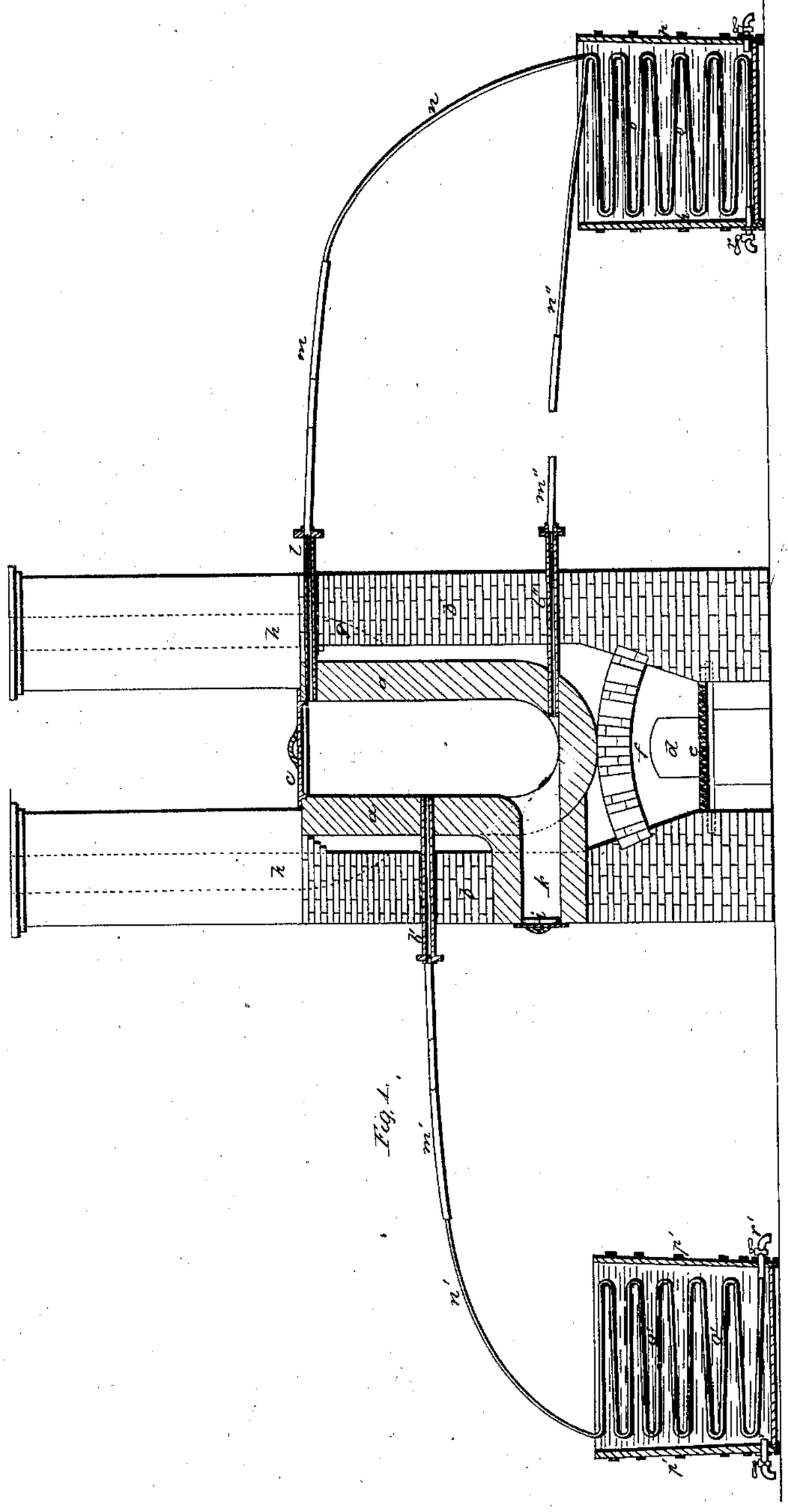
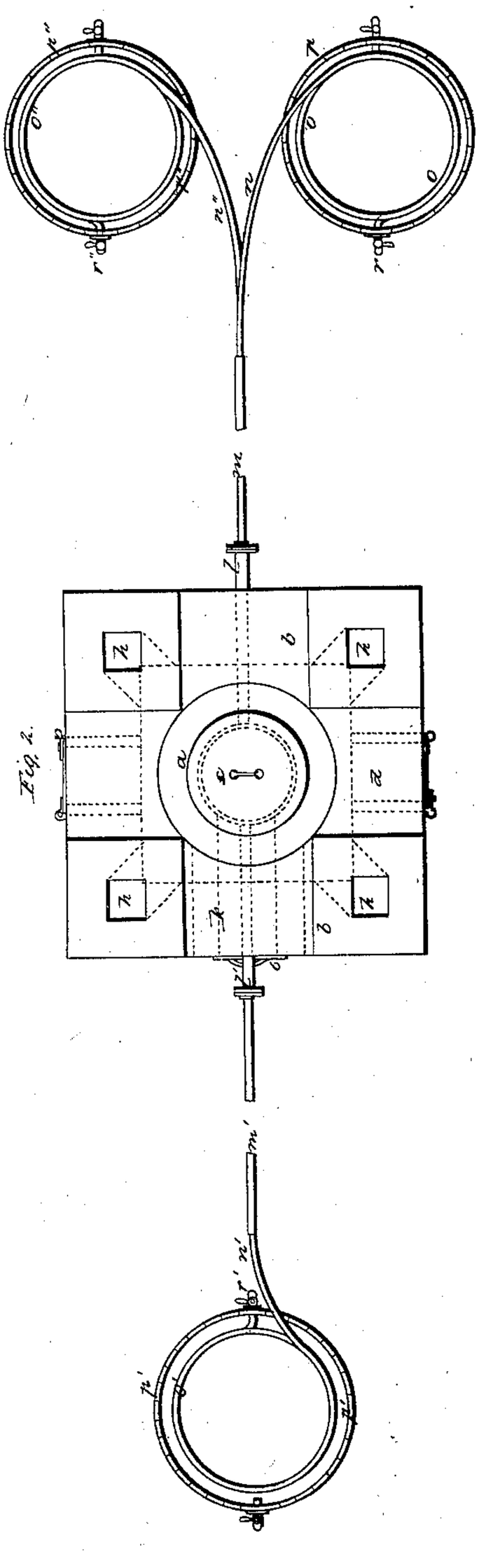
R. Shroder.

