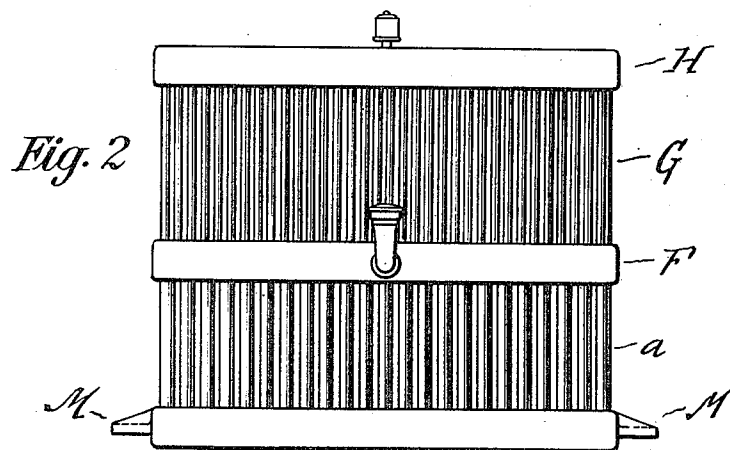
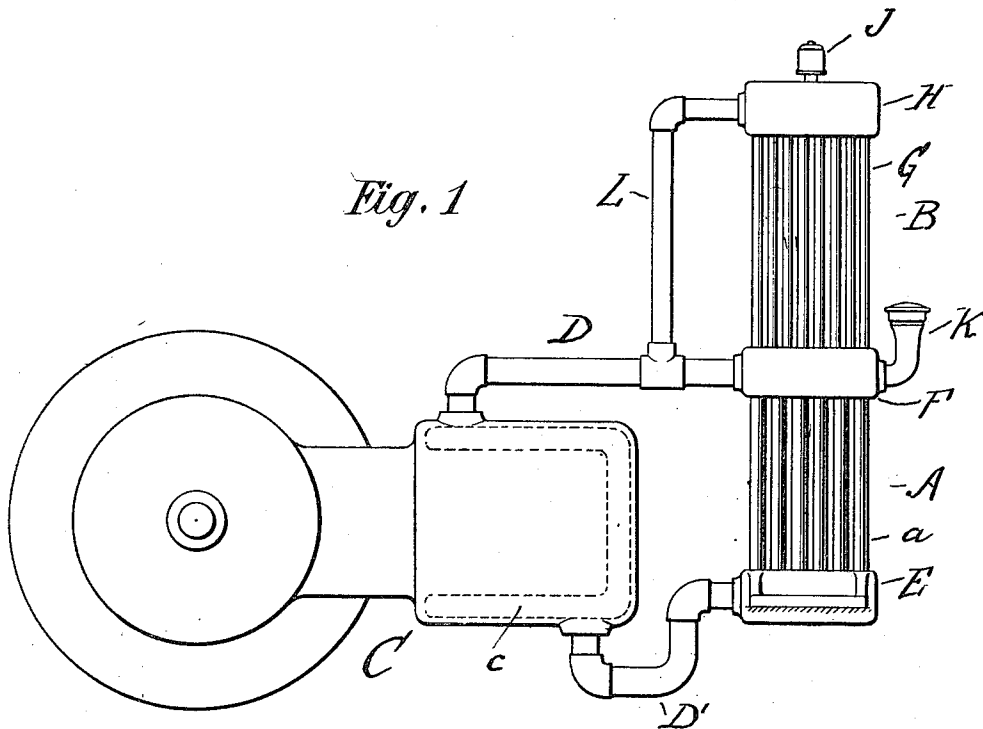


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COOLER FOR INTERNAL COMBUSTION ENGINES.
APPLICATION FILED JUNE 1, 1908.

1,147,232.

Patented July 20, 1915.



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COOLER FOR INTERNAL-COMBUSTION ENGINES.

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Specification of Letters Patent.

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Application filed June 1, 1908. Serial No. 435,960.

To all whom it may concern:

Be it known that I, HUGO C. GIBSON, a British subject, residing in the borough of Manhattan, city and State of New York, have invented certain new and useful Improvements in Coolers for Internal-Combustion Engines, of which the following is a full and clear description, reference being had to the accompanying drawings.

