June 17, 1924. 1,497,973

G. A. BRYAN

STEAM GENERATOR

Filed Nov. 22, 1919 2 Sheets-Sheet 1

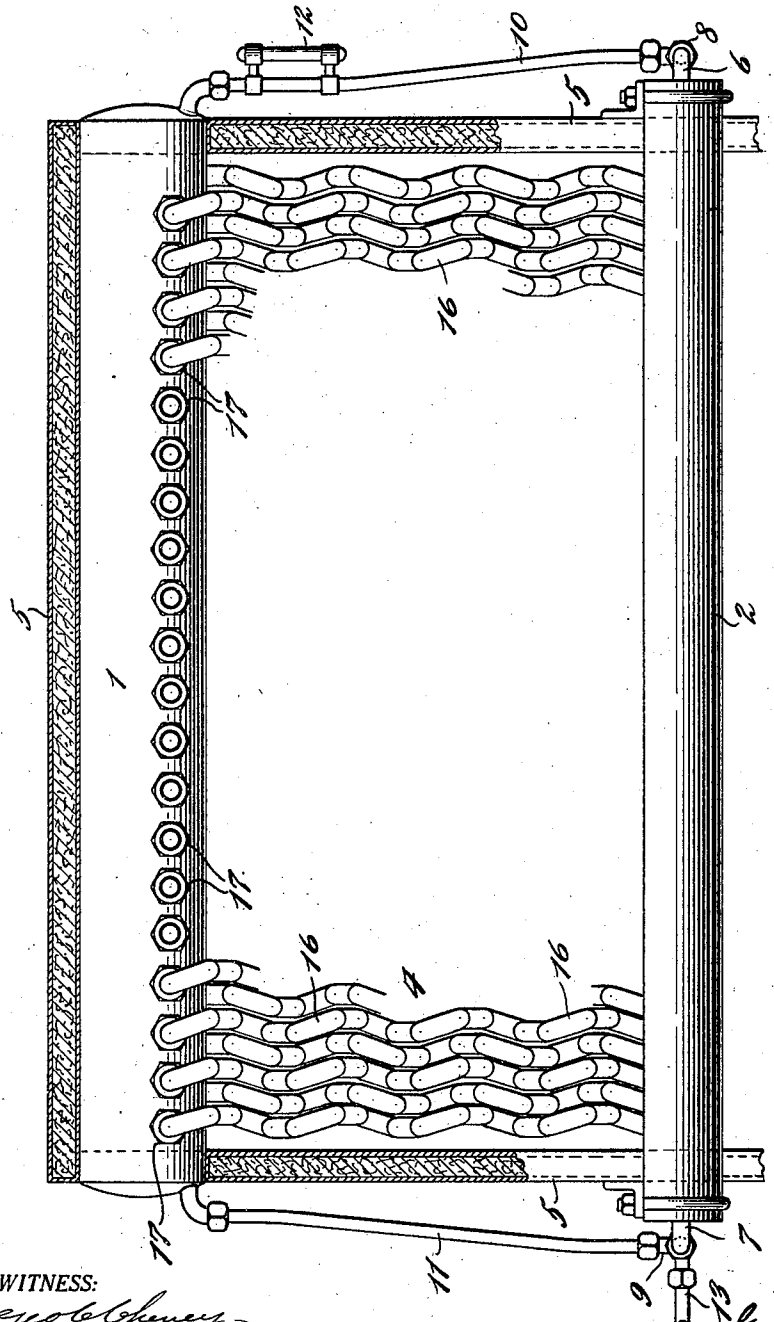


Fig. 1.

WITNESS:

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Fig. 2.

