

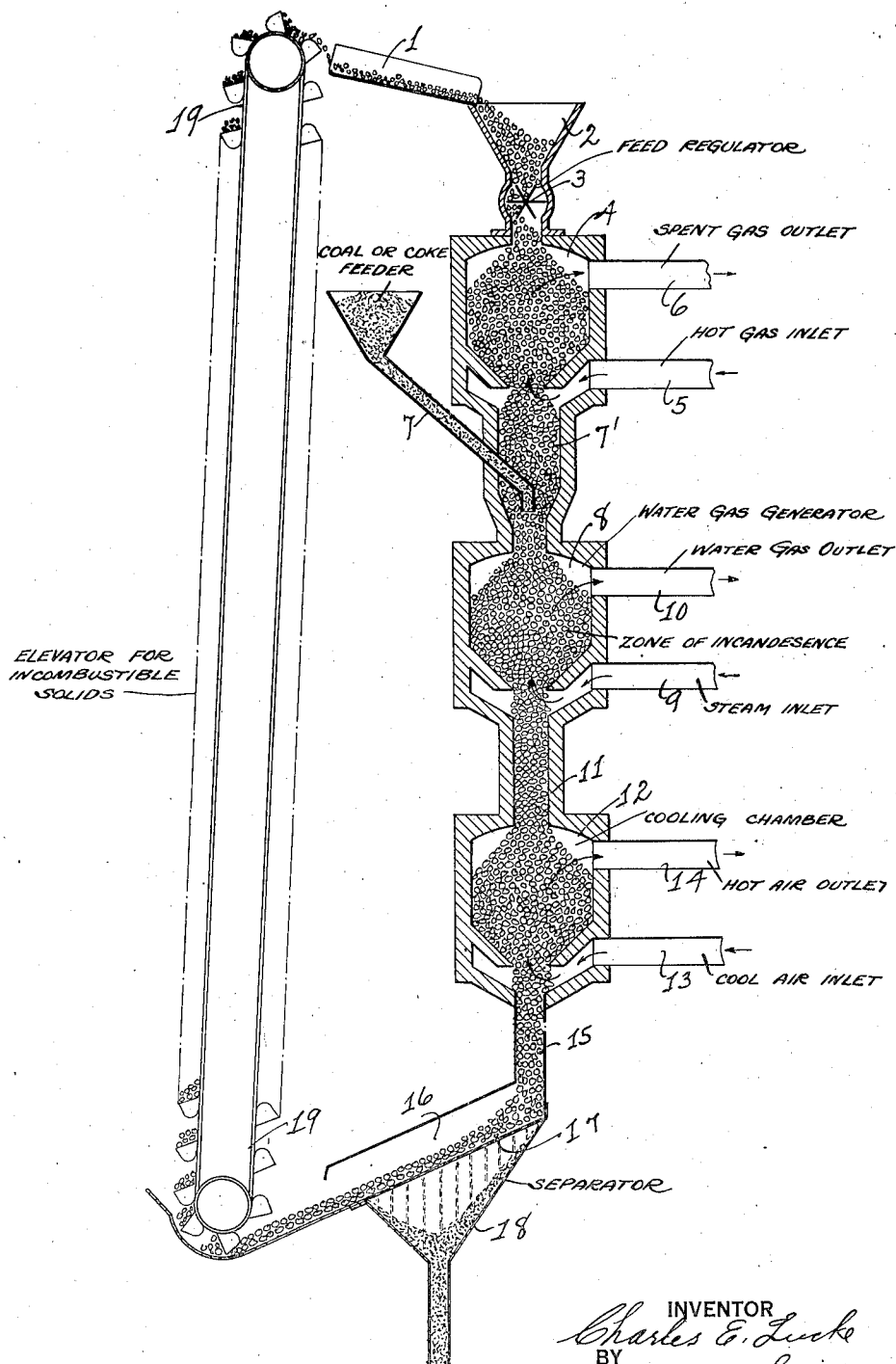
Oct. 23, 1934.

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1,977,684

PROCESS OF PRODUCING WATER GAS

Original Filed Oct. 1, 1927



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UNITED STATES PATENT OFFICE

1,977,684

PROCESS OF PRODUCING WATER GAS

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Original application October 1, 1927, Serial No.
223,268. Divided and this application Decem-
ber 1, 1928, Serial No. 323,108. Renewed No-
vember 18, 1932

2 Claims. (Cl. 48—206)

This invention relates to the production of wa-
ter gas by heating coal or coke, using balls or
other shaped particles of incombustible solid ma-
terial and supplying steam thereto. This is a di-
vision of my application Ser. 223,268 filed Octo-
ber 1, 1927.

The invention will be understood from the de-
scription in connection with the accompanying
drawing, which is a vertical section through an
illustrative embodiment of a device for carrying
out the invention.

