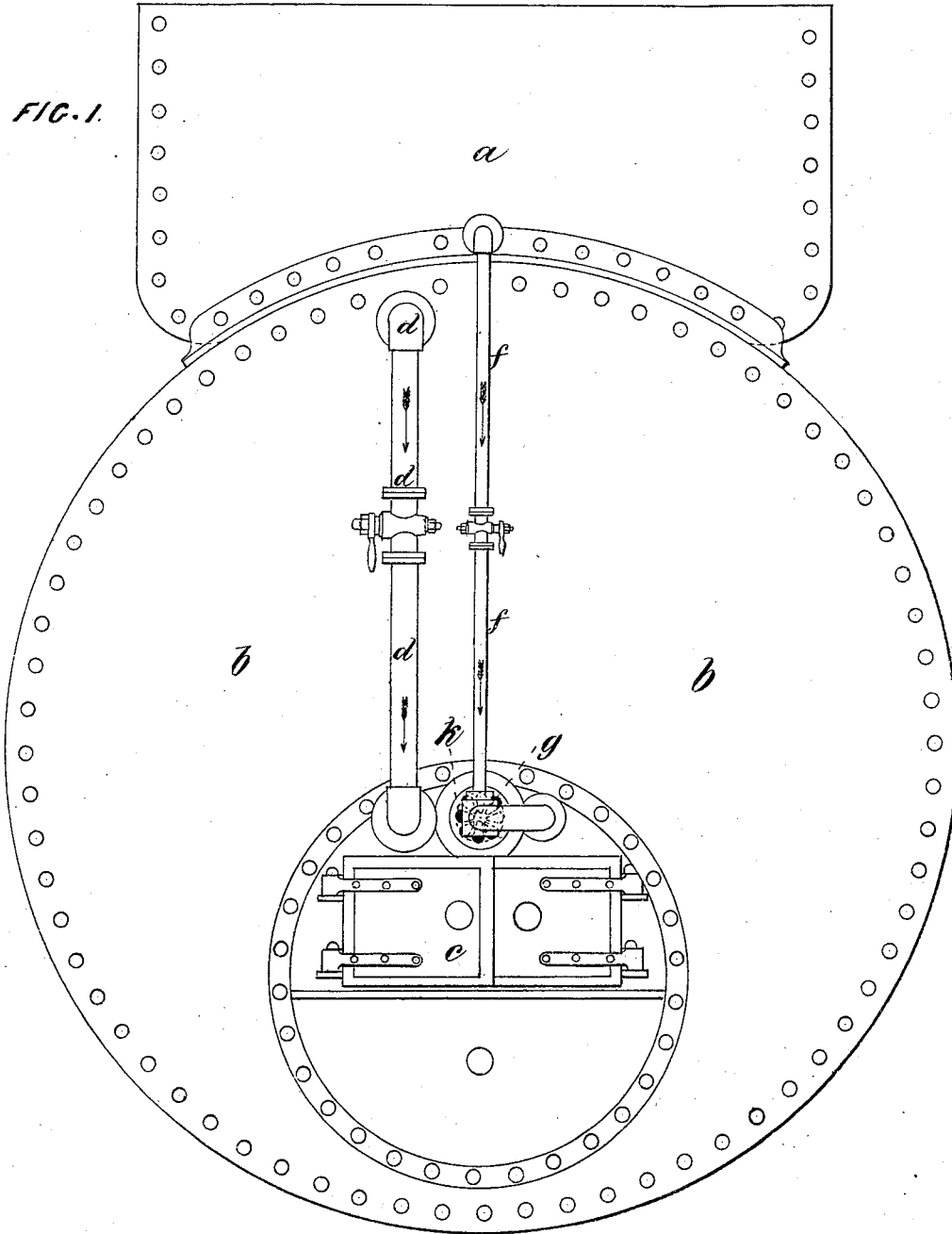
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