H. N. BICKERTON & P. W. ROBSON.

GAS PRODUCING PLANT.

APPLICATION FILED FEB. 12, 1907.

919,683.

Patented Apr. 27, 1909.

2 SHEETS—SHEET 1.

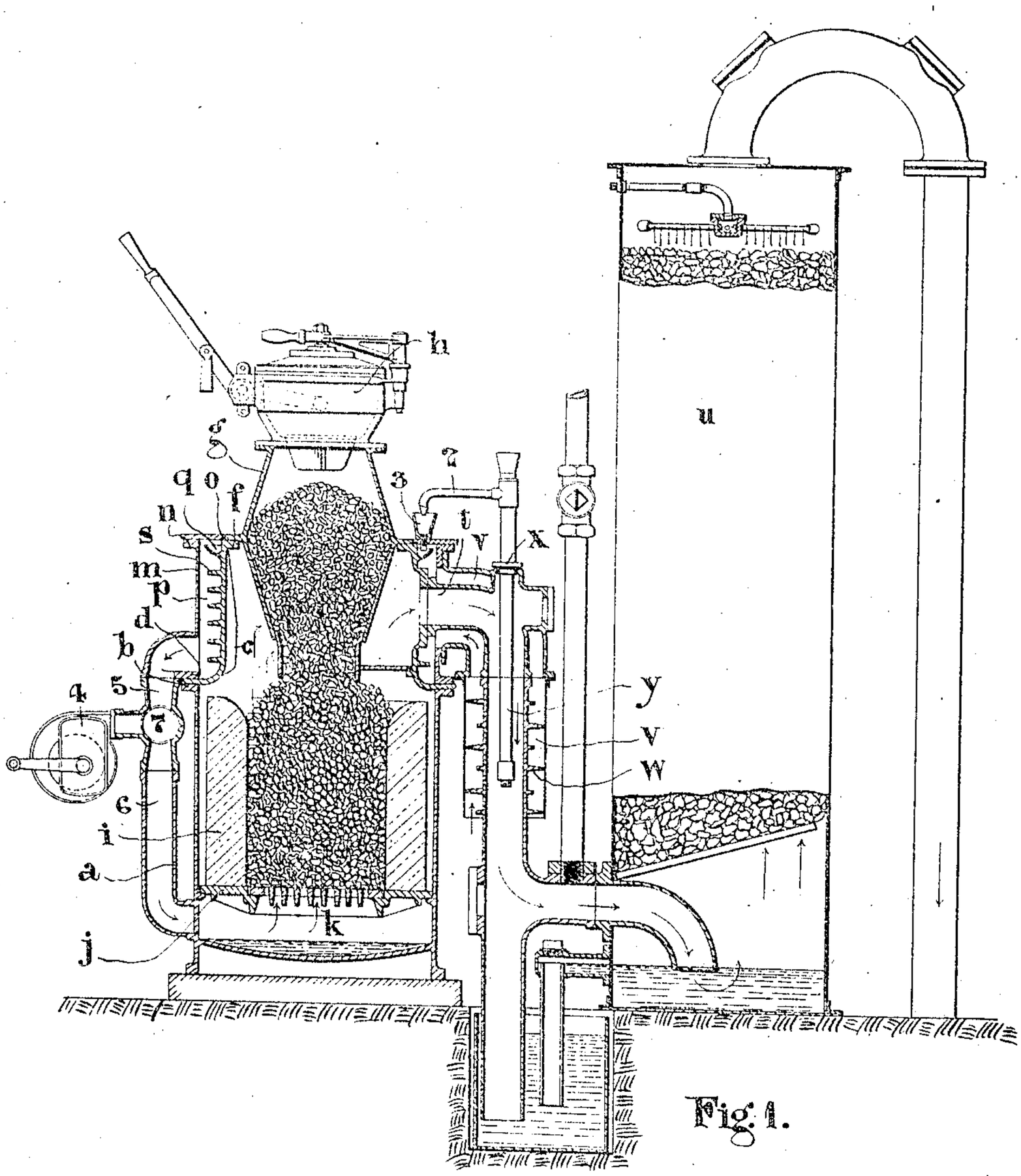

Fig. 1.

