(No Model.)

C. M. RYDER.

GAS PRODUCER.

No. 458,378. Patented Aug. 25, 1891.

Fig. 1

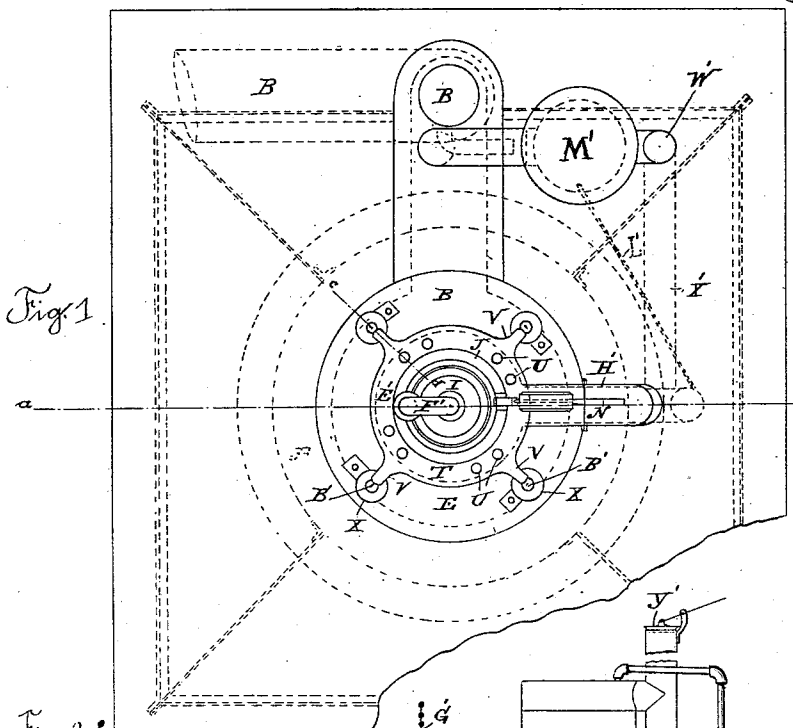


Fig. 4

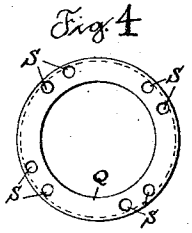


Fig. 3

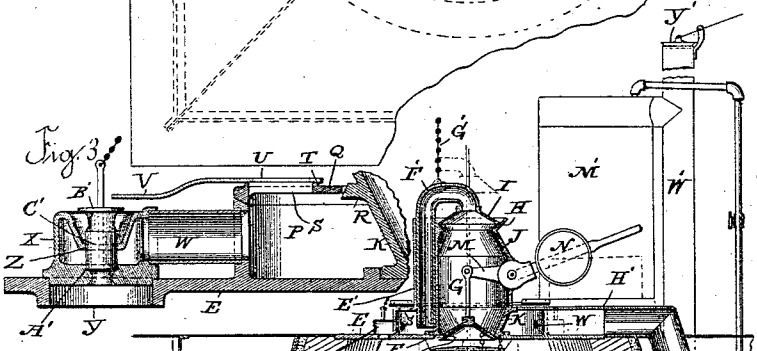


Fig. 2

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UNITED STATES PATENT OFFICE.

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GAS-PRODUCER.

SPECIFICATION forming part of Letters Patent No. 458,378, dated August 25, 1891.

Application filed December 12, 1887. Serial No. 257,581. (No model.)

To all whom it may concern:

Be it known that I, CHARLES M. RYDER, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Gas-Producers; and I do declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates to an improvement in gas-producers, the object being to furnish an apparatus adapted to effect a general economy of fuel, labor, construction, and repair over existing apparatus of its class.

With these ends in view my invention consists in certain details of construction and combinations of parts, as will be hereinafter described, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a broken plan view of a gas-producer embodying my invention. Fig. 2 is a view thereof in vertical section on the line *a b* of Fig. 1. Fig. 3 is an enlarged view in vertical section on the line *c d* of Fig. 1 of one of the chambered poking-heads and the adjacent portion of the annular draft-chamber with which it is connected; and Fig. 4 is a detached plan view of the ring for closing the upper end of the said draft-chamber.

As herein shown, my improved gas-producer includes a producer-chamber A, a gas-conduit B, a grate C, an ash-pit D, and other adjuncts to be duly described. The upper end of the said producer-chamber A is closed by a circular plate E, forming a portion of the working-floor of the apparatus and having a central opening F, over which an upright hopper is secured. The said hopper is provided with a flaring flange or mouth-piece H, forming a self-cleaning seat for the bell-shaped hopper-lid I, the upper portion of the hopper being contracted, as at J, to meet the lower end of the said flange, capacity in the hopper being thus secured without unduly enlarging its mouth; also, by contracting the hopper, as described, surfaces are secured for deflecting rising gases into the hopper-lid aforesaid. The lower end of the hopper is also contracted, as at K, to deflect the fuel upon the bell-valve L, which opens downward and closes the lower end of the hopper, and thus an even distribution of the fuel upon the fire is effected. This valve normally cuts off connection between the producer-chamber and the hopper and is normally closed. It is provided with a stem rising vertically into the hopper and connected at its upper end with an arm M, pivoted to the hopper and furnished with a counterweighted manual N. The bell-valve is operated by this manual. A check-chain O, connecting the valve and the plate E, is provided for preventing the valve from dropping into the fire in case it becomes detached from its supporting-connections.

