No. 624,889. Patented May 9, 1899.

F. M. ASHLEY.

APPARATUS AND SYSTEM FOR BURNING LIQUID FUEL.

(Application filed Oct. 26, 1893.)

(No Model.)

Fig. 1.

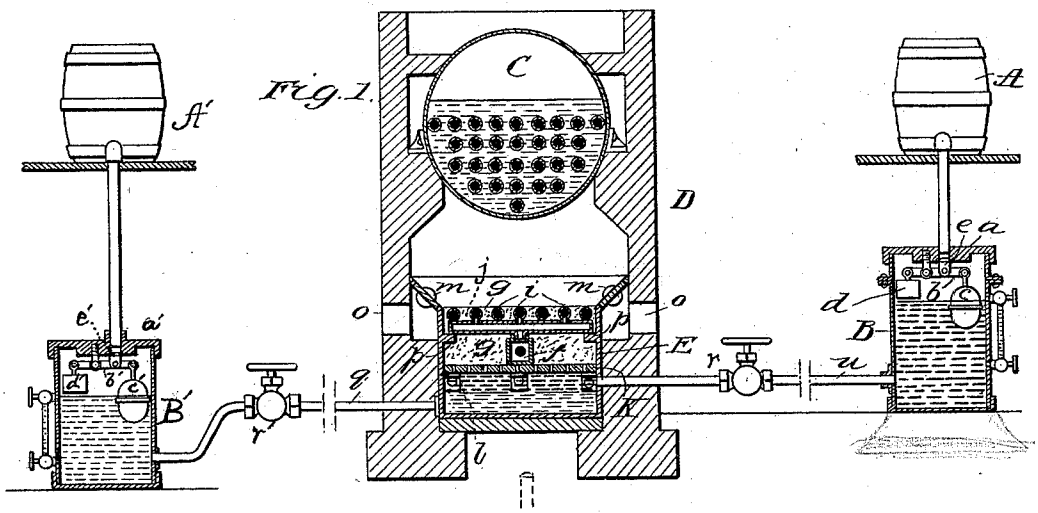


Fig. 2.

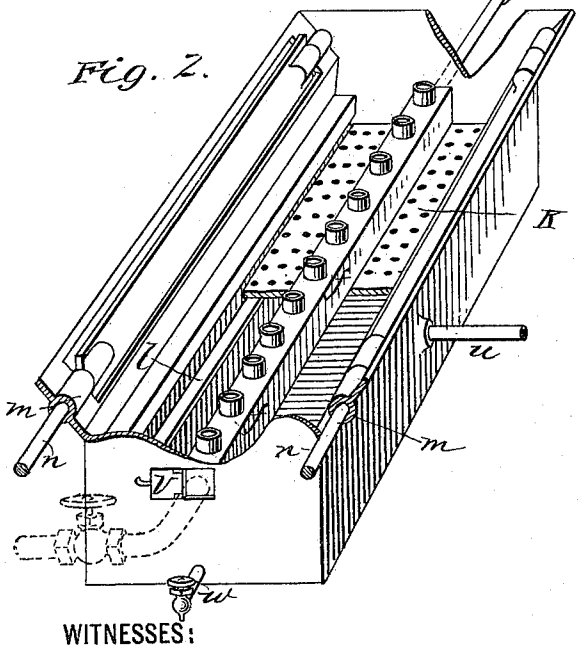
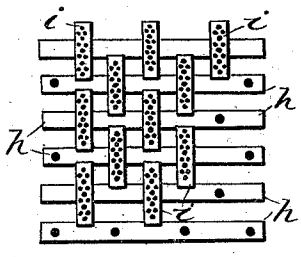


Fig. 3.



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APPARATUS AND SYSTEM FOR BURNING LIQUID FUEL.

SPECIFICATION forming part of Letters Patent No. 624,889, dated May 9, 1899.

Application filed October 26, 1893. Serial No. 489,241. (No model.)

To all whom it may concern:

Be it known that I, FRANK M. ASHLEY, a citizen of the United States of America, and a resident of Hawthorne, county of Passaic, and State of New Jersey, have invented a new and useful Improvement in Apparatus and Systems for Burning Liquid Fuel, of which the following is a specification.

My invention relates to a system and apparatus for burning fluid fuels, and may be used under boilers or in cook-stoves or for any purpose where heat is needed.

It also provides automatic devices whereby the fuel can be supplied to the burner and means for separating the impure and heavier particles from the oil or fluid without waste.

It further provides for the control of the fire and the thorough mixing of the proper quantity of air with the gases generated from the fuel.

The details of construction will be referred to more specifically in the description which follows and with reference to the accompanying drawings, in which—

Figure 1 represents a sectional view of the burner and receiver with a steam-boiler above it, also showing means for supplying oil to the burner to automatically regulate the level of the fluid in the receiver. Fig. 2 is a perspective view of the receiver, and Fig. 3 represents the air-supply tubes.

Referring to the drawings by letter, A represents a barrel or reservoir containing the fluid fuel, (which we will in this description assume to be crude petroleum-oil,) adjusted above the level of the supply-tank B. Supported on the under side of the cover *a* of the supply-tank B is a lever having its fulcrum between its two ends. On one end of this lever is a hollow cylinder *c*, which is always filled with oil, and on the opposite end is a weight *d*. Between the hollow cylinder *c* and the fulcrum is a valve *e*, which controls the passage between the receiver A and the tank B. Its operation is as follows: As long as the oil is above or buoys up the cylinder *c* the weight *d* is the heavier, and consequently keeps the valve *e* closed, thus shutting the oil from flowing into the tank B′. When the oil by any reason falls below the cylinder *c*, it is left full of oil and is heavier than the weight *d*. The cylinder consequently descends, thus allowing the valve to open, and oil is admitted to the tank B until it again rises sufficiently high to support the cylinder to allow the weight *d* to close the valve *e*. The object of this is to keep the oil as near a certain level as possible. The reason will appear later.