Attest:

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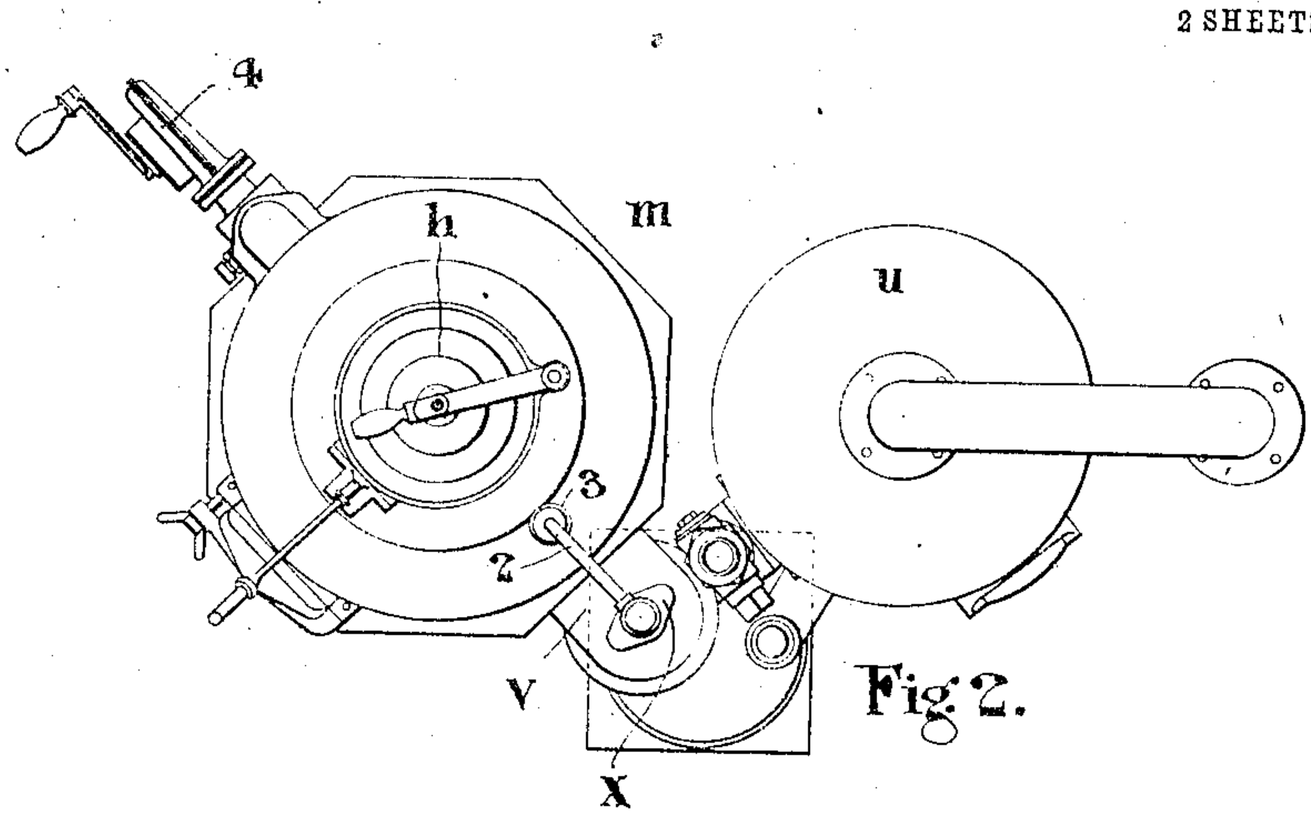

Fig. 2.

