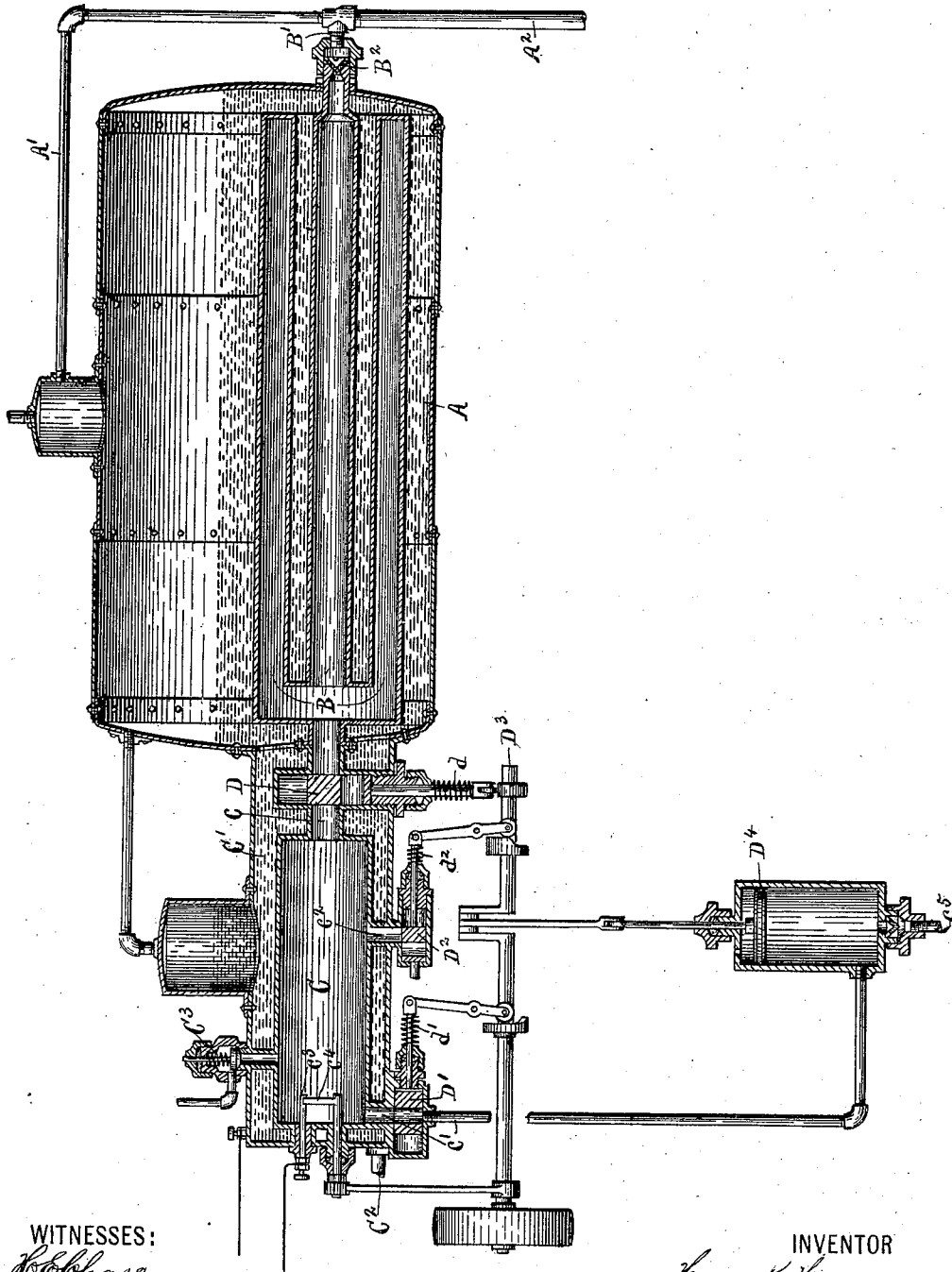


(No Model.)

H. K. HESS.
STEAM GENERATOR.

No. 582,351.

Patented May 11, 1897.



WITNESSES:

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UNITED STATES PATENT OFFICE.

HENRY K. HESS, OF SYRACUSE, NEW YORK.

STEAM-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 582,351, dated May 11, 1897.

Application filed June 16, 1896. Serial No. 595,770. (No model.)

To all whom it may concern:

Be it known that I, HENRY K. HESS, of Syracuse, in the county of Onondaga, in the State of New York, have invented new and
5 useful Improvements in Steam-Generators, of which the following, taken in connection with the accompanying drawing, is a full, clear, and exact description.

