

No. 666,032.

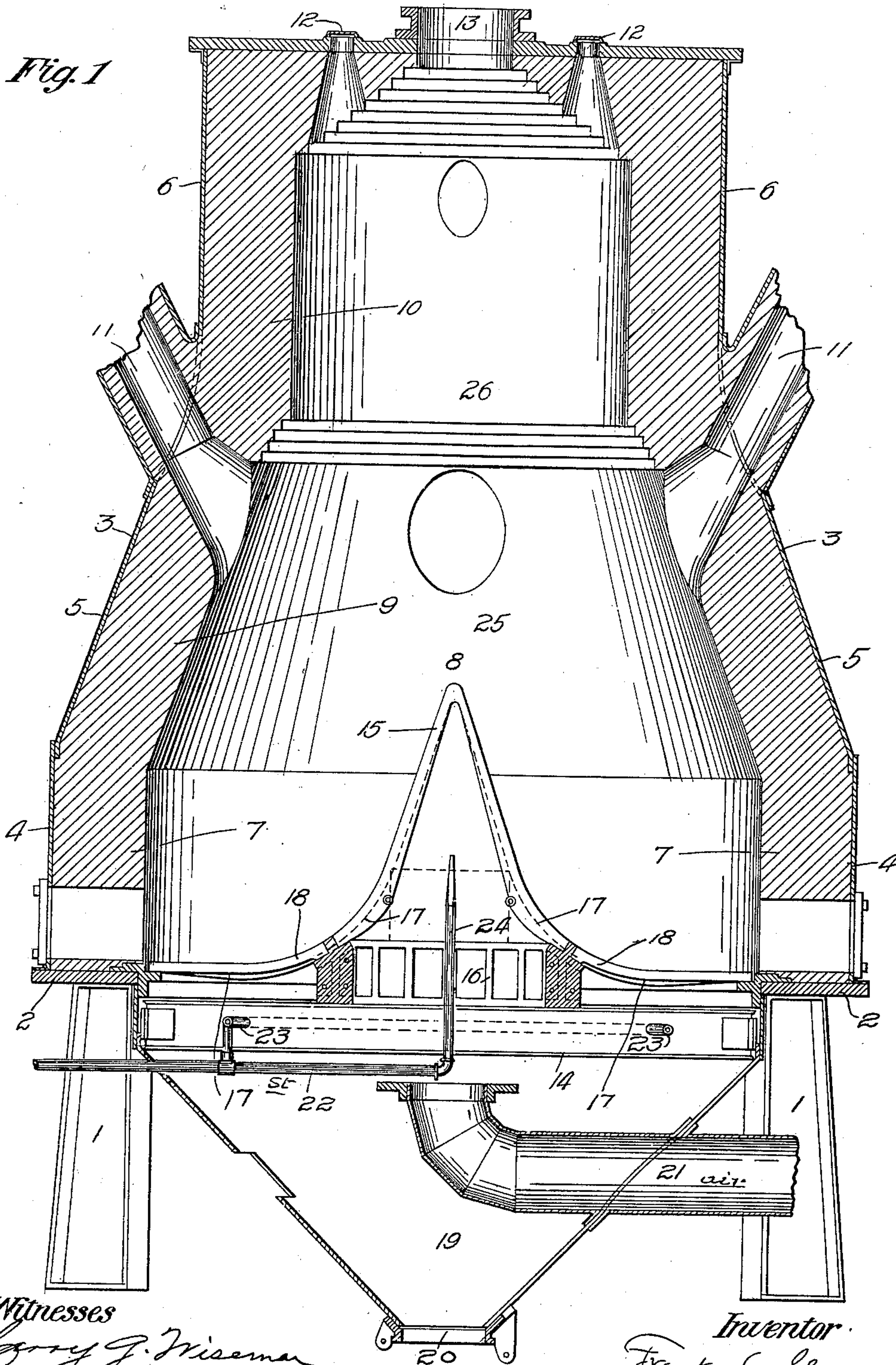
Patented Jan. 15, 1901.

