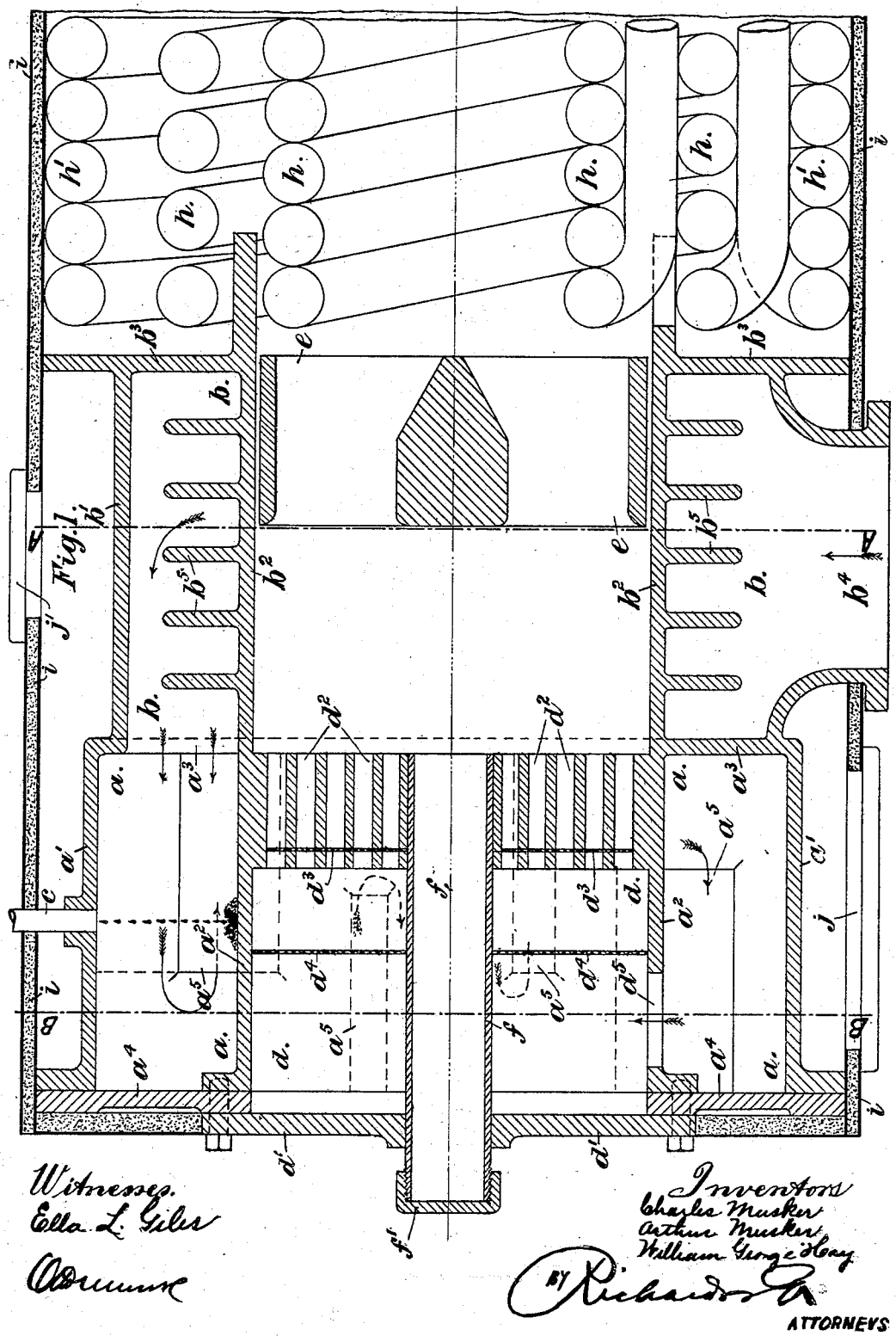
No. 676,096. Patented June 11, 1901.

C. & A. MUSKER & W. G. HAY.

OIL HEATED STEAM GENERATOR.

(Application filed Feb. 28, 1899.)

