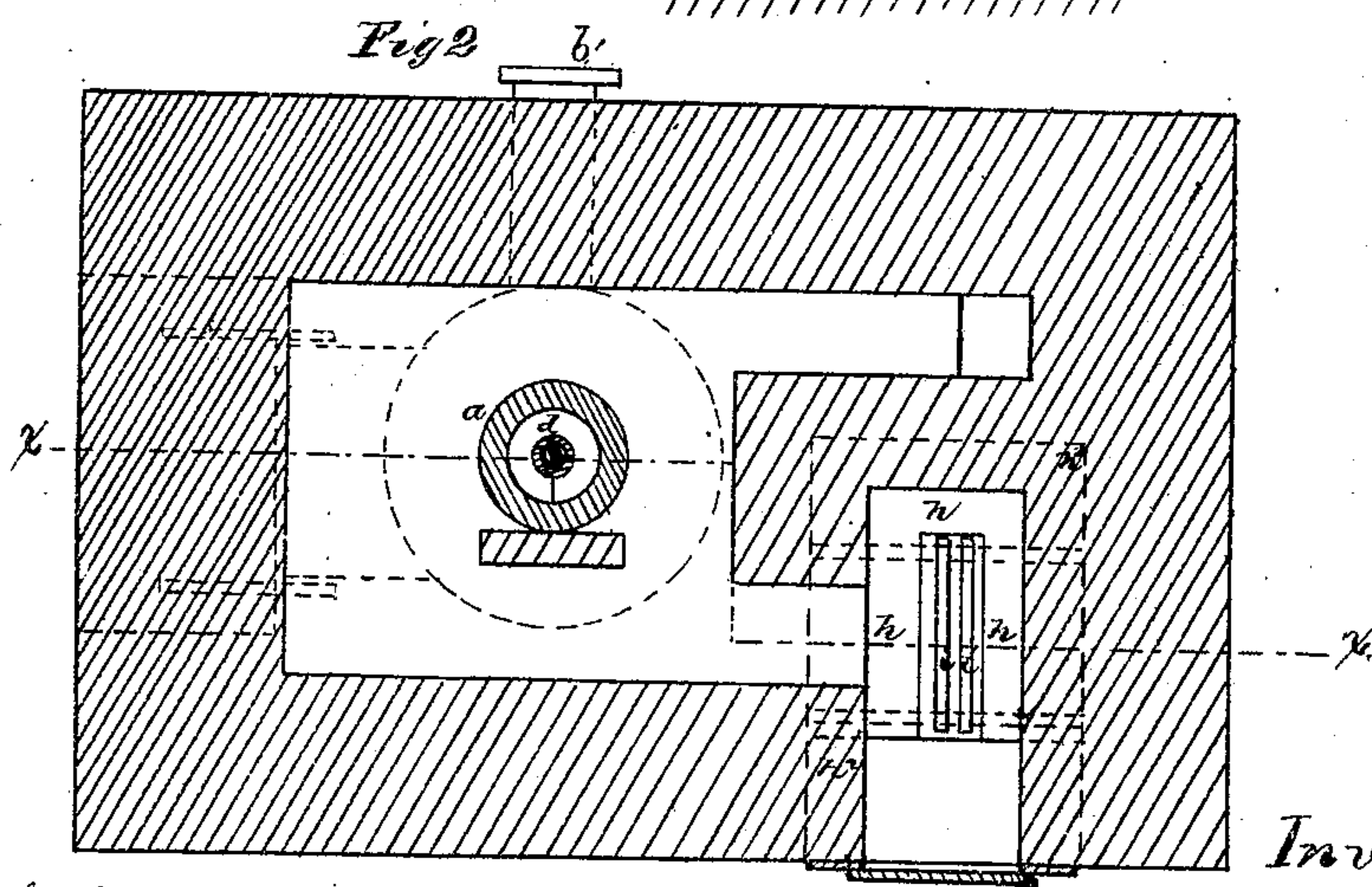
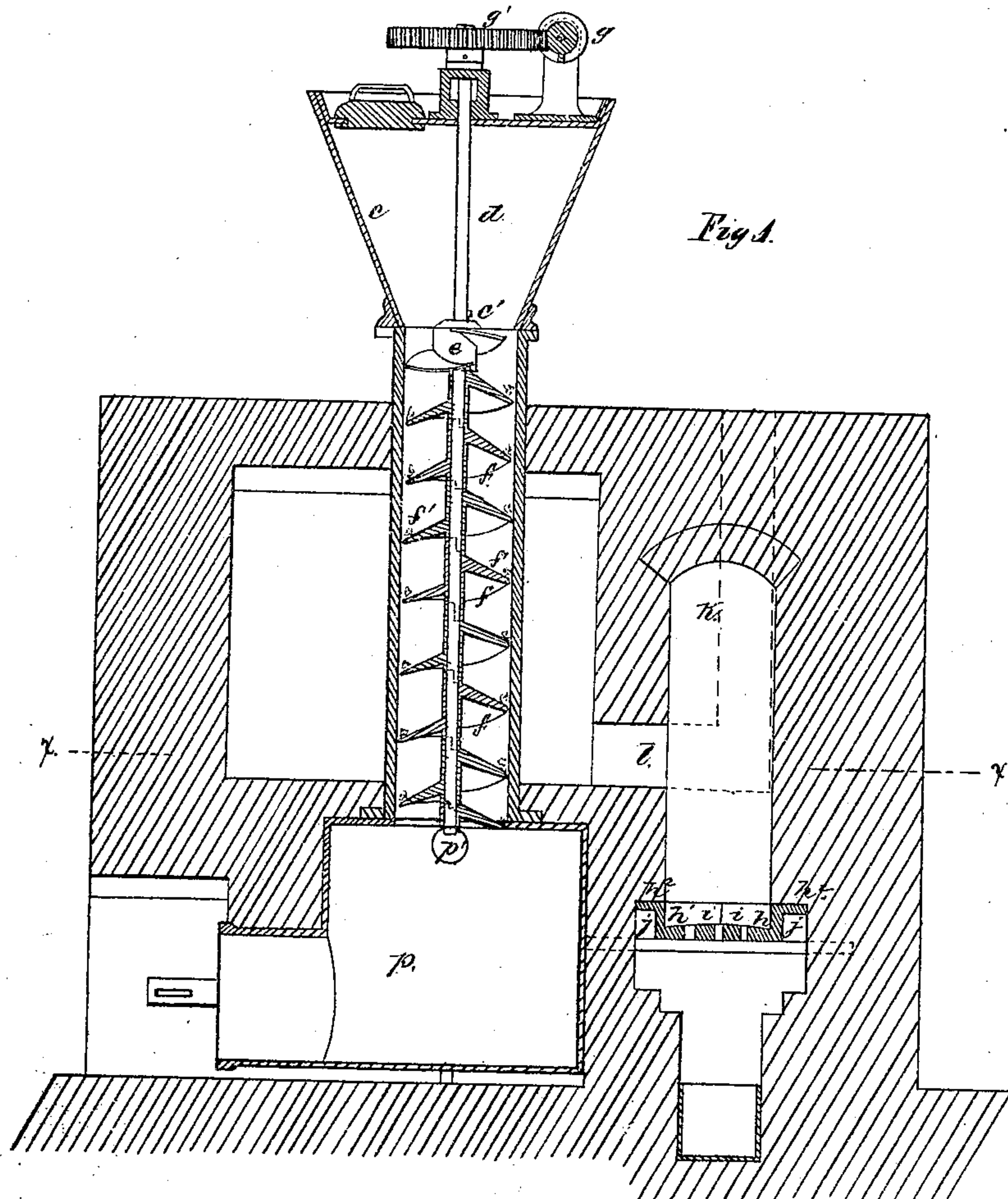


