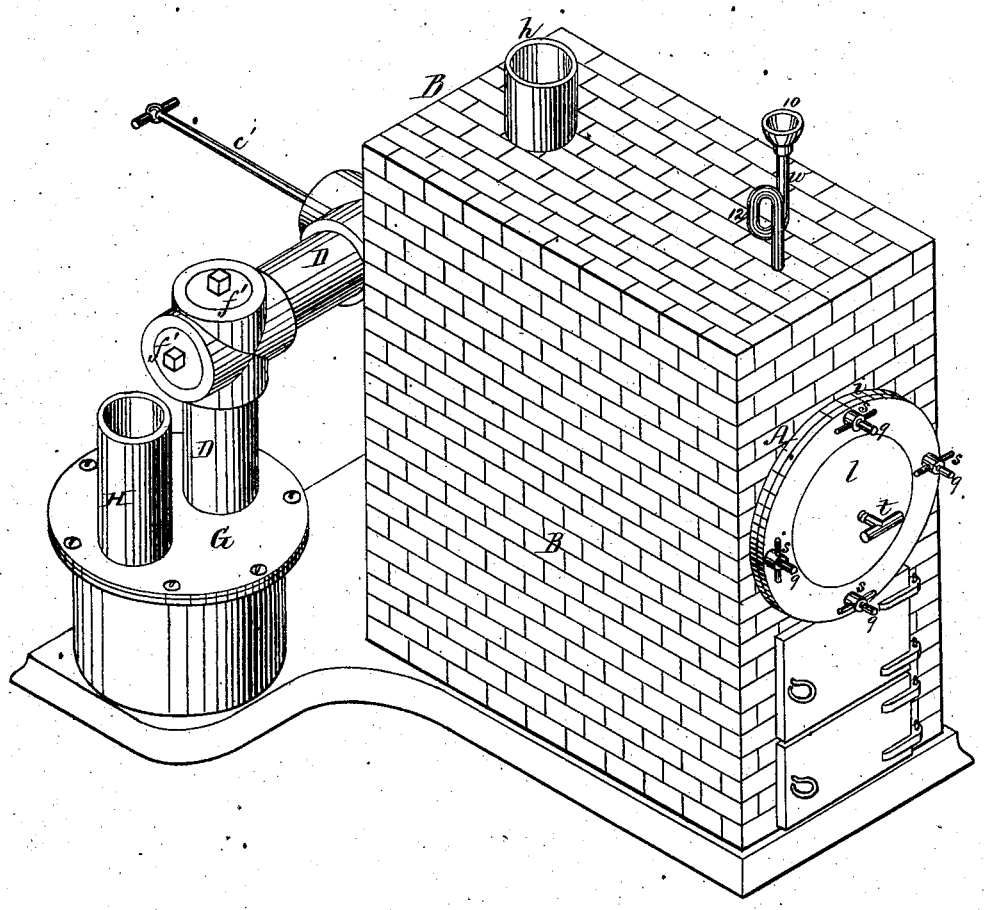
3 Sheets--Sheet 1.

S. S. PUTNAM.

.Gas-Retort.

No. 162,309. Patented April 20, 1875.

Fig. 1.



Witnesses,
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Attys

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Fig. 2.