F. L. SLOCUM.  
PROCESS OF MAKING GAS.

(Application filed Jan. 10, 1900.)

(No Model.)

Fig. 1



Witnesses  
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# UNITED STATES PATENT OFFICE.

FRANK L. SLOCUM, OF PITTSBURG, PENNSYLVANIA.

## PROCESS OF MAKING GAS.

SPECIFICATION forming part of Letters Patent No. 666,032, dated January 15, 1901.

Application filed January 10, 1900. Serial No. 931. (No specimens.)

*To all whom it may concern:*

Be it known that I, FRANK L. SLOCUM, a resident of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Manufacturing Gas; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to the manufacture of water-gas and carbureted water-gas, its object being to provide for the manufacture of such gases by the quick blasting up of the fuel—coal or coke—and the production of carbonic acid in large proportion in such blasting operation, so as to raise the fuel to higher heat by shorter blasting periods and provide for longer runs of gas-making.

The particular improvements relating to this general process are specially, though not exclusively, applicable to the making of gas from bituminous coal and to so operating as to prevent the clogging of the generator and to provide for the carrying off of the hydrocarbons or other vapors from the coal with the water-gas generated, as will be hereinafter more particularly set forth.

The special improvement consists, generally stated, in making such water-gas by providing a wide shallow body of ignited fuel, superposed by a narrow body of unignited fuel, and passing the air in upward and diagonally-outward courses through the body of ignited fuel in such quantities as to insure the production of a major portion of carbonic acid, and subsequently passing the steam in upward course through the ignited and incandescent fuel and the gases produced upwardly through the unignited fuel, it being found that in so working the fuel can be maintained in condition for gas-making with but short air-blasting at long intervals and that a larger proportion of gas may be obtained, and at the same time the hydrocarbons contained in the coal can be carried off with the water-gas produced, while practically all danger of clogging the apparatus is overcome.

To enable others skilled in the art to practice my invention, I will describe the same more fully, referring to the accompanying drawing, which is a longitudinal central section of a generator suitable for practicing the invention.

In practicing the invention it is preferred to employ bituminous coal, for the reason that a large proportion of the hydrocarbons contained therein can be saved and carried off with the water-gas generated, while but little of the same are wasted in connection with the blasting up of the mass. The apparatus illustrated is considered the best suited for the practice of the method, especially in connection with the use of such bituminous coal, and I will therefore describe the same before describing the method in detail.

The generator-body is supported on suitable standards 1, which support the bed-plate 2, on which the shell 3 and the brickwork of the generator are supported. The shell 3, as shown, is provided with the vertical portion 4, the converging portion 5, and the vertical portion 6, and the lining of the brickwork of the generator is arranged practically on the same lines, having the vertical portion 7 extending up a short distance above the grate 8 and the upwardly-converging or downwardly-flaring portion 9 leading up into the narrow vertical fuel-feeding portion 10. At or near the top of the converging portion 9 are the blast-outlets 11, there being several of such blast-outlets, the drawing showing three of the four used with the type of furnace disclosed, and the number depending upon the size of the generator, and these outlets being arranged around the generator so as to give free exit to the products of combustion from the wide body of fuel in the lower part of the generator.

In the upper part of the generator is the gas-outlet 11<sup>a</sup>, while the top of the generator is provided with the poke-holes 12 and the fuel-entrance 13, which are of course closed in any suitable way. In the lower part of the generator is arranged the grate 8, above referred to, which is supported on the cross-beams 14 and has a wide grate expanse, as illustrated, having a conoidal central grate portion 15 extending up centrally of the generator, so as to increase the grate-surface and provide for the distribution of the air throughout the mass of coal in the wide shallow base of the generator. As illustrated, this conoidal grate portion 15 rests on the ring 16, supported on the beams 14, said ring 16 giving support to the lower ends of the grate-bars 17, forming the conoidal central portion 15,