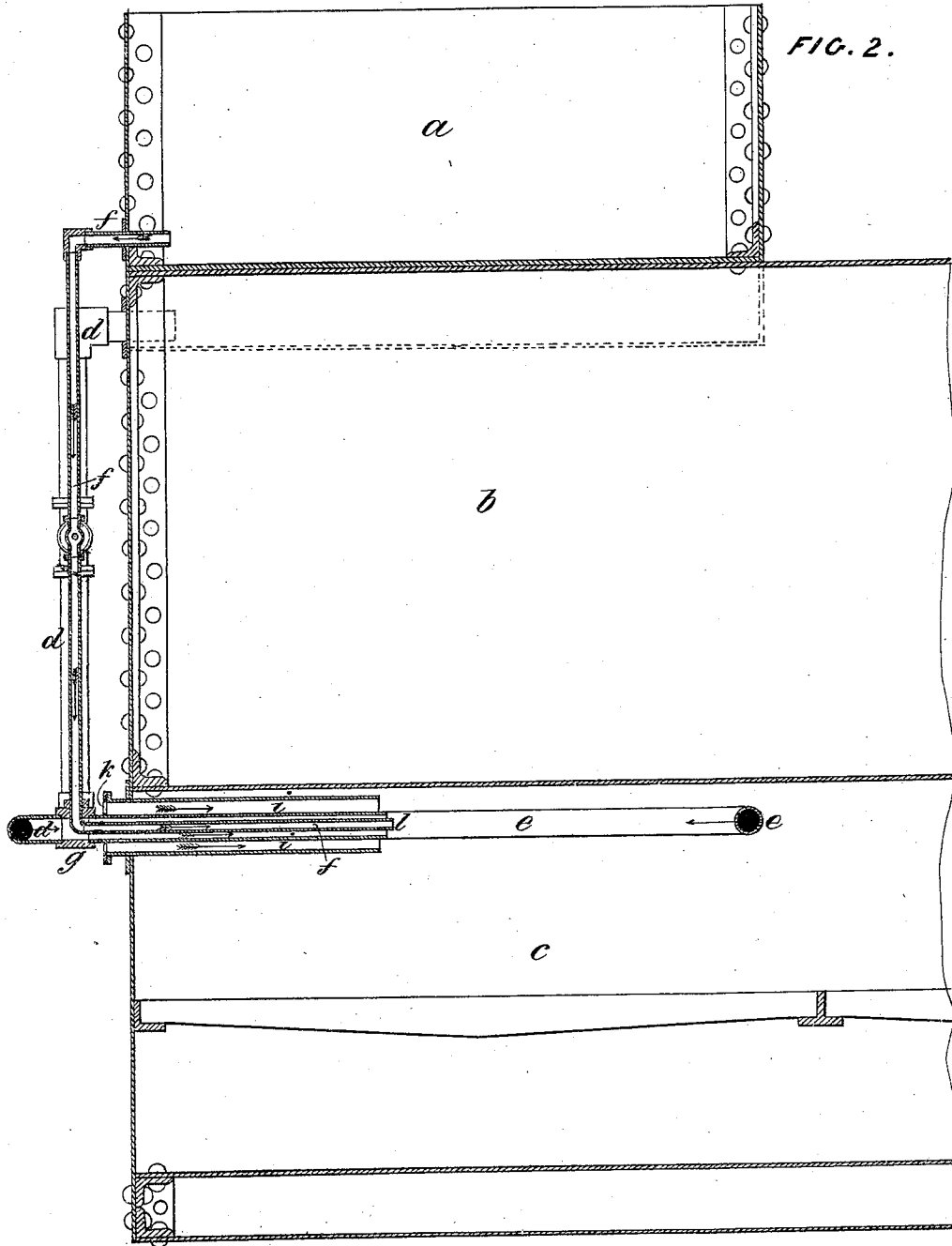
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