

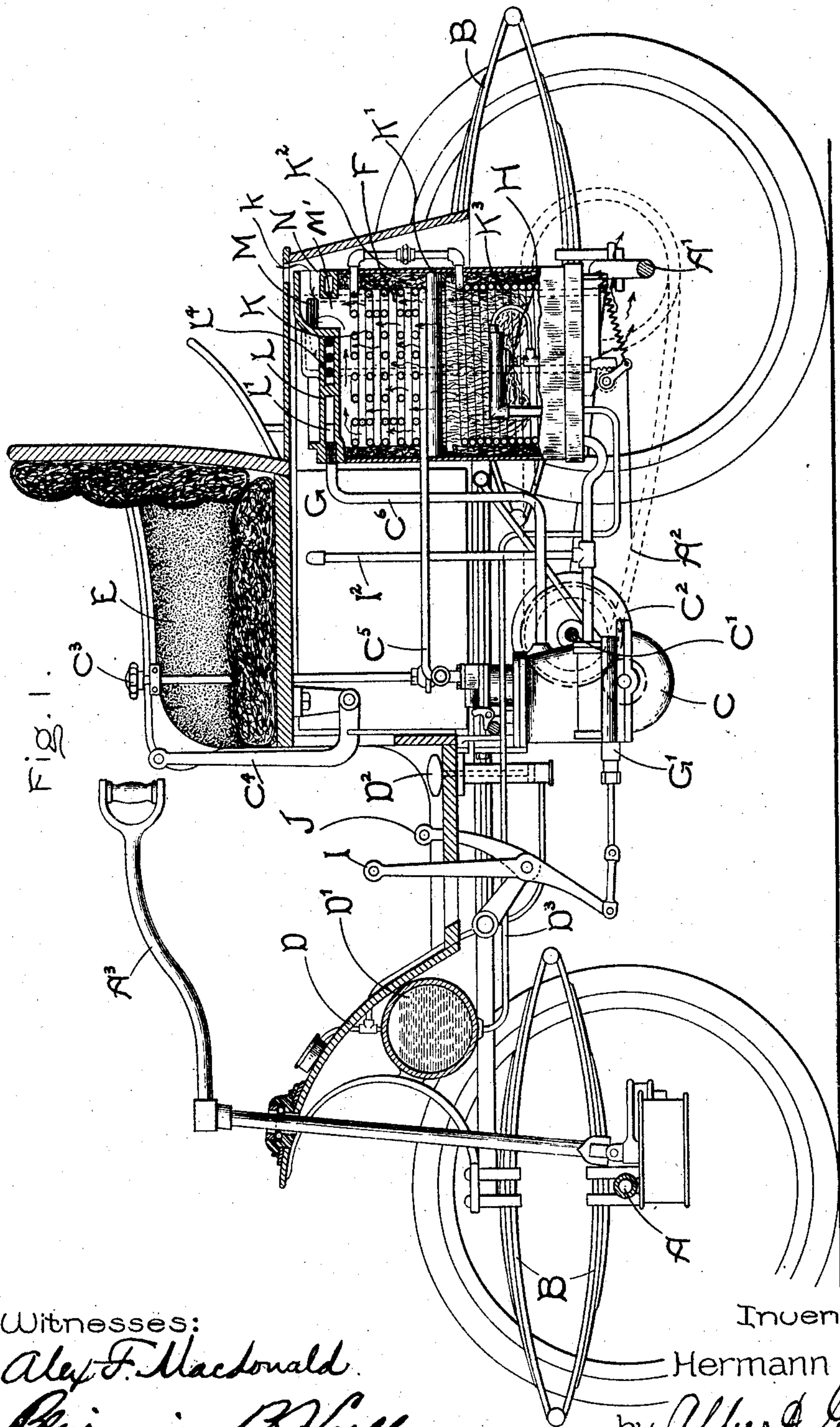
No. 859,567.

PATENTED JULY 9, 1907.

H. LEMP.
STEAM PROPELLED VEHICLE.

APPLICATION FILED NOV. 2, 1900.

3 SHEETS—SHEET 1.



Witnesses:

Alex F. Macdonald.

Benjamin B. Hill.

