No. 673,667. Patented May 7, 1901.

J. W. SUTTON.

STEAM GENERATOR.

(Application filed Jan. 23, 1901.)

(No Model.) 2 Sheets—Sheet 1.

Fig: 2.

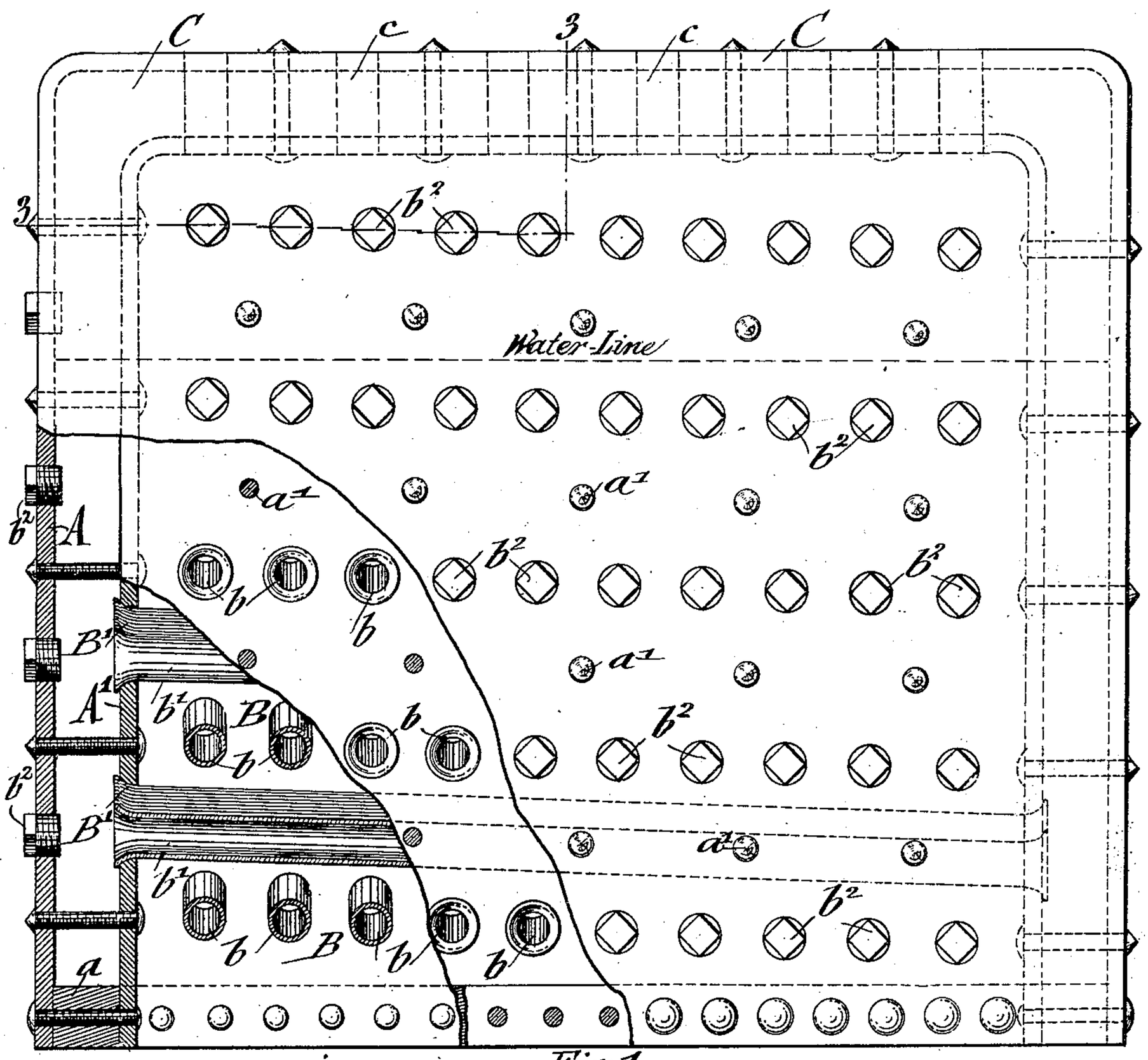

Fig: 1.