My invention relates to cooling, as, for instance, the cylinders of internal combustion engines, and among my objects are the production of a compact apparatus and a most efficient apparatus, while one of the particular purposes of my invention is to maintain a uniform temperature in the cooling system, or at least in such proportion as will result in maintaining a gas engine cylinder at a uniform and predetermined, proper temperature.

Other objects of my invention and particular features involved in my construction, will appear hereinafter from the more detailed reference to my invention in connection with a description of a particular embodiment, which is shown in the accompanying drawings, of which—

Figure 1 is a side elevation showing my radiator in relation to an engine, Fig. 2 is a front elevation of my radiator.

In this particular embodiment of my invention, A is a water tank, B is a condenser, C is an engine having a water cooling jacket *c*, D is the connection from the water jacket of the engine to the cooler comprising the two principal parts, A, B and D' is a connection from the cooler to the water jacket *c* of the engine C.

In the embodiment shown, the tank A comprises tubes *a*, which are let into the base E and enter at their top the header or water box F.

The condenser comprises the tubes G, which extend from a header H to the upper side of the water box F. On the header H is the air valve J, while connecting with the water box F, in a suitable manner, is a funnel connection K suitably adapted for filling the water box and from the water box the other parts of the water tank A and the pipe connections D D' and jacket C, with water.

L is the steam riser connecting as a shunt from the water connection D to the condenser header H.

On either side of the base E are the lat-

eral projections M, which form suitable feet or lugs for supporting the radiator as a whole.

Thus it will be seen that in the example of a structure containing my invention, the water contained in the water jacket *c* which surrounds the head or explosion chamber of the engine C, will be heated in the usual manner during the operation of the engine. The cooling water will then pass through the connection D and will flow into the water box F, where it will distribute itself over the heads of and pass through the tubes *a* into the base box E, and in turn pass through the connection D' back to the water jacket. During this circuit a large radiating area presented by the surface of the tubes *a*, cools the water to a sufficient extent. While the circuit of water is being made as above, it will be seen that under certain conditions of design and operation of the engine, the heating of the water is such that when passing from the water jacket some steam may be found in the system, being generated by the excessive heat. In this case steam so formed will rise through the steam riser L, while it may be gathered in a hood or dome at any suitable place, co-operating with the connection D. The steam so passing through riser L is led to the condenser head H, where it will pass into the tops of the condenser tubes G. These condenser tubes are of comparatively small section, and as a result the water resulting from the condensation of the steam near their top, will fill the section of the pipe in which it is condensed and will flow to the lower end, and there pass into the water box or header F of the water tank proper A. It will thus be seen that the water condensing in the small tubes G will act as a suction pump to draw the steam from the riser L and the header H, into the small tubes G, where it in turn is condensed and there co-operates to draw in any more steam that may accumulate in riser L and header H, and in view of the large radiating area of the small condenser tubes G it will be quickly condensed and pass into the water and header F at less than steaming temperature.

The funnel K is used for filling the system with water, and as seen in the drawings it is located above the level of the water tank and the water connections to the engine cylinder jacket, so that the water box and

all connections and jacket may be filled with water through the funnel inlet K, which may then be closed in any usual or desired manner. The steam riser and steam condenser being above the water system, become operative only when the cooling water begins to give off steam. From this it will be seen that the cooling system including only the water tank A, will accommodate a circulation of the cooling medium so long as it remains at a temperature less than steaming. The steam arising from the cooling medium, however, passes into the condenser, and by my arrangement is completely condensed and brought well below the steaming temperature before it is again mingled with the main body of the cooling water in tank A, which will insure that all water passing through the tubes *a* of the cooler or radiator proper, will be less than steaming temperature and contain no steam, and will, after the cooling in these tubes *a*, pass into the water box E and back to the cylinder. I construct my cooler proper of such proportions, particularly with respect to radiating surface, that the cooling of the water is not excessive, in order to preserve the temperature of the jacketed cylinder at the right degree for best operation of the engine. But using what would, under other circumstances, be a deficiency in radiating surface in the cooler proper, my condenser cooperating with the cooler insures the practical, immediate elimination of heat at steam temperature. I am, therefore, enabled to preserve the cylinder of the engine cooled by my system, at practically uniform temperature and with very small radiating surface for the cooler.

While I have chosen to illustrate my invention by the particular construction, it will be seen that various modifications in design, arrangement and construction may be made without departing from my invention.

