E. E. SWEET.

COOLING SYSTEM FOR EXPLOSION ENGINES.

APPLICATION FILED FEB. 10, 1908.

915,506. Patented Mar. 16, 1909.

2 SHEETS—SHEET 1.

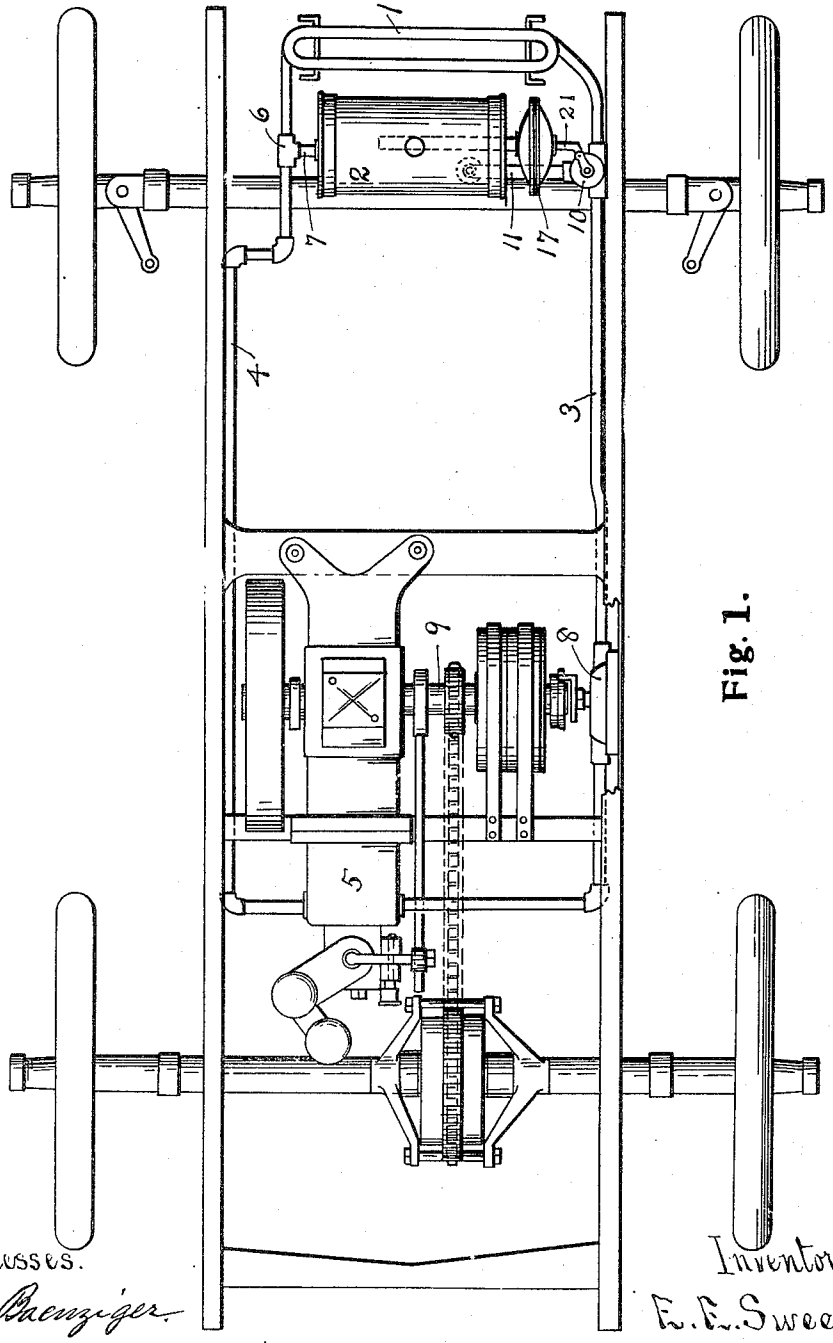


Fig. 1.

Witnesses.
O. B. Baenziger.
E. M. Brown.