Inventor:

Hermann Lemp,

by *Albert G. Davis*

Atty

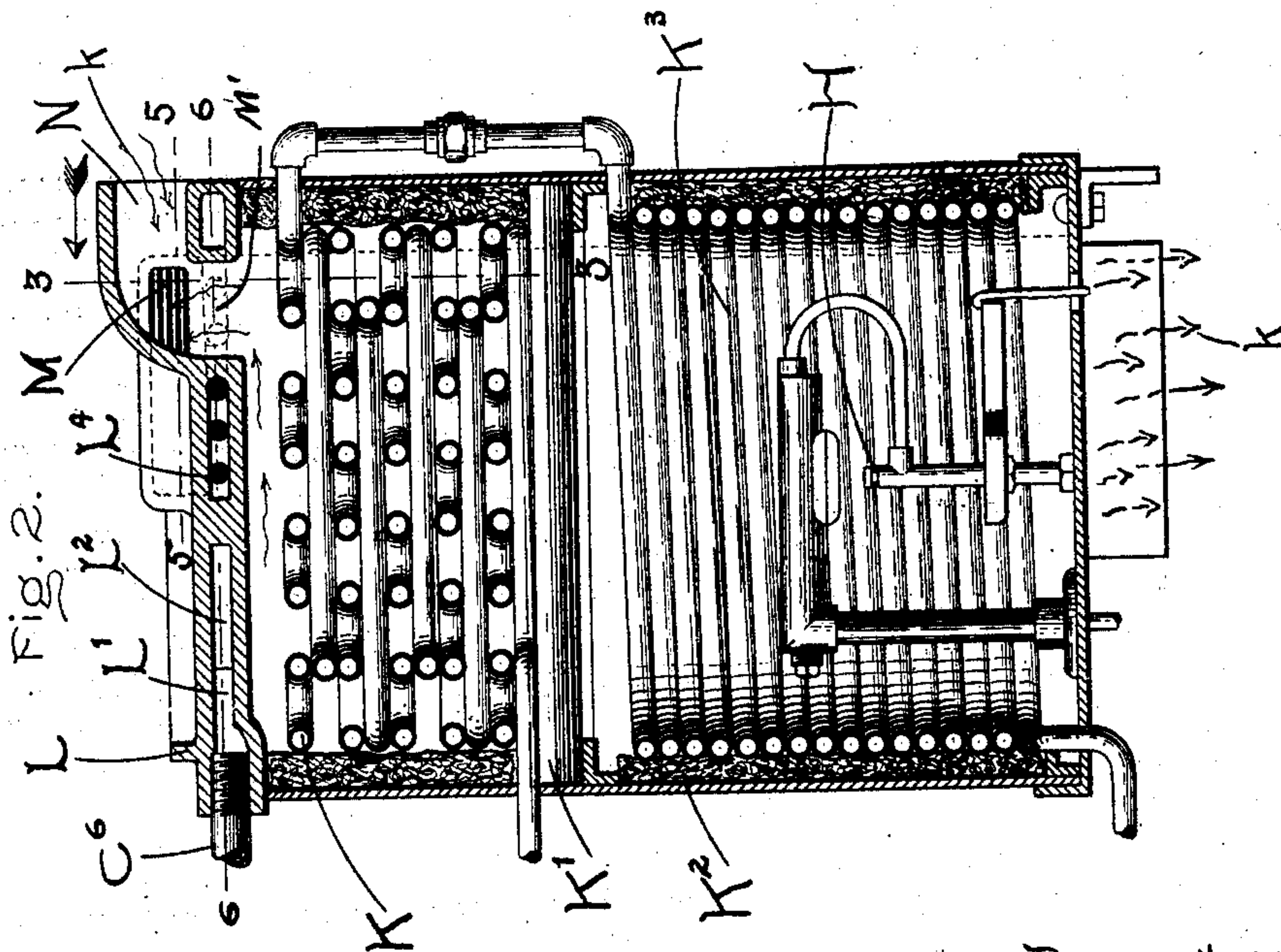
