

No. 755,702.

PATENTED MAR. 29, 1904.

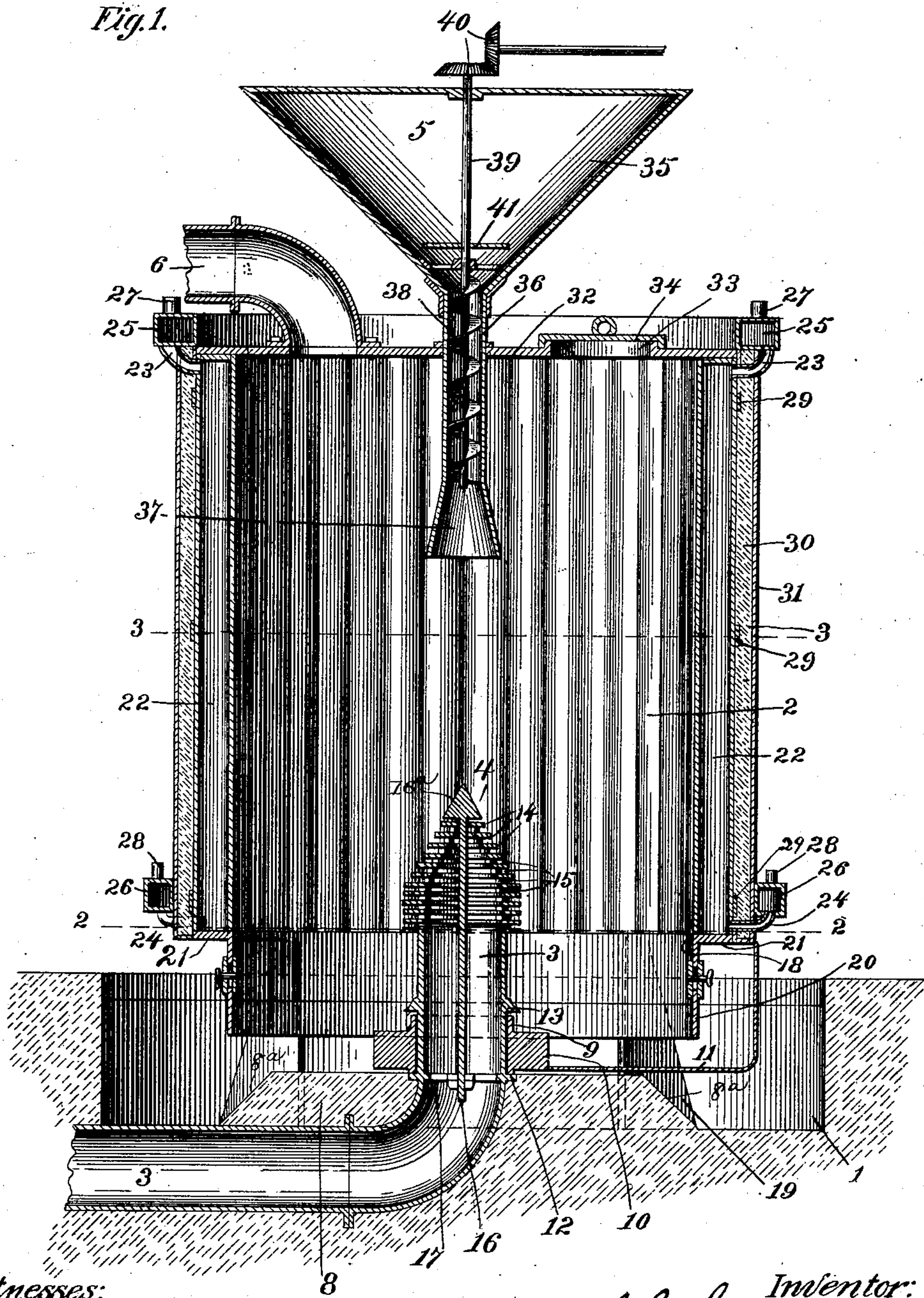
J. G. SANDERSON.  
GAS PRODUCER.