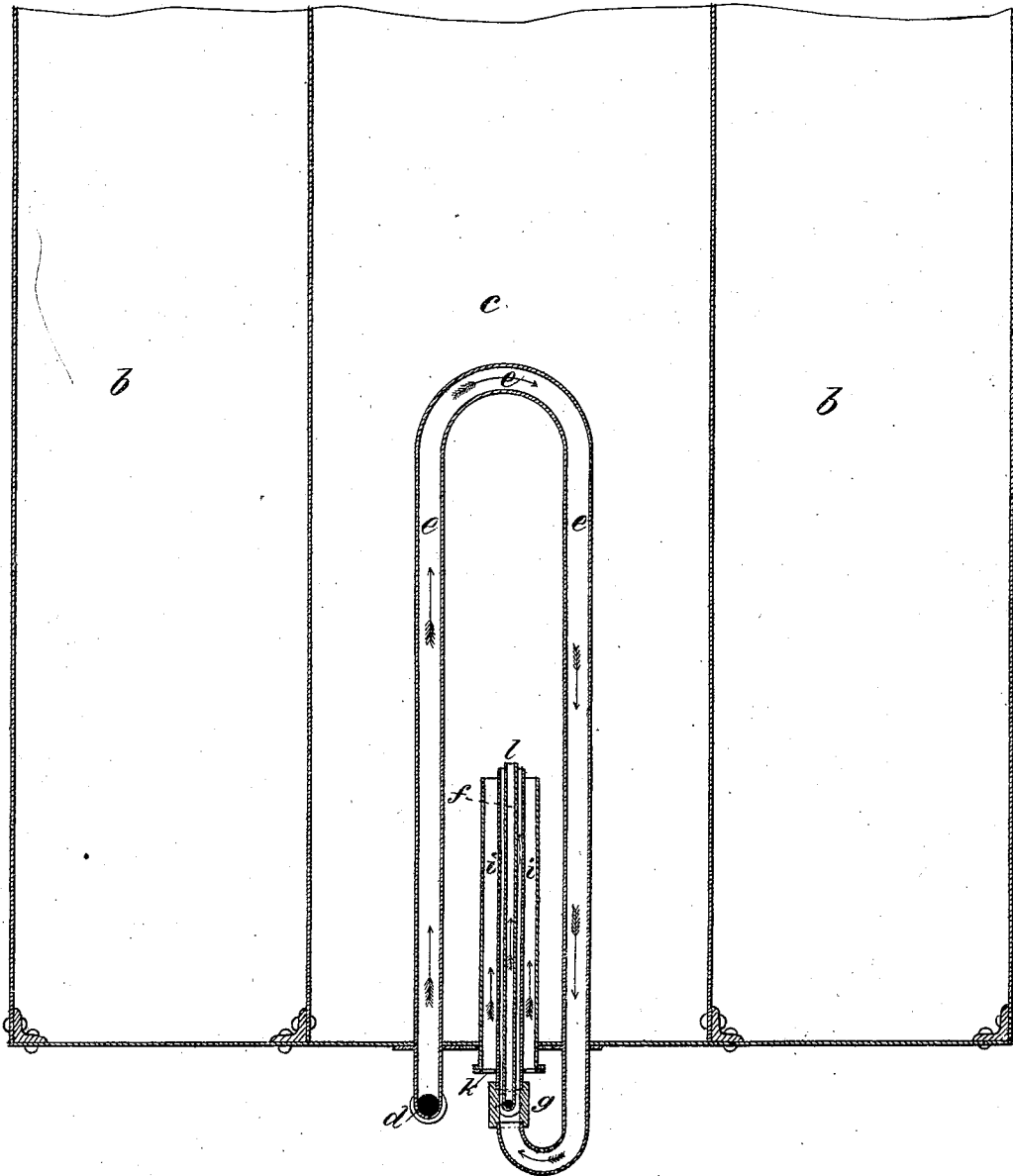
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FIG. 3



