No. 837,114. PATENTED NOV. 27, 1906.

W. A. PITT.

STEAM GENERATOR.

APPLICATION FILED MAR. 26, 1906.

2 SHEETS—SHEET 1.

Fig. 1.

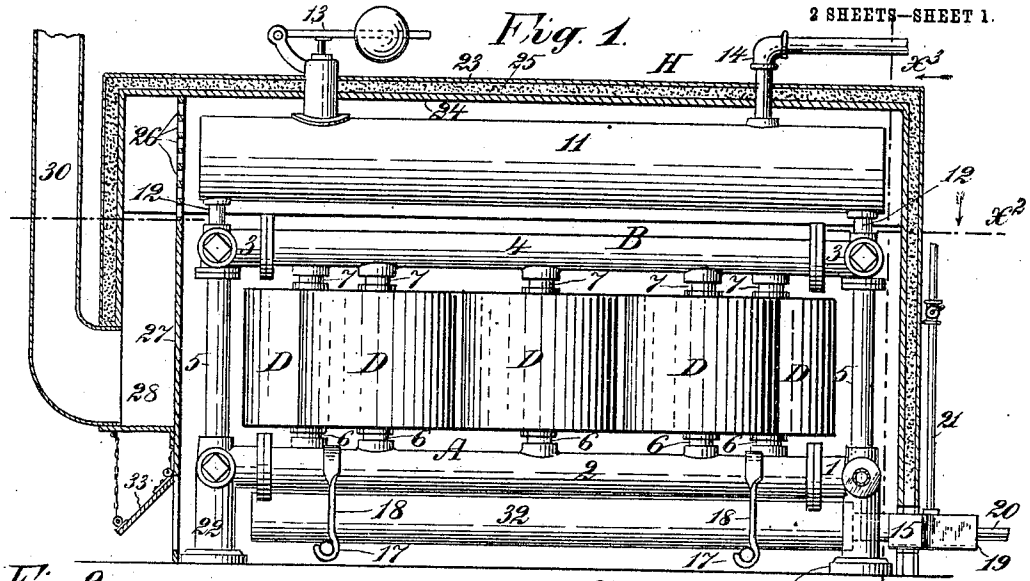


Fig. 2.

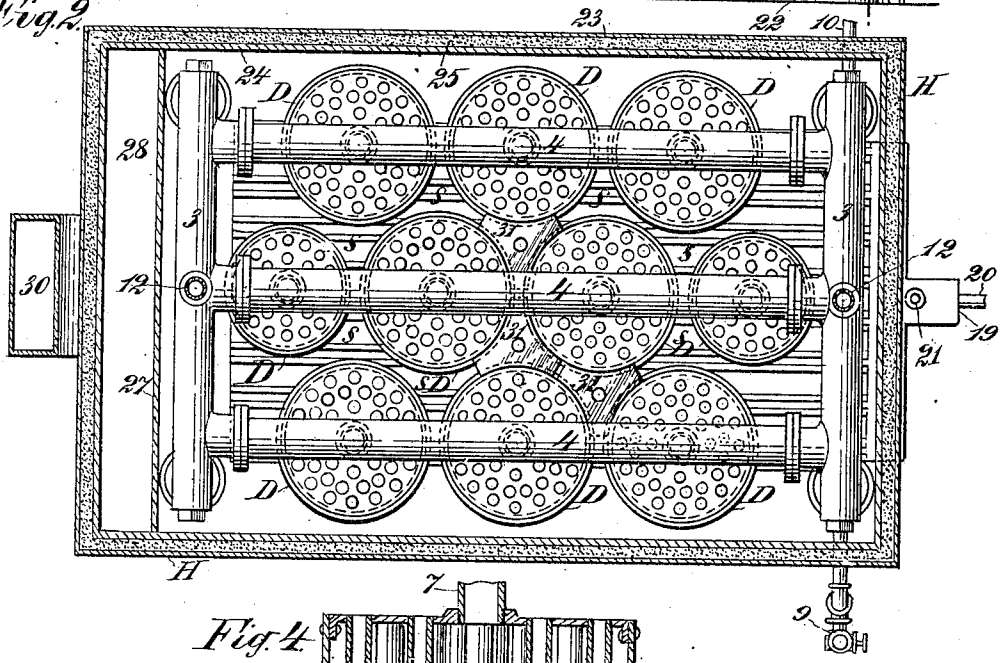
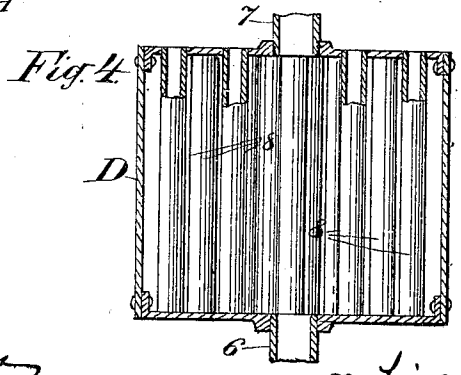