APPLICATION FILED JAN. 31, 1900.

NO MODEL.

2 SHEETS—SHEET 1.

Fig. 1.



Witnesses:

*C. S. Austin*  
*H. A. Knight*

Inventor:

*J. G. Sanderson*  
*By Knight Bros*  
*Attys.*



No. 755,702.

PATENTED MAR. 29, 1904.

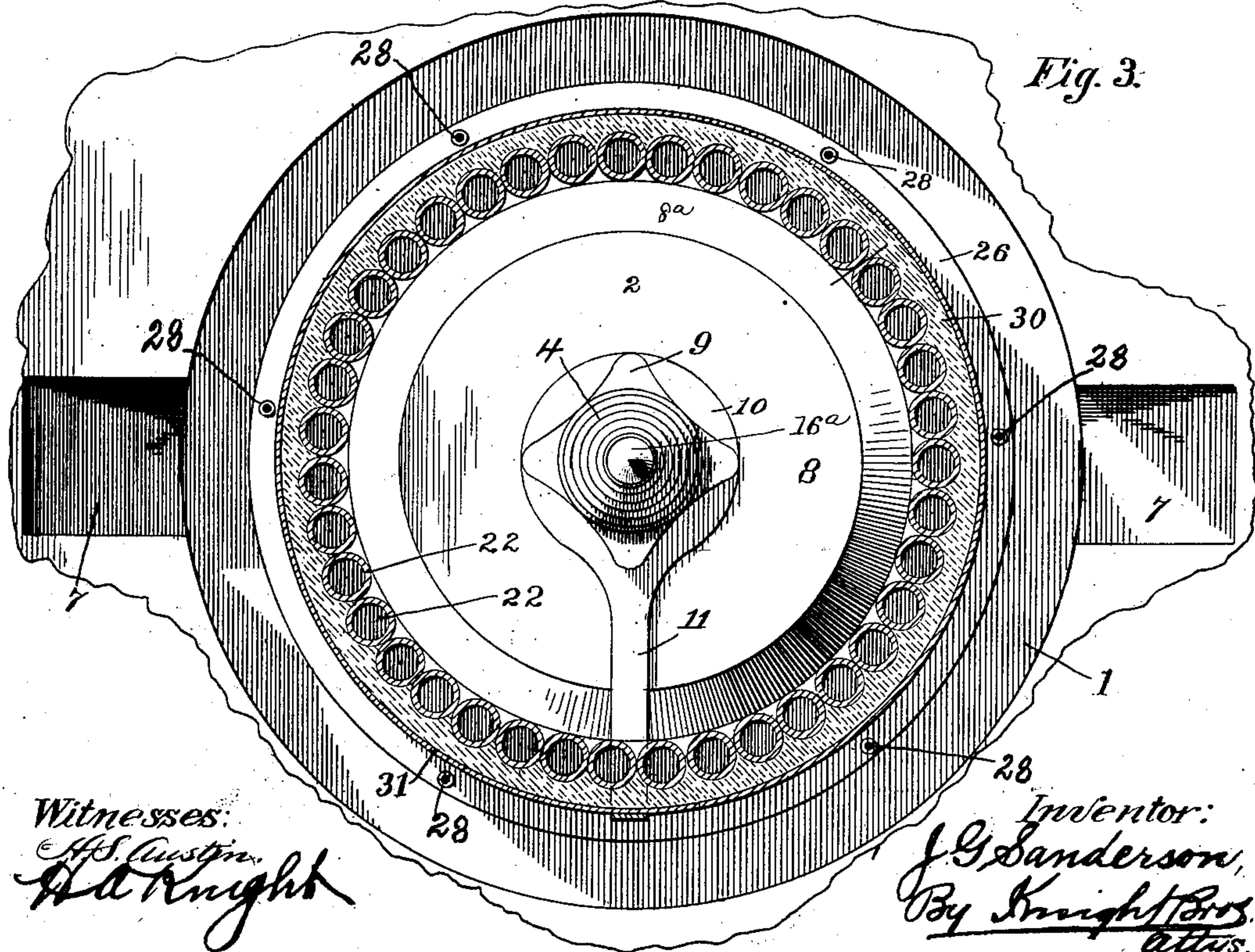
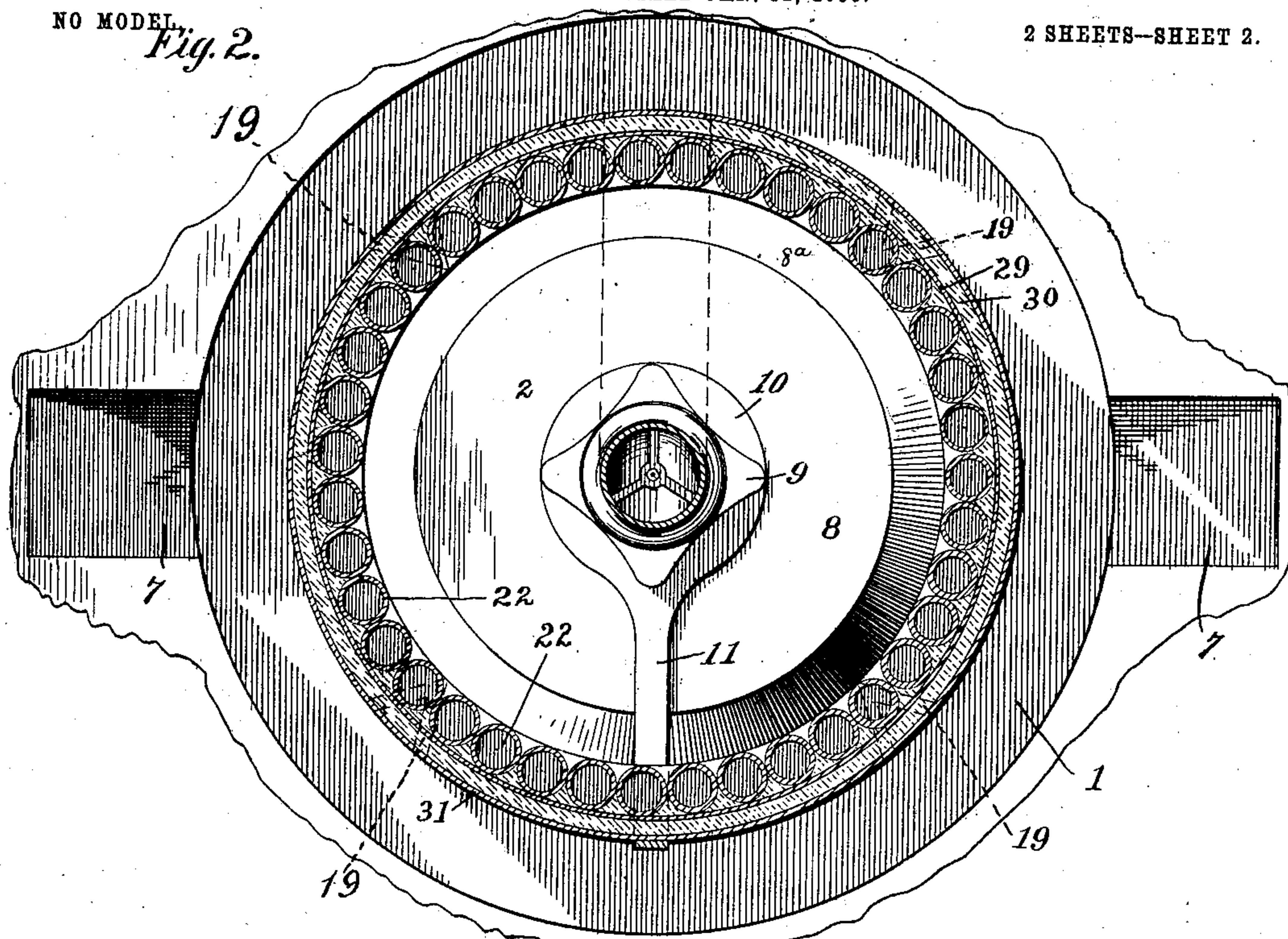
J. G. SANDERSON.  
GAS PRODUCER.