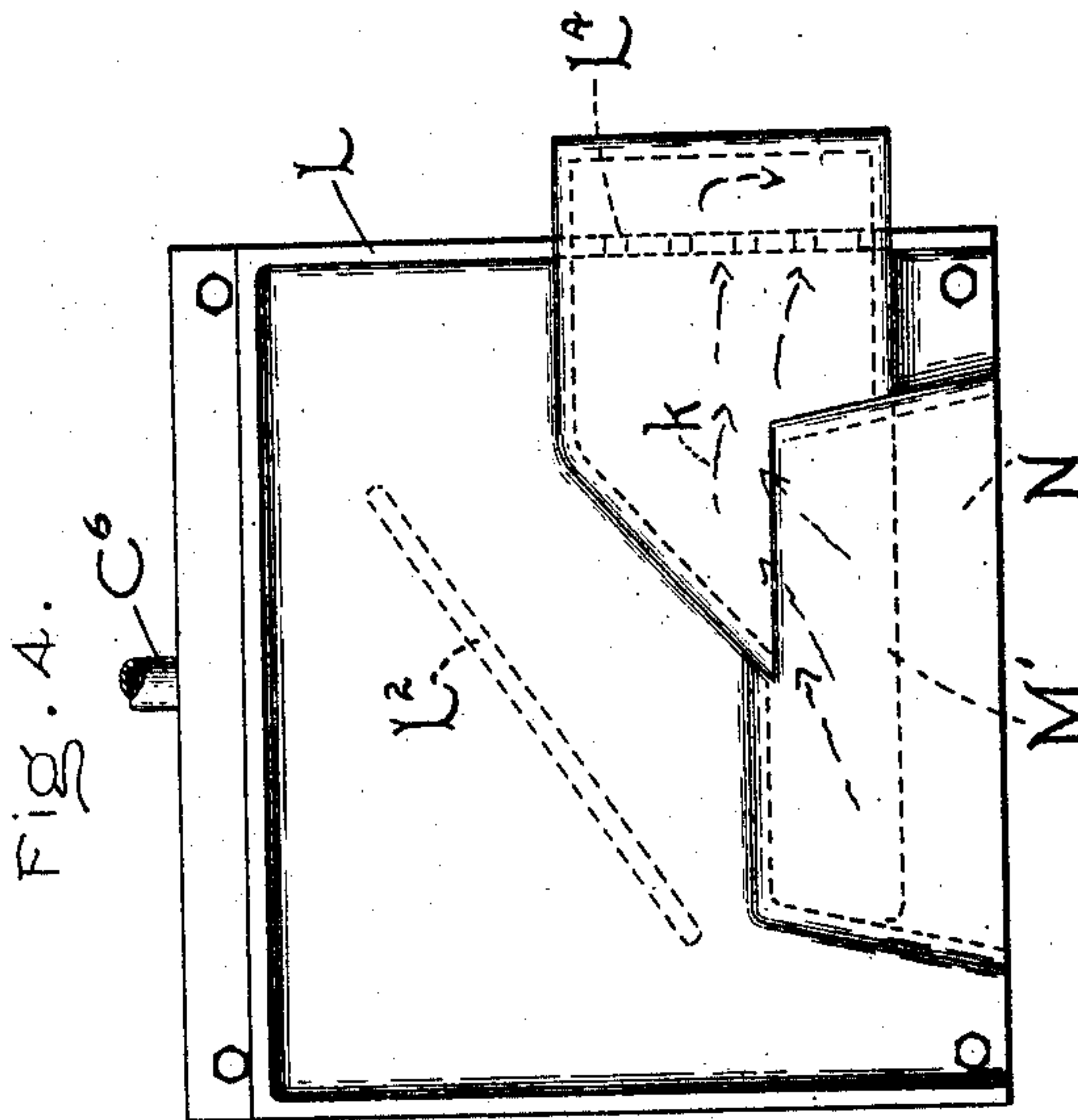
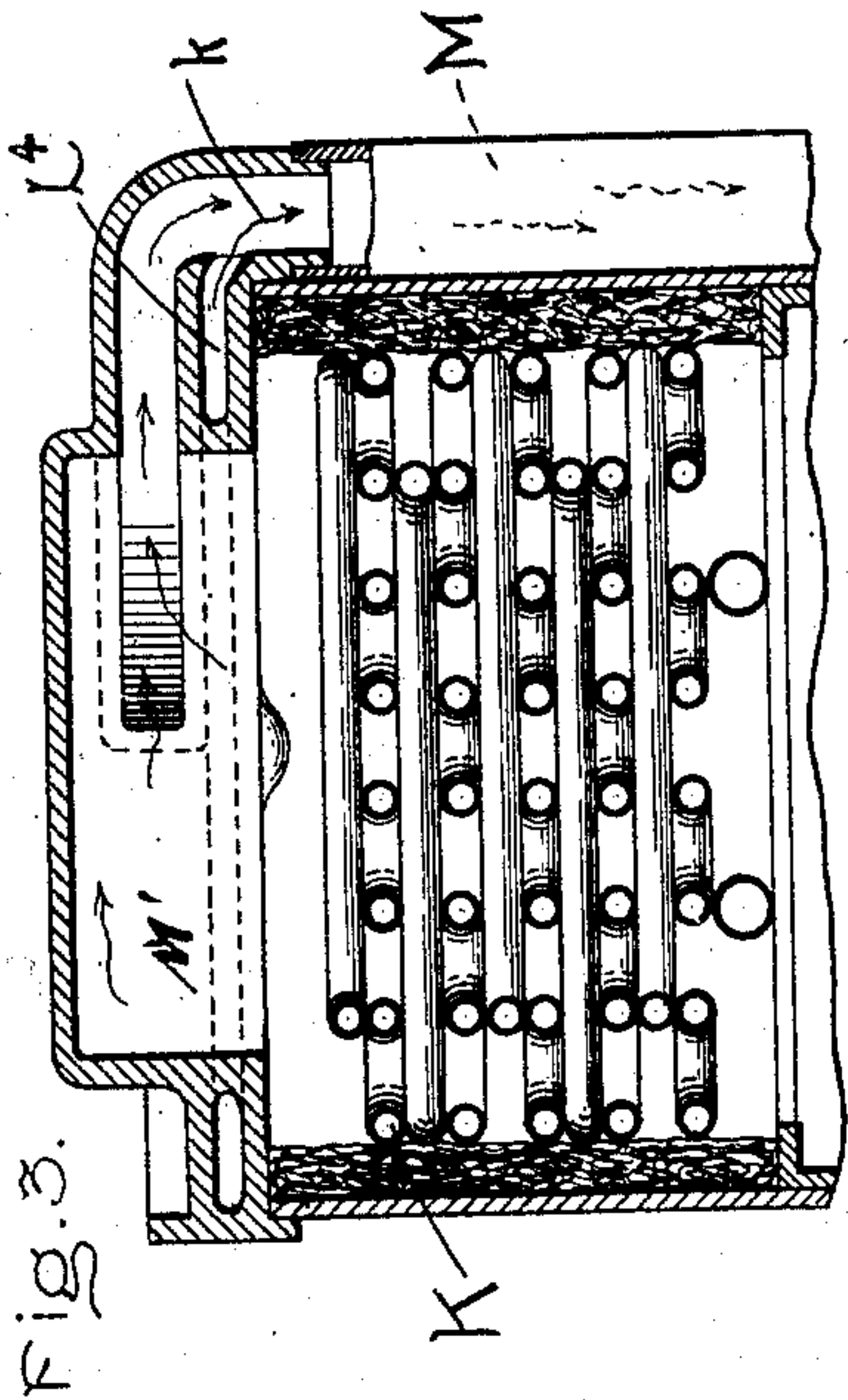
No. 859,567.