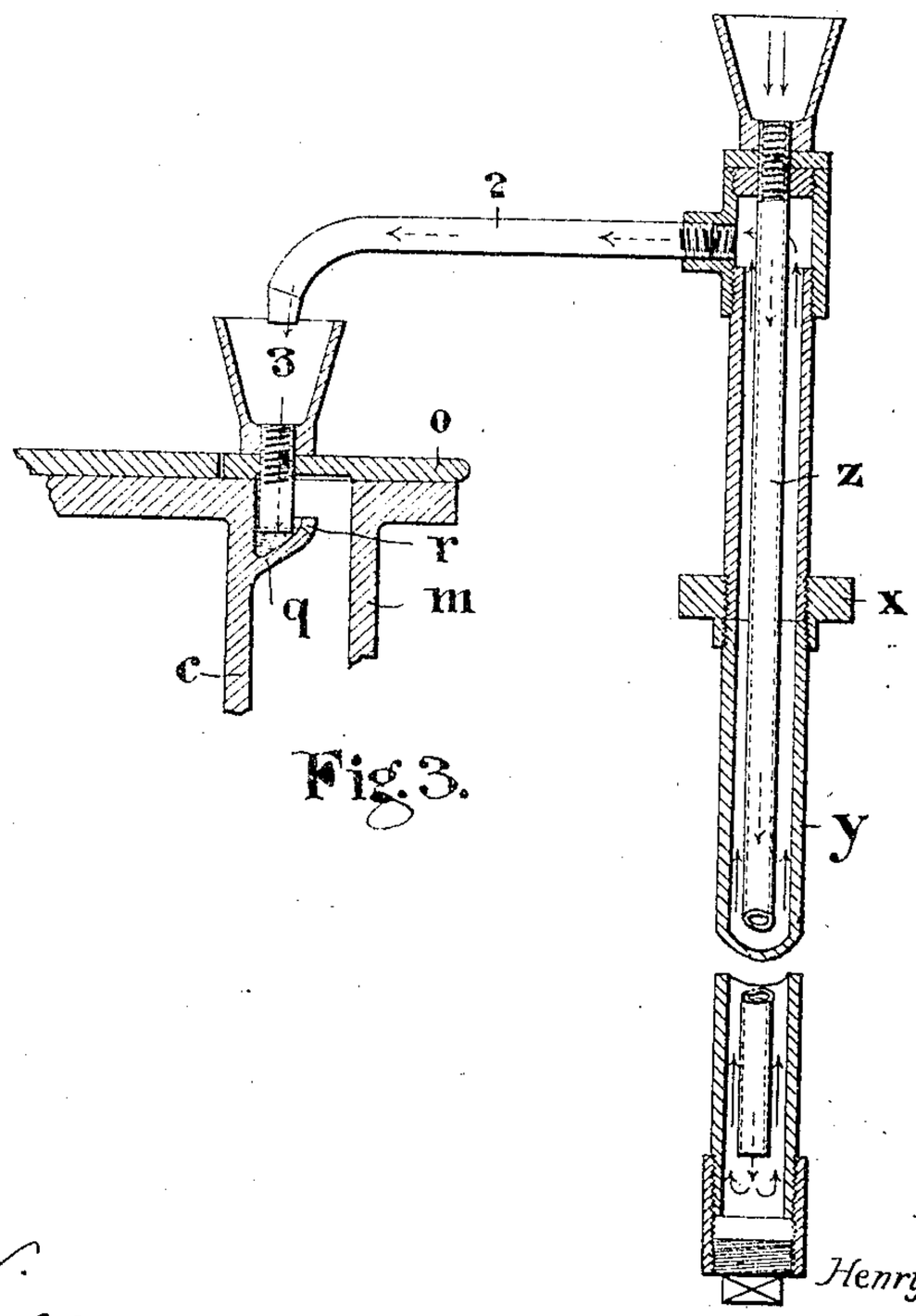

Fig. 3.

