

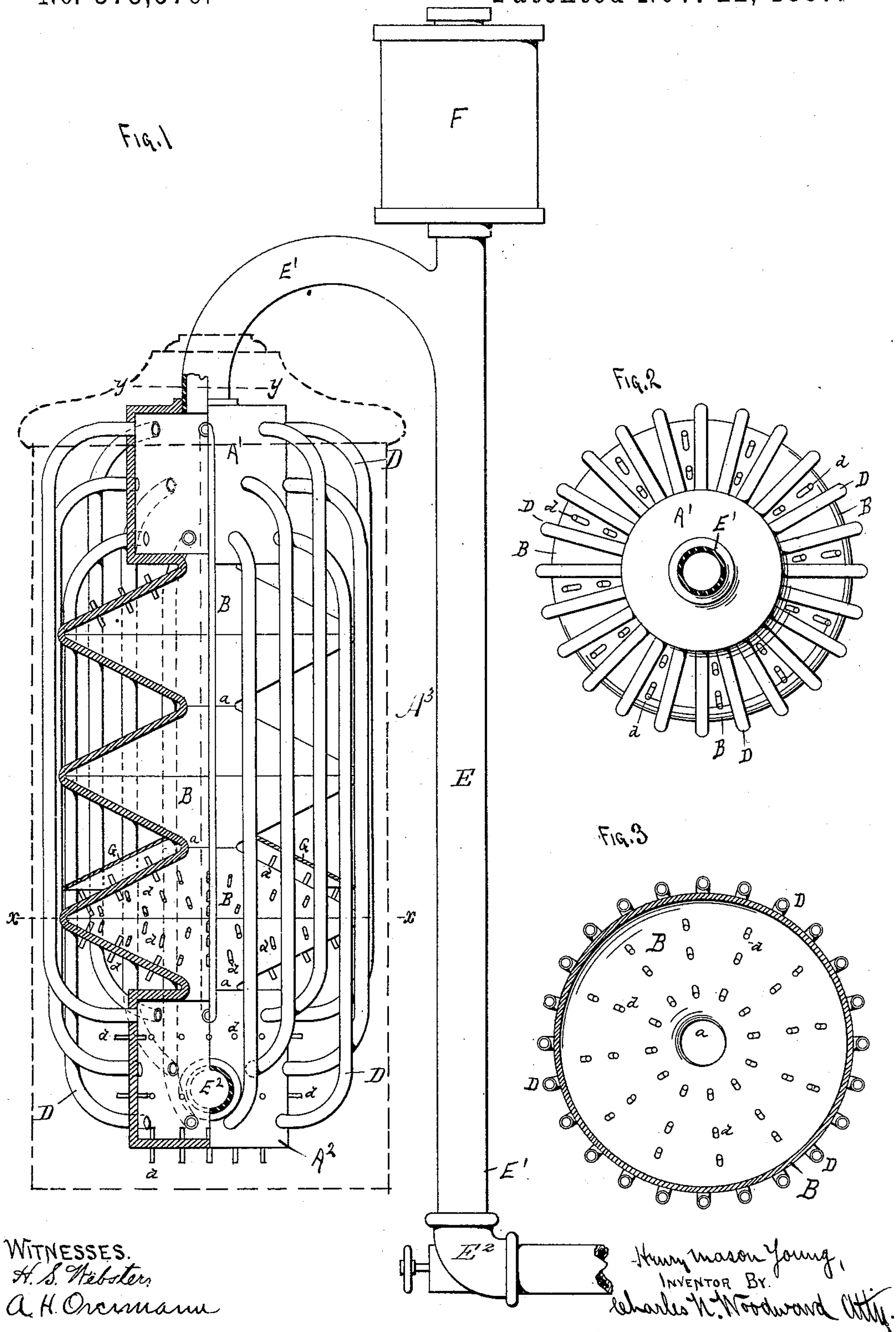
(No Model.)

H. M. YOUNG.

WATER HEATER OR STEAM GENERATOR.

No. 373,576.

Patented Nov. 22, 1887.