PATENTED JULY 9, 1907.

H. LEMP.
STEAM PROPELLED VEHICLE.

APPLICATION FILED NOV. 2, 1900.

3 SHEETS—SHEET 2.



Witnesses:

Alex. Macdonald.

Bryan B. Hill

Inventor.

Hermann Lemp,

by

Albert G. Davis

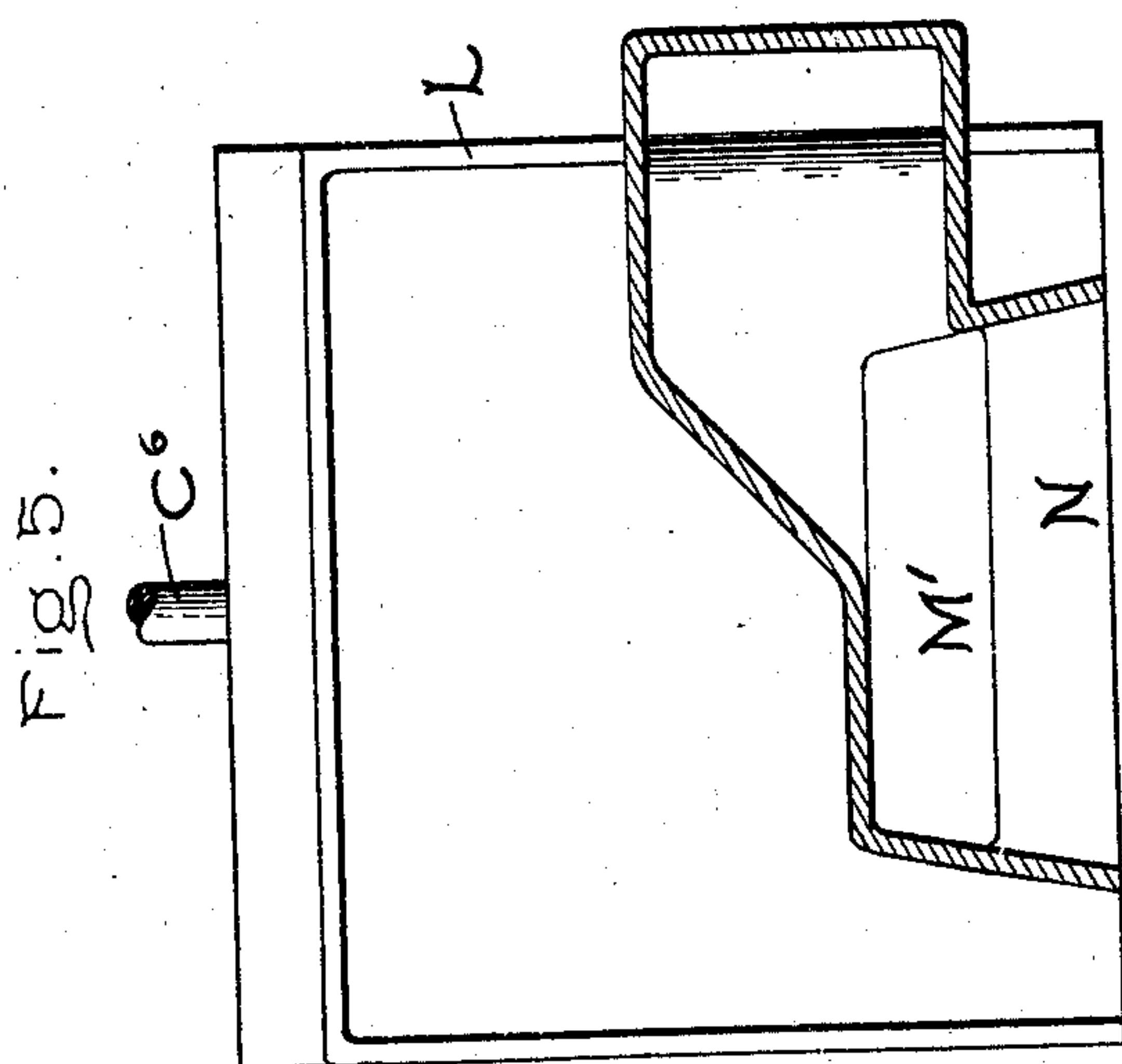
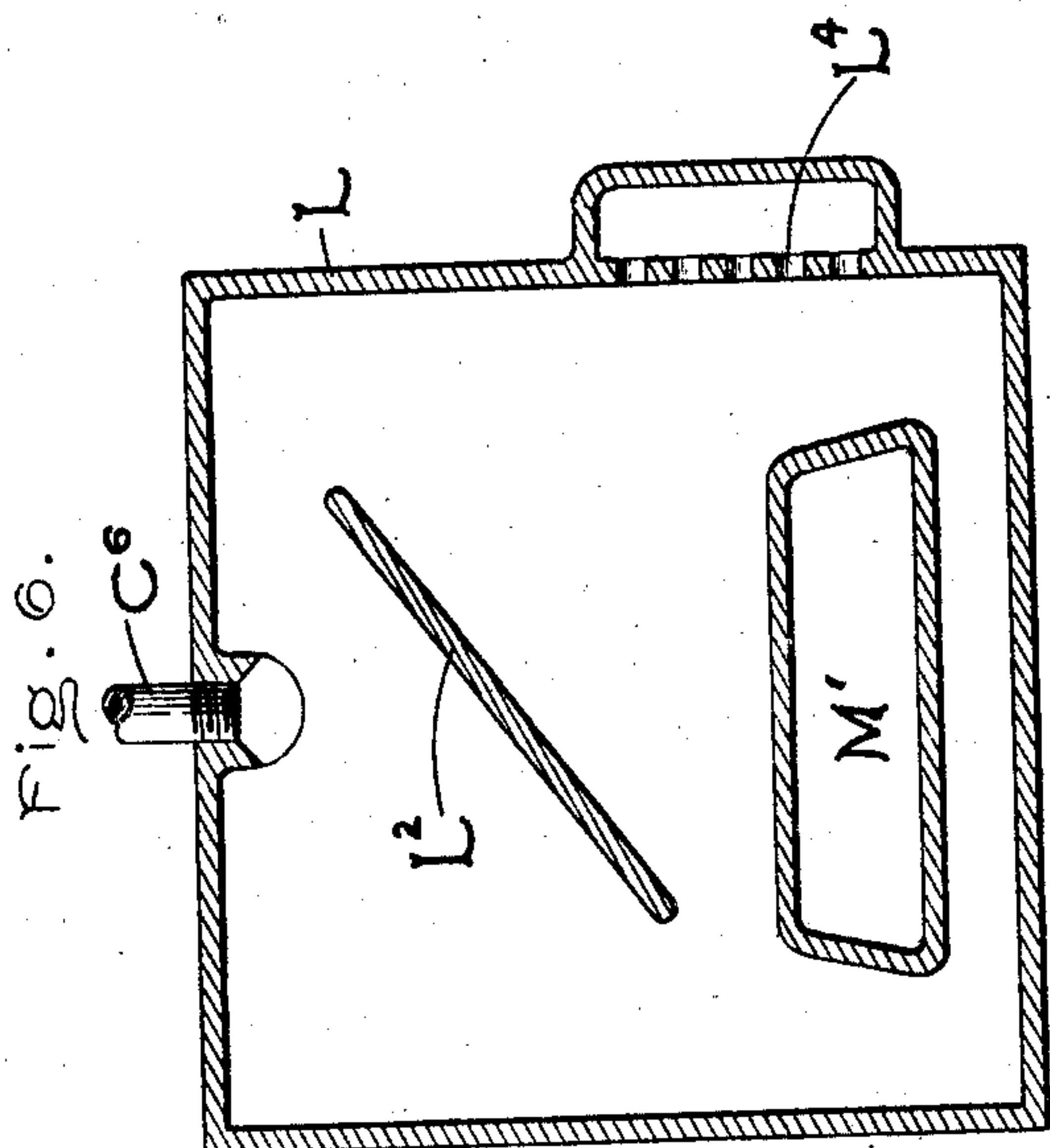
Atty

