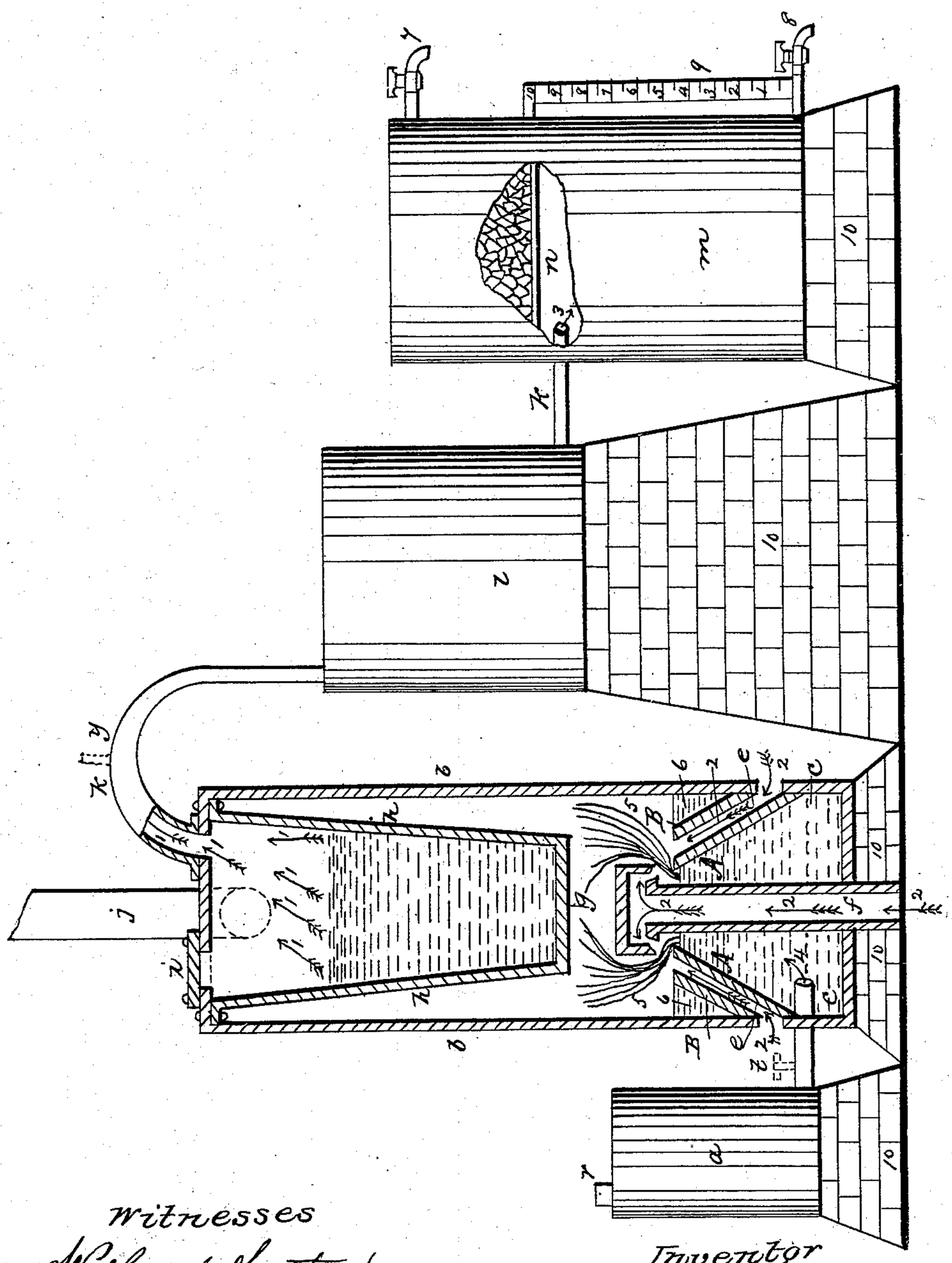
J. J. JOHNSTON.

Apparatus for Distilling Oil.

No. 48,285. Patented June 20, 1865.



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JAMES J. JOHNSTON, OF ALLEGHENY CITY, PENNSYLVANIA.

IMPROVED APPARATUS FOR DISTILLING OIL.

Specification forming part of Letters Patent No. **48,285**, dated June 20, 1865.

To all whom it may concern:

Be it known that I, JAMES J. JOHNSTON, of the city and county of Allegheny, in the State of Pennsylvania, have invented a new and useful Improvement in Apparatus and Process for Distilling Oil, &c.; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawing, and to the letters of reference marked thereon.

The nature of my invention consists in exhausting air from the still, condenser, and receiving-vessel, so that the distilling process may be carried on under a partial vacuum, said still and its furnace and the condenser and receiving-vessel being constructed, arranged, and combined substantially in the manner hereinafter described.

In the accompanying drawing, 10 represents the pedestals or piers upon which the various parts of the apparatus rest. These pedestals or piers may consist of brick or stone work, and they should correspond in form and size to the part of the apparatus resting on them.

In the drawing, *a* represents a vessel for holding crude coal-oil or petroleum. This vessel *a* is connected, by means of a pipe marked *o*, to the lower part of the furnace *b*, which is marked *c*, which I will call the "fire-chamber."

The furnace *b* and its fire-chamber *c* are made of heavy sheet-iron, and may be lined with brick, (all above chamber *c*,) if so desired.

