

ALTER & HILL.

Oil Still.

No. 20,026.

Patented April 27, 1858.

Fig. 1.

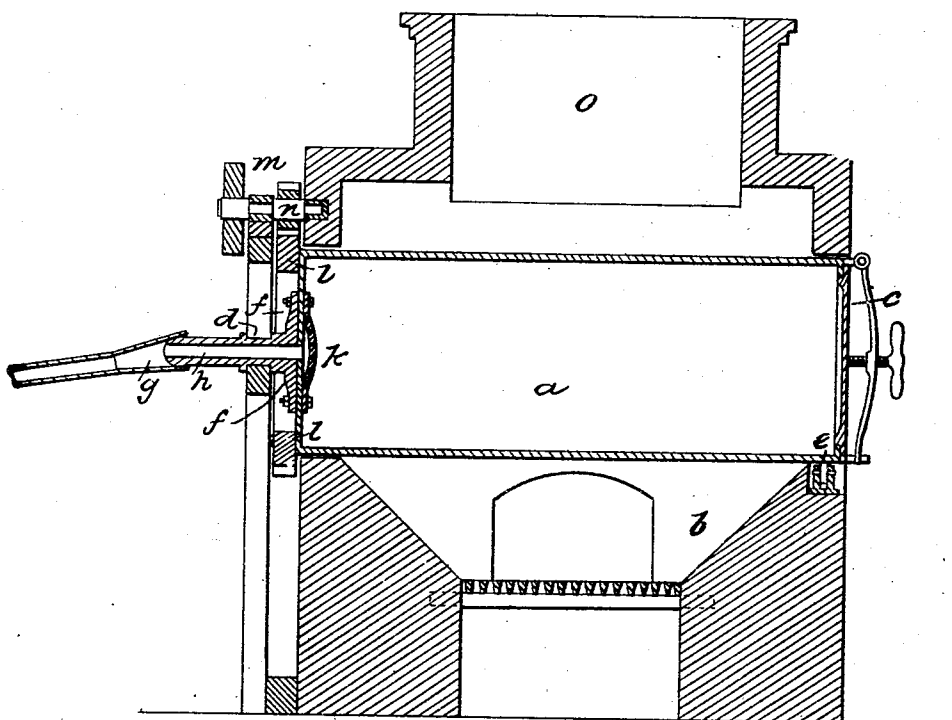


Fig. 2.

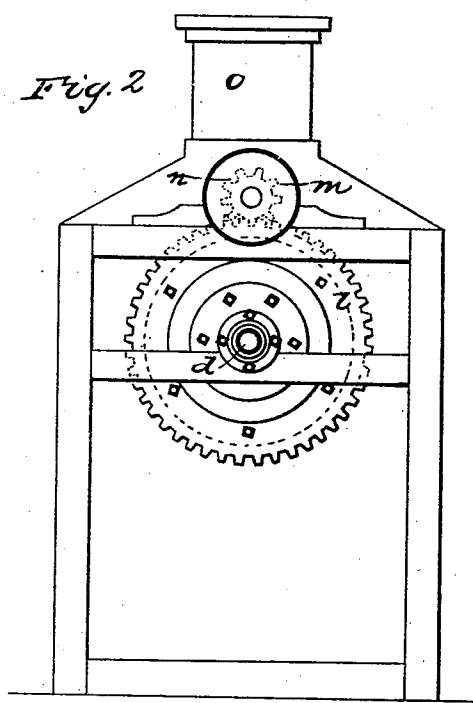
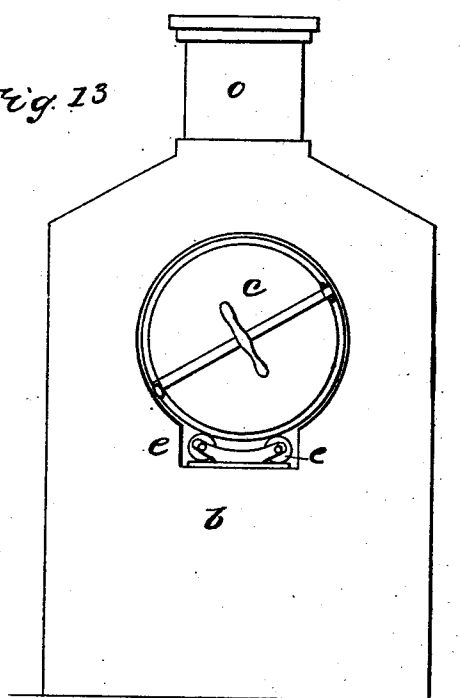


Fig. 13.



Inventors
David Alter
Samuel A. Hill.

UNITED STATES PATENT OFFICE.

DAVID ALTER AND SAMUEL A. HILL, OF FREEPORT, PENNSYLVANIA.

IMPROVEMENT IN REVOLVING RETORTS FOR DISTILLING COAL, &c.

Specification forming part of Letters Patent No. 20,026, dated April 27, 1858.

