No. 785,955. PATENTED MAR. 28, 1905.

F. W. JOHNSTONE.

GAS PRODUCER.

APPLICATION FILED OCT. 27, 1904.

FIG. 1.

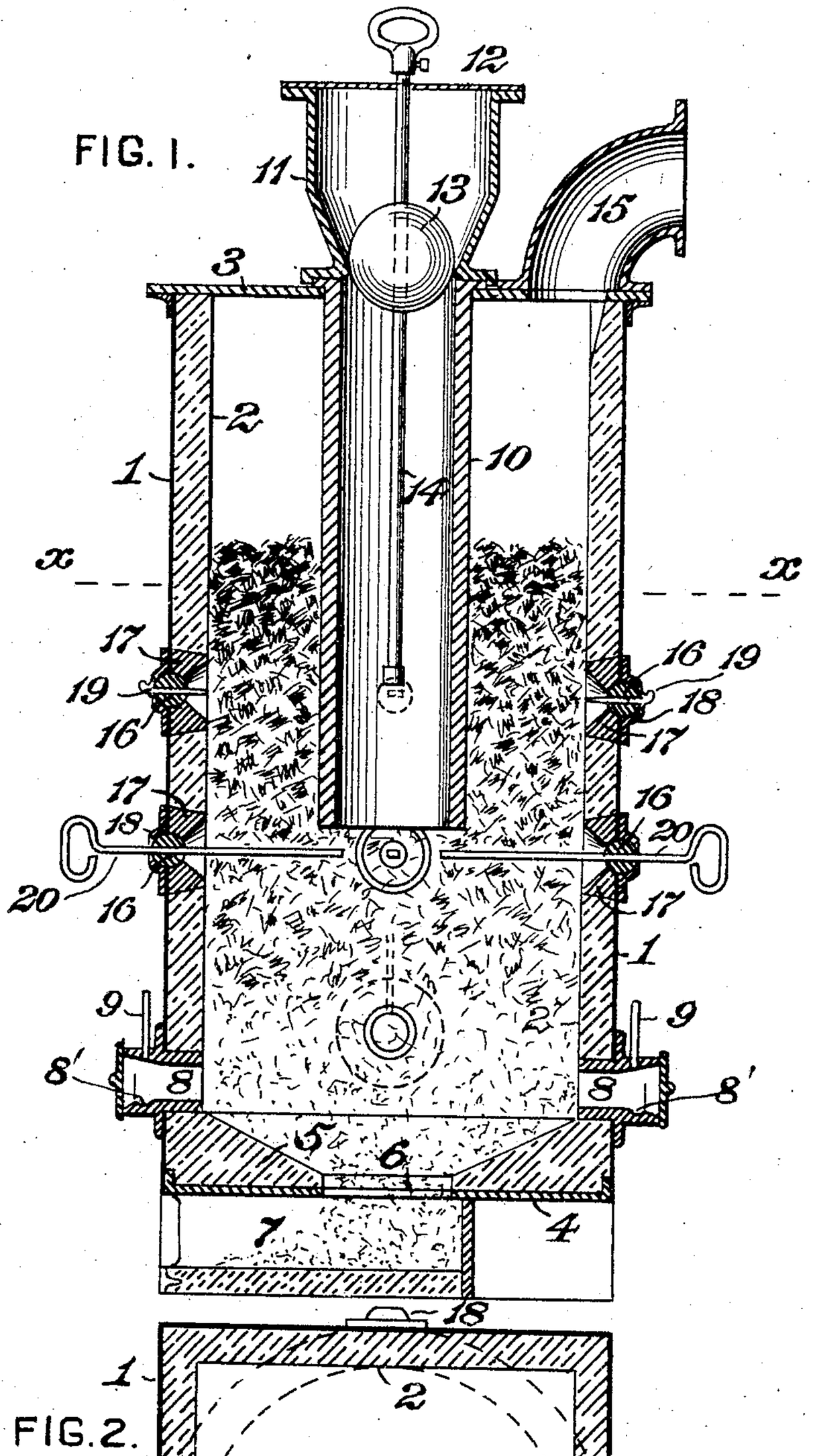
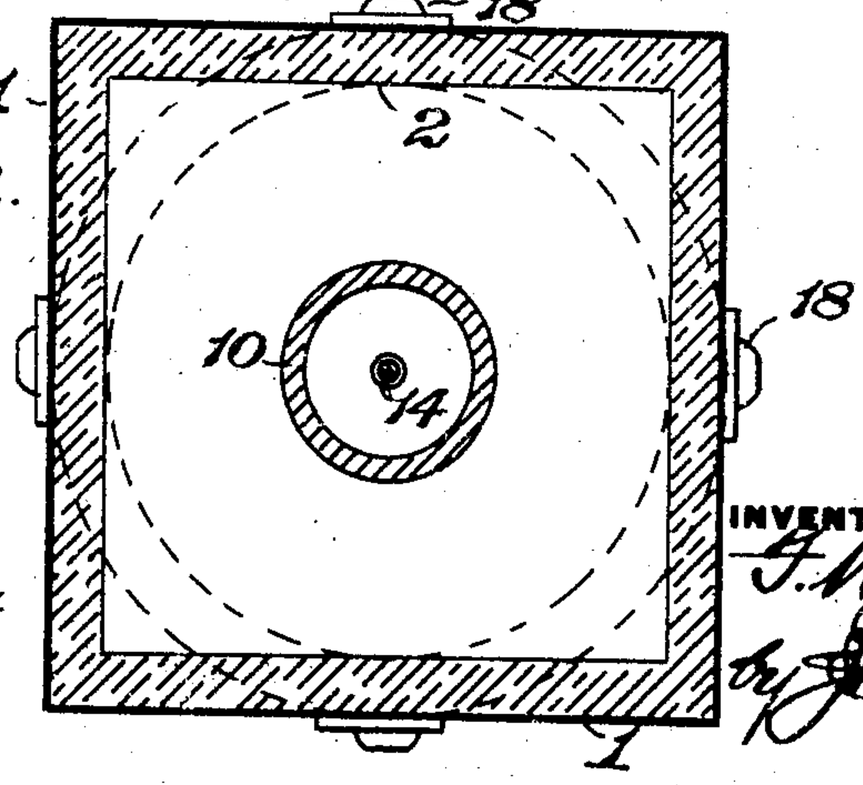