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Improvement in Gas Apparatus.

No. 130,388.

Patented Aug. 13, 1872.



Witnesses.

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UNITED STATES PATENT OFFICE.

ROBERT PORTER AND THOMAS LANE, OF LONDON, ENGLAND.

IMPROVEMENT IN GAS APPARATUS.

Specification forming part of Letters Patent No. 130,388, dated August 13, 1872.

Specification describing certain Improvements in the Manufacture of Gas and in Apparatus therefor, invented by ROBERT PORTER, mechanical engineer, and THOMAS LANE, civil engineer, both of Fenchurch street, London, England.

The object of the first part of the said invention is the more perfect carbonization of the materials submitted to distillation in the manufacture of gas. This object is accomplished by passing the charge of coal or other material from which the gas is to be made in a thin stream through a vertical retort, so that the whole of the said charge is kept in contact with the sides of the retort, and the entire heated surface thereof is utilized, while the central portion of the said retort is left free for the passage of the gas.

The manner in which our invention may be advantageously carried into practice is clearly illustrated in the drawing, which we will now proceed to describe.

Figure 1 is a vertical central section of our improved apparatus on the line xx , Fig. 2. Fig. 2 is a horizontal section of the same on the line $x'x'$, Fig. 1.

Like letters indicate the same parts in both of the figures.