My invention relates to improvements in
10 generators for steam or hot water, and has for its object the production of a device which produces a maximum amount of steam at a minimum cost of fuel; and to this end it consists, essentially, in the general construction
15 and arrangement of the component parts of the generator, all as hereinafter fully described, and pointed out in the claims.

In describing this invention reference is had to the accompanying drawing, forming a
20 part of this specification, in which like letters indicate corresponding parts.

The drawing is a sectional view, partly in elevation, of my improved generator.

As is well known a great amount of heat is
25 produced upon the explosion of gases, and my improved generator is of such construction that heat generated in this manner is utilized to raise the temperature of a circulating fluid and, if desired, to generate steam.

30 A represents a water-containing receptacle, B a chamber for heating the water in said receptacle, and C an explosion-chamber, which receives gas, vaporized oil, or similar fuel, communicates with the chamber B, and
35 is surrounded by a water-containing chamber C', preferably supplied by a feed-water pipe C².

A conduit *c* preferably connects the chambers B C, and a valve D of any desirable construction is movable in a valve-chamber opening from said conduit and operates to control the passage of the gas through said conduit.

Conduits A' B' conduct the hot water or steam and the exploded gas from the receptacle A and the chamber B and discharge the
45 same into a conduit A², which conveys the hot water or steam and the exploded gas to any desired locality for utilization. An automatically-operating valve B² in the conduit
50 B' prevents return of the exploded gas, &c., into the chamber B.

A suitable conduit *c'* discharges gas within the chamber C, which is preferably provided with an automatically-operating vent-valve C³. A conduit *c*³ permits the escape of the
55 exploded gas from said chamber. Valves D' D², of any desirable construction, regulate the passage of the gas and air through said conduits, and an igniter consisting of normally-separated terminals *c*³ *c*⁴ produces the
60 spark for exploding said gas and air.

The valves D D' D² are operated by suitable means, here illustrated as springs *d d'* *d*², a shaft D³, driven by any desirable power-transmitting mechanism, (unnecessary to herein
65 illustrate and describe,) and suitable connections between said shaft and valves. The terminals *c*³ *c*⁴ of the igniter are contacted with each other by suitable connections between said shaft D³ and one of the terminals,
70 which is movable toward and away from the other terminal. The gas mixed with a suitable amount of air is forced through the conduit *c'* by any desirable means, as a pump
D⁴, which is connected to said conduit and a
75 gas-supply conduit *c*⁵, and is provided with a piston connected to suitable driving means, as the shaft D³. If desired, however, the air may be fed to the chamber C in the same
80 manner as the gas by a separate conduit, and suitable means for feeding the air through said conduit and controlling its discharge therefrom.

In the operation of my invention the valve D closes the passage between the chambers
85 B C, gas and air are fed within the chamber C, the valves D' D² shut off the passage of the gas and air, the valve D opens the communication between the chambers B C, and the igniter then explodes the gas and air,
90 which is free to expand into the chamber B. After the explosion of the gas the valve D prevents communication between the chambers B C, the valve D² temporarily permits the discharge of the exploded gas from the
95 chamber C and then prevents said discharge, and the valve D' permits the entrance of additional gas within the explosion-chamber C. The heat generated by the explosion of the gas raises the temperature of the fluid within
100 the receptacle A and the chamber C', and the valve B² permits the escape of the exploded

gases from the chamber B when the pressure within said chamber is sufficient to operate the valve.

The operation of my invention will now be readily understood upon reference to the foregoing description and the accompanying drawing, and it will be particularly noted that I do not herein specifically limit myself to the detail construction and arrangement of the component parts of my generator.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a generator for steam or hot water, the combination of a water-containing receptacle, a heating-chamber for heating the water in the receptacle, an explosion-chamber communicating with the heating-chamber for discharging the exploded gas thereinto, and a valve for controlling the passage between said chambers, substantially as and for the purpose described.

2. In a generator for steam or hot water, the combination of a water-containing receptacle, a heating-chamber for heating the water in the receptacle, an explosion-chamber communicating with the heating-chamber for discharging the exploded gas thereinto, a valve for controlling the passage between said chambers, and a water-containing chamber surrounding the chamber for the valve, substantially as and for the purpose specified.