To all whom it may concern:

Be it known that we, DAVID ALTER and SAMUEL A. HILL, of Freeport, in the county of Armstrong and State of Pennsylvania, have invented a new and useful Improvement in Retorts for Extracting the Volatile Products from Coal, Shale, and other Minerals by Dry Distillation; and we do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the annexed drawings, forming part of this specification, in which—

Figure 1 is a longitudinal sectional elevation of our retort and furnace, through the axis of the retort. Fig. 2 is an elevation of the rear end of the retort and furnace, showing the arrangement for effecting the revolution of the retort. Fig. 3 is an elevation of the front end of the retort and furnace.

In the several figures like letters of reference denote similar parts of our apparatus.

Our invention consists in giving a continuous rotary motion to cylindrical metallic retorts for the extraction of the volatile products of coal, bituminous shale, and other minerals, for the purpose of subjecting the contents of the retort to a more uniform heat than can be obtained where the retort is stationary, and also greatly expediting the process without in any way diminishing the amount of product from a given quantity of coal, &c.

In order to enable others skilled in the art to make and use our improved retort, we will proceed to describe its construction and operation.

In the drawings, *a* is a cylindrical metallic retort, which is set in a furnace, *b*, so constructed that the flame passes all round the retort, as seen in Fig. 1. The front end of the retort *a* is closed by a door, *c*, similar to those used for ordinary gas-retorts, which may be removed whenever it is desired to put a fresh charge into the retort or remove the charge which has been exhausted. The retort does not touch the furnace itself at any point, a circular aperture being made in the front and back walls of the furnace, through which the ends of the retort pass but do not project beyond the face of the wall. The front end of the retort *a* is supported by two friction-rollers, *e e*, which turn in bearings resting on the wall of the furnace, as seen in Figs. 1 and 3. The rear end of the retort is supported by a

tube, *d*, which is attached to the end of the retort by a flange, *f*, (or other suitable device,) the orifice of the tube *d* coinciding with an aperture of similar diameter in the center of the retort. This tube serves as a journal on which the retort turns, and is also the only opening through which the volatile products of the charge in the retort escape to the condensing-worm. The tube *d* projects a short distance from the rear end of the retort, and its extremity is spherical and turned smooth, so as to form a close joint with the short conical tube *g*, which fits onto the ball *h* at the extremity of the pipe or tube *d*, thus allowing the tube *d* to turn in the conical tube *g* without permitting any of the oleaginous vapor arising from the distillation to escape, and also permitting the conical tube *g* to incline slightly downward, so as to prevent the return of any vapor which may condense in it into the retort. The conical tube *g* and spherical ball *h* form what is usually termed "a ball-and-socket joint." The aperture in the center of the rear end of the retort *a* is covered, but not closed, by a convex perforated disk, *k*, the perforations of which permit the free passage of the oleaginous vapor from the retort through the tube *d*, and prevent the aperture in the retort and orifice of the tube being choked by the contents of the retort. This convex disk *k* is placed inside, and attached to the rear end of the retort by rivets or bolts. The rotation of the retort on its axis is produced by a large cog-wheel fastened to the rear end of the retort externally, the center of which is coincident with the axis of the retort. (See *l*, Figs. 1 and 2.) A cog-wheel or pinion, *n*, driven by power communicated to the pulley *m* on the same shaft, gears into the cog-wheel *l*. The arrangement thus described is very simple, and cannot easily get out of order. The charge of coal or bituminous mineral being put into the retort through the door *c*, so as to make it about half full, the door is fastened up, and a fire is kindled. The heat and flame pass all round the retort in their passage to the chimney *o*. The retort is then set in motion, revolving about once every twenty seconds, the rapidity of revolution being increased as the heat grows more intense, and the retort is kept in motion from the time the retort is charged during the whole time that the pro-

cess of distillation is continued. This rotary motion of the retort causes a continual mixing up and stirring of the contents of the retort, and causes all portions of the charge to be subjected to an equal degree of heat, and as the heat is thus much more rapidly abstracted from the retort by the charge which it contains, it prevents any injury to the products of distillation, which would ensue if the retort became too hot or if one portion of its contents were subjected to a higher degree of heat than the other portions, as would be the case if the retort were stationary.

Another and very important result of the revolving of the retort, is that the process of distillation is carried on much more rapidly than is possible with stationary retorts without injury to the products, for experience has proved that with stationary retorts the process has to be conducted very gradually and under a low heat, otherwise the result of distillation is permanent gas, and not an oleaginous vapor, such as is susceptible of condensation; but with our revolving retorts a charge can be worked off without injury to the product in one-half or one-fourth the time necessarily consumed where the retort is stationary.

It is desirable in using our retorts to crush

the charge to powder before placing it in the retort.

Having thus described our improvement in retorts, we do not claim originality or novelty in the use of cylindrical metallic retorts for dry distillation; nor yet do we claim the use of such retorts so constructed as to be capable of being shifted on their axis from time to time, so as to expose a different portion of the retort to the action of the fire at each successive charge, for the purpose of preventing the retorts burning out so soon, as seen in Gengembre's patent; but

What we do claim as our invention, and desire to secure by Letters Patent, is—

The use of retorts so constructed, as hereinbefore described, as to revolve continuously on their axis during the process of distillation, substantially in the manner and for the purpose hereinbefore set forth.

In testimony whereof we have hereunto set our hands this 6th day of May, A. D. 1857.

DAVID ALTER.
SAMUEL A. HILL.

Witnesses:

JOHN TURNER,
DAVID TODD.