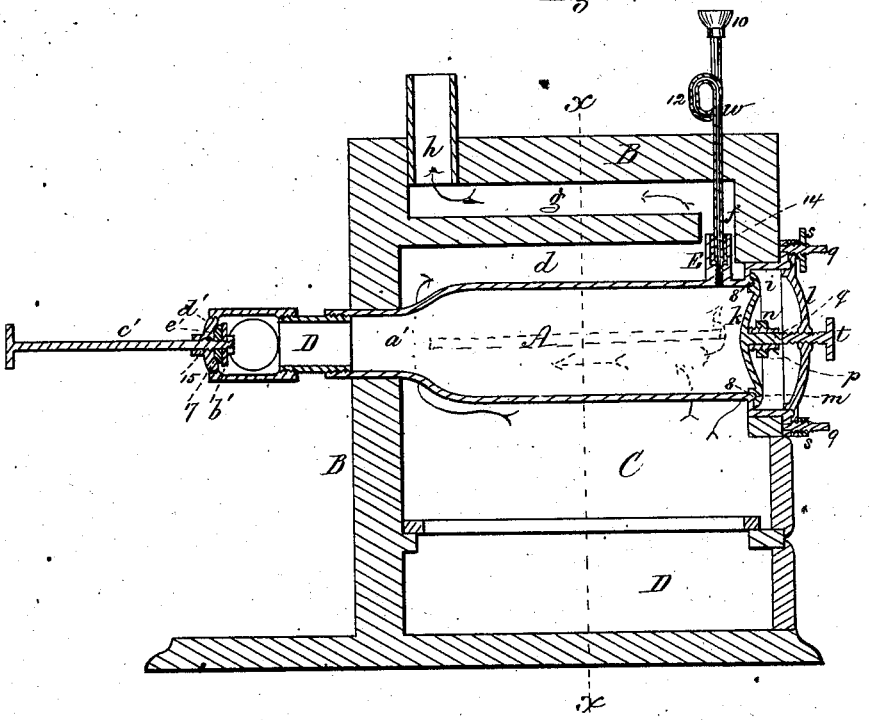

Fig. 3.

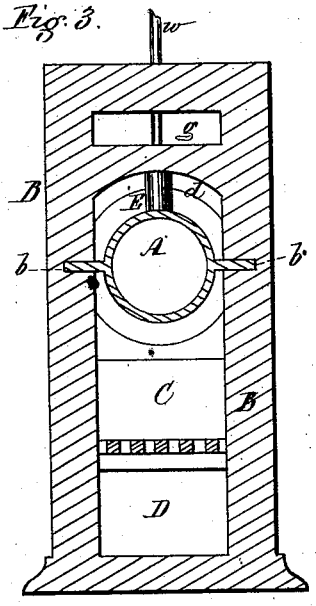

Fig. 6.

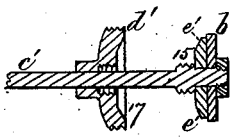

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Fig. 4.

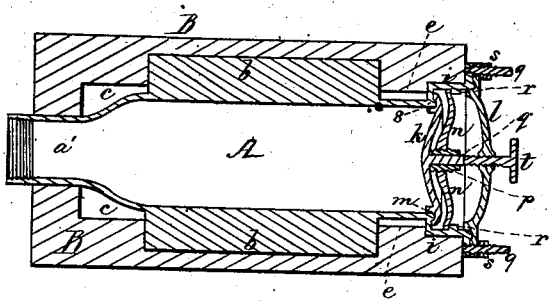
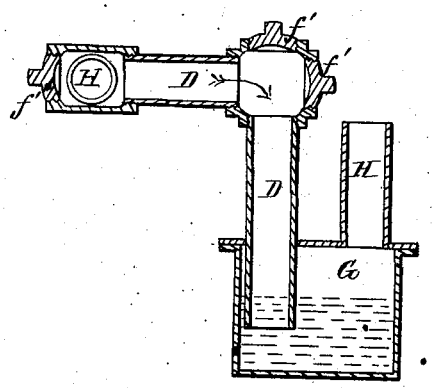


Fig. 5.



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UNITED STATES PATENT OFFICE.

SILAS S. PUTNAM, OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN GAS-RETORTS.

Specification forming part of Letters Patent No. **162,309**, dated April 20, 1875; application filed March 4, 1875.

To all whom it may concern:

Be it known that I, SILAS S. PUTNAM, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain Improvements in Gas-Retorts, for the manufacture of gas from crude petroleum or other oil, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings making part of this specification, in which—

Figure 1 is a perspective view of my improved gas-generator. Fig. 2 is a longitudinal vertical section through the center of the same. Fig. 3 is a transverse vertical section on the line *x x* of Fig. 2. Fig. 4 is a horizontal section through the center of the retort. Fig. 5 is a vertical section through the purifier and pipes connected therewith; Fig. 6, sectional detail, enlarged.