Attest:

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UNITED STATES PATENT OFFICE.

HENRY N. BICKERTON AND PHILIP W. ROBSON, OF ASHTON-UNDER-LYNE, ENGLAND.

GAS-PRODUCING PLANT.

No. 919,683. Specification of Letters Patent. Patented April 27, 1909.

Application filed February 12, 1907. Serial No. 357,976.

To all whom it may concern:

Be it known that we, HENRY NIELD BICKERTON and PHILIP WARWICK ROBSON, both subjects of the King of Great Britain and Ireland, and residing at Ashton-under-Lyne, in the county of Lancaster, England, have invented certain new and useful Improvements in and Relating to Gas-Producing Plants of the Suction Type, of which the following is a specification.

This invention relates to improvements in gas producing plants of the suction type. In such producers, as at present constructed, it is usual to provide around a hot portion of the producer a vaporizing chamber through which the air supply is drawn and into which water is delivered for supplying the requisite steam for the producer. In the best practice hitherto this vaporizing chamber has been filled with such material as metallic turnings or the like to increase the evaporative surface. It is found, however, that after a while the chamber becomes more or less choked or locally channeled, especially when hard or impure water is used, and it becomes necessary to clear out the chamber and renew the turnings. With producers as hitherto constructed, however, this cleansing and renewal has been a difficult matter, involving the dismantling of the producer and the breaking and remaking of jointing which must be kept air tight when the producer is in operation.

The primary objects of our invention are to provide a suction producer with an improved vaporizing chamber which may be very easily opened up or removed without breaking any of the principal joints of the producer and to provide large evaporative surface of a character which shall not become choked or locally channeled when used for long periods even with hard water.

Further objects of our invention are to provide improved air and feed water devices and an improved air supply arrangement for use in starting the apparatus.

Our invention consists in providing around the upper portion of the producer a casing which is removably secured at its lower part to the producer leaving between the casing and the upper part of the producer a space which is closed at the top by a flange or the like, thus forming a vaporizer chamber the outer wall of which may be lifted bodily or in parts away from the producer without disturbing any of the main joints of the apparatus.

The invention further consists in forming in the vaporizing chamber one or more troughs projecting from the upper part of the producer and providing below this trough a number of horizontal or substantially horizontal flanges or ribs preferably of increasing width from top to bottom whereby water delivered to the trough trickles down the side of the producer and spreads out horizontally along the ribs, drip from top to bottom being prevented by these ribs.

Our invention further consists in leading the air supply to the vaporizer through an annular space around the gas outlet pipe which is provided with external ribs preferably of a spiral form and is incased to form an air duct to the vaporizer whereby the inflowing air is preheated by the outflowing gases. The feed water is heated by causing it to pass through one or more "Field" tubes inserted in the gas outlet pipe.

The invention also consists in connecting the discharge of a fan to the outlet pipe from the vaporizer and providing a deflector whereby communication with the vaporizer may be closed when the apparatus is being started up and whereby communication with the fan may be closed when the apparatus is working.

The invention also consists in the improved suction producer hereinafter described.

Referring to the accompanying drawings which form part of our specification; Figure 1 is a vertical sectional view of a producer plant according to our invention, Fig. 2 is a plan of the same and Fig. 3 is an enlarged detailed view of the feed water pipe.

In carrying out the invention according to one construction we form the producer with a lower body portion, *a*, consisting of one or more cylindrical parts having at the top a flange, *b*, to which the upper flanged portion, *c*, of the producer is secured by means of the flange, *d*, a tight and permanent joint being made at these flanges. The upper portion, *c*, of the producer is preferably of smaller diameter than the lower portion. The top of the upper portion is provided with a flange, *f*, which supports a coal container, *g*, a tight and permanent joint being made at this flange also. A coal feed regulating device, *h*,

of any convenient construction may be mounted upon the top of the coal container. A refractory lining, *i*, is supported upon a dead plate, *j*, carried by the lower part of the producer above a closed ashpit, *k*.