While the invention will be described in con-
nection with the use of balls of solid incombusti-
ble material, it is to be understood that other
shapes may be used and that the material may
be metallic or non-metallic.

In the drawing reference character 1 indicates
a chute that leads to a hopper 2 that is provided
with a rotating valve 3 at the lower portion there-
of for feeding the balls into a heating chamber
4 that is provided with a hot gas inlet 5 near its
lower end and with a spent gas outlet 6 near its
upper end. When the balls moving beyond the
valve 3 fall, as indicated, centrally of the cham-
ber 4, the stream of balls is expanded and the
heating of the materials in the chamber by the
passage of hot gases therethrough is facilitated.

An inlet 7 for coal or coke leads into a connec-
tion 7' leading from the lower portion of the
chamber 4 into the upper portion of a second
chamber 8 where the water gas is generated.
When the coal or coke passes from the inlet 7
to a position centrally of the relatively contracted
stream of incombustible bodies in the connec-
tion 7, adequately prompt and complete heating
of the fuel is promoted. When, after the fuel is
delivered centrally of the relatively contracted
stream and after the gasification of the fuel is
started, the combined stream of fuel and incom-
bustible bodies expands within the chamber 8
while steam passes upwardly through the com-
bined mass. This simultaneous passage of the
steam and expanding of the stream of incandes-
cent, incombustible bodies provides for improved
passage and contact of the steam with the bodies
and improved action in the formation of the re-
sultant water gas. A steam pipe 9 enters the
lower portion of the chamber 8 and an outlet
pipe 10 for the water gas leads away from the
upper portion of the chamber 8.

A connection 11 leads from the lower portion
of the chamber 8 into the upper portion of the
chamber 12 where the solid particles are cooled.
The lower portion of the chamber 12 is provided

with a cooled air inlet 13 near the bottom and a
heated air outlet 14 near the top.

A connection 15 leads from the lower portion of
the chamber 12 to a chute 16 that is provided
along the bottom side thereof with a perforated
screen 17 below which an outlet 18 is provided.
An elevator 19 is provided at the lower end of
the chute 16 for raising the balls to the chute
1 at the top.

The operation is as follows:

Balls or other shapes of solid incombusti-
ble material pass along the chute 1 into the hop-
per 2 from which they are fed at a regulated rate
by means of the rotating valve 3 into the heat-
ing chamber 4 where they are heated by hot gases
entering through the inlet 5 and contacting with
the balls in a countercurrent direction, the spent
gases passing out through the outlet 6. The balls
are heated in the chamber 4 to a sufficiently high
temperature to render the coal or coke that is
subsequently mixed therewith incandescent. The
hot balls pass downwardly through the connection
7' and coal or coke, preferably in particles smaller
than the balls, are introduced through the inlet
7 and pass with the balls into the water gas gen-
erator 8 in an incandescent state. Steam that
enters through the inlet 9 contacts with the in-
candescent coal or coke in the generator 8 and
the sensible heat of the balls supplies the heat
for the endothermic reaction in this chamber that
generates water gas. The endothermic reaction
cools the mixture to some extent. The water gas
passes through the outlet 10 to a cooler or place
of use, not shown.

The partially cooled balls and the ashes from
the coal or coke pass through the connection
11 into the chamber 12 where they are further
cooled by cool air that enters through the inlet
13 while the hot air passes out through the outlet
14. The cooled mixture of hot balls and ashes
then passes over the screen 17 at the bottom of
the chute 16, the ashes passing into the outlet
18 and the balls pass into the lower end of the
chute 16, from which they are elevated by means
of the conveyor 19 and again enter the chute 1.

I claim:

1. In a process for producing water gas, the
maintenance of an enclosed column of incom-
bustible bodies constantly moving towards one
end of the column, the commingling of solid
carbonaceous fuel by delivering said fuel within
the moving column while the stream of mate-
rials in the column is in a relatively contracted
state, subsequently expanding the enclosed
stream of the column in a chamber at a position

beyond the positions of heating and commingling, passing steam countercurrently through the commingled materials in the stream of the column while it is expanding, continuously withdrawing water gas formed during the movement of the column, and returning the bodies of incombustible material to the entry end of the column after their movement past the position at which the water gas was formed.

2. In a process for producing water gas, the maintenance of a constantly progressing enclosed stream of heat absorbing incombustible bodies, heating said bodies in an initial zone of the stream, commingling solid carbonaceous fuel by causing said fuel to be delivered at a point within the stream where the latter is relatively contracted, expanding the stream of commingled incombustible bodies and fuel in a chamber beyond the point of entry to the fuel, introducing steam into said chamber so that it passes through the bodies of mixed fuel and incombustible materials while the latter are in a state of incandescence and while the stream is expanded in said chamber, continuously withdrawing the water gas formed in said chamber, again expanding the stream of material after it passes from said chamber, and extracting heat from the bodies of material while they are subject to the last mentioned expansion.

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60	135
65	140
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75	150