APPLICATION FILED JAN. 31, 1900.

NO MODEL.

Fig. 2.

2 SHEETS—SHEET 2.



Witnesses:  
H. S. Austin  
H. A. Knight

Inventor:  
J. G. Sanderson,  
By Knight Bros.  
attys.



# UNITED STATES PATENT OFFICE.

JAMES GARDNER SANDERSON, OF SCRANTON, PENNSYLVANIA.

## GAS-PRODUCER.

SPECIFICATION forming part of Letters Patent No. 755,702, dated March 29, 1904.

Application filed January 31, 1900. Serial No. 3,395. (No model.)

*To all whom it may concern:*

Be it known that I, JAMES GARDNER SANDERSON, a citizen of the United States, and a resident of Scranton, in the county of Lackawanna and State of Pennsylvania, have invented certain new and useful Improvements in Gas-Producers, of which the following is a specification.

My invention relates to an improvement in gas-producers, and is especially designed for the production of gas from small coals, such as coal-waste and anthracite culm. The apparatus may, however, with slight modification of details, without change in its general plan, be adapted for producing gas from larger sizes of coal, as will hereinafter appear.

My invention consists in certain novel features of construction, which will be hereinafter fully described, and particularly pointed out in the claims, reference being had to the accompanying drawings, in which—

Figure 1 is a vertical section of a complete apparatus embodying my invention. Figs. 2 and 3 are horizontal sections taken, respectively, on the lines 2 2 and 3 3 of Fig. 1.

The apparatus comprises a water-tight ash-pit 1, a fuel-chamber 2, rising from said pit, a pipe 3, projecting centrally from the pit and terminating in a conical grate 4 within the fuel-chamber, through which air and steam are supplied to support combustion, a fuel-supply hopper 5, and a gas-outlet pipe 6.

The water-tight pit is preferably constructed of cement, with radial inclines 7, Figs. 2 and 3, for withdrawing ashes therefrom, and a central elevation 8, through which the pipe 3 rises, having a beveled periphery 8<sup>a</sup>, while surrounding said pipe above the elevation 8 is a star-shaped agitator 9, having a circular base 10, controlled by an arm 11, which extends outward and upward within reach above the pit for displacing the ash outward from the central elevation toward the pit, said agitator being supported by flange 12 and retained against riding up by annular shoulder 13.

The conical grate 4, surmounting the pipe 3, is preferably constructed of rings 14, spaced apart by lugs or ribs 15, the whole being built up and secured together by bolt 16, having a conical head 16<sup>a</sup> and extending downward

through and provided with a nut beneath a cross-bar 17, as described in my Letters Patent No. 561,729, issued June 9, 1896.

The wall of the fuel-chamber has a base 18, supported upon radially-disposed legs 19 and formed with a cylindrical apron 20, extending below the water-line in the pit 1, and a horizontal flange 21, the latter providing a support and closure for the lower ends of an annular series of closely-arranged tubes 22, that constitutes a cylindrical water-tube wall for the fuel-chamber. These tubes are arranged so as to have direct peripheral contact and provide a continuous circumferential wall or fire-chamber into which the fuel is fed. The tubes are likewise closed at top and are individually connected near their respective upper and lower ends, through upper and lower series of short pipes 23 24, with an upper annular water or steam chamber 25 and a corresponding lower chamber 26. The annular chambers 25 and 26 are suitably connected, through pipes 27 28, with suitable water discharge and supply pipes. The cylindrical water-tube wall 22 is girdled by strengthening-bands and surrounded by non-conducting jacket 30, filling the interstices between the outer sides of the tubes and metallic sheathing 31. The top 32 of the fuel-chamber may be of any suitable metallic construction. It supports the gas-outlet 6 and may be provided with manhole 33 and cover 34.