I have found my invention particularly applicable to automobiles, and to that end arrange base supports or feet, such as M, by means of which I may secure my radiator to the sill of an automobile, and in the particular form shown my radiator may be located at the forward end of an automobile, in the now usual manner, although such location may be readily changed. In fact, I have found that in some cases I may practically eliminate any special radiating area in the tank A, simply completing a circuit of pipe connections and a small water reservoir. This I have found effective in view of the rapid condensation of any steam given off by the cooling water. In the operation of my invention, I effect the radiation of heat simply from the medium, namely, the steam, which is at high temperature, and therefore best adapted for rapid

radiation, in view of which a given area for radiating surface in the steam condensing system becomes far more effective than a like area for cooling water, which is already below steaming temperature.

I may also apply a suitable dome or trap to collect any steam arising from the jacket *c* or passing through the connection D, so that no steam will be carried through into the tank A and thus to the lower end of the condenser tubes G, but, on the contrary, all steam will be suitably collected and passed to the upper ends of the condenser B. My condenser may be of any desired form having the necessary effective dimensions for the purposes of my invention. I may also use any desired system for forcing the circulation, as by pumps of the many forms now in use, and may likewise connect my radiator to any number of cylinders, and in numerous ways apply my invention to automobiles or gas engines or for any other purposes to which it is adapted.

Having now described one embodiment of my invention, I do not mean to be limited to the particular form of the construction of the same, but

What I claim and desire to secure by Letters Patent is:

1. In a cooling system for gas engines, an engine, a water circulating system for the latter including a tank in the circuit and connections to and from said tank below the normal level of water in the tank, a steam condenser above said tank, a steam gathering pipe rising from the connection from the engine to the tank which gathering pipe leads to the top of the condenser and connections from the bottom of the condenser to the tank.

2. In a cooling system for internal combustion engines, a closed water circulating system comprising a water jacket, a water outlet pipe from said jacket, a steam riser from the pipe, a water tank having a header to which said pipe is connected, radiating means interposed between the steam riser and the tank and located entirely above and directly connected with said water tank and a return system to said water jacket.

3. In a cooling system for internal combustion engines, a water sealed water circulating system, comprising in part tubes having their axes substantially vertical and constituting a condenser whereby the water of condensation can drop freely by gravity directly to the water circulating system, connections from said tubes to the water circulating system whereby steam separated from the water is carried to a passage connecting only with the upper ends of said tubes, the latter connecting at their lower ends with the water circulating system at a point above the normal water level.

4. In combination in an automobile radi-

ator, a suitable water reservoir, an engine jacket, water connections to and from said engine jacket affording water sealed free circulation of water through said reservoir, a condenser above the level of the water reservoir having a plurality of narrow passages permitting free movement of water of condensation in a substantially vertical direction, a riser leading to said condenser for carrying steam independently of the water circulation and direct connections from the bottom of said condenser to the water circulating system.

5. A radiator for the cooling system of internal combustion engines, comprising a lower portion having a regular reservoir for water to be held at a predetermined level, a condenser portion above the level of the water in said reservoir, a water inlet below the water level and a water outlet below the water level of said reservoir portion of the radiator, and a steam inlet to said condenser and connections between said condenser and said reservoir including a water outlet from said condenser to the top of said reservoir portion.

6. In combination in a radiator for the cooling system of internal combustion engines, a reservoir included in the lower portion and comprising part of a water circulating system, an inlet and outlet to said reservoir below the normal level of the water, and an engine-jacket included in said water circulating system, a condenser above the water level in the reservoir having substantially vertical tubes of such dimensions

that the water of condensation by gravity operates to draw steam into said condenser, a connection from the water circulating system to the top of said condenser to carry steam to said condenser.

7. In combination in a radiator for the cooling of internal combustion engines, an engine jacket, a water reservoir with inlet and outlet connections below the predetermined level of the water to afford closed water circulation from and to said engine jacket, a condenser above the water level and emptying directly into the water circulating system, a conduit for steam from said jacket to said condenser, and tubes in the condenser whereby the water of condensation acts by gravity to draw the steam from the circulating water into said condenser.

8. In a radiator for the cooling system of internal combustion engines, a water reservoir below the water level and having inlet and outlet pipes, a water jacket with which said reservoir communicates, a condenser arranged above said reservoir and emptying directly in the same, said condenser comprising a plurality of tubes of such size that the water of condensation will by gravity induce suction of the steam into the condenser.

Signed at New York this 27th day of May, 1908.

HUGO C. GIBSON.

Witnesses:

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H. T. CLINTON.