My invention consists in a peculiar means of securing the inner head within the mouth of the retort, and tightening it without removing the outer head, in order to effectually prevent the leakage of gas at this point. My invention also consists in providing the retort with wings or flanges, (one on each side,) which support it at the center, and also partially close the space between the retort and the brick-work or casing in which it is set, thus causing the heat and products of combustion to be retained for a greater length of time in contact with the body of the retort, passages at each end of the retort being provided for the escape of the heat, &c., into the longitudinal flue or flues above it. My invention also consists in the peculiar construction of the scraper or device for keeping a clear passage through the rear end of the retort and outlet-pipe when in operation, for the escape of the gas, and for the removal of deposits, whereby the employment of a packing around the rod to which the scraper is attached is rendered unnecessary.

To enable others skilled in the art to understand and use my invention, I will proceed to describe the manner in which I have carried it out.

In the said drawings, A represents a cylindrical retort, which is contracted at one end so as to resemble a bottle, and is set in a casing, B, of brick or other suitable material. C is the furnace, and D is the ash-pit. On each side of the retort A is a flange or wing, *b*, which is embedded in the adjacent portion of the casing, and serves to support the central portion of the retort, and prevent it from sagging and warping when exposed to great heat. These wings also partially close the spaces at the sides of the retort between it and the casing B, and cause the heat and products of combustion to be retained for a greater length of time in contact with the body of the retort. Additional wings of suitable size may be added to the retort, if desired, to still further increase its strength and prevent it from warping. The length of the wings *b* is such that spaces or passages *c* are left near the rear end of the retort, through which passages the heat, &c., passes into the longitudinal flue *d* immediately above, spaces or passages *e* being also left near the mouth of the retort, which also communicate with the flue *d*, the passage of the flame, &c., through these passages *e* serving to keep the front portion of the retort at the required temperature.

I am aware that retorts have been made with side flanges, opened at one end, and resting on ledge-bearings in furnace-walls; but this is not my invention.

The flue *d* communicates, through a passage, *f*, with another longitudinal flue, *g*, immediately above, from the rear end of which the smoke escapes through the chimney *h*. The mouth or front portion *i* of the retort is enlarged, and is provided with two heads, an inner one, *k*, and an outer one, *l*, separated a short distance from each other. The head *k* is provided on the inside with an annular groove, *m*, into which fits a projecting rim, 8, at the mouth of the retort, the groove being filled with a luting of clay or other suitable material to prevent the escape of gas, and this head is held tightly in place by a yoke or brace, *n*, through the center of which passes a hollow screw, *p*, which fits over a stud, *q*, projecting from the center of the head *k*, the ends of the brace being forced out tightly against projections *r r* on the interior of the mouth *i* of the retort by turning the screw *p* with a suitable wrench applied to its square

head, and the inner end of this screw is thus caused to exert a pressure against the head to hold it in place, as required.

The outer head *l* which is held in place by screws 9 and nuts *s*, is also provided with an annular groove into which fits a corresponding rim, the joint being closed by luting in the usual manner. Through the center of the head *l* projects a screw, *t*, which bears against the outer end of the stud *q*, and by turning this screw an inward pressure is exerted against the head *k*, which can, by this means, be tightened without removing the outer head, and additional security is thus afforded against the leakage of gas this point. Should, however, a slight leak occur at the joint of the inner head, the gas would be prevented from escaping by the outer head *l*. The retort being sufficiently heated, petroleum is introduced therein in small quantities through a feed-pipe or conductor, *w*, and on coming into contact with the heated metal is instantly converted into gas or vapor, which passes off through the outlet-pipe D, which is connected with the contracted rear end *a'* of the retort. The pipe *w* is provided at its upper end with a mouth piece or tunnel, 10, and is bent around at 12 to form a trap for preventing the escape of gas. The lower end of the pipe *w* enters the retort A near its front end, and is surrounded by a tube, E, rising from the upper side of the retort. The interior of this tube E, which may be of any desired length, is of larger diameter than the pipe *w*, a chamber, 14, being thus formed, which extends up around the lower portion of the pipe *w*, and serves to hold the clay or other packing material, which is employed to prevent the escape of gas at this point, and by this construction the lower portion of the pipe is prevented from being unduly heated, and thereby injured or destroyed, while at the same time it is sufficiently heated to insure the free flow of the oil through it into the retort.