(No Model.) 2 Sheets—Sheet 1.



Witnesses.
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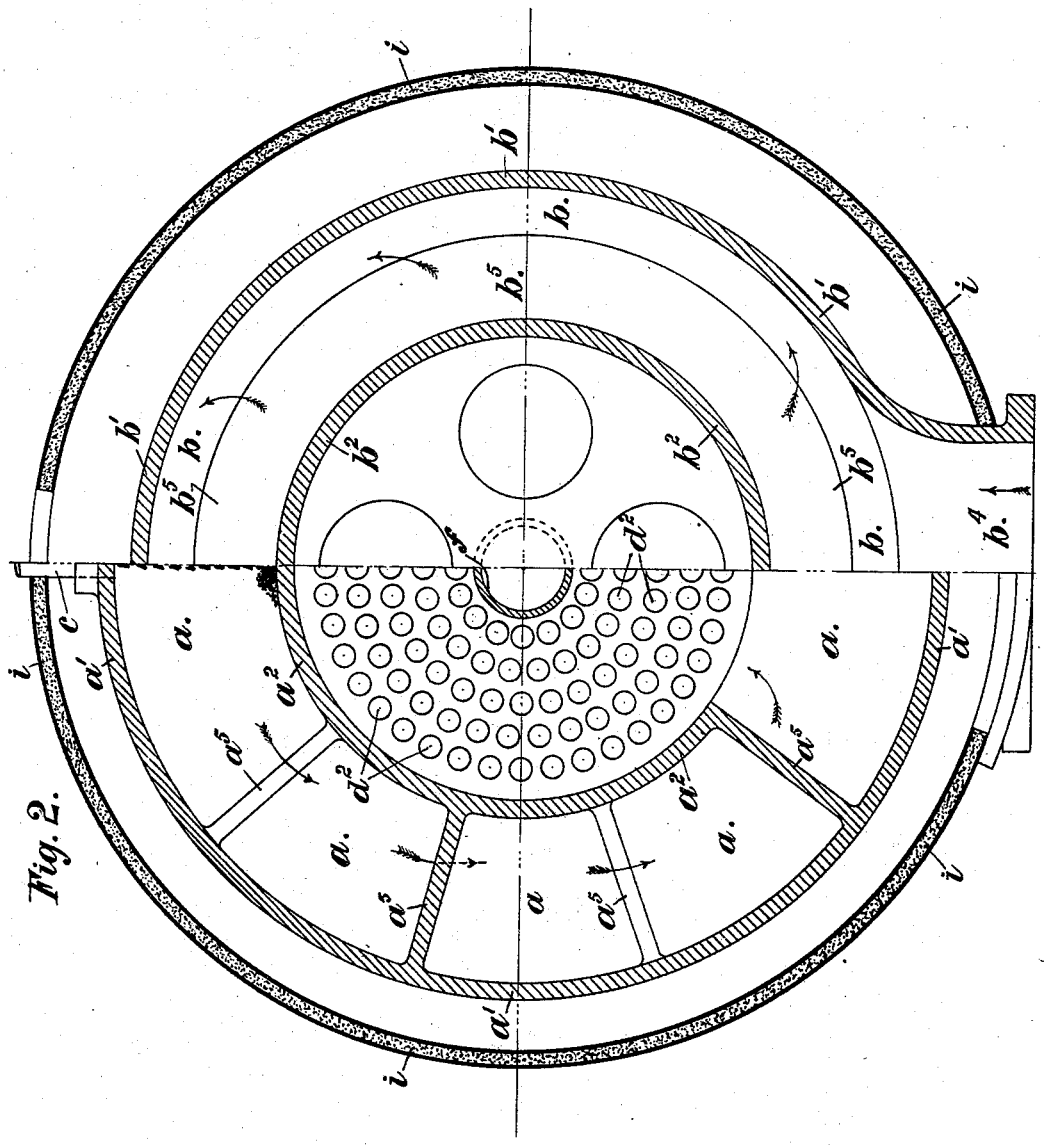

Fig. 2.