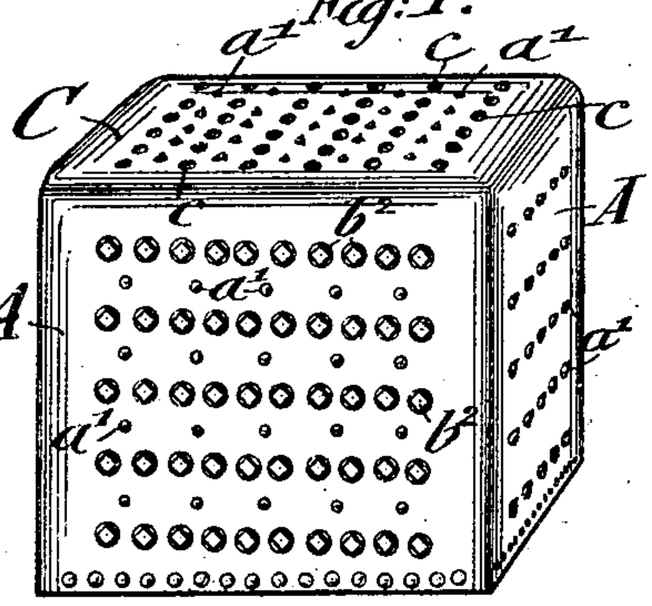

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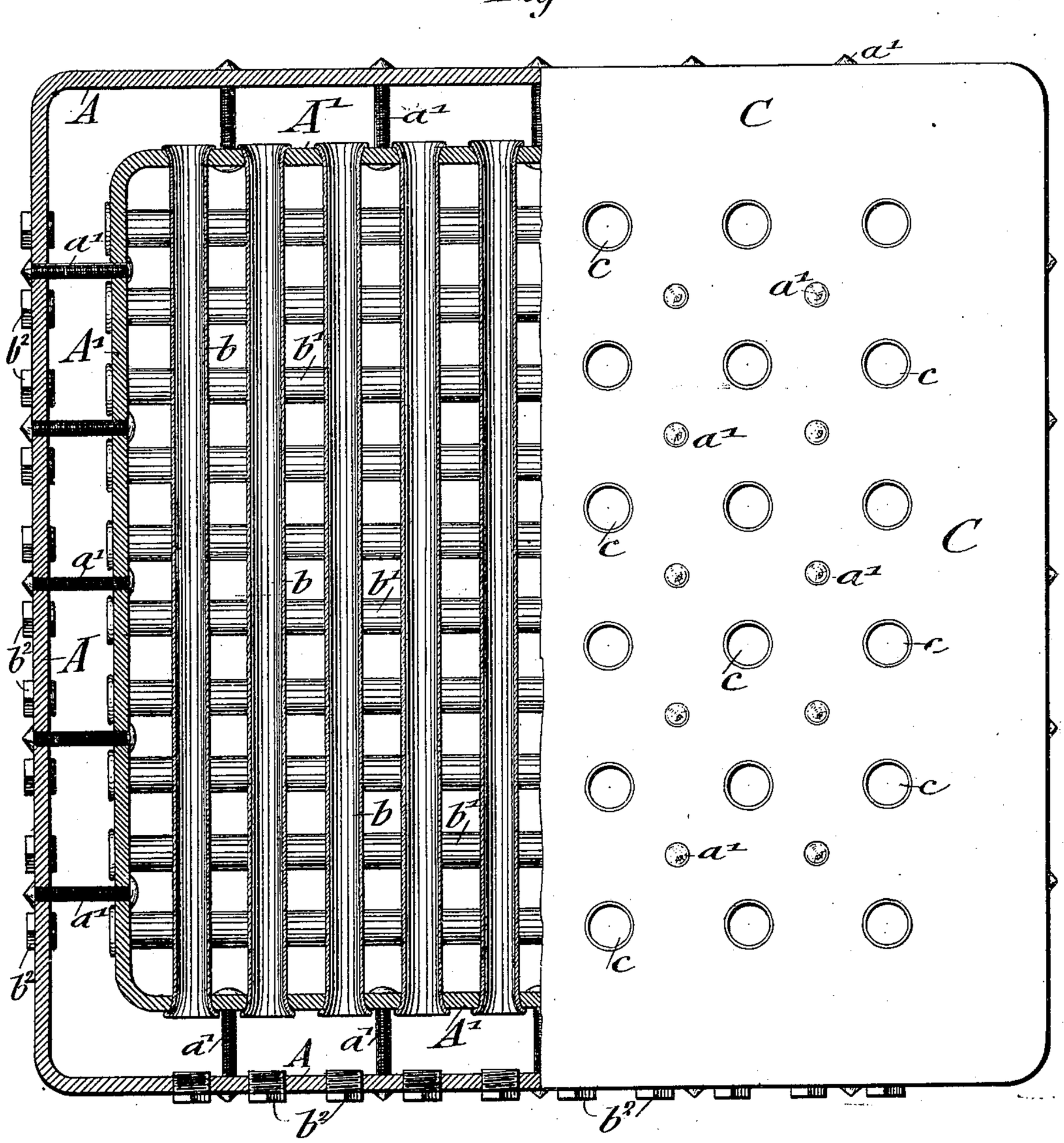
Fig: 3



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JOHN W. SUTTON, OF BROOKLYN, NEW YORK.