# UNITED STATES PATENT OFFICE.

HENRY MASON YOUNG, OF MINNEAPOLIS, MINNESOTA.

## WATER-HEATER OR STEAM-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 373,576, dated November 22, 1887.

Application filed October 4, 1887. Serial No. 251,436. (No model.)

*To all whom it may concern:*

Be it known that I, HENRY MASON YOUNG, a citizen of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain new and useful Improvements in Water-Heaters or Steam-Generators, of which the following is a specification.

This invention relates to water-heating or steam-generating apparatus; and it consists in the peculiar construction and combination or arrangement of the parts, whereby a rapid, free, and continuous circulation of the water or steam is produced and the heating-surface of the generator increased, as hereinafter described, shown in the drawings, and claimed.

In the drawings, wherein the same letters of reference indicate the same or corresponding parts, Figure 1 represents a partly-sectional side elevation of my improved water-heater or steam-generator; Fig. 2, a partly-sectional plan view of the same on the line *y y* of Fig. 1, and Fig. 3 a plan view in section on the line *X X* of Fig. 1.

My improved water-heater or steam-generator consists of two cylindrical drums,  $A' A^2$ , united by a series of "double conical drums,"  $B$ , so called, the apexes and bases thereof being united, as shown in the drawings, so as to form irregular or alternately contracted and enlarged surfaces both interiorly and exteriorly of the same, whereby a series of peculiarly constructed and connected heating-chambers are obtained, the throats or connecting-passages between said chambers being in the apexes  $a$  of the cones. The upper and lower cylindrical drums,  $A' A^2$ , are also connected by a number of end-curved copper pipes or tubes,  $D$ , arranged outside of the double conical chambers or drums, as shown. Surrounding or inclosing said pipes and the several drums constituting the water-heater or steam-generator is a suitably formed casing,  $A^3$ , as shown in dotted lines in Fig. 1. The upper drum,  $A'$ , has secured thereto a pipe,  $E'$ , which may be connected with a water or steam heating apparatus such as are used for heating radiators, railway passenger-coaches, street-cars, and like structures. Connected to said pipe  $E'$ , and arranged above the water or steam line therein, is a combined water-feed

and air compression and expansion tank,  $F$ , in which an air-cushion is formed to assist the water or steam to be forced or circulated through the system or circuit of piping being heated. To the lower drum,  $A^2$ , is connected a return-pipe,  $E^2$ , by which continuous circulation is maintained between the system or circuit of water or steam-heated pipes and the generator. This circulation is due to the opposing action of the expanded or heated water or steam and the compressed air in the feed-tank  $F$ .

The water may be supplied to the generator in any suitable manner—as, for instance, it may be supplied thereto through the piping  $E'$ , being introduced at the point  $E^2$  by means of a force-pump; or it may be supplied through the tank  $F$ , which will be subsequently tightly closed.

Each of the double conical drums  $B$  and the lower cylindrical drum,  $A^2$ , will be provided with a series of studs or pins,  $d$ , projecting both inside and outside of said drums, although in Fig. 1 of the drawings said studs or pins are only shown as applied to the lower cylindrical drum,  $A^2$ , and the lower and upper conical drums  $B$ ; but they will usually be employed in connection with all of the double conical drums; also, they may be used in connection with the upper drum,  $A'$ , if desired. The function and purpose of these studs or pins is to greatly increase the heating-surface of the generator without materially increasing its weight or bulk or lessening the water capacity. The studs or pins become quickly heated and impart their heat to the water, and thus expedite the process of heating or generation. The double conical drums  $B$  are also supplied with hoods or deflectors  $G$ , which are adapted to deflect and retard the heat and hold the same for a longer time in contact with said drums, and thus utilize the radiating qualities of the generator to a greater extent than would be possible were they not employed. These hoods may be formed integrally with the drums  $B$ , or separately and connected thereto, as preferred, although, generally, the drums  $A' A^2 B$ , studs or pins  $d$ , and the hoods  $G$  will be cast in one piece.