An annular draft-chamber surrounding the lower end of the hopper is formed by an annular flange P, extending upward from the plate E, and by a removable ring Q, supported upon the upper edge of the said flange and upon a ledge R, encircling the contracted lower part K of the hopper, the edges in contact being beveled to form a tight joint. The said ring which closes the upper end of the draft-chamber is provided, as herein shown, with eight air-inlets S, arranged in pairs of two inlets at equidistant points around it. The inlet of air through the said inlets is gaged and controlled by a rotatable cover T, supported upon the ring Q, having openings U corresponding in number and arrangement to the air-inlets S formed in it and provided with four equidistant arms V, through which it is rotated to open, close, and graduate the said inlets and which form couplers, as will be described hereinafter. Four short pipes W, located at equidistant points in the face of the upright flange P, respectively extend to as many chambered poking-heads X, located over poking-holes Y, formed in the plate E aforesaid, and hence in the top of the producer-chamber. Each of the said poking-heads has an air-opening Z, having vertical walls forming a vertical valve-seat, and a smaller gas-opening A′, located below the said air-opening, leading into the producer-chamber through the poking-hole occupied by the head and having inclined walls forming a horizontal valve-seat. The two openings of each head are closed by a suitable cylindrical plug B′, having a slightly taper-

ing central portion C′ co-operating with the walls of the air-opening and a squared lower end D′ co-operating with the inclined walls of the gas-opening. Under this construction the gas-opening is always closed tightly by the plug when the same is in position in the head and wear compensated for as well as vertical displacement of the plug, owing to the accumulation of foreign matter upon the horizontal valve-seat. When the plug is removed the openings in the head afford access to the fire by a poker. The arms V aforesaid normally extend over the said plugs, and when they are moved aside for the removal of the same the rotatable cover T, of which they are a part, is moved and closes the air-inlets, so that the plugs cannot be removed without shifting the draft from the air-inlets to the heads, as will be hereinafter more fully described. An upright sleeve E′, formed integral with the hopper, receives a pipe F′, extended at its lower end into the said draft-chamber and curved at its upper end to reach over the mouth of the hopper, the lid I whereof it carries. A chain G′ or its equivalent, attached to the curved end of the said pipe, is provided for raising and lowering it in removing and replacing the hopper-lid in line with the mouth of the hopper. All gases collected by the lid when on its seat or lifted above the same are drawn through this pipe and delivered into the said draft-chamber. A branch pipe H′, leading from the draft-chamber down over the producer, connects with the upper end of the steam-jet blower I′, the lower end of which connects with a pipe J′, terminating underneath the grate. The steam-jet pipe K′ of the said blower is connected with a steam-supply pipe L′, leading into a steam-generator M′, the draft-flue W′ whereof is connected at its lower end by a pipe X′ with the branch H′, whereby the waste products of combustion may be exhausted into the lower end of the producer by closing the upper end of the flue by a cap Y′, which is removed when the steam-generator is operated by a fire on its own grate P′, as will be done in starting the apparatus.

Having now described my improved apparatus in detail, I will set forth the mode of its operation. The producer having been started in the production of gas and steam being supplied to the jet-blower, the steam operates to exhaust atmospheric air into the draft-chamber through the air-inlets S in the ring Q thereof, the air passing thence through the branch pipe H′, through the blower I′, and through the pipe J′ into the lower end of the producer and below the grate thereof. Mingled with the air thus introduced into the producer will be more or less gas collected in the draft-chamber from the chambered poking-heads and from the hopper. The air and gas so introduced into the producer is heated in the said chamber and pipes on its way thereto and effects an economy of fuel in the apparatus. A part of its heat it absorbs from the working-floor of the producer-chamber, which is thus cooled to the great convenience of the men who work upon the same. It will thus be seen that in the ordinary operation of the apparatus the steam-jet blower exhausts air and escaping gas from the top of the producer-chamber and forces it under pressure into the lower end of the producer. When now it becomes necessary to introduce more fuel into the producer-chamber, the lid of the hopper is lifted, as indicated by broken lines in Fig. 2 of the drawings, and the hopper is filled with coal, after which the lid is dropped back again upon its flaring seat. If any gas escapes into the hopper while the same is being filled it is drawn into the lid and thence transferred into the draft-chamber with which the lid is in exhaust connection. The hopper having been filled, the bell-valve L is dropped, as indicated by broken lines in Fig. 2 of the drawings, by lifting the counterweighted manual N, and the fuel discharged into the producer-chamber being evenly distributed upon the fire. As long as the bell-valve is open or away from the seat formed for it by the lower end of the hopper, large volumes of gas will rise into the hopper and be exhausted therefrom through the hopper-lid into the draft-chamber, and thence be returned into the lower end of the producer and thence into the producer-chamber, what gas remains in the hopper after the bell-valve is closed being exhausted back into the producer before the lid of the hopper is opened again, so that no gas escapes from the hopper to be lost. The fuel having been evenly distributed over the fire will not require much if any poking, except it be of a nature requiring it by reason of coking. When it is desired to poke the fire, the arms V of the rotatable cover T must be first got out of the way, for access to the plugs B′, by rotating the said cover, whereby the air-inlets S in the ring Q are closed. The plugs being now successively removed, the air will be drawn through the air-openings of the poking-heads, passing thence into the short pipes W and thence to the draft-chamber. It will thus be seen that before the poking-holes are opened the air-supply must be cut off from the inlets ordinarily admitting air to the producer, so as to form a strong draft through the poking-holes as soon as they are opened. As soon as a plug is removed from a poking-head a strong current of air will at once flow thereinto. This inflowing current of air will be met by a stream of gas rising under pressure from the producer-chamber through the gas-opening of the head; but the air-current, being larger and stronger, in part repulses the gas-current, but carries the gas that does escape through the said gas-opening along with it, and, commingled, they are exhausted through the pipe W of the head into the draft-chamber. It will be understood that only one plug is removed at a time, although all of the air-in-