The fuel-supply means will vary according to the condition of the fuel to be supplied. The construction shown is intended for very small coal, such as waste or culm, and comprises a hopper 35 with a chute 36, terminating in a flaring mouth 37 within the fuel-chamber, a feed-screw 38 in the chute, mounted upon a shaft 39, having a suitable driving connection 40 without the hopper, and an agitator 41 on said shaft at the mouth of the hopper to keep the fuel loosened up and permit its passage into the chute. If it should be desired to feed fuel in coarser condition, it will be desirable to use some different construction of fuel-feed—such, for instance, as that described in my previous Letters Patent, No. 561,729, hereinbefore referred to.

The operation of the apparatus and the ob-



ject of the various parts are as follows: The pit is filled with water to a level above the lower edge of the apron, and the bottom of the apparatus is filled with ash, waste fuel, or rubbish to a level above the water. Fire is then started on top of this bed in the usual manner, air being admitted through the air-pipe and grate. When combustion is well established, the fuel-chamber is filled with fuel up to the discharge end of the feed-chute. The hopper being supplied with fine fuel, like anthracite culm, (which is pulverized coal, much of it being powder,) the vertical shaft carrying the feed-screw is revolved in the direction to convey the fuel downward through the chute, and fuel is continuously and uniformly supplied to the fuel-chamber of the gas-producer, the quantity of fuel so supplied being regulated by the speed of the feed-screw. The chute being always filled with the fine fuel prevents the escape of gas therethrough, but compels all the gas to pass out through the intended outlet.

The peculiar construction of the cylindrical water-tube wall of the gas-producer permits the replacing of any damaged portion thereof without the destruction of the entire structure. The heated water from the upper chamber may be conducted to a steam-boiler for furnishing steam used in the manufacture of gas or for other purposes. As combustion proceeds and ash accumulates in the lower portion of the fuel-chamber it may be removed from around the walls of the chamber by raking out from underneath the apron into the pit, the agitator being employed to loosen it up and shove it to the outer portion of the chamber. It will be observed that the base, grate, and ash-pit of this producer are very simple and substantial in construction, with but one moving part, and that below the line of combustion and water-level.

The walls of the pit and base of the producer are preferably composed of Portland-cement concrete, the air-pipe being embedded in the concrete. The legs of the base offer little obstruction to the removal of ash from the interior of the producer. The hand-holes which are provided in the apron afford opportunity for reaching the interior above the water-level in case of necessity, such as to break up an accumulation of clinker, &c. The ash is finally removed from the pit by way of the

radial inclines, as already set forth. I have shown two of these inclines in the accompanying drawings; but one or more than two may be employed.

Having thus described my invention, the following is what I claim as new therein and desire to secure by Letters Patent:

1. A gas-producer comprising a fuel-chamber having a continuous wall formed of a series of circumferentially-arranged individual water-tubes located in direct contact with each other and provided with passages for the ingress and egress of water therefrom, and bands encircling and impinging against the wall for holding the tubes in place.

2. A gas-producer comprising a fuel-chamber having a continuous wall formed of a series of circumferentially-arranged individual water-tubes located in direct contact with each other and provided with passages for the ingress and egress of water therefrom, a metallic sheathing surrounding the fuel-chamber and a non-conducting jacket located between the water-tubes and the sheathing.

3. A gas-producer comprising a fuel-chamber having a continuous wall formed of a series of circumferentially-arranged individual water-tubes located in direct contact with each other and provided with passages for the ingress and egress of water therefrom, bands encircling and impinging against the wall for holding the tubes in place, a metallic sheathing surrounding the fuel-chamber and a non-conducting jacket located between the water-tubes and the sheathing.

4. A gas-producer comprising a fuel-chamber having a continuous wall formed of a series of circumferentially-arranged individual water-tubes located in direct contact with each other and each tube provided with a small tube at the bottom and a small tube at the top thereof for the ingress and egress of water therefrom, lower and upper annular water-chambers with which the small tubes are independently connected and means for conducting water to and from the water-chambers.

Signed at Scranton, Pennsylvania, this 24th day of January, 1900.

JAMES GARDNER SANDERSON.

Witnesses:

HERBERT L. TAYLOR,  
J. B. DOWD.