Referring to Fig. 1, C represents a steam-boiler, and D the setting or brickwork therefor. E represents the burner and receiver, Fig. 2 showing it in perspective. It consists of a rectangular box, with supports cast or suitably fastened therein.

f represents an air-flue which conducts the air from without to the burner *g*.

h represents the cross-tubes communicating with the flue *f*, and *i* the distributing-tubes for conveying and distributing the air evenly over the whole surface of the burner. The tubes *i* communicate with the tubes *h* and are perforated on top for the exit of air, the tubes *h* likewise having suitable perforations, if desired.

j represents an absorbing material preferably consisting of a non-combustible, such as asbestos or brick-dust or any substance which will absorb the oil and act as a wick or burner. This material rests on a perforated metal sheet K, which in turn is supported on the ledges *l*.

m and *n* represent a damper the rods *n* of which project through the furnace-walls, where an attendant can operate them without opening the furnace-doors. The object of the dampers is to admit air above the fire when it is desired. Passages *o*, Fig. 1, extend through the walls, as shown; but the air cannot get to the fire, except through the dampers *m*.

P represents supports to keep the supply-pipes *h* in a horizontal position.

q represents a tube communicating with a tank B′, that is connected by a pipe with a reservoir or barrel A′, to supply water to tank B′.

b′ is a lever fulcrumed within tank B′ and having a weight *d′* at one end and a hollow cylinder *c′* at the other end, and said lever operates a valve *e′*, which controls the passage of water from reservoir A′ to tank B′.

These parts are arranged and operate substantially similarly to the corresponding parts connected with tank B.

r r' represent valves in pipes *u* and *q* to control the passage between the tanks B B' and the burner.

Referring to Fig. 2, *s* represents a pipe communicating with the steam-space of the boiler C and the air-flue *f*.

u represents the tube which supplies oil to the burner from the tank B.

v represents a valve controlling the admission of air to the air-flue *f*.

w is a tube communicating with the bottom part of the receiver, Fig. 2. Its object is to draw off the water from time to time.

Having now described the parts, I will explain the action of the apparatus. The barrel A at the right in Fig. 1 contains the oil to be used as fuel. It is placed above the tank B, so that the oil will flow by gravity into tank B. The barrel A may be removed to a safe distance from the tank and furnace. The automatic valve in the top of tank B keeps the oil at any desired height, and if the valve *r* is opened the oil will flow from the tank B through tube *u* into the receiver E and will stand at the same height in the receiver as it is in the tank B. The preferred height should be just above the perforated sheet *k*, although it is shown higher in the drawings. We will suppose that the oil is at a level in the tank B, and consequently in the receiver, a little above the sheet *k*. The absorbing material *j* would then, by capillary action, absorb the oil and carry it to the surface of the burner *g*. Now if the oil is lighted the flame will spread over the whole surface of the burner. The air which is necessary to the complete combustion of the fuel is immediately drawn into the gases generated by the oil through the spray-tubes and is mixed intimately therewith over the whole surface of the burner. Should the fire be used with the absorbing material covering the spray-tubes and more air be needed above the burner, it can be admitted by opening the dampers *m*, air flowing in through passages *o*.

By referring to Fig. 3 it will be seen that the spray-tubes are so arranged that the air and gas will be quite evenly mixed over the burner. The amount of air supplied to the burner is controlled by adjusting the damper *v*, Fig. 2, and the dampers *m*. The tube *s*, Fig. 2, as previously explained, communicates with the steam-space of the boiler or with an air-compressor and is for the purpose of forcing the fire. If the damper *v* was closed, the air or steam or air and steam would enter the flue *f* and would then flow to the spray-tubes, and thus be distributed. In this connection I desire to state that the absorbing material could be laid entirely over the spray-tubes *i*, if desired, and the air or steam or air and steam would then act through the said material, acting as a forced draft, and cause the vapor from the oil to rise freely through the absorbing material.

Referring in Fig. 1 to the tube *q*, it will be seen that said tube enters the receiver at a lower point than the oil-tube *u*. This tube *q* supplies water from tank B' to receiver E, in which receiver the water is kept at a level below the perforated sheet *k*. The oil by reason of its specific gravity floats on the surface of the water, and any particles which are heavier than the oil would therefore sink into the water and the water can be drawn off, thus carrying the heavy and impure particles with it and keep the oil from being wasted.

In case it is necessary the receiver could be made in two or more parts, or, in fact, separate receivers and burners, and placed side by side and connected by branch tubes in such a manner that the assembled units would act as one large receiver and burner. The burning of the fire is controlled by the damper in the smoke-stack, as usual, and by operating the dampers *m* and *v* and by regulating the flow of steam or air through the tube *s*. The whole receiver and burner is inclosed in the brickwork or casing of the boiler or stove. The receiver can be made in any desired form to suit the conditions of its use.

Having thus described my invention, what I claim as new is—

1. The combination of a casing adapted to receive oil, a perforated plate, an absorbent material thereover, a flue passing through said casing, and air-delivery tubes connected therewith, substantially as described.

2. The combination of a casing adapted to receive oil, a perforated plate, an absorbent material thereover, a flue *f*, cross-pipes *h* communicating therewith, and perforated tubes *i* communicating with the pipes *h* and extending substantially at right angles thereto, substantially as described.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 19th day of October, 1893.

FRANK M. ASHLEY.

Witnesses:
IRVING MERWIN,
L. VAN BRAMER.