

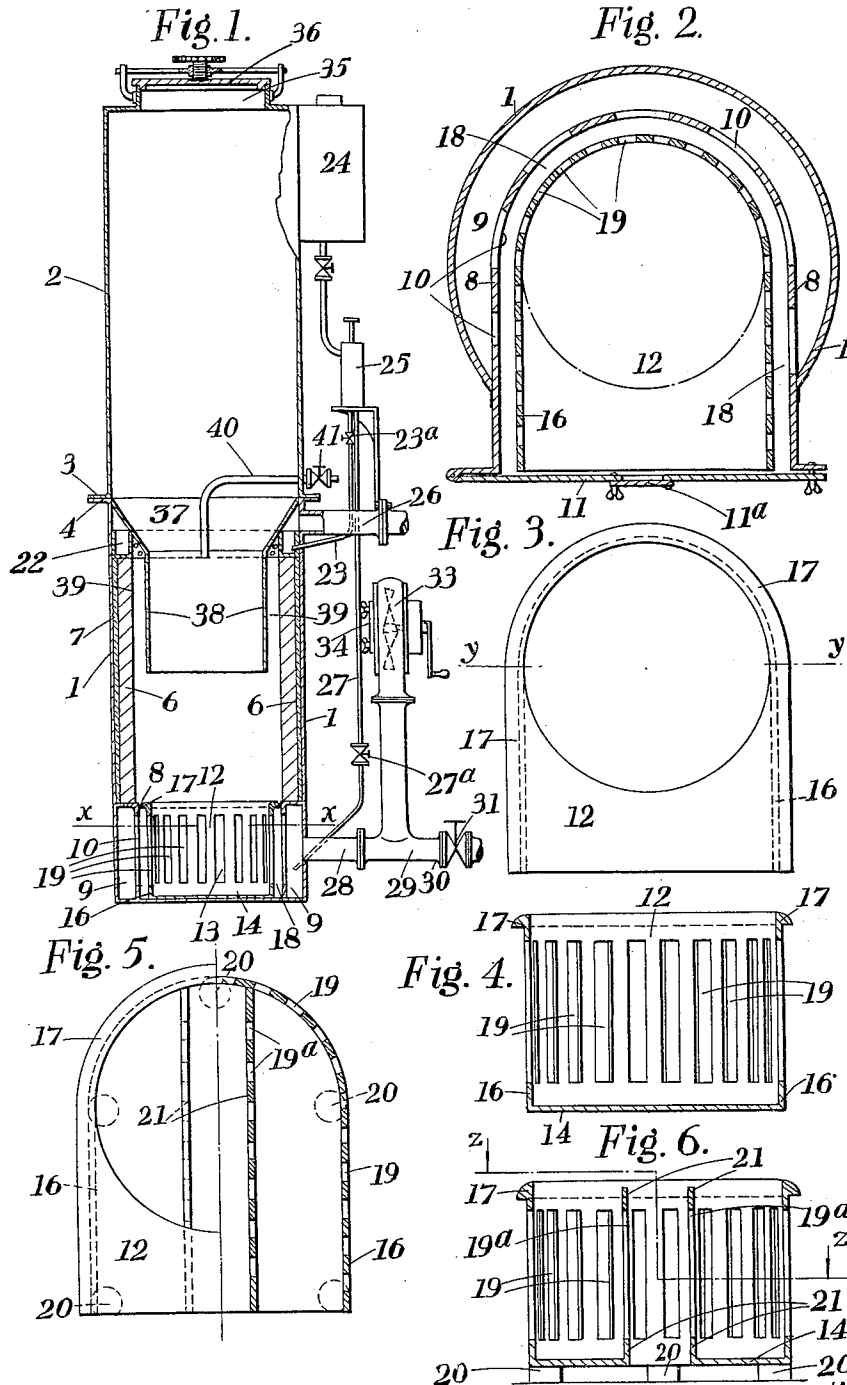
May 2, 1933.