Fig. 4.



Witnesses

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2 SHEETS—SHEET 2.

Fig. 3.

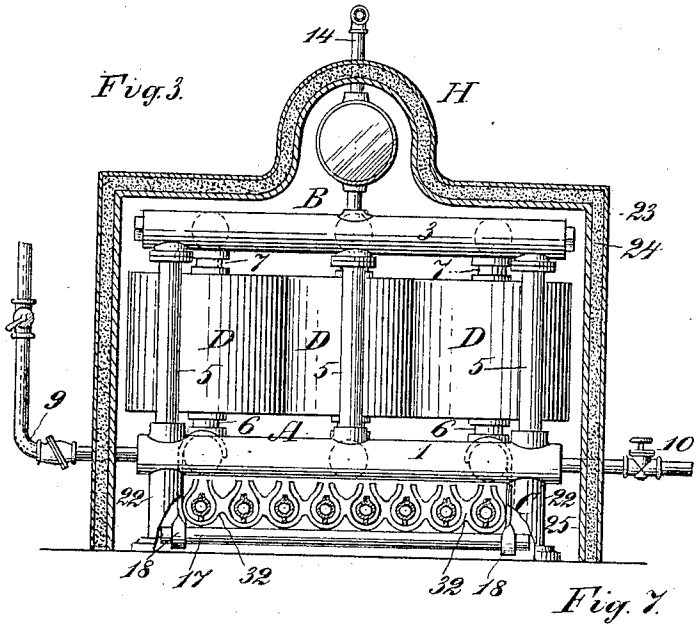


Fig. 7.

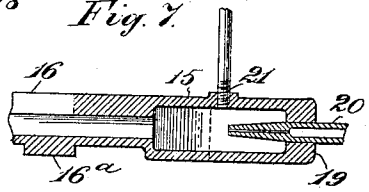


Fig. 5.

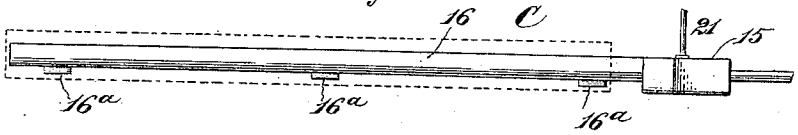


Fig. 8.

Fig. 6.

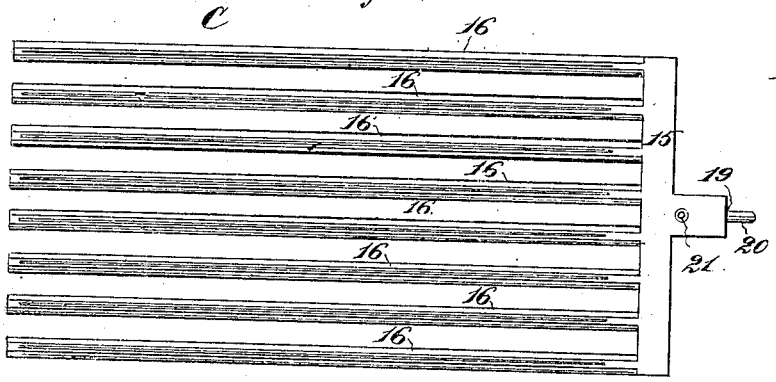
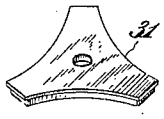


Fig. 9.