Around the upper portion of the producer there is placed a circular casing *m*, which may be bolted or otherwise secured with a rough joint to the lower flange, *d*, of the upper part, *c*, of the producer. The top of this casing which is preferably a casting, carries a flange *n*, upon which may be secured a circular plate, *o*, which extends across the top of the vaporizing chamber, *p*, which is formed by this casing and the top portion of the producer. By disconnecting the bottom of the casing, *m*, from the producer it may be removed without breaking any of the main joints of the plant.

Near the top of the upper portion of the producer there is formed a trough, *q*, extending horizontally around the apparatus and projecting into the vaporizing chamber. Water to be vaporized is delivered to this trough, the edge of which is provided with a number of V grooves, *r*, or the like through which the water overflows. Below the trough is a series of horizontal ribs, *s*, extending around the producer, each rib being of somewhat greater width than the one next above it whereby the water trickling down the side of the upper portion of the producer is spread out and is prevented from dripping through more than a short distance.

The interior of the upper part of the producer is provided with vertical ribs, *l*, which serve to strengthen this part of the producer as well as to extract from the gases heat for transference to the vaporizer.

By our invention we are able to avoid the difficulties met with in vaporizers which employ turning or other porous filling, and to obtain a vaporizer which is capable of almost instantaneously raising the steam required for gas making, the ability of the plant to quickly respond to fluctuations of load being greatly increased by the fact that there is practically no reserve of water contained in the vaporizer as is done in other producers.

The gas outlet pipe, *t*, from the producer is passed on its way to the scrubber, *u*, concentrically through an air conduit, *v*, which opens into the vaporizing chamber around the gas outlet. The exterior of the outlet pipe is provided with ribs, *w*, which are preferably arranged spirally so that the air is highly heated before it enters the vaporizer on account of the long path of contact with the hot walls of the outlet pipe. It is important that the air shall be considerably preheated in order that it may carry the requisite amount of steam into the fire. By these means we obtain the necessary heat from the outflowing gases passing to the scrubber. The feed water is heated also by the outflowing gases. This is effected by inserting through a stuffing box, or suitable joint, *x*, in the outlet pipe, a tube, *y*, closed at the inner end, into which tube is inserted a pipe of smaller bore, *z*, after the manner of the well known "Field" tubes in certain water tube boilers. The hot feed water is withdrawn by a pipe, 2, at the top of the "Field" tube and delivered to a mouth piece, 3, communicating with the trough, *q*, of the vaporizer.

We connect the fan, 4, to the generator in a manner which greatly increases the facility and convenience of starting the plant, *i. e.* we unite the outlet branch of the fan to a junction, 5, on the pipe, 6, which conveys air and steam from the vaporizer to the ash-pit, *k*. In this junction piece we place a deflector, 7, which may be placed so as to shut off the vaporizer from the ash-pit and establish communication between the fan and the ashpit, *k*, or to shut off the fan and establish communication between the vaporizer and the ashpit. By this means the usual cocks and blank plates such as are adopted in most existing plants are dispensed with.

Having now described our invention what we claim as new and desire to secure by Letters Patent is:—

1. In combination in a gas producer; a lower body portion terminating at the top with a flange; a refractory lining for said body portion; an upper body portion terminating at its top and bottom with flanges the bottom flange making a permanent joint with said flange of the lower body portion; a coal container carried upon and making a permanent joint with the flange at the top of the upper portion; a separate casing surrounding the upper body portion and forming a vaporizing chamber therewith; a flange on the underside of said separate casing which flange is secured removably to the upper side of the bottom flange of the upper body part, said casing being removable from the apparatus without breaking any of the joints between the lower and upper parts or between the upper part and the coal container; water and air admission means to the vaporizing chamber; and a vapor outlet therefrom.