N. C. JONES

1,907,388

PRODUCER GAS GENERATOR

Filed June 9, 1930



INVENTOR

Norman C. Jones

BY

Wilkinson & Mawhinney

ATTORNEYS

UNITED STATES PATENT OFFICE

NORMAN CLARKE JONES, OF LONDON, ENGLAND, ASSIGNOR TO MOTOR OWNERS
PETROL COMBINE LIMITED, OF LONDON, ENGLAND

PRODUCER GAS GENERATOR

Application filed June 9, 1930, Serial No. 460,022, and in Great Britain June 10, 1929.

This invention relates to apparatus for the generation of producer gas as used for the fuel supply of internal combustion engines and has particular reference to that class of apparatus used in connection with automobiles, tractors, agricultural sets, small marine craft and the like. Various fuels such as charcoal, sawdust, ordinary gas coke and other carbonaceous substances have been used in connection with this class of apparatus wherein the generator used for the purpose is provided with an ordinary grate and the fuel is consumed for the purpose of gas generation by an up or down draught through the fuel.

Now with the employment as the fuel of low temperature coke, that is to say, coke obtained from or by the low temperature distillation of coal, when used for the purpose aforesaid and in a generator of the ordinary kind, owing to the intense heat emitted during the combustion of the fuel the excessive clinkering or collection of ash and slag on the grate is inevitable in consequence of which the quality of gas generated falls and finally the generation of gas is quickly prevented because the admission of air to support combustion becomes inadmissible or prevented.

The principal object of the present invention is to provide means whereby this low temperature coke can be used for the production or generation of producer gas and according to the present invention, whether it be applied to a generator working on the up or down draught system, the ordinary grate is dispensed with in a manner somewhat similar to the down draft generator described in patent specification No. 1,523,163, and in substitution thereof an ashpan or receptacle is provided which makes provision for slag, ash and clinker for a considerable period and permits the ingress of the air necessary for supporting the combustion of the fuel.

Incidentally by the construction of the generator according to the present invention when low temperature coke is used as fuel not only the up or down draught system may be employed but when tarry matter is present in the fuel a combined up and down draught sys-

tem can be utilized whereby the richer gas which it is possible to obtain by the up-draught system as against the poorer gas from the down draught system can still be obtained while the tarry matter is destroyed. By this means the advantages of each system can therefore be obtained.

Another object of the invention is to provide a gas generator of increased output capacity in place of the ordinary grate generator where the output depends upon the grate area available.

Other objects and advantages of the invention will be apparent from the following description in which reference is made to the accompanying drawing.

In order that the invention may be more clearly understood and readily carried into effect, reference may now be had to the accompanying drawing in which:—

Figure 1 is a diagrammatical cross section of the improved generator.

Figure 2 is a transverse sectional plan on line $x-x$ of Figure 1 to a larger scale.

Figure 3 is a plan view of the ashpan of the generator, and

Figure 4 is a sectional elevation on line $y-y$ of Figure 3.

Figures 5 and 6 illustrate a modification in the construction of the ashpan, the former being a sectional plan as viewed from line $z-z$ Figure 6 which is a sectional elevation.

Similar reference characters relate to like parts in all the figures or the drawing.

Referring now to Figure 1 of the drawing, the generator consists of two cylindrical drums 1 and 2 provided with flanges 3 and 4 which are secured together by bolts in the usual way. The drum 1 forms the combustion chamber or gas generating compartment and is provided with a renewable lining 6 of refractory material or non-corrosive heat-resisting steel which is separated from the walls of the drum 1 by a partition of insulating material 7. The lining 6 rests upon a steel angle ring 8 which is welded on to the wall of drum 1 near the bottom, the said angle ring 8 forming an annular chamber 9 round the generator base. A communication to the inside of drum 1 from the annular chamber 9

is made possible by means of passages 10 cut out from the vertical wall of ring 8. A door 11 (Figures 1 and 2) affords access to the combustion chamber and into the space made in the base of the generator by the ring 8. The door 11 is of such size as to be the full height of the ring 8 and as wide as the distance between the two vertical walls of the ring on line $y-y$ Figure 2. The door thus affords complete access to the base of the generator for an ashpan or receptacle 12. The ashpan or receptacle 12 which is made of suitable heat-resisting non-corrosive steel or metal alloy is of such size as will just allow it to slide through door 11 into the space provided in the bottom of the generator by the angle ring 8, the bottom of the generator being covered with a thin layer of fire cement or refractory lining 13.