FIG. 2.




WITNESSES

James C. Herron.

S. R. Bell.

INVENTOR

F. W. Johnstone,

by Johnson Dell,

Att'y.

No. 785,955. Patented March 28, 1905.

# UNITED STATES PATENT OFFICE.

FRANCIS W. JOHNSTONE, OF MEXICO, MEXICO.

## GAS-PRODUCER.

SPECIFICATION forming part of Letters Patent No. 785,955, dated March 28, 1905.

Application filed October 27, 1904. Serial No. 230,162.

*To all whom it may concern:*

Be it known that I, FRANCIS W. JOHNSTONE, of the city of Mexico, in the Republic of Mexico, have invented a certain new and useful Improvement in Gas-Producers, (for which I have been granted a patent in Mexico, dated September 6, 1904, No. 3,963,) of which improvement the following is a specification.

The object of my invention is to provide a gas-producer of simple and inexpensive construction which may be employed for the generation of gas from any suitable fuel, as bituminous coal, anthracite, peat, wood, charcoal, &c., and in the operation of which the fuel will be thoroughly carbonized, tar and other impurities removed from the generated gas before its delivery from the producer, and the loss of gas by its mixture with entering air and consumption before reaching the incandescent portion of the body of fuel be avoided.

The improvement claimed is hereinafter fully set forth.

In the accompanying drawings, Figure 1 is a vertical central section through a gas-producer, illustrating an embodiment of my invention; and Fig. 2, a horizontal section through the same on the line *x x* of Fig. 1.

In the practice of my invention I provide a vertical casing 1, of metal, which has a lining 2, of suitable refractory material, and which is closed at top by a cap-plate 3. The casing 1 may be of square or circular horizontal section, as preferred, and the space within it constitutes a fire-chamber, which is closed at bottom by a base-plate 4, faced with a refractory lining 5 and communicating by a central opening 6 with a subjacent ash-pit 7. Air for the support of the imperfect combustion required in the fire-chamber is introduced through twyers 8 near its lower end and may supplied either by forced or induced draft, in the latter case by means of an exhaust-fan or by the suction of a gas-motor. Steam for enriching the gas is supplied through valve-governed pipes 9, leading from a steam-generator and opening into the twyers 8. The lower sides of the twyers are concaved or recessed, so as to form water-cups 8′, to which water is supplied by any suitable means and in which it is evaporated by the heat of the adjoining portion of the fire-chamber. The draft is regulated by suitable dampers.

An open-ended retort 10 of cylindrical form is supported upon the cap-plate 3 of the fire-chamber and depends centrally therein through the major portion of the height thereof. The retort 10 communicates at its top with a feed-hopper 11, which is closed at top by a movable cover 12, and communication between the feed-hopper and retort is controlled by a gate 13, which is here shown as of spherical form, fitting on a seat at the bottom of the feed-hopper and secured upon a vertical poker-bar 14, which passes freely through the cover of the feed-hopper and is movable longitudinally in the retort. The gas which is generated in the fire-chamber passes therefrom to the desired point of utilization or storage through a discharge-pipe 15, connected to the cap-plate 3.

The fuel which is supplied to the producer is after passing down through the retort 10 into the fire-chamber progressively raised to different levels in the fire-chamber space surrounding the retort, the means by which such elevation of the fuel is effected being in the instance shown the following: A plurality of lifter-bars 20 are insertible through openings or sockets in the walls of the fire-chamber, these being for facility of operation formed in universal joint-blocks 16, preferably of spherical form, which are fitted movably in seat-blocks 17, fixed to the inside of the casing 1, and close openings in said blocks leading into the fire-chamber. One set of, say, four of said seat-blocks, each having a joint-block, as described, is located below the level of the lower end of the retort and another set is located at a higher level. The joint-blocks are held in position by exterior caps 18, and the openings in each set of joint-blocks are closed when the lifter-bars are removed therefrom by removable plugs 19. The joint-blocks being related to and movable in their seat-blocks in the manner of a ball-and-socket joint, the lifter-bars when inserted can be moved both vertically and horizontally, and

the manipulation of the superincumbent body of fuel can thereby be readily effected as desired.