lets are simultaneously closed for the purpose, whereby the entire exhaust power of the furnace is thrown upon one poking-head, through which a powerful current is therefore established. After the fire has been poked the plug is replaced and the air-inlets are thrown open again by rotating the cover T, the arms V of which are thereby brought over the plugs, so that they cannot be removed without first rotating the cover again and closing the air-inlets. This coupling, as it were, of the chambered poking-heads and air-inlets makes it impossible to remove a plug without throwing the entire draft of the producer upon the hole which it has exposed. After the production of gas has been begun a portion of it may, if desired, be used for generating the steam employed by the steam-jet blower. In this case air and gas are burned in the combustion-chamber of the steam-generator. The waste gases resulting from this combustion are returned to the producer. These gases and the heat retained by them are thus utilized with obvious economy.

During the operation of the producer the amount of air supplied thereto may be increased or diminished by rotating the cover T so as to expose more or less of the air-inlets. The amount of steam supplied to the producer may also be controlled by manipulating the valve of the steam-supply pipe. By providing for independently regulating the relative volumes of air and steam supplied to the producer the specific composition of the gas and the temperature of the apparatus are readily controlled.

It is obvious that some changes in the construction and arrangement of parts from what is herein shown may be made. I would therefore have it understood that I do not limit myself to the exact construction and arrangement of parts herein shown and described, but hold myself at liberty to make such changes and alterations as fairly fall within the spirit and scope of my invention.

Having fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A gas-producer having a chambered poking-head normally closed by a plug and located over a poking-hole formed in the top of its producer-chamber, and an exhaust connection between the said head and the lower end of the producer, whereby the gas escaping through the poking-hole is recovered, substantially as described.

2. A gas-producer having a chambered poking-head normally closed by a plug and located over a poking-hole formed in the top of the producer-chamber, a draft-chamber located upon the top of the said producer-chamber, draft connection between the said poking-head and draft-chamber, and means adapted to exhaust the contents of the draft-chamber into the lower end of the producer, whereby gas escaping from the poking-hole is recovered.

3. A gas-producer having poking-holes and air-inlets, plugs for the said holes, and a movable cover for the inlets, constructed to normally expose the said inlets and extend over the plugs when the same are in place, substantially as described, and whereby the movement of the cover preparatory to taking out the plugs closes the air-inlets.

4. A gas-producer having a hopper located upon the top of its producer-chamber, a vertically-movable lid for the hopper, and extensible exhaust connection through the said lid between the upper end of the hopper and the lower end of the producer, substantially as set forth.

5. A gas-producer having a hopper located upon the top of its producer-chamber, a draft-chamber surrounding the lower end of the hopper, a vertically-movable lid for the hopper, an extensible conduit between the said lid and draft-chamber, and a conduit between the draft-chamber and the lower end of the producer, substantially as described.

6. A gas-producer having the top of its producer-chamber constructed with poking-holes, a hopper located upon the top of the said chamber, a draft-chamber surrounding the lower end of the said hopper and provided with air-inlets, chambered poking-heads located in the said poking-holes, pipes connecting each of the said heads with the said draft-chamber, a pipe between the said draft-chamber and the producer, and means to create an exhaust-current through the heads, pipes, and draft-chamber into the producer, substantially as described.

7. A gas-producer having a draft-chamber located upon the top of its producer-chamber and provided with air-inlets, chambered poking-heads located over poking-holes formed in the top of the said producer-chamber, draft connections between the said draft-chamber and poking-heads, and a perforated rotatable cover located upon the said draft-chamber and adapted to gage the amount of air passing through the air-inlets therein and provided with arms arranged to extend over the poking-heads when the air-inlets are open and to prevent access to the said heads without first rotating the cover and closing the air-inlets, substantially as described.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

CHAS. M. RYDER.

Witnesses:
C. L. SWAN, Jr.,
CHAS. B. SHUMWAY.