Witnesses

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UNITED STATES PATENT OFFICE.

WILLIAM A. PITT, OF NEW YORK, N. Y.

STEAM-GENERATOR.

No. 837,114. Specification of Letters Patent. Patented Nov. 27, 1906.

Application filed March 26, 1906. Serial No. 308,087.

To all whom it may concern:

Be it known that I, WILLIAM A. PITT, a citizen of the United States, residing in the city, county, and State of New York, have invented certain new and useful Improvements in Steam-Generators, of which the following is a specification.

This invention relates to the class of fire-tube generators adapted to be employed in connection with a furnace burning liquid fuel; and the object of the invention is to provide a generator of simple construction with an extended heating-surface and adapted for the rapid generation of steam.

In the accompanying drawings, which illustrate an embodiment of the invention, Figure 1 is a side elevation of the generator with the casing thereof in vertical longitudinal mid-section. Fig. 2 is a horizontal section taken at line x^2 in Fig. 1. Fig. 3 is an end elevation of the generator with the casing thereof in vertical transverse section. Fig. 4 is a detail sectional view of one of the drums of the generator, enlarged. Fig. 5 is an elevation, and Fig. 6 a plan, of the burner adapted for steam and liquid hydrocarbon. Figs. 7 and 8 are fragmentary sectional views, enlarged, illustrating features of the burner. The former is a view showing the admission of the steam and hydrocarbon and the latter a cross-section of one of the slotted bars. Fig. 9 is a perspective view of one of the asbestos covers 31.

The generator in the form and dimensions herein shown is constructed as will now be described. There is a lower rectangular frame or grid A and an upper grid B of the same kind. The lower grid comprises two pipes or headers 1, connected by parallel pipes 2, and the upper grid comprises two pipes or headers 3, connected by pipes 4. The headers 1 are directly over the headers 3, and the two are connected by upright pipes 5. The pipes 2 are directly over the pipes 4, and between the upper and lower pipes are disposed drums D, with their axes vertical. The drums are connected at their lower ends with the pipes 2 by short pipes 6 and above with the pipes 4 by short pipes 7. Preferably the drums will be cylindrical and the short connecting-pipes 6 and 7 will connect with the drum at the center of its circular head. To economize space, the drums in the rows are by preference staggered, as clearly shown in Fig. 2, and there may be two drums of smaller diameter at the respective ends at the middle row or shorter row or rows.

The specific construction of the drum is best seen in Fig. 4. Extending through the drum parallel with its upright axis are numerous fire-tubes 8. The bodies of the drums and the pipes above referred to form the water and steam space of the generator. The feed-water is admitted to the lower grid at 9, and there is a blow-off 10. The water-level may be in the tubes forming the upper grid B, and mounted on this grid there may be a steam drum or "dome" 11, connected with the headers of this grid by short pipes 12. On the steam-drum are a safety-valve 13 and an outlet 14 for supplying steam to an engine or for any other purpose.