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UNITED STATES PATENT OFFICE.

CHARLES MUSKER, ARTHUR MUSKER, AND WILLIAM GEORGE HAY, OF BOOTLE, ENGLAND.

OIL-HEATED STEAM-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 676,096, dated June 11, 1901.

Application filed February 28, 1899. Serial No. 707,182. (No model.)

To all whom it may concern:

Be it known that we, CHARLES MUSKER, ARTHUR MUSKER, and WILLIAM GEORGE HAY, subjects of the Queen of England, and residents of Bootle, in the county of Lancaster, England, have invented certain new and useful Improvements Connected with Oil-Heated Steam-Generators and other Apparatus, of which the following is a specification.

This invention has reference to the generation of steam by oil fuel or liquid fuel on autovehicles in which the motor fluid for driving them is steam; but parts of the apparatus or novel characteristics of the invention are also applicable for use for the generation of steam for other purposes. For convenience of description, however, the invention will be described as applied mainly in connection with an autovehicle steam-generator.

The class of oil-heated apparatus to which this invention relates is that in which the oil is vaporized or gasified and the vapor or gas burned as it is produced, the vaporization or gasification being effected at or in the burner or furnace to be heated.

The invention will now be mainly described in its application to the heating of steam-generators, and more especially of the type in which only a small quantity of water and steam is contained, such as are proposed for use in connection with autovehicles.

In the drawings, Figure 1 is a longitudinal section showing a burner attached to a steam-generator of the type referred to; and Fig. 2 is a cross-section through the burner, half taken at the line A A and half at the line B B.

This apparatus comprises a chamber or part in which the oil is vaporized, a part in which the air used to support combustion of the gases or vapors of oil is heated, and a burner portion proper.

In the drawings the oil vaporizing or gasifying chamber is designated a, and it is formed by an outer circular wall a', an inner annular wall a^2, an end wall a^3, and an end cover a^4, bolted on the ends of the walls a' a^2. The chamber is thus annular. The air-heating chamber is designated b and is of similar form to a, its outer and inner walls b' b^2 being substantially continuations of a' and a^2, respectively, while the outer wall b closes one end and the other end being closed (except at the upper part where it communicates with a) by the wall a^3. This wall a^3 constitutes a partition between the chambers a and b. The communication between the chambers b and a is at the highest part and is made by a portion of this wall being cut away. The entrance of air to the chamber b is by the branch b^4 at the bottom of this chamber, this branch being connected with the source of supply of air. Within the chamber b there are thin annular ribs b^5, which convey heat from the burner within the wall b^2 to the air as it passes through the chamber b. The oil—say ordinary petroleum—is introduced into the chamber a through the pipe c, entered through the top of the outer wall a', and falls onto the upper part of the wall a^2. Within the chamber a there are a series of partial partitions a^5 extending out from the walls a^3 and a^4 alternately and also extending radially from the inner wall a^2 to the outer wall a'. These partitions cause the oil and air to flow in a circuitous course through the chamber a.

Within the wall a^2 at the front end of the burner there is a chamber d, closed at one end by a bolted-on cover d' and having a perforated wall d^2 at the other end. The perforations in this wall are numerous and are in the form of tubular passages of small diameter arranged closely together—that is, they are relatively small in diameter and relatively long. This proportion is conveniently provided by making this wall d^2 of thick metal and drilling or coring out the holes through it. In the front end of this wall there is inserted a gauze diaphragm d^3 for the purpose of insuring that no back-firing shall take place, and a second wire-gauze diaphragm d^4 may also be provided.

In front of the wall d^2 there is a perforate block e of iron or fire-resisting material for breaking up the flame-jet and obstructing its flow, thereby reducing its velocity and increasing its heating action in the steam-generator. It also assists in obviating noise in the combustion.

The chamber a communicates with the chamber d by an opening at d^5 in the bottom of the wall a^2, and communication between

the outside of the burner and the space in front of the wall d^2 is by means of a tube f, which passes through a cover d' and the wall d^2 and is provided with a cap f'. By removing this cap and introducing a kindling device the combustible fluid issuing through the wall d^2 is ignited.