2. In combination in a gas producer; a lower body portion terminating at the top with a flange; a refractory lining for said body portion; an upper body portion terminating at its top and bottom with flanges the bottom flange making a permanent joint with said flange of the lower body portion; a coal container carried upon and making a permanent joint with the flange at the top of the upper portion; a separate casing surrounding the upper body portion and forming a vaporizing chamber therewith; a flange on the underside of said separate casing which flange is secured removably to the up-

per side of the bottom flange of the upper body part, said casing being removable from the apparatus without breaking any of the joints between the lower and upper parts or between the upper part and the coal container; a removable ring cover closing the top of the vaporizer; water and air admission means to the vaporizing chamber; and a vapor outlet therefrom.

3. In combination in a gas producer; a lower body portion terminating at the top with a flange; a refractory lining for said body portion; an upper body portion terminating at its top and bottom with flanges the bottom flange making a permanent joint with said flange of the lower body portion; a coal container carried upon and making a permanent joint with the flange at the top of the upper portion; a separate casing surrounding the upper body portion and forming a vaporizing chamber therewith; a flange on the underside of said separate casing which flange is secured removably to the upper side of the bottom flange of the upper body part, said casing being removable from the apparatus without breaking any of the joints between the lower and upper parts or between the upper part and the coal container; a water trough and ribs formed in one with said upper portion and extending into the vaporizing chamber; water and air admission means to the vaporizing chamber; and a vapor outlet therefrom.

4. In combination in a gas producer; a lower body portion terminating at the top with a flange; a refractory lining for said body portion; an upper body portion terminating at its top and bottom with flanges the bottom flange making a permanent joint with said flange of the lower body portion; a coal container carried upon and making a permanent joint with the flange at the top of the upper portion; a separate casing surrounding the upper body portion and forming a vaporizing chamber therewith; a flange on the underside of said separate casing which flange is secured removably to the upper side of the bottom flange of the upper body part, said casing being removable from the apparatus without breaking any of the joints between the lower and upper parts or between the upper part and the coal container; a gas outlet connected to the upper body part and passing through the removable vaporizer casing; an air inlet to the vaporizer surrounding the gas outlet pipe at its point of entrance into the vaporizer chamber; water admission means to the vaporizing chamber; and a vapor outlet therefrom.

5. In combination in a gas producer; a lower body portion terminating at the top with a flange; a refractory lining for said body portion; an upper body portion terminating at its top and bottom with flanges the bottom flange making a permanent joint with said flange of the lower body portion; a coal container carried upon and making a permanent joint with the flange at the top of the upper portion; a separate casing surrounding the upper body portion and forming a vaporizing chamber therewith; a flange on the underside of said separate casing which flange is secured removably to the upper side of the bottom flange of the upper body part, said casing being removable from the apparatus without breaking any of the joints between the lower and upper parts or between the upper part and the coal container; a gas outlet connected to the upper body part and passing through the removable vaporizer casing; an air inlet to the vaporizer surrounding the gas outlet pipe at its point of entrance into the vaporizer chamber; a water trough in the vaporizer chamber; a Field tube for heating feed water said tube extending into the gas outlet pipe and means acting to conduct the water from the Field tube to the trough of the vaporizer.

6. In combination in a gas producer, a removable casing around the upper part of the producer and forming therewith a vaporizing chamber, an ashpit, an outlet pipe from the vaporizing chamber to the ashpit, an air blower, an outlet pipe therefrom, the blower outlet pipe being connected to the outlet pipe from the vaporizer and a deflector in the outlet pipe from the vaporizer acting when moved in one direction to close off the vaporizer from the ashpit and open the blower thereto and when moved in another direction to close off the blower and open the vaporizer.

In testimony whereof, we affix our signatures in presence of two witnesses.

HENRY N. BICKERTON.
P. W. ROBSON.

Witnesses:
ERNEST HALLSWORTH,
JOHN ORME.