

C. A. HARDY.
STILL FOR OILS, &c.

No. 46,899.

Patented Mar. 21, 1865.

Fig: 1.

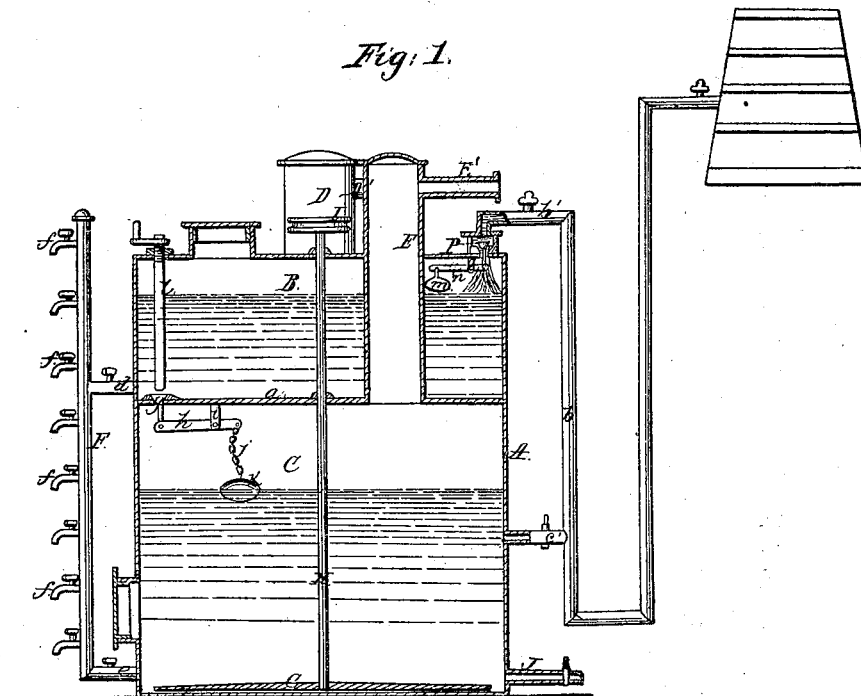
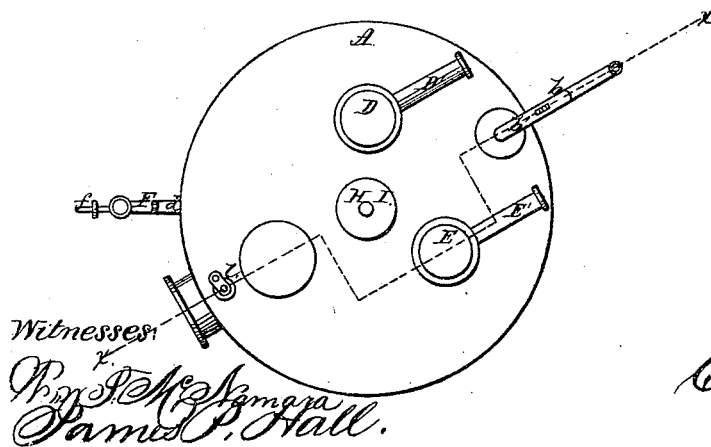


Fig: 2.



Inventor:

Charles A. Hardy

UNITED STATES PATENT OFFICE.

CHARLES A. HARDY, OF PITTSBURG, PENNSYLVANIA.

IMPROVED STILL FOR OILS, &c.

Specification forming part of Letters Patent No. 46,899, dated March 21, 1865.

To all whom it may concern:

Be it known that I, CHARLES A. HARDY, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and Improved Still for Oil and other Liquids; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a vertical section of this invention, the line *x x*, Fig. 2, indicating the plane of section. Fig. 2 is a plan or top view of the same.

Similar letters of reference indicate like parts.

This invention consists in a still with two chambers, one above the other, communicating with each other through suitable pipes or valves arranged in combination with a supply-pipe and with separate heads and escape-pipes in such a manner that oil or other liquid introduced into the upper chamber or compartment can be freed from its most volatile constituents and heated to a high temperature before it is let down into the lower compartment, in which the final distillation is effected. The valves which open and close the supply-pipe and the passage leading from the upper to the lower compartment are connected to floats in such a manner that the level of the liquid in both compartments remains uniform by the automatic action of said floats and valves. The formation of a sediment in the bottom of the still is prevented by a stirrer, to which a continuous rotary motion is imparted while the distilling operation is in progress.