In the drawings, h represents the water-tubes of the steam-generator to be heated by the burner, three coils being shown. Outside these coils h and also the chambers a and b there is a casing i of a non-conducting character—say asbestos—held between two sheet-plates. At the bottom, beneath the chamber a, there is a removable cover j, while at the upper part, over the chamber b, there is a cover j'. When the apparatus is cold and it is required to start it, this cover is removed and the heat of an oil or other lamp is conducted through the space or opening in i, which is normally covered by j, and this heat passes around the outside of the chambers a and b and out by j', heating thereby both the air-chamber and oil-vaporizing chamber.

In action the oil is supplied to the chamber a, falling onto the plate a^2, and flows on both sides over this plate a^2, and air while in a highly-heated state, coming from the chamber b, (wherein it receives its heat from the wall b^2 and annular webs b^5,) vaporizes the oil, and this same air also serves to support the combustion of the oil-vapors. The heated air and vapors therefore pass together in zigzag fashion through a and become mixed and pass up through the lower aperture d^5 in a^2 into the chamber d and thence through the holes in the diaphragm d^2, and this combustible mixture of air or oil vapor or gases burns at the discharge ends of these apertures, being first ignited by passing a kindling device through the tube f, and they burn at the end of these holes as nozzles in the space or chamber between d^2 and e. The device e acts as an obstruction and breaks up the flame and its velocity, the effect of which is that a steady and more effective burning and heating action of the combustible gases is afforded, while it also, with the other parts, obviates all roaring, hissing, or noise which usually accompanies burners of large power.

What is claimed in respect of the herein-described invention is—

1. In apparatus heated by liquid fuel, an oil-vaporizing apparatus comprising an oil-vaporizing chamber having an inclined hot vaporizing-surface down which the oil is adapted to run, an oil-inlet; an inlet for the air used for supporting the combustion of said vaporized oil; an outlet for the passage of the combined air and vaporized oil; and a burner in which the said mixed fluid burns the said oil and air inlets uniting before entering the burner; substantially as set forth.

2. In apparatus heated by liquid fuel, an annular oil-vaporizing chamber; an oil-supply conduit feeding the oil onto the upper part of the inner wall of the said chamber; an opening connected with the said chamber for supplying the combustion-air thereto; a chamber within the said vaporizing-chamber and communicating therewith; and a perforated wall at one end of the said inner chamber through which the mixed combustible fluid is discharged.

3. In apparatus heated by liquid fuel, an annular oil-vaporizing chamber; an oil-supply conduit feeding the oil onto the upper part of the inner wall of the said chamber; an opening connected with the said chamber for supplying the combustion-air thereto; a chamber within the said vaporizing-chamber and communicating therewith; a perforated wall at one end of the said inner chamber through which the mixed combustible fluid is discharged; and a flame breaking up and obstructing perforated block directly in front of the said perforated discharge-wall.

4. In apparatus heated by liquid fuel, an annular oil-vaporizing chamber; an oil-inlet at the upper part of same; an annular air-heating chamber adjacent thereto and communicating therewith; an inner chamber communicating with the oil-vaporizing chamber; a perforated wall at one end of the said chamber through which the combustible fluid passes and at which it burns; and a combustion-space within the air-heating chamber.

5. In apparatus heated by liquid fuel, the annular oil-vaporizing chamber a, air-heating chamber b adjacent thereto and communicating therewith; chamber d within the chamber a and communicating therewith, and a perforated wall d^2.

6. In apparatus heated by liquid fuel, an annular oil-vaporizing chamber having an oil-inlet at the top and directing partial partitions a^5 and an air-inlet also at the top, and a discharge-opening at the lower part for the outlet of the combined fluid, and an internal chamber d into which the said fluid is delivered.

In witness whereof we have hereunto set our hands in presence of two witnesses.

CHARLES MUSKER.
ARTHUR MUSKER.
WILLIAM GEORGE HAY.

Witnesses:
ERNEST R. ROYSTOR,
JOHN H. WALKER.