The ashpan or receptacle 12 is provided with a base plate 14 and the vertical walls 16 are provided at the top with a bead or flange 17 so that when in position a space 18 is left between ring 8 and the wall 16. The wall 16 is provided with a number of slots or slits 19 which may extend from the base plate 14 to the ledge 17 or be shorter if required, the said slots or slits being of any suitable width. The ashpan is open at the top except for the portion which is immediately under the refractory liner 6. It is also open at the front so that ready access may be had to the ashpan when in the generator through door 11 or so that the ashpan contents may be examined through slide door 11a fitted on the main door 11.

A modification in the construction of the ashpan is shown in Figures 5 and 6 in which the base plate 14 is provided with feet 20 so that an air passage is provided beneath the pan in which case the pan may also have internal vertical walls 21 provided with slots or slits 19a as well as with the external walls provided with the slots or slits 19.

At the top of the lining 6 there is provided an annular chamber 22 with a perforated inside wall, such chamber serving for the purpose of the reception of a regulated quantity of water which may be fed to it, when working on the down draught system, by pipe 23 from water tank 24 situated on the side of the drum 2 controlled by the ordinary needle valve or drip feed regulator 25, a valve 23a being provided to exclude such supply when not required. The annular chamber 22 also serves (when working on the up-draught or the combined up and down draught system) as a collecting ring for the gas for which a suitable conduit 26 is provided.

The annular chamber 9 formed in the base of the generator by angle ring 8 serves for the reception of a regulated quantity of water (when working on the up-draught system) by the pipe 27 controlled by the drip

feed regulator 25 in connection with the water tank 24, a valve 27a being interposed to exclude the supply when not required. The chamber 9 also serves for the reception of gas when working on the down draught system and is provided with a suitable conduit 28 to which is connected a T piece 29. To the flange 30 on the T piece 29 is connected a suitable valve 31 for use when working on the up-draught system or combined up and down draught system.

The vertical leg 32 of T piece 29 is provided with a suitable hand power fan 33 fitted with a slide 34, the said fan being used for starting up purposes and the slide for regulating the air supply to the generator when working on the up-draught system or combined up and down draught systems. When working down draught the slide 34 is of course kept fully closed.

The drum 2 forms the fuel container and has an opening 35 which is closed by a cover 36 which serves for the purpose of charging the generator with fuel. At the bottom of the fuel container is the inclined base 37 which is provided with a tubular dependence or spout 38 that actually constitutes an auxiliary furnace, the said spout being made of non-corrosive heat-resisting metal and is of such diameter that a narrow passage 39 is formed between its wall and the liner 6. Passing through the side of the container 2 there is a tube 40, one end of which passes into the centre of the container at a position directly above the spout 38. A regulating valve 41 is provided in the tube 40 outside the container 2 by which a regulated quantity of air can be allowed to pass when working the generator on the combined up and down draught system or the combined down draught system.

A brief description of the method of operating the above described apparatus may be now given referring to Figure 1 and assuming it is desired to work on the up-draught system, the lid 36 is removed and when the fire in the ashpan or receptacle 12 is kindled the door 11 is closed. The valve 31 is closed and the slide 34 on fan 33 is open. The fan 33 is set in motion so that air is forced through the conduit 28 into annular chamber 9 then by passages 10 into space 18 and finally through the slits or slots 19 into the ashpan or receptacle 12 and then through the fuel finally proceeding via passage 39 into the annular chamber 22 to pass through conduit 26 on its way to the engine. When the fire is well alight the container 2 is filled with fuel and the lid 36 fixed in position. The fan 33 is then rotated until the fuel is of a sufficiently high temperature when the fan is stopped and water is allowed to pass into the annular chamber 9 where it is vaporized and mixes with the incoming air. The engine to which the gen-

erator is fitted is then started and the generator then works by engine suction, the air being drawn through the fan slide opening through the conduit 28 is mixed with steam
5 in annular chamber 9 and is finally drawn into the ashpan 12 by the passage described whence it passes through the incandescent fuel, is converted into gas and passes through the passage 39, chamber 22 and pipe
10 26 on its way to scrubbers preparatory to entering the engine.