The means for heating the generator consists of a burner C. This device consists of a grid comprising a header 15 and slitted tubes or tubular bars 16, connected with the header. They may be all cast in one piece. This burner C, which is represented detached in Figs. 5 and 6, has ribs 16^a on the several bars 16, and these bars enter and are inclosed in slitted tubes or casings 32, open at the ends and below to admit air to the burner. These casings are cast in one piece, and this device is supported on bars 17, (they may be pieces of iron pipe,) suspended by hooks 18 from the pipes 2 of the lower grid A. The ribs 16^a support the burner-tubes 16 in proper position in the respective tubular casings 32. At an inlet 19 in the header 15 steam is supplied to the burner through a pipe 20, and the steam carries in with it a volatile liquid hydrocarbon, as gasolene, supplied at 21 from any source desired. The generator is supported on suitable feet 22 and will be inclosed in a casing or housing H. This housing will be of two thicknesses of sheet-iron, embracing between them a sheet of asbestos or other non-conducting material. The outer sheet of iron 23 may be Russia iron, and the inner sheet 24 a heavier or thicker sheet. The asbestos or the like 25 may be of any suitable or desired thickness. This construction provides a housing which will prevent heat convection and radiation in a good degree.

In the operation of the furnace and generator the heated products from the burner pass up among the water-pipes of the generator and through the numerous fire-tubes in the drums D, which are of course always im-

mersed in the water in the drum, the wall of which also serves as a heating-surface. After passing up and about the steam-drum 11 the gases pass through perforations 26 in a transverse partition 27 in the housing H, then down through a chamber 28 in the casing, and thence to the atmosphere by way of a suitable flue 30. The casing or housing H should go down to the floor, and it will have a door 33 to admit air to the burner to promote combustion. Any suitable means may, however, be provided for this purpose. The number of drums D employed will depend of course on the size of the generator. In order to prevent the too-free rise of the hot gases through the triangular spaces *s* between the drums, (see Fig. 2,) these may be, and preferably will be, covered or closed by triangular sheets of asbestos 31, placed loosely on the drums. Each sheet 31 may have in it a small aperture for the gases to pass through. In Fig. 2 some of the spaces *s* are left uncovered; but this is merely to better illustrate the invention. In Fig. 9 this cover 31 is shown in perspective. The other spaces about the drums may be, and preferably will be, covered by sheets of asbestos or the like to prevent the too-free upward passage of the gases about the drums, as it is desirable that the main portion of said gases shall pass through the tubes in the drums or boiler-sections D. The steam drum or dome 11 is not absolutely essential, nor is it essential that the water-line shall be as high as the upper grid B.

These generators are especially well adapted for automobiles and the like where a generator of small size, but adapted to generate steam quickly and rapidly, is required. It will be noted that the entire generator, exclusive of the heater, is made up of sections of pipe, which may be bought in the market and cut to length. The drums or sections D may also be made from pipe of sufficiently large diameter—as, for example, seamless tubing or piping of iron or steel. This avoids the expense of bending and riveting plates and enables the generator to be constructed at a moderate expense.

The asbestos in the housing might be substituted by any other refractory non-conductor of heat, such as mineral wool or the like.

Having thus described my invention, I claim—

1. A steam-generator, having horizontal and upright water-containing pipes, a plurality of upright drums between the upper and lower water-containing pipes and connected therewith at their respective upper and lower ends, said drums each provided with a plurality of upright fire-tubes, and apertured refractory covers for the spaces about the drums.

2. A steam-generator, having an upper tier and a lower tier of substantially horizontal water-pipes, upright water-pipes connecting the same, a plurality of fire-tubes, water-containing drums disposed upright between said tiers of pipes, and connected therewith at their respective ends, means for partially closing the upright gas-passages between said drums, a steam-drum mounted on the generator, a non-conducting casing about said generator with an upright chamber at the end of the generator for the descent of the gases to the outlet, and means for heating the generator.

3. A steam-generator, comprising a lower rectangular grid of water-pipes consisting of the headers 1 and pipes 2, an upper similar grid composed of headers 3 and pipes 4, upright connecting-pipes 5 between the upper and lower headers, drums D, provided with upright fire-tubes and connected at their upper and lower ends with the respective pipes 4 and 2, a steam-drum 11, mounted on and connected with the headers, a casing inclosing the generator, and means for heating the latter.

In witness whereof I have hereunto signed my name, this 23d day of March, 1906, in the presence of two subscribing witnesses.

WILLIAM A. PITT.

Witnesses:

ALAN F. CONNELL,

H. G. HOSE.