The fire-chamber *c* of the furnace *b* should be made water or oil tight, and substantially in the form represented in the accompanying drawing.

f represents an air-flue, which is placed in the center of the fire-chamber *c*. This air-flue *f* is furnished with a crown or hollow disk, (marked *g*,) on the under side and near the outer edge of which are placed a number of small holes for the purpose of distributing the air which passes up through the flue *f*.

e represents a narrow air-flue, which surrounds the coniformed top A of the fire-chamber

6 represents clay or brick work, which fills up the cavity between the wall of the furnace *b* and the coniformed arch-plate B used in forming the air-flue *e*.

j represents the stack or chimney of the furnace *b*.

h represents the still, which is furnished with an ordinary man-hole, which is covered with a cap marked *i*. The still is also furnished with an ordinary condensing-pipe, (marked *k*,) which passes through water in the vessel *l* and enters the receiving-vessel *m* just above the pipe *k*. In the receiving-vessel is placed a rack, *n*, consisting of a series of bars which extend across the whole diameter of the vessel *m*. Upon this rack *n* is placed common wood-charcoal in lumps or pieces about the size of American walnuts. The depth of this body of charcoal should be about two feet, and is used for absorbing the fixed or uncondensed gas which may pass over and through the condensing-pipe *k* with the condensed oil. The receiving-vessel *m* is also furnished with two stop cocks or valves (marked 7 and 8,) and a glass tube, (marked *x*.) which communicates with the interior of the vessel *m*. This tube *x* is secured to a scale-plate marked 9, which is secured to the side of the receiving-vessel *m*. The still *h*, condensing-pipe *k*, receiving-vessel *m* and its valves 7 and 8, and glass tube *x* should be made perfectly air-tight, and be so arranged with relation to each other that, exhausting the air from either the still, condensing-pipe, or receiving-vessel, the air would be exhausted from all of them at the same time. Thus, if I attach an air-pump to the condensing-pipe *k* at the point indicated by the dotted lines marked *y*, I will be enabled to exhaust the air from the condensing-pipe *k*, still *h*, receiving-vessel *m*, and tube *x* at one and the same operation.

It will readily be observed by those skilled in the art that the various parts herein described and represented can be changed in size, form, and proportions. Therefore I do not limit myself in relation to the manner of constructing the several parts.

The operation of my improvement is as follows: Having all things constructed and arranged as herein described and represented, I put crude coal-oil or petroleum in the vessel *a* at the tube *r*. I then put water, by any of the known means, into the fire-chamber *c*, filling it within an inch, or thereabout, of the top. I

then put the desired quantity of oil in the still *h* by any known means. I then exhaust the air from the still *h*, condensing-pipe *k*, and receiving-vessel *m* by means of a suitable air-pump. I then, by means of a valve (as indicated by the dotted lines marked *t*) in the pipe *o*, admit by a regular flow the desired quantity of oil into the fire-chamber *c*. The oil thus admitted will rise to the surface of the water. I then light or set fire to this oil, and the air will pass up through the flues *e* and *f*, mix with the flame (marked 5) of the burning oil, and the combustion be complete and perfect. The heat caused by the flame 5 will heat the oil in the still *h* and cause a vapor to evolve from the oil, which vapor will pass into the condensing-pipe *k*, as indicated by the arrows marked 1, where it will be condensed and flow into the receiving-vessel *m*, as indicated by the arrow marked 3, and the oil, as it rises up in the vessel *m*, will be indicated by the tube *x* and scale 9.

The arrows marked 2 represent the course of the air through flues *e* and *f* to the flame 5.

When I desire to draw off any part of the oil which has been distilled—as benzole—I open the valve 7 to admit air into the vessel *m*. I then open the valve 8 and draw off what is desired. I then close the valves 7 and 8 and again exhaust the air, as described, and again proceed with the distillation.

The advantages of my improvement are as follows: It is a well-understood fact that the boiling or evolving point of all liquids depends on their density and the amount of atmospheric pressure bearing on them—that is to say, a light liquid under a light atmosphere will boil or evolve with less heat than will a heavy oil or liquid under a heavy atmosphere; and it is also a well-understood fact that all burning-oils which are distilled by a low degree of heat are better in quality and appearance than oils which are distilled by a high degree of heat. Now, by the use of my improvement and apparatus, I am enabled to distill oil or other liquids with a very low degree of heat by carrying on the distilling process under a partial vacuum, as herein described, and I thereby make a better burning-oil, with less expense of fuel and less of the chemicals used for bleaching and for deodorizing the oil, for it is well known that the greater the heat used in distilling oil the greater must be the quantity used of fuel and chemicals.

Another very great advantage gained by my improvement is safety from the dangers of fire in the distilling process, for there can be no escaped gas flying about in the distilling and receiving rooms, nor any exposure of distilled oil to the lights of lamps or sparks of fire.

Having thus described the nature, construction, operation, and advantages of my improvement, what I claim as of my invention is—

1. Distilling oil or other liquids by means of a still, condenser, and receiving-vessel from which oil is exhausted, so that the distilling process is carried on under a partial vacuum, substantially as herein described and set forth.

2. The arrangement of the vessel *a*, furnace *b*, condenser *k*, vessel *l*, and receiving-vessel *m*, furnished with tube *x*, scale 9, valves 7 and 8, and rack *n*, the whole being constructed, arranged, and operating substantially in the manner herein described, and for the purpose set forth.

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