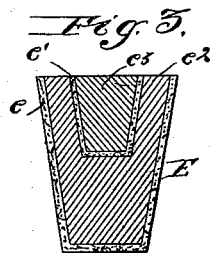
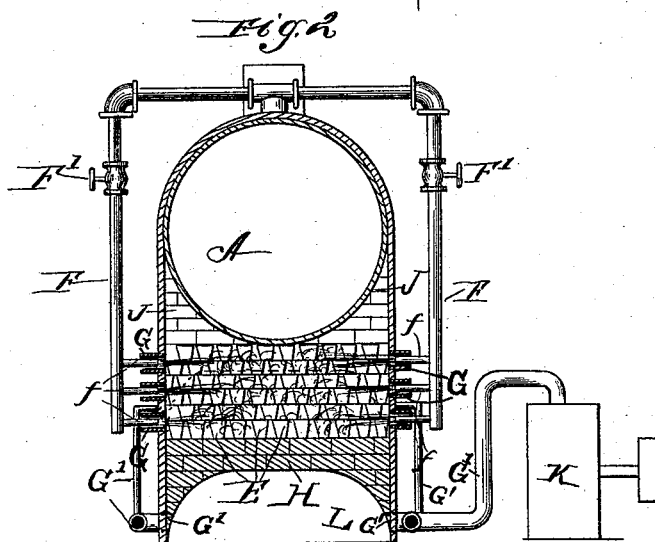
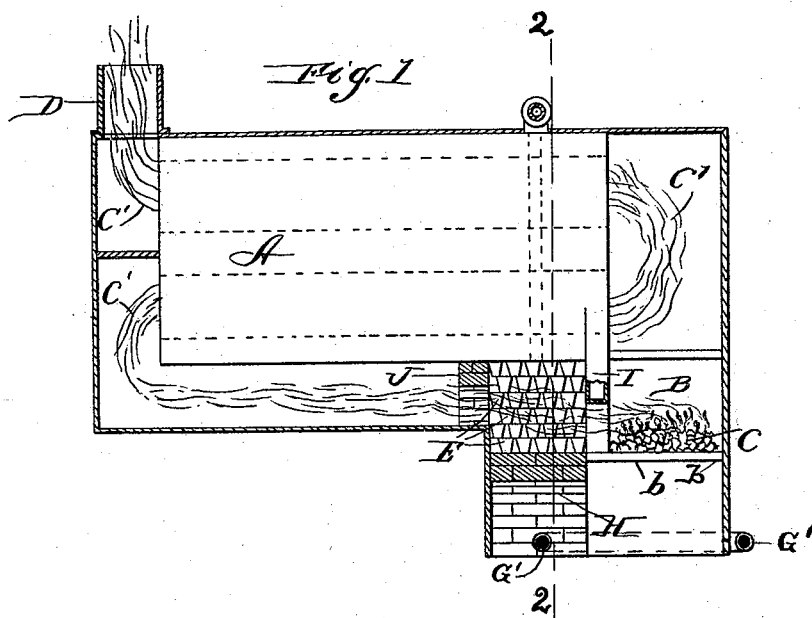


(No Model.)

T. G. HALL.
SMOKE CONSUMER.

No. 494,201.

Patented Mar. 28, 1893.



Witnesses:
Wm. M. Rheem.
Wm. F. Hemming.

Inventor:
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UNITED STATES PATENT OFFICE.

THURSTON GORDON HALL, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE HALL
CHEMICAL AND GAS COMPANY, OF SAME PLACE.

SMOKE-CONSUMER.

SPECIFICATION forming part of Letters Patent No. 494,201, dated March 28, 1893.

Application filed April 8, 1892. Renewed January 14, 1893. Serial No. 458,380. (No model.)

To all whom it may concern:

Be it known that I, THURSTON GORDON HALL, residing at Chicago, Cook county, Illinois, have invented certain new and useful
5 Improvements in Smoke-Consumers, of which the following, in connection with the drawings accompanying and forming a part hereof, is a full and complete description, sufficient to enable those skilled in the art to understand
10 and make the same.

The object of my invention is to obtain a smoke consumer adapted to be attached to, or built into, stationary, marine and locomotive boilers, by means of which the production
15 of smoke in the ordinary use of the boiler to which the device is attached shall be largely, if not entirely, obviated.

In the drawings illustrating my invention as applied to a return flue boiler, Figure 1, is
20 a longitudinal section of the boiler and of the device embodying my invention placed therein; Fig. 2, a cross-section on line 2—2 of Fig. 1; and Fig. 3, a cross-section of one of the elements entering into and forming a part of the
25 device.

The same letter of reference is used to indicate a given part where more than one view thereof is shown in the several figures of the drawings.