The apparatus constituting the first part of our invention consists of a vertical retort, a , or a number of such retorts, either cylindrical or slightly taper, fixed vertically upon a coke box or receptacle, b , for the exhausted charge. To the upper end of the said retort we attach a hopper or reservoir, c , for containing a supply of coal or other suitable gas-making material. Both the hopper and coke-box are in communication with the retort, and each of them is provided with a suitable lid or cover, made gas-tight by luting or otherwise. In the hopper c , extending through the same and the retort a , we place a central shaft, d , with the upper end projecting through the top of the hopper. Upon this shaft, at or near the top of the retort, we fix a worm or screw, e , for feeding the charge from the hopper into the retort. Below this screw the said shaft d carries another worm or screw, f , extending from end to end of the retort. The threads or blades of this screw are made to slope or incline downward, preferably at an angle of

about forty-five degrees, toward the sides of the retort, to cause the charge in descending to slide down them to the outside of the retort and lie in the angles formed by the said blades and the sides of the retort, as shown at f' , Fig. 1. We prefer to construct this lower or main screw f in a number of separate lengths or sections, each section having a central hollow boss. The bosses are notched and fitted together to bear upon or clutch one another, and any number of them may be placed together upon the central shaft d , to which they are so secured as to form one continuous screw; or, where found more convenient, a washer may be inserted between any two sections of the screw to break the continuity of the thread. Only the top piece or section, which is not exposed to so great a heat as the other pieces, need be keyed or otherwise fastened on the shaft, as from the peculiar manner in which the pieces are fitted together the first or top section will insure the rotation of the others with the shaft; or, if preferred, the said screw may be formed all in one piece. The boss may be perforated with apertures to still further increase the area of the passage for carrying off the gas produced in the retort. The said screw may be made of iron, clay, or other suitable material. The shaft d , carrying these screws e and f , is caused, by a worm and wheel, $g g'$, or other suitable gearing, to rotate slowly, and so carry the charge gradually from the hopper through the heated retort, and thence discharge it into the coke-box b below, while the gas generated passes through the central portion of the retort and is conducted away through the aperture b' . It will be seen that the screw e has a finer pitch than the main screw f . The object of this difference in the two screws is the regulation of the charge so that the quantity of the coal or other material supplied to the screw f shall not be so large as to clog the said screw or otherwise prevent the free and regular descent of the charge in a thin stream or layer all round the vertical surfaces of the retort. The same object may also be accomplished by extending or contracting the orifice c' between the hopper and the retort, or by a screw lying in a horizontal pipe attached to the neck of the retort and actuated by suitable gearing. By this latter

arrangement the feeding apparatus might be worked independently of the screw in the retort, which might be removed from its setting without disturbing the feeding apparatus. Other suitable contrivances for regulating the charge may also be employed.

Although the apparatus above described and shown is the best at present known to us for obtaining or producing the passage of the charge in a thin stream through a vertical retort, yet we do not limit ourselves to this particular apparatus, and may use any other machine by which we could effect the desired object—viz., the descent of the charge in a thin stream, which is kept in contact with the heated surfaces of the retort throughout its entire descent, while the central portion of the retort is left free for the passage of the gas.

The object of the second part of our said invention is the construction of a furnace to be used for heating the said retorts in a highly economical manner. The said furnace, moreover, permits the ready removal of clinkers or scoriæ. It also permits of directing the draft most effectually through the fuel and away from the sides of the furnace, thereby preventing the rapid destruction of the same. The said furnace has an iron dead-plate, *h*, which extends around the sides and back of the said furnace at or near the level of the grate-bars *i*. Around the edges of this dead-plate we form a rim, *h*¹, with an outwardly-projecting portion or flange, *h*². Upon this flange *h*² we build the inner lining of the fur-

nace, while below the said flange we leave a space, *j*, for the free admission of air and also of steam from the evaporating-pan. The air and steam surround the said plate, and thereby preserve it from the destructive effects of the heat. We also construct the furnace with a combustion-chamber, *k*, with its arch or top above the level of the outlet-flues *l* of the furnace. This part of our invention, although forming a portion of our apparatus for manufacturing gas, may be applied to furnaces for other purposes.

I do not claim broadly the combination of a charging apparatus with a vertical retort; but

What I do claim is—

1. The retort *a*, in combination with the central rotating screw *f*, having a sloping or inclined thread adapted to cause the coal to pass through the retort in close contact with the heated surface of the retort, as described.

2. The combination of the feed-screw *e* with the main screw *f*, the screw *e* having a finer portion than the main screw, for the purpose of regulating the descent of the coal, as described.

3. The combination of the furnace, constructed as described, with the vertical retort, having the central screws arranged as described, for the purpose set forth.

ROBERT PORTER.
THOMAS LANE.

Witnesses:

JNO. PORTER,
E. C. JACKSON.