In Fig. 1 of the drawings the hood  $G$  is only shown applied to the lower or double conical



drum; but they are to be employed in connection with all of said double conical drums.

Any desired construction of heating apparatus may be employed beneath the lower drum, A<sup>2</sup>, for generating the required heat; but, preferably, some form of hydrocarbon or other non-smoke-producing burner will be employed, as my improved generator is especially applicable to small systems of heating apparatus, such as are employed for heating portable radiators, street and other cars, and similar structures.

When a suitable heater or burner is placed beneath the lower drum, A<sup>2</sup>, the heating of the water therein will cause it to expand and freely circulate throughout all the parts of the drums and piping of the generator; also, as the rapidity of the circulation increases as the temperature rises, the water or steam will flow into the piping E', and be thence conducted into all parts of the structure being heated. The passage of the water or steam from the generator under pressure, assisted by the air-cushion in the compression and expansion tank F, will cause the water or steam to circulate through the circuit of piping in the structure being heated and be returned into said generator through the pipe E<sup>2</sup>, connecting with the lower drum, A<sup>2</sup>.

It is obvious that the water in the whole apparatus is soon set in motion and a free, rapid, and continuous circulation maintained so long as the heat continues; also, the form of the generator gives a very large heating-surface within a very small space, and by its peculiar construction it insures a very rapid and free circulation.

Under some circumstances the tubes D may be dispensed with; but they will generally be employed. Also, any number of the double conical drums may be employed, as desired.

I am aware that a hot-water radiator has been provided with a reservoir constructed of corrugated sheet-metal plates extending lengthwise of said reservoir or horizontally across the whole width of the radiator, so that when the several plates are brought into proximity to each other narrow serpentine vertically-arranged spaces will be formed between them, some of said spaces being entirely inclosed to contain water, while others form passages through which the products of combustion travel on their way to the chimney, the said spaces, which form the water-chambers of said reservoir, being connected together at top and bottom by small short pipes; but such a construction of water-heating reservoir I do not claim.

In my water-heater or steam-generator the heating-chambers are not horizontally-extending corrugated sheet-metal plates, but upper and lower cylindrical drums and intermediate

double conical drums; also, there are no interior passages for the products of combustion in my apparatus, nor any short pipes connecting serpentine interior and exterior water-spaces at top and bottom. Hence my device contains a larger and more solid body of water, a larger amount of heating-surface, is less cumbersome, occupies less space, and is more economical in construction than the apparatus just named.

Also, I am aware that a cylindrical steam-boiler has been constructed and provided with a small pendent dome or chamber at its lower end, and with circulating-pipes connected therewith and with the upper portion of the cylindrical boiler; but I am not aware that a series of double conical drums and an upper and lower cylindrical drum have been connected by a series of circulating-pipes communicating with said upper and lower cylindrical drums prior to my invention. Under my construction and arrangement of the parts named the water circulates more freely and rapidly and forces the heated water more quickly to the surface, owing to the larger area of pipes and heating-surface exposed to the direct action of the heat than is possible under the construction of steam-boiler just named.

Having thus fully described my invention, what I claim as new is—

1. A water-heater or steam-generator comprising two cylindrical drums and one or more intermediate communicating double conical drums, substantially as described.

2. A water-heater or steam-generator comprising two cylindrical drums, and one or more intermediate communicating double conical drums provided with studs or pins and deflecting-hoods, all ranged to operate substantially as described.

3. A water-heater or steam generator comprising two cylindrical drums, one or more intermediate communicating double conical drums, and a series of pipes or tubes connecting said cylindrical drums, whereby a free and rapid circulation of hot water or steam may be maintained, substantially as described.

4. A water-heater or steam-generator comprising two cylindrical drums, one or more double conical drums, and a series of circulating-tubes connecting said cylindrical drums, in combination with the piping leading to or from said generator and the air compression and expansion or water-feed tank, substantially as and for the purpose set forth.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

HENRY MASON YOUNG.

Witnesses:

C. N. WOODWARD,  
H. S. WEBSTER.