In the operation of a gas-producer of the construction above described fuel is supplied to the feed-hopper and the cover thereof closed. The gate at the lower end of the hopper is then raised by the poker-bar 14 and the fuel passes down into the retort, within which it is supported by the body of incandescent fuel in the fire-chamber below the retort. The fresh fuel in the retort is by the heat in the fire-chamber surrounding it preliminarily carbonized, and after sufficient time has been allowed for this purpose the lifter-bars are introduced through the lower set of joint-blocks and a portion of the previously-carbonized fuel, which has been in an incandescent condition below the retort, is raised by the lifter-bars into the surrounding space in the fire-chamber, its place being supplied by fuel from the retort. The lifter-bars are thereafter removed and introduced through the upper set of joint-blocks, and the fuel is raised still higher in the space around the retort. The supply of fuel to the retort is continued, and the body of fuel therein is progressively forced down by gravity and by the central poker-bar and is raised into the surrounding fire-chamber space by successive alternate manipulations of the lifter-bars in the lower and upper joint-blocks, as above described. The ashes and cinders are as they accumulate removed from time to time from the ash-pit.

It will be seen that as the retort extends downwardly to such a level as to be continuously surrounded by incandescent fuel it is so heated thereby that a preliminary carbonization of the fuel as progressively supplied to the retort will be effected prior to its discharge therefrom and also that said fuel will be thereafter mingled with and its evolved gas passed through a body of previously-carbonized and incandescent fuel, the gas being thereafter delivered for use through the upper discharge-pipe and tar and other injurious products being removed from it. There being no facility for communication between the gas which passes upwardly through the fire-chamber and air which may enter the feed-hopper with the fuel, there is no loss due to union with oxygen and combustion of the gas before its passage through the incandescent fuel, which loss is experienced to a greater or less degree in gas-producers of different prior constructions.

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

1. In a gas-producer, the combination, substantially as set forth, of a vertical fire-chamber, an open-bottomed retort depending therein throughout the major portion of its height, means for supplying fuel to the retort, means for raising fuel which passes out of the bottom of the retort into the surrounding fire-chamber space between the walls of the producer and the retort, and a gas-discharge pipe leading out of the upper portion of the fire-chamber.

2. In a gas-producer, the combination, substantially as set forth, of a vertical fire-chamber, an open-bottomed retort depending therein throughout the major portion of its height, means for supplying fuel to the retort, a plurality of sockets or openings in the walls of the fire-chamber below the level of the bottom of the retort, a plurality of lifter-bars insertible through said sockets for raising fuel in the fire-chamber space between the walls of the producer and the retort, and a gas-discharge pipe leading out of the upper portion of the fire-chamber.

3. In a gas-producer, the combination, substantially as set forth, of a vertical fire-chamber, an open-bottomed retort depending therein throughout the major portion of its height, means for supplying fuel to the retort, a plurality of lower sockets or openings in the walls of the fire-chamber below the level of the bottom of the retort, a plurality of upper sockets or openings in the walls of the fire-chamber above the level of the bottom of the retort, lifter-bars insertible through either set of sockets for raising fuel in the fire-chamber space, and a gas-discharge pipe leading out of the upper portion of the fire-chamber.

4. In a gas-producer, the combination, substantially as set forth, of a vertical fire-chamber, an open-bottomed retort depending therein throughout the major portion of its height, means for supplying fuel to the retort, a plurality of seat-blocks fixed in the walls of the fire-chamber below the level of the bottom of the retort, joint-blocks fitted movably in the seat-blocks and having openings for the passage of lifter-bars, lifter-bars insertible through said openings for raising fuel in the fire-chamber space between the walls of the producer and the retort, and a gas-discharge pipe leading out of the upper portion of the fire-chamber.

5. In a gas-producer, the combination, substantially as set forth, of a vertical fire-chamber, an open-bottomed retort depending therein throughout the major portion of its height, a feed-hopper communicating with the upper portion of the retort, a movable cover closing the top of the feed-hopper, a gate controlling communication between the feed-hopper and retort, a poker-bar passing through the feed-hopper cover and connected to the gate and extending downwardly into the retort, means for raising fuel which passes out of the bottom of the retort into the surrounding fire-chamber space, and a gas-discharge pipe leading out of the upper portion of the fire-chamber.

6. In a gas-producer, the combination, sub-

stantially as set forth, of a vertical fire-chamber, an open-bottomed retort depending therein throughout the major portion of its height, means for supplying fuel to the retort, means for raising fuel which passes out of the bottom of the retort into the surrounding fire-chamber space, twyers passing through the lower portion of the walls of the fire-chamber and concaved or recessed on their lower sides to form water-cups, and a gas-discharge pipe leading out of the upper portion of the fire-chamber.

FRANCIS W. JOHNSTONE.

Witnesses:
A. D. GOBRECHT,
E. Z. LESH.