The clinker or slag which in the case of the grate type generator usually form on the grate now forms in the ashpan or receptacle
15 12 and as a rule in a molten or semi-fluid condition falls to the bottom of the pan where it can remain throughout the day's work of the generator or may be removed occasionally through door slide 11a if required. It
20 should be understood that the depth of the ashpan 12 is based upon a maximum ash content of the type of fuel used and is calculated to make possible long periods of running required from this type of apparatus without
25 trouble due to air stoppage. The air slots or slits 19 in the ashpan are calculated to supply much more air than is necessary for the efficient operation of the generator so that even if the slots or slits, due to long periods
30 of running, become partially covered with the molten or semi-fluid clinker from the base upwards, sufficient air can still pass into the generator to maintain efficiency. The engine which produces the suction on the generator
35 only draws into the generator sufficient air to produce the gas so that the extra provision of air passages is of considerable importance.

It will also be understood from the accompanying drawing that by partially closing
40 the slide 34 on fan 33 and opening the air valve 41 to the requisite degree, that a double draught will be obtained on the generator and that the fuel in the spout 38 will become ignited. The gas from this fuel will pass
45 through the incandescent fuel in the generator below the spout and any tarry matter will be consumed, yet at the same time, owing to the fuel above the ashpan being subjected to an up-draught, the calorific value of the
50 gas delivered from the pipe 26 will be maintained.

In order to operate the generator by the down-draught principle the valve 31 is
55 opened and is connected to the scrubbers and thence to the engine. The fuel in the generator is then ignited as in the case of the up-draught above described and as soon as gas is obtained the engine is started up, air then being drawn by suction through pipe 26,
60 through the annular ring 22, down passage 39, through the incandescent fuel, the gas then leaving the ashpan 12 by slots 19 passes through passages 10 to the annular chamber 9 and thence through pipe 28 to the scrubbers.
65 Before starting the engine the slide 34 on

fan 33 must of course be fully closed. When working down-draught a regulated quantity of water is allowed to enter annular ring 22 from pipe 23 and in the case of very tarry
70 fuels, for which the down-draught system is usually employed, it is possible, by opening valve 41 to the requisite degree, to ignite the fuel in spout furnace 38, the tarry gas from which, by being drawn through the incandescent fuel below the spout, is purified
75 owing to the tarry matter being consumed.

It should be understood that while the above improvements are intended more particularly to facilitate the employment of low
80 temperature coke as fuel, they are also applicable to ordinary known fuels, and in fact, with certain fuels such as those with very low ash content such as charcoal, result in increased efficiency owing to the vastly increased air inlet area made possible by the
85 vertical slots 19 as against the ordinary grate area available in a generator of the same size fitted with the usual grate upon which the fuel rests.

What I claim is:—

In a producer gas generator for automobile engines comprising two cylindrical drums, the upper adapted to contain fuel, provided with a removable cover and a conical base, a lower drum having a refractory lining there-
95 in supported by an annular ring at the base, a perforated annular ring mounted on said lining, pipes communicating with said base and said collector ring, and a removable perforated ash pan communicating with a door
100 in said base, the improvement comprising means for admitting regulated quantities of water to the base of said generator and to the said annular collecting ring, a valved air inlet pipe communicating with the interior of
105 said upper drum, and a perforated baffle ring spaced from said ash pan and forming a gas chamber with said base.

In testimony whereof I affix my signature.

NORMAN CLARKE JONES. 110

115

120

125

130