30 A, is a boiler, and B is the fire-box thereof. *b, b*, are the grate bars.

C, is fuel on the grate bars; and C', C', are lines indicating the gaseous and other products of combustion, or of partial combustion, in the fire-box extending through the
35 boiler from such fire-box to the smoke stack D.

E, E, are the elements of which my device is built up. Each of such elements consists of insulating cup *e*, the smaller insulating cup
40 *e'*, contained in cup *e*, (both of such cups being preferably constructed of silica, fire-clay or other heat resisting insulating material), material *e*², preferably iron, contained in cup *e*; and material *e*³ of opposite electric polarity
45 from material *e*², and preferably copper, contained in the cup *a'*.

F, F, are steam pipes extending from boiler A to branch pipes *f, f, f*.

50 F', is a valve in pipe F by which the amount of steam passing through such pipe, and

through the branch pipes *f, f, f*, thereof can be controlled.

G, G, are pipes extending through the casing of the boiler into the fire-box thereof. Branch pipes *f, f, f*, extend through the pipes
55 G, G, in the manner ordinarily employed where the current of steam extending into a fire-box is designed to produce an induced current of air thereinto along therewith.

H, is an arch, preferably constructed of
60 fire-brick upon which are arranged the elements E in such manner that a series of passage-ways shall be formed therethrough, through which the products of combustion or of partial combustion of the fuel on the grate
65 bars *b*, shall pass before extending through the boiler A.

I, is a water-leg.

In constructing the smoke consumer and putting it in position in the fire-box of the
70 boiler, I have found it practical to remove the grate bars from the fire-box and to place at the rear end of such fire-box arch H upon which are arranged the elements E in the
75 manner described, and then to put in position shorter grate bars extending from the arch H to the forward part of the fire-box.

J, is an arch which may be built up underneath the boiler if desired, but I do not consider such arch essential, the purpose thereof
80 being, in connection with the water-leg I, to retain the elements E in position when my device is attached to a marine or locomotive boiler.

The manner of operation of my device is; 85 when the products of the combustion or partial combustion of the fuel C in the fire-box B pass through the several passage-ways between the elements E of the device, such elements are heated thereby: and upon the opening of the valves F', F', steam and air is also, forced through the several passage-ways between the elements E, becoming commingled with such products of combustion, or partial combustion, extending from the fire-box B.
95 An electric action will be induced by the passage of such steam, air, and the products extending from the fire-box B, through such passage-ways, and this together with the heated condition of the mass formed by the ele- 100

ments arranged as described will, wholly, or to a very appreciable extent supply the conditions necessary for the complete combustion of the products generated in the fire-box B, and the same will be thereby consumed, or nearly so, in passing through the device or through the ways provided therefor between such device and the chimney D. I am thus enabled by the extremely simple means herein described, to obtain a very effective smoke burner adapted to be used, as stated, with stationary, marine or locomotive steam boilers. Where the draft produced by the smoke stack D will not furnish the required amount of air for the combustion desired in the fire-box B, a blower, (K,) may be employed to force air into the fire-box, or into the ash-box L beneath the grate bars of the fire-box. In case the blower K is used the grate bars may be removed and the fuel allowed to rest on the bottom of the ash-box. Where the blower K is used it is evident that the pipes G, G', should be omitted and the required amount of air forced through the pipes G', G', as in such case no benefit would result from injecting the air by means of the steam jet entering through pipes *f, f, f*.

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

1. In a smoke consumer a series of elements consisting of insulating cups containing materials of opposite electric polarities arranged so that materials of opposite electric polarities will not come in contact with each other, and so that the products generated in the fire-box will extend through the series of passage-ways formed by the interstices between such material in passing out of the fire-box, in com-

bination with steam and air pipes extending through the walls of the fire-box and opening into the series of passage-ways formed by the interstices between the cups in which such material is contained; substantially as described.

2. The combination in a smoke consumer of an arch built into the fire-box of a boiler back of the grate bars therein, series of insulating receptacles arranged on the arch so as to make passage-ways through the mass obtained thereby, materials of opposite electric polarities contained in such receptacles, passage-ways through the casing of the fire-box opening into the passage-ways between such receptacles, and through which steam and air may be forced into the passage-ways and in contact with the products from the fire-box, also passing through such passage-ways; substantially as described.

3. The combination in a smoke consumer of a series of insulating receptacles arranged in a mass so as to obtain series of passage-ways therethrough, materials of opposite electric polarities contained in such receptacles, so that materials of one electric polarity are not in electrical contact with materials of opposite electric polarity, air inlets in the casing of the fire-box through which air may be forced into the fuel and into the passage-ways, and steam inlets through which steam may be forced into the passage-ways, and an air blower connected with the air inlets; substantially as described.

THURSTON GORDON HALL.

Witnesses:

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