No. 859,567.

PATENTED JULY 9, 1907.

H. LEMP.
STEAM PROPELLED VEHICLE.
APPLICATION FILED NOV. 2, 1900.

3 SHEETS—SHEET 3.



Witnesses:

Alex. F. Macdonald,
Bryanin B. Hill.

Inventor:

Hermann Lemp,
by *Albert G. Davis*
Atty

UNITED STATES PATENT OFFICE.

HERMANN LEMP, OF LYNN, MASSACHUSETTS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

STEAM-PROPELLED VEHICLE.

No. 859,567.

Specification of Letters Patent.

Patented July 9, 1907.

Original application filed February 28, 1900, Serial No. 6,805. Divided and this application filed November 2, 1900. Serial No. 35,254.

To all whom it may concern:

Be it known that I, HERMANN LEMP, a citizen of the United States, residing at Lynn, county of Essex, State of Massachusetts, have invented certain new and useful Improvements in Steam-Propelled Vehicles, of which the following is a specification.

The present application is a division of my application S. N. 6,805, filed Feb. 28, 1900, which division is made in accordance with the requirements of the United States Patent Office, under Rules 41 and 42.

The present invention relates to steam-propelled vehicles, and more particularly to the means employed for controlling the exhaust from the engine or engines and for taking care of the products of combustion from the burner or burners.

The object of the invention is to improve the construction and operation of steam-propelled vehicles as will be more fully described and claimed hereinafter.

In the accompanying drawings which illustrate my invention, Figure 1 is a longitudinal section of a steam-propelled carriage with certain parts in elevation; Fig. 2 is a vertical section of the boiler and burner; Fig. 3 is a partial vertical section of a boiler taken on line 3—3 of Fig. 2, looking in the direction of the arrow; Fig. 4 is a plan view of the top of the boiler; Fig. 5 is a transverse section of the boiler cover or hood taken on the line 5—5 of Fig. 2; and Fig. 6 is also a transverse section through the cover or hood of the boiler taken on the line 6—6 of Fig. 2.