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UNITED STATES PATENT OFFICE.

MILES WILLIAMS, OF WIGAN, ENGLAND.

IMPROVEMENT IN APPARATUS FOR BURNING LIQUID FUEL.

Specification forming part of Letters Patent No. 148,270, dated March 3, 1874; application filed December 4, 1873.

To all whom it may concern:

Be it known that I, MILES WILLIAMS, of Wigan, in the county of Lancaster, England, have invented an Improvement in Apparatus for Burning Liquid Fuel, of which the following is a specification:

The object of my invention is to facilitate the burning of hydrocarbon oils and other liquid fuel by arranging within a furnace an injector consisting of an oil-pipe, *a*, a surrounding steam-pipe, *b*, having a superheating extension, and an air-pipe, *d*, surrounding a portion of both the oil and steam pipes, all as best observed in the enlarged sectional plan, Figure 1, of the accompanying drawing.

Figs. 2 and 3 represent front and sectional elevations, drawn to a reduced scale, of a steam-boiler and furnace to which my invention is applied.

The oil-tank *e* is secured, in the present instance, to the top of the boiler *f*; but it may be placed in any other convenient position above the level of the lower extremity or injector end of the oil-pipe *a*, which is contained within the furnace *g* of the boiler. The pipe *b* communicates with the steam-space of the boiler and extends into the furnace, through which it is continued at one side of the injector to a point beyond the same, and is then bent so as to cross the front of the said injector, and is returned at the opposite side to the exterior of the furnace, where it is bent a second time at the point of junction *h* with the oil-pipe *a* before being again extended into the furnace. (See Fig. 1.) An air-pipe, *d*, surrounds the injector or delivery end of the steam-pipe, and the latter in turn surrounds the oil-pipe, which extends slightly beyond the end of the said steam-pipe. The supply of air to the pipe *d* is controlled by a register or other regulator, *i*, at the exterior of the furnace. Both the oil and steam pipes are provided with suitable regulating-cocks, *k k'*. (See Fig. 2.)

In using the apparatus, I heat the water in the boiler with coal or other fuel, or with the oleaginous liquid only, until the pressure of steam is from, say, two to five pounds per square inch, when the injection of the oil and steam through the pipes *a* and *b* is commenced, the supply being regulated by a manipulation of the cocks *k k'*, so that by the admission of oil or steam the heat may be increased or diminished.

By carrying the steam-pipe into the furnace and across the front of the injector, as above described, and as shown in Fig. 1, it is subjected to intense heat, so that the steam before reaching the injector becomes superheated, and is, consequently, in the best condition for dispersing and finely dividing the liquid injected through the pipe *a*.

The steam and oil are injected into the furnace in the form of vapor, and so rapidly does the oil enter into combustion that the steam, which is intimately mixed with it, and already in a partial state of gas by being superheated, becomes decomposed into its elements—hydrogen and oxygen—and, being consumed, assists most materially to increase the volume and heat of the fire, and to diminish the consumption of fuel. The superheated steam chemically combines with or otherwise seizes all the surplus carbon of the oils and consumes it, thereby preventing smoke and requiring little, if any, admission of cold air.

The injector and the extension of the pipe *b* for superheating the steam are arranged above the furnace-doors, as shown in Figs. 1 and 2, so that the liquid fuel can either be used separately or in conjunction with ordinary fuel, or the latter can be used independently, the two systems of feeding not interfering with each other. The air required to promote combustion is admitted through the pipe *d*, which should be of about twice the diameter of the steam-pipe, and the supply of air can be regulated as required by the register *i*.

The injector can, if desired, be provided with a nozzle or spreader for the better distribution of the liquid fuel, and this will also enable the operator to command the direction of the flame.

I claim as my invention—

The combination, with a furnace, of an injector consisting of a central oil-pipe, *a*, external air-pipe *d*, and intermediate steam-pipe *b*, the whole being arranged above the grate-bars and opposite the superheating-coils, as and for the purpose set forth.

MILES WILLIAMS.

Witnesses:

WILSON W. BYROM,
Solicitor, 27 King street, Wigan.

THOMAS TABERNER,
27 King street, Wigan, his clerk.