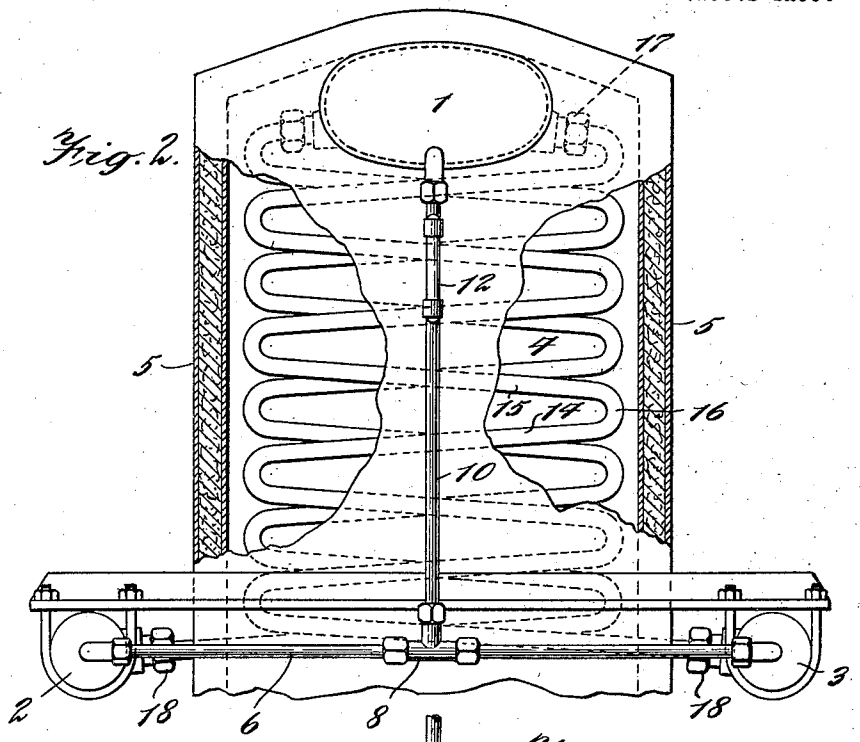
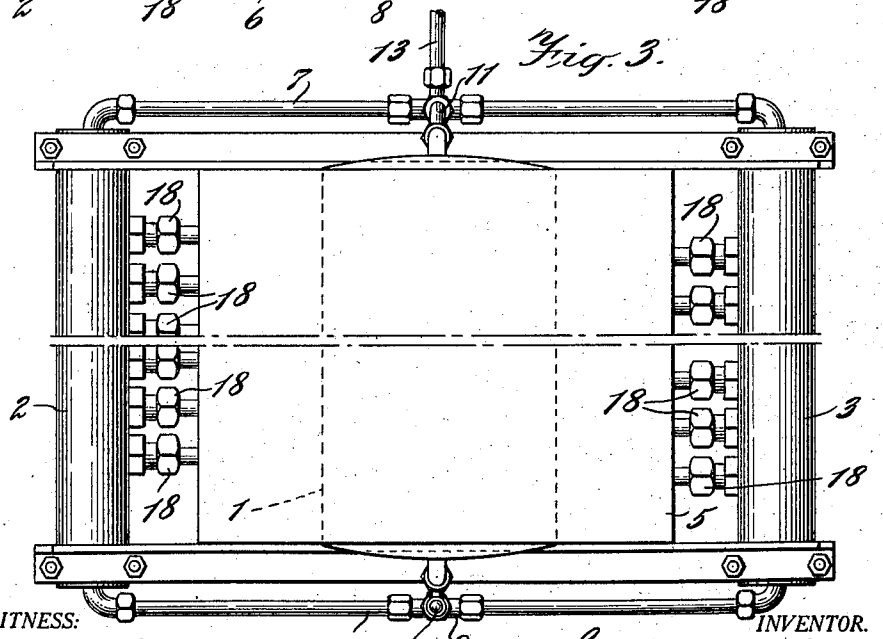


Fig. 3.



WITNESS:

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UNITED STATES PATENT OFFICE.

GEORGE A. BRYAN, OF PERU, INDIANA.

STEAM GENERATOR.

Application filed November 22, 1919. Serial No. 339,945.

To all whom it may concern:

Be it known that I, GEORGE A. BRYAN, a citizen of the United States, residing at Peru, in the county of Miami and State of Indiana, have invented certain new and useful Improvements in Steam Generators, of which the following is a full, clear, and exact description.

This invention relates to steam generators and has special reference to generators adapted for steam-driven automobiles, trucks and tractors. The primary object of my invention is to provide a steam generator, the parts of which are easily accessible and which may be taken apart for cleaning and repairs and reassembled speedily and accurately. A further object of my invention is to provide a generator in which the water and steam shall have free and uniform circulation through those parts thereof which are subjected to the heat. Further objects and advantages of the invention will appear from the detailed description which follows hereinafter.

In the accompanying drawing, Fig. 1 is a side elevation of the generator with the side wall of the enclosure or hood removed.

Fig. 2 is a front end elevation of the generator with a portion of the front wall of the cover broken away.

Fig. 3 is a plan of the generator.