STEAM-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 673,667, dated May 7, 1901.

Application filed January 23, 1901. Serial No. 44,366. (No model.)

To all whom it may concern:

Be it known that I, JOHN W. SUTTON, a citizen of the United States, residing in New York, borough of Brooklyn, in the 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 an improved steam-generator for automobile vehicles, said generator being so constructed that a large number of heating-tubes are arranged within a comparatively small compass, so that an effective generator for such vehicles is obtained; and the invention consists of a steam-generator comprising a double-walled shell of rectangular shape, open at the bottom and provided with exit-flues in its top part, and groups of longitudinal and transverse generating-tubes connecting the walls of the inner shell, said groups alternating in direction with each other, the successive tubes of each group being arranged in a transverse plane at an angle of inclination to the bottom of the generator, and the tubes of the opposite group being longitudinally inclined at the same angle as said transverse plane of the first group.

In the accompanying drawings, Figure 1 represents a perspective view of my improved steam-generator for automobile vehicles. Fig. 2 is a side elevation, on a larger scale, with some portions broken away and others in section, so as to show the construction of the generator; and Fig. 3 is a plan view, partly in horizontal section, on line 3 3, Fig. 2.

Similar letters of reference indicate corresponding parts.

Referring to the drawings, A A′ represent a double-walled shell, which is made of rectangular shape, of boiler-iron of suitable thickness and closed at the sides and top, the inner shell A′ being open at the bottom, but connected with the outer shell A by a solid portion *a*. The inner shell A′ is supported in the outer shell by means of a number of connecting stay-bolts *a*′, the ends of which are riveted to the outer shell, as shown in Figs. 2 and 3, said stay-bolts imparting the required degree of stiffness to the shell of the generator. The space between the walls at opposite sides of the generator is connected by two systems of steam-generating tubes, one system extending from the front to the back wall, while the other system extends from one side wall to the other, the longitudinal groups B alternating with the transverse groups B′ from top to bottom of the generator. Each individual steam-generating tube *b* or *b*′ is enlarged at the ends by suitable tools, which are introduced through holes in the outer shell, which holes are after the ends of the tubes are expanded closed by suitable screw-plugs b^2 in manner similar to the screw-plugs of water-tube boilers. The flues of each group are arranged transversely in a plane forming an angle of inclination with the open bottom of the generator, so that the heating-gas can readily lap around the same. Each individual flue is also arranged longitudinally at an inclination which corresponds approximately to the transverse plane in which the opposite group is arranged. By this arrangement a very effective circulation of the water from one side of the generator-shell and from front to back of the same during the generation of steam is accomplished and the even distribution of the heated products of combustion among the successive groups of tubes is secured.

The top or head C of the generator is provided with outlet-openings *c*, through which the products of combustion of the heating-gases are conducted off. Any suitable source of heat may be used, provided the heating-gases are introduced at the open lower part of the generator. They are then conducted around the transverse groups of inclined flues, so as to pass in a meandering course through and around the same until they escape through the openings at the top of the boiler. The water is kept at a certain level in the boiler, as indicated by dotted line in Fig. 2, so that the space of the shell above the same is always filled with steam, which is supplied to the motor by which the vehicle is driven.

The tubes parallel to the sides of the boiler are of the same length and made of the same material, and therefore expand exactly the same under equal heating. Hence with extremely-low water they are not drawn so as

to leak. The holes in the outer shell opposite the ends of the tubes allow any tube to be removed and a new one put in its place without disturbing any other tube, thus making repairs easy and cheap.

My improved steam-generator has the advantage that its steam-generating flues have a very large heating-surface, so as to produce the quick generation of steam from the water supplied from the double-walled shell of the generator. As each tube is inclined, there is a positive circulation of water through each tube. The heat is effectively applied and fully utilized in its passage between the longitudinal and transverse groups of heating-tubes. The upper tubes and space between the heads at the top of the generator insure dry steam, and lastly a generator of very compact shape and small weight is supplied, which are necessary conditions for generators for automobile propulsion.

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

A steam-generator, consisting of a double-walled shell of rectangular shape, open at the bottom and provided with exit-flues in its top part, and groups of longitudinal and transverse generating-tubes connecting the walls of the inner shell, said groups alternating in direction with each other, the successive tubes of each group being arranged in a transverse plane at an angle of inclination to the bottom of the generator, and the tubes of the opposite group being longitudinally inclined at the same angle as said transverse plane of the first group, substantially as set forth.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

JOHN W. SUTTON.

Witnesses:
PAUL GOEPEL,
JOSEPH H. NILES.