and the inner ends of the grate-bars 18, which extend from said ring to the outer wall of said generator. The lower portion of the generator has a closed ash-pan 19, with a discharge-door 20 and the entrance-pipe 21 for the air-blast. The steam-pipe 22 enters through the ash-pit 19, and in order to distribute the steam quickly to the incandescent fuel in the lower part of the generator I employ the perforated ring-pipe 23, extending around about midway of the horizontal grate portion 18, and also the central steam-pipe 24, rising within the conoidal grate 15, it being found that by such construction the steam is discharged from the steam-pipes close to the fuel and rises quickly, so as to pass into the same.

In the practice of the invention with the apparatus above described fire is built upon the grate, and in the ordinary way the mass of fuel is built up within the generator until a sufficient body for gas-making is obtained, the fuel in the lower part of the generator—that is, the combustion-chamber 25 thereof—gradually tapering in upward direction and supporting a body of unignited fuel in the upper chamber 26 thereof. I thus provide a wide shallow body of ignited fuel in the lower part of the generator in position for the passage of the blast through the same in but a short course and that course diagonally upward and outward through the mass of the fuel, so that all the fuel in the large shallow body can be rapidly blasted up ready for gas-making, while above the same is supported the narrow body of unignited fuel and one of bituminous coal containing the ordinary hydrocarbons, which can be carried off by the water-gas generated. As the air enters through the blast-pipe, a large, indeed the major, part thereof rises through the conoidal central portion of the grate and passes in such diagonally upward and outward course from the center of the mass through to the blast-outlets 11, and sufficient air is supplied in this way to form carbonic acid and prevent the formation of any large proportion of carbonic oxid in the passage of the same through the mass, a much higher heat being so generated and the mass of the fuel in the lower part of the generator being thus raised to proper incandescence for gas-making with very short blasting periods. The air is then turned off, the blast-outlets closed, the gas-outlet opened, suitable well-known means being used therefor, and steam is admitted, this steam rising upwardly through the mass of incandescent fuel in the lower part of the generator, and on account of the wide shallow

mass of fuel present it being possible to provide for the generation of a very large volume of the gas, and such water-gas so produced after passing upwardly through the mass of ignited and incandescent fuel rising into the mass of unignited fuel, which has been, of course, heated up by the high heat generated by the rapid combustion in the mass below it, so that the hot-water gases so formed can easily carry off the hydrocarbons contained in the fuel, which pass off with the water-gas and serve to enrich the same. In so operating a very short time only is required to blast up the fuel after it has cooled below the temperature proper for making water-gas, while the runs in the making of water-gas can be extended much longer on account of the high heat to which the fuel is brought, and in this way a much greater proportion of gas per ton of coal is produced, and the hydrocarbons contained in the fuel, such as found in bituminous coal, are practically all saved in the resultant water-gas, and the fuel superposed above the mass is gradually coked, a large proportion of the same being brought into coke form before it reaches the lower part of the generator, where it is subjected directly to the air-blast.

What I claim as my invention is—

1. The improvement in the art of making carbureted water-gas herein described, consisting in providing a wide, shallow body of ignited fuel superposed by a narrow body of unignited fuel, passing air in upward and diagonal outward courses through the body of ignited fuel in such quantity as to insure production of a major portion of carbonic acid, and subsequently passing steam in upward course through the ignited and incandescent fuel and the gases produced upwardly through the unignited fuel.

2. The improvement in the art of making carbureted water-gas herein described, consisting in providing a wide, shallow body of ignited fuel superimposed by a narrow body of unignited fuel, passing air through the body of ignited fuel only, in such quantity as to insure production of a major portion of carbonic acid, drawing off the blast products at a point below the body of unignited fuel and subsequently passing steam in upward course through both the ignited and unignited fuel.

In testimony whereof I, the said FRANK L. SLOCUM, have hereunto set my hand.

FRANK L. SLOCUM.

Witnesses:

JAMES I. KAY,  
ROBERT C. TOTTEN.