Oil Still.

No. 16,255. Patented Dec. 16, 1856.





UNITED STATES PATENT OFFICE.

RICHARD SHRODER, OF DARLINGTON, PENNSYLVANIA, ASSIGNOR TO J. L. RUSSELL, R. SHRODER, AND A. ANDERSON.

IMPROVEMENT IN APPARATUS FOR COAL-OIL.

Specification forming part of Letters Patent No. **16,255**, dated December 16, 1856.

To all whom it may concern:

Be it known that I, RICHARD SHRODER, of Darlington, in the county of Beaver, State of Pennsylvania, have invented a new and useful Improvement in Apparatus for the Manufacture of Oil from Cannel or other Bituminous Coal; and I 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 sectional elevation through the center of my apparatus. Fig. 2 is a top view or plan of the same.

In both figures like letters of reference denote similar parts.

My invention consists in the use of small upright retorts of fire-clay, closed at top and set in a furnace, so as to be surrounded by the flame and fire, with pipes leading from it at different heights, by means of which I am enabled to extract the crude oil from cannel or other bituminous coal of different degrees of purity at the same time without any subsequent process of separation or purification, and in the mode, hereinafter described, of driving off all the water from the coal before the formation of oil, whereby the oil produced is of better quality.

In order to enable others skilled in the art to make and use my improvement, I will proceed to describe its construction and operation.