Referring more particularly to Fig. 1, A, A¹ represent the fixed axles of the vehicle. The front wheels are used for steering and are supported by the well-known double-axle suspension, a handle A³ being employed to move the wheels. The rear wheels are mounted directly on the axle A¹ and are mechanically connected to the engine by sprockets and chains A² as indicated by the dotted lines. The carriage frame is constructed of tubes, arranged to substantially form a rectangle, and is supported from the axles by four full elliptic springs B, two being secured to the front axle and two to the rear axle. The engine C is of the single-acting four-cylinder type, and is supported from the rectangular frame of the vehicle in any suitable manner. On the main shaft of the engine is a gear, and meshing therewith is a second gear which is carried by the intermediate shaft C¹; this shaft extends across the vehicle and is divided into two parts, which parts are connected by a differential system of gearing, known as a jack-in-the-box in the ordinary manner. Surrounding the gearing is a gear-case C², a portion of which is formed integral with the engine frame, and in the case are formed bearings for the intermediate shaft. Mounted on the vehicle frame in any suitable manner is the main body or box of the vehicle. The front of the body is provided with a curved dash D, and back

of the dash is a seat E for the occupants of the vehicle. The body or box of the vehicle is extended rearwardly and incloses the boiler F and the water-tank G. The rear portion of the vehicle body is provided with a top plate containing a flue opening, which opening is so situated with respect to the flue opening N that the fire gases pass freely through it when the forced draft is not in operation. The water-tank is U-shaped in construction, the main portion being located directly under the seat, while the arms or extensions surround the boiler and its down draft flue on two sides and extend to the rear of the body. Situated directly under the dash is a fuel-tank D¹, and connected therewith is a small hand pump D² for furnishing an initial air pressure to the tank. Extending from the fuel-tank to the burner H is a fuel-pipe D³. The engine is controlled by a throttle valve having a hand wheel C³, and is reversed by the reversing lever C⁴. Mounted on an extension of the main frame is a foot lever I, which is arranged to actuate the water-pump G¹, the latter being connected with the water-tank by a pipe I². The foot lever is only employed for actuating the pump under certain conditions, such for example as when the vehicle is started or when there is an unusual demand for water. It is to be understood that suitable apparatus is employed for maintaining a supply of water to the boiler and fuel to the burner, but since this forms no part of the present invention it is not illustrated. Carried on the same extension with the foot lever for operating the pump is a brake-lever J which may be connected with the brake-mechanism in any suitable manner. Steam is admitted to the engine from the pipe C⁵, and the exhaust is carried from the engine by the pipe C⁶.

Referring more particularly to Figs. 2 to 6 inclusive, the construction and arrangement of the boiler parts and the draft flues for the waste products of combustion and the exhaust will be described. The boiler is of a type suitable for the rapid generation of steam and is surrounded on three sides by the water-tank G. It is located in the rear of the body of the vehicle and is composed of a series of grids K, which are united in any suitable manner. These grids are so placed with respect to each other that passages are provided through which the products of combustion may pass. The grids are supported by means of horizontally-extending pieces K¹ that are supported by the boiler casing K². Surrounding the burner H and located below the boiler-tubes, is a coil of pipe K³ which constitutes a feed water heater. The construction and arrangement of the boiler-tubes, the burner, and the feed water heater are not claimed in this application, but form the subject of the parent application, Serial No. 6,805, filed Feb. 28, 1900, of which this is a division. Covering the top of the boiler casing is a cast-metal cover or

hood L and in this cover is formed a chamber L' that is connected to the exhaust pipe C⁶ from the engine at one point and to the down draft flue M at another. The down draft flue consists of a rectangular sheet-metal casing, and is fitted to a shoulder formed on the under side of a cast-metal projection on the hood or cover L. The down draft flue M is located at the rear of the vehicle and extends downward through the water tank G between the arms or sides thereof to a point below the body of said vehicle so that the waste products of combustion and the exhaust are conveyed backward and downward to a point near the roadbed. In addition to this is an up draft flue N communicating with the external air, through which the products of combustion escape to the external atmosphere when the vehicle is standing still or running at its lowest speeds. The parts are so arranged that the products of combustion are conveyed to the rear of the vehicle where they will not be offensive to the occupants. The downwardly opening flue M and the upwardly opening flue N are in permanent and unrestricted communication, as clearly shown in Fig. 2. In other words the flue openings are so related that the fire gases will automatically pass out of the upper or lower opening according to the condition of operation, and this without thought or action on the part of the operator. Communication between the flue opening and the fire chamber is established through the rectangular flue openings M¹ formed in the cover L.