In order to prevent the accumulation of tar in the retort, it is necessary to admit the fluid at or about its hottest point, where it is subject to an intense heat; but this heat is calculated to destroy, in a short time, the lower part of the inlet-pipe, and cause leakage of the gas by expansion.

By my mode of constructing the retort with the tube E, as shown in Fig. 2, I am enabled to surround the inlet-pipe with a packing of clay, which protects it from being so easily destroyed, and makes the escape of gas impossible, while at the same time I prevent the formation of the tar.

I do not claim a packing-chamber broadly, as I am aware the same is not new.

The outlet-pipe D is connected with a condenser, G, of ordinary construction, which contains water, after passing through which, the gas is conducted by a pipe, H, to the desired point. That portion of the outlet-pipe D which forms a prolongation of the rear portion *a'* of the retort is furnished with a scraper, *b'*, for keeping a clear passage for the escape of the gas. This scraper *b'* consists of a circular disk, which is made to fit the interior of the pipe, and is attached to the end of a rod, *c'*, which passes through a removable screw-plug, *d'*, and by means of this rod the scraper is moved back and forth to remove any soot or other deposits, and to keep the passage open during the formation of the gas. The inner portion of the opening through the plug *d'* is enlarged, and is provided with a screw-thread into which fits a corresponding thread on an enlarged portion, 15, of the rod *c'*, and thus, when the scraper is drawn back and the rod *c'* is turned so as to screw the portion 15 into the plug *d'*, a disk, *e'*, secured to the scraper, and having a ground beveled edge is forced up tightly against a correspondingly-shaped ground seat, 17, on the inner side of the plug *d'*, whereby all liability of the leakage of gas at this point is effectually prevented, rendering the employment of packing, which would be liable to be destroyed by the heat to which it would be exposed, entirely unnecessary.

The scraper is intended to be drawn back at all times, except when actually in use for keeping a clear passage through the outlet.

The various portions of the outlet-pipe D, are provided with screw-plugs *f'*, to facilitate the removal of deposits, and a scraper similar to *b'* may be applied to any one, or to all of the plugs, so as to reach any desired portion of the outlet-pipe.

By constructing the retort in the form of a bottle, as shown, with its outlet at the neck or contracted portion, I am enabled to maintain a perfectly red heat at the outlet, and thus make a drier and more perfect illuminating gas than is possible with a retort of the ordinary construction, in which a much larger portion of the escape or outlet end is embedded in the wall of the casing and exposed to the atmosphere.

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

1. The retort A, with its wings *b*, in combination with the casing B, passages *c e*, formed at the opposite ends of the retort, by contracting the wings *b b*, and one or more flues, substantially as and for the purpose set forth.

2. The retort A, constructed in the form of a bottle with its outlet at the neck or contracted portion, and provided with the inner head *k*, in combination with the wings *b b*, passages *c* and *e*, outlet-pipe D, and condenser G, substantially as and for the purpose set forth.

3. The inner head *k*, provided with a central stud, *q*, and secured within the mouth of the retort A by the brace *n*, hollow screw *p*, and projections *r*, in combination with the

outer head *l*, having a central screw *t*, which bears against the stud *q*, whereby a pressure may be exerted on the inner head to tighten it, without removing the outer head, substantially as described.

4. The scraper *b'*, with its rod *c'*, screw 15, and beveled disk *e'*, in combination with the screw-plug *d'*, provided with a beveled seat, 17, and with the outlet-pipe D, substantially as described, for the purpose set forth.

Witness my hand this 27th day of February, A. D. 1875.

SILAS S. PUTNAM.

In presence of—
S. S. PUTNAM, Jr.,
WM. W. WHITMARSH.