In the drawings, *a* is the retort, made of fire-clay. It is cylindrical, with a semi-spherical bottom about two feet internal diameter and about six feet in height. It is open at top, which, when in operation, is closed by an iron cap, *c*, which fits closely and is luted around the edges to prevent the escape of the oleaginous fumes from the coal. This iron cap is kept close in its seat by weights or by a screw and arch. The retort is set in a furnace, of which *b b* are the side walls, *d* is the fire-chamber, *e* the grate-bars, and *f* is an arch of brick thrown over the fire-chamber, on which rests the bottom of the retort *a*. (See Fig. 1.) This arch is perforated with apertures through which the flame and fire pass up around the retort, the smoke escaping through the flues *g g* into the four chimneys *h h h h*, which are built at the four corners of the walls of the furnace. A space of about four inches is left all round the retort, in which the fire plays on the sides of the retort. At the bottom of the retort is a horizontal cylindrical projection, *k*, long enough to extend to the outside of the furnace-wall, the aperture of which communicates with the inside of the retort close to the bottom, the opening at the side being closed by a cap or door, *i*. The object of this aperture *k* is to clear the retort of the carbonized coal or coke left after the oil is extracted. A horizontal iron pipe, *l*, passing through the wall of the furnace, penetrates the side of the retort very near to the top. It projects externally a few inches from the wall of the furnace, where it connects with a tin or copper pipe, *m*, several feet long, into the extremity of which is inserted a lead pipe, *n*, which terminates in a worm or coil, *o*, inserted in a vessel of cold water or condenser. The end of the coil or worm is inserted into a spigot, *r*, at the bottom of the cooler *p*. A similar iron pipe, *l'*, is inserted horizontally through the furnace-wall into the retort *a*, about midway between the top and bottom. This pipe is connected with a tin or copper pipe, *m'*, and that with a lead pipe, *n'*, terminating in a worm, *o'*, inserted in the condenser *p'* of cold water. The length of the pipes *m'* and *n'* need not be so great as that of the pipes *m* and *n*. A third horizontal iron pipe, *l''*, is inserted into the retort so as to open into it at the lowest point of the cavity of the retort. This pipe *l''* is also connected with a tin or copper pipe, *m''*, and that with a lead pipe, *n''*, terminating with a worm, *o''*, inserted in the condenser *p''*. The pipes *m''* and *n''* may be still shorter than the pipes *m'* and *n'*, though this is not necessary.

The operation of my apparatus just described is as follows: The coal, having been broken up to about the size of hens' eggs, is thrown into the retorts through the opening at top. Retorts of the size described will hold about ten bushels, leaving a small vacant space at top of the retort. The cover *c* is then put on and luted, and fastened down, and the door *i* (to the lower aperture *k*) is also closed and luted. The furnace is then heated slowly, and before the heat of the furnace is sufficient to cause the generation and escape of gas the water in the coal (of which there

is a considerable quantity in cannel and other bituminous coals) is converted into steam, and passing up through the retort *a* escapes through the top pipe, *l*, and is allowed to pass off at the stop-cock *r*. It is important to drive off all the watery particles from the coal before the oil begins to be produced, as I find that it improves the quality of the oil not to allow them to mix or be generated at the same time, and this I consider an important feature of my improved process. It requires about four hours from the time when the fire is put under the furnace to drive off all the water from the coal, and during this time no oil, or very little, is generated. After the lapse of about four hours the oil begins to run from the stop-cock *r* at the extremity of the first series of pipes, *l m n o*. This is produced by the condensation of the oleaginous vapor arising from the coal passing through the pipes *l m n*, in which it is partially condensed, and more completely by passing through the worm *o* in the condenser *p*. The oil which issues from the stop-cock *r* from the first series of pipes is of dark color, but is not thick, and flows freely, and makes a most excellent lubricating-oil for machinery, as it does not gum, and yet has sufficient body. The oil continues to flow from the first series of pipes for about eight hours after it commences to run. After oil has been flowing from the first series of pipes for about two hours, it will commence to issue from the second or middle series of pipes, *l' m' n' o'*, through the stop-cock *r'*. This oil will be found to be thicker than the oil produced by the first series of pipes, and not so pure. In about two hours longer the third or lowest series of pipes, *l'' m'' n'' o''*, will begin to yield oil of a still thicker and less pure quality than that proceeding from the other pipes, and then all the pipes will continue to yield oil until all the oil is extracted from the coal, and nothing but coke is left in the retort, which will be (if the fires have been properly managed) in about twelve hours from the time when the fires were put on. The coke is then withdrawn from the retort through the aperture *k* in the bottom, and the retort should be allowed to cool before another charge is inserted. After the fire is put in the furnace, and the heat is gradually increased until it is made as hot as possible, a series of retorts arranged as I have described may be set in one furnace.

The great peculiarity of my process is that I am enabled to procure three different qualities of oil at the same time without any process of refinement or purification, the best quality being, of course, much purer than the crude oil produced by other processes or apparatus where the whole product of each retort is collected in one receiver and no such separation is or can be effected. My process is also very simple and economical, as the carbonized residuum or coke is worth as much as the coal was before it was put into the retorts.

I wish it to be understood that I do not claim, broadly, the extraction of oil from bituminous coal excepting in the manner hereinbefore described; but

What I do claim as my invention, and desire to secure by Letters Patent, is—

Constructing the retort or generator with openings at different heights, as shown in the drawings, for the purpose of obtaining oil of different qualities, as hereinbefore set forth.

In testimony whereof I have hereunto set my hand this 4th day of August, A. D. 1856.

RICHARD SHRODER.

Witnesses:

J. L. RUSSELL,

JOHN M. COWIN.