Extending across the cover in a manner to substantially divide the chamber L¹ into two parts, is a web L², constituting a baffling plate, shown in dotted lines in Fig. 4 and in section in Fig. 6. This plate serves to distribute the steam and to prevent it from passing directly to the outlet and to the down draft flue. The outlet opening between the chamber and the down draft flue M is restricted, as indicated by the series of small holes L⁴; these holes or openings are slightly curved at their outer extremity so as to direct the passage of steam downward. The effect of this arrangement is to muffle the sound of the exhaust so that in place of a series of short sharp puffs taking place at the ends of the piston strokes, there is a constant hissing of low tone taking place when the carriage is in operation.

A further advantage in making restricted openings between the chamber L' and the down draft flue lies in the fact that a series of small jets working under high pressure make a better draft than one or more larger openings working under a low pressure.

As before stated, when the vehicle is standing still or is moving very slowly, the products of combustion pass rearwardly to the external atmosphere through the up draft flue N, or, in other words, through a natural draft flue; but as soon as the engine is started into operation at the speeds ordinarily employed, the exhaust passing into the down draft flue, as indicated by the arrows k, Figs. 2 and 3, takes with it substantially all of said products, and at the same time materially increases the draft. The metal forming the hood or chamber L, being located directly over the fire box, becomes very hot, and in addition to the advantage set

forth, it serves to superheat or to reheat the exhausted steam so as to render it invisible except in damp weather.

Having thus described my invention what I claim as new and desire to secure by Letters Patent of the United States, is:

1. A boiler, a casing above the boiler to receive the products of combustion, a flue or stack extending downward from said casing, and means to discharge exhaust steam into said flue or stack so as to carry the products down and out of the lower end of the latter, and an air inlet opening into which the air is drawn by the exhaust and out of which the products of combustion flow naturally when exhaust is not operating.
 2. In a steam carriage, the combination with the boiler-furnace of a constantly open upwardly discharging flue, a constantly open downwardly discharging flue, and means for forcing the downward discharge.
 3. In a steam carriage, the combination with a boiler-furnace and engine, of a constantly open upwardly discharging flue, a constantly open downwardly discharging flue, and means for discharging the exhaust steam from the engine into the downwardly discharging flue, substantially as described.
 4. In a steam carriage, the combination with the boiler-furnace, of a constantly open upwardly discharging flue, a constantly open downwardly discharging flue in unrestricted communication with the upwardly discharging flue, and means for forcing the downward discharge.
 5. In a steam carriage, the combination with a boiler, furnace and engine, of a constantly open upwardly discharging flue, a constantly open downwardly discharging flue in unrestricted communication with the upwardly discharging flue, and means for discharging the exhaust steam from the engine into the downwardly discharging flue, substantially as described.
 6. In a steam carriage, the combination with a furnace and boiler of a constantly open flue for the discharge of the products of combustion by natural draft, a second constantly open flue for the discharge of the products of combustion by forced draft, and means for producing the forced draft and thereby diverting the discharge from the natural-draft flue.
 7. In a steam carriage, the combination with a furnace, boiler and engine of a constantly open natural-draft flue, a second constantly open flue in uninterrupted communication with the first, and means for discharging the exhaust steam from the engine into the second flue and thereby diverting the products of combustion from the first, substantially as described.
 8. The combination with a boiler, furnace and engine, of a constantly open upwardly discharging flue, a constantly open downwardly discharging flue, a chamber heated by the escaping products of combustion, and means for passing the exhaust steam from the engine into the chamber and from the latter into the downwardly discharging flue, substantially as described.
 9. The combination with a boiler, furnace and engine, of a constantly open upwardly discharging flue, a constantly open downwardly discharging flue, a chamber heated by the escaping products of combustion, means for passing the exhaust steam from the engine into the chamber, a baffle plate in the chamber for distributing the exhaust steam within the same, and means for discharging the reheated exhaust steam from the chamber into the downwardly discharging flue, substantially as described.
- In witness whereof I have hereunto set my hand this 30th day of October, 1900.

HERMANN LEMP.

Witnesses:

DUGALD MCKILLOP,
HENRY O. WESTENDARP.