The generator comprises essentially a steam drum or dome 1 arranged horizontally in a fore and aft direction at the top of the structure, two headers or distributing drums 2 and 3 respectively arranged parallel with the steam drum but at the lower portion of the generator and on each side thereof, and a series of tubes or coils indicated generally by 4, extending from the headers to the steam drum. The steam drum and the tubes 4 are housed within a heating chamber formed by a hood or cover 5, which may be understood to be in sections hinged or otherwise secured together so as to be removable wholly or in part to give access to those portions of the generator within it. The two headers 2 and 3 are connected across their forward ends by a horizontal circulating pipe 6 and across their rear ends by a similar pipe 7. At the central point of each of these pipes 6 and 7 is a T-coupling 8 and 9 respectively, from which rise vertical standpipes 10 and 11 to the respective ends of the steam drum 1 the attachment thereto being near the bottom thereof. The pipe 10 at the front of the boiler affords a convenient place for attachment of a water level gauge 12. To the coupling 9 at the rear end of the boiler the feed water pipe 13 is connected, from which point the water leads to the rear ends of each of the headers 2 and 3 and thence circulates easily between the headers through the pipes 6 and 7. The vertical pipes 10 and 11 being connected with this circulatory system afford a means of carrying the water of condensation from the steam drum 1 back into the system.

The coils 4 are arranged in two sets, one set having their lower ends connected to the header 2 and their upper ends to the drum 1, while the other set is connected at their lower ends to the header 3 and at their upper ends to the drum 1. The coils of one set alternate from front to rear with those of the other set and each coil is composed of a plurality of runs 14 and 15 extending across the heating chamber and connected together by bends 16, each coil being continuous, that is, without couplings or sections throughout its length, and the runs of each coil being inclined instead of horizontal to promote the rise of the steam to the drum. Furthermore these coils are so shaped that succeeding runs 14 and 15 are offset from each other so that any run in one coil will be above a space between the runs of two adjacent coils, thus producing a staggered relation which exposes the runs to the fullest extent to the heat from the burners which are supposed to be located below the lowest runs of the coils.

An important feature of my invention is the fact that every coil has its upper end attached to the steam drum on the same side as the header is located to which its lower end is attached. Thus it will be seen with reference to Fig. 2 that the front coil whose upper end is attached at 17 to the right hand side of the steam drum, has its lower end attached at 18 to the header 3 on the right hand side of the generator. With compression couplings located at these two points 17 and 18 it will be seen that any coil can be readily removed entirely from the generator by simply loosening the two couplings and drawing the coil out sidewise from between the two coils where it may be located. This operation is of course facilitated by removing or opening the side wall of the cover. In case of the blowing

out of a tube when another to replace it is not at hand, the defective tube may be readily removed and the openings in the drum and header plugged, thus permitting of the continued use of the boiler. Another feature of the construction which renders such a removal or repair readily possible, is the location of the lower coupling 18 outside of the heating chamber and that of the upper coupling 17 at the extreme upper part of the heating chamber where neither of the couplings will be subjected to such heat as to destroy them or render their separation difficult.

The front vertical pipe 10 will be located outside of the cover 5 and the gauge connected thereto will be in plain sight.

The simplicity of this boiler and the accessibility and removability of its parts renders it especially adaptable for use on self propelled vehicles of all kinds.

I claim:

1. A steam generator comprising two base distributing members disposed on opposite sides of the heating chamber, a common distributing member disposed at the top of the heating chamber, and two sets of overlapping alternately arranged tubes bent upon themselves so as to run back and forth and side by side substantially across the heating chamber, one set of tubes being detachably connected to one of the base distributing members and to the corresponding side of the top distributing member and the other set of tubes being detachably connected to the other base distributing member and to the corresponding side of the top distributing member, the succeeding runs of the individual tubes being arranged in staggered relation so that each run above the lowermost is disposed above a space between two runs.

2. A steam generator comprising two base distributing members, disposed on opposite sides of the heating chamber, a common distributing member disposed at the top of the heating chamber, and two sets of overlapping alternately arranged tubes bent upon themselves so as to run back and forth and side by side substantially across the heating chamber, one set of tubes being detachably connected to one of the base distributing members and to the corresponding side of the top distributing member and the other set of tubes being detachably connected to the other base distributing member and to the corresponding side of the top distributing member, the runs being inclined upwardly and the bends connecting the runs being inclined successively in opposite directions, so as to afford a staggered relation of the runs, the corresponding bends of two adjacent tubes being on opposite sides of the heating chamber and inclined in the same direction.

In witness whereof, I hereunto subscribe my signature.

GEORGE A. BRYAN.