3. In a generator for steam or hot water, the combination of a water-containing receptacle, a heating-chamber for heating the water in the receptacle, a gas-explosion chamber communicating with the heating-chamber for discharging the exploded gas thereinto, a valve for permitting the discharge of the exploded gas from the explosion-chamber and preventing return of the discharged gas, and automatically-operating means for actuating the valve, substantially as and for the purpose set forth.

4. In a generator for steam or hot water, the combination of a water-containing receptacle, a heating-chamber for heating the water in the receptacle, a conduit leading from the heating-chamber, a steam-feeding conduit communicating with the water-containing receptacle and the former conduit, a gas-explosion chamber communicating with the heating-chamber for discharging the exploded gas thereinto, a valve for controlling the passage between said chambers, and automatically-operating means for actuating the valve to permit the discharge of the exploded gas from the explosion-chamber and to prevent the return of the discharged gas, substantially as and for the purpose described.

5. In a generator for steam or hot water, the combination of a water-containing receptacle, a heating-chamber for heating the water in the receptacle, a gas-explosion chamber communicating with the heating-chamber for discharging the exploded gas thereinto,

a water-containing chamber surrounding the gas-explosion chamber and communicating with the water-containing receptacle, a valve for regulating the passage between said heating and explosion chambers, and automatically-operating means for actuating the valve to permit the discharge of the exploded gas from the explosion-chamber and to prevent the return of the discharged gas, substantially as and for the purpose specified.

6. In a generator for steam or hot water, the combination of a water-containing receptacle, a heating-chamber for heating the water in the receptacle, a gas-explosion chamber communicating with the heating-chamber for discharging the exploded gas thereinto, a water-containing chamber surrounding the gas-explosion chamber and communicating with the water-containing receptacle, and a feed-water pipe discharging into the water-containing chamber surrounding the gas-explosion chamber, substantially as described.

7. In a generator for steam or hot water, the combination of a water-containing receptacle, a heating-chamber for heating the water in the receptacle, a gas-explosion chamber, a conduit between said chambers for discharging the exploded gas into the heating-chamber, a valve-chamber opening from the conduit, and a valve movable in the valve-chamber for controlling the passage through said conduit, substantially as and for the purpose set forth.

8. In a generator for steam or hot water, the combination of a water-containing receptacle, a heating-chamber for heating the water in the receptacle, a gas-explosion chamber, a conduit between said chambers for discharging the exploded gas into the heating-chamber, a valve-chamber opening from the conduit, a valve movable in the valve-chamber for controlling the passage through said conduit, and a water-containing chamber surrounding the gas-explosion chamber and the valve-chamber, substantially as and for the purpose set forth.

9. In a generator for steam or hot water, the combination of a water-containing receptacle, a heating-chamber for heating the water in the receptacle, a gas-explosion chamber, a conduit between said chambers for discharging the exploded gas into the heating-chamber, a valve-chamber opening from the conduit, a valve movable in the valve-chamber, and automatically-operating means for actuating the valve to permit the discharge of the exploded gas from the explosion-chamber through the conduit into the heating-chamber, and to prevent the return of the discharged gas from the heating-chamber through the conduit into the explosion-chamber, substantially as and for the purpose specified.

10. The combination of a water-containing receptacle, a heating-chamber for heating the water in the receptacle, a gas-explosion cham-

ber communicating with the heating-chamber for discharging the exploded gas thereinto, a valve for controlling the passage between said chambers, automatically-operating means for
5 actuating the valve to permit the discharge of the exploded gas from the explosion-chamber and to prevent the return of the discharged gas, and a second valve for permitting the discharge of the exploded gas from
10 the explosion-chamber when the former valve prevents communication between the gas-explosion and the heating chambers, substantially as and for the purpose described.

11. The combination of a water-containing
15 receptacle, a heating-chamber for heating the water in the receptacle, a gas-explosion chamber communicating with the heating-chamber for discharging the exploded gas thereinto, a valve for controlling the passage between said
20 chambers, a valve for permitting the dis-

charge of the exploded gas from the explosion-chamber when the former valve prevents communication between the gas-explosion and the heating chambers, means for feeding the gas within the explosion-chamber, a valve
25 for controlling the feeding of the gas, means within the explosion-chamber for igniting the gas therein, and automatically-operating mechanical means for conjointly actuating the feeding means and said valves, substantially
30 as and for the purpose set forth.

In testimony whereof I have hereunto signed my name, in the presence of two attesting witnesses, at Syracuse, in the county of Onondaga, in the State of New York, this
35 12th day of June, 1896.

HENRY K. HESS.

Witnesses:

E. A. WEISBURG,
K. H. THEOBALD.