A represents a still, made of sheet-iron or any other suitable material, in the form of a cylinder or in any other desirable shape. It is divided by a horizontal partition, *a*, in two compartments, B C, of equal or unequal capacity, as may be most convenient. Both compartments communicate by a siphon-tube, *b*, or in any other suitable manner with a supply-tank, from which the oil or other liquid is introduced into the still. The upper compartment, B, serves to separate from the liquid to be distilled its most volatile constituents—for instance, if crude petroleum is to be distilled, to drive out the benzine. These volatile con-

stituents escape through the head D and escape-pipe D', and the remaining liquid is let down into the compartment C, where the final distillation is effected. The products of distillation from this last-named compartment escape through the head E and escape-pipe E', and each of the escape-pipes D' and E' leads to a separate condenser, so that the light and the heavy constituents of the liquid to be distilled are separated in an easy and simple manner. The supply-pipe *b* communicates with the two compartments B C of the still by branch pipes *b' c'*, each of which is provided with a stop-cock, so that the liquid to be distilled can be let into either or both compartments of the still.

In practice the cold or fresh liquid will be introduced into the upper compartment, B, where it is heated so as to drive out its most volatile constituents, and it is then let down into the lower compartment, C. In order to effect this purpose the two compartments are made to communicate with each other through the upright stand-pipe F, with branch pipes *d e*, each of which is provided with a stop-cock, as clearly shown in Fig. 2. The stand-pipe F is furnished with a series of gage-cocks, *f*, whereby the level of the liquid in either compartment can be ascertained at any moment.

If desired, the communication between the two compartments of the still can be effected by an aperture in the partition *a*, which is closed by a valve, *g*. The stem of this valve is hinged to the long arm of a lever, *h*, which has its fulcrum in a bracket, *i*, secured to the under surface of the partition *a*, and the short arm of said lever connects by a chain or cord, *j*, with a float, *k*. If the liquid in the lower compartment, C, sinks below a certain point, the weight of the float *k* throws open the valve *g* and a fresh supply of liquid descends from the compartment B. A screw-rod, *l*, which passes down through the top of the still, serves to close the valve *g* at any moment when it may be desirable, independent of the level of the liquid in the compartment C. The supply of liquid to the upper compartment can also be regulated by a float, *m*, which is secured to the long arm of a lever, *n*, the fulcrum of which is in a bracket, *o*, secured to the under side of the top of the still, and its short arm connects by a hinge-joint with the stem of valve *p* in the opening leading from

the supply-pipe *b* to the upper compartment, B. If the liquid in this compartment rises beyond a certain point, the valve *p* is closed by the action of the float *m* and the supply of liquid is stopped; but so soon as the liquid sinks below a certain level the valve opens again and a fresh supply of liquid is admitted. By the action of the two valves *g* and *p* and floats *k* and *m* the level of the liquid in both compartments is regulated automatically, and no attention is required to that part of the operation while the still is in action.

To prevent the formation of a sediment on the bottom of the still, an agitator or stirrer, G, is applied, which is secured to the lower end of a vertical shaft, H, which extends up through the center of the still, and to the upper end of which a pulley, I, is secured, which serves to impart to the shaft and agitator a rotary motion. The lower edge of the agitator sweeps close over the inner surface of the bottom of the still, and by its action the bottom is kept clean and prevented from burning out. The residuum is drawn from the still through a pipe, J.

A still of this construction can be worked without interruption for a long time, the supply of liquid is self-regulating, the heavy and light products of distillation are readily separated, and a comparatively small amount of fuel is required, because the liquid to be distilled is first heated in the upper compartment before the final distillation takes place in the lower compartment.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

The arrangement and combination of parts in the diaphragm-still, consisting of the float-valves *m p* and *k g*, governing the inlets to the upper and lower compartments, B and C, respectively, and the heads D E, communicating with the separate escape-pipes D' E', as described and represented.

CHARLES A. HARDY.

Witnesses:

WM. F. MCNAMARA.

M. M. LIVINGSTON.