Inventor.
E. E. Sweet.
by Edward N. Pagelsen
Atty

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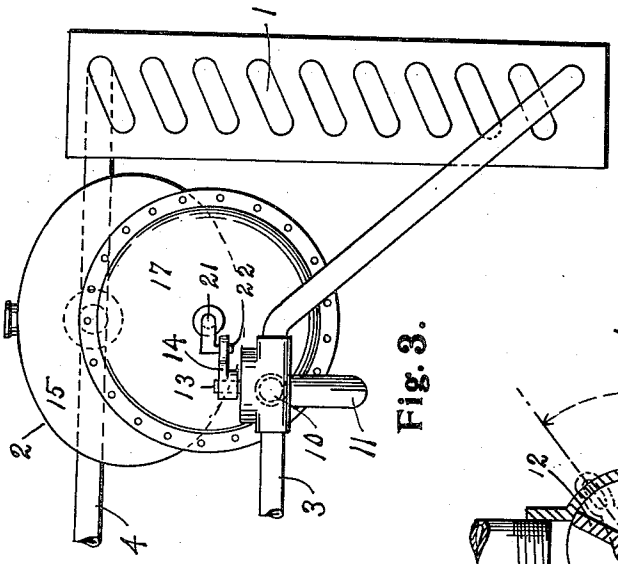


Fig. 3.

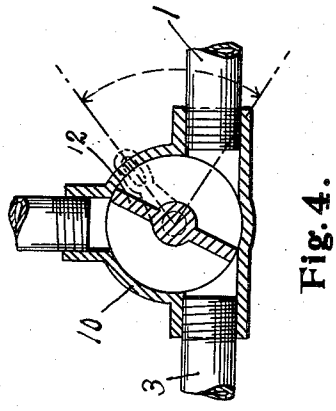


Fig. 4.

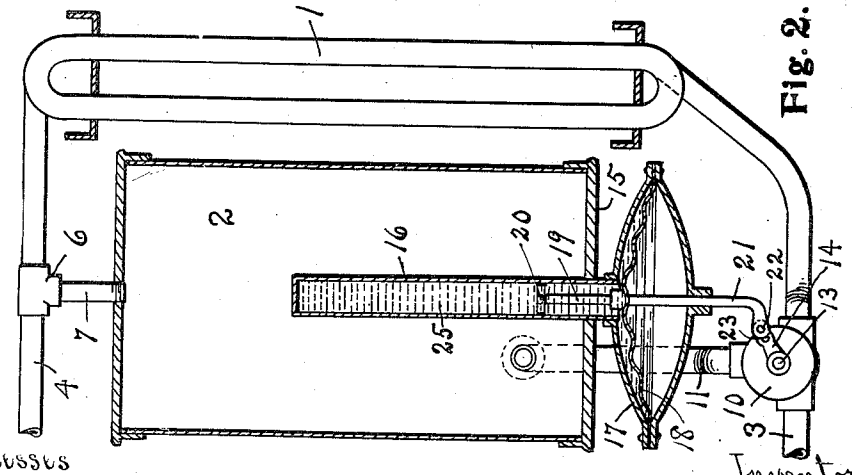


Fig. 2.

Witnesses
O. B. Baenziger.
E. M. Brown.

Inventor.
E. E. Sweet.
by Edward N. Pagelsen
Atty

UNITED STATES PATENT OFFICE.

ERNEST E. SWEET, OF DETROIT, MICHIGAN, ASSIGNOR TO CADILAC MOTOR CAR COMPANY, OF DETROIT, MICHIGAN, A CORPORATION OF MICHIGAN.

COOLING SYSTEM FOR EXPLOSION-ENGINES.

No. 915,506. Specification of Letters Patent. Patented March 16, 1909.

Application filed February 10, 1908. Serial No. 415,099.

To all whom it may concern:

Be it known that I, ERNEST E. SWEET, a citizen of the United States, and a resident of Detroit, in the county of Wayne and State of Michigan, have invented a new and Improved Cooling System for Explosion-Engines, of which the following is a specification.

This invention relates to means for controlling the reduction of the temperature of the cooling liquid of explosion engines after it has circulated through the walls of the cylinder, and the object of this improvement is to provide means which shall automatically regulate the temperature of the cooling liquid passing to the engine.

My invention consists in a combination of a tank of small radiating capacity in proportion to its contents, a radiator of large radiating capacity, piping for the cooling liquid between the tank and the engine, connections between the piping and the radiator, and a valve to control the flow through the radiator.

My invention further consists in a device whereby the position of said regulating valve and thereby the amount of flow through the tank and radiator will be controlled by the temperature within the tank.

In explosion engines, especially those of automobiles, where the temperature of the cylinder walls is kept down by means of a cooling liquid circulating therethrough, means must be provided for reducing the temperature of the cooling liquid. The usual radiators employed for such purpose are of such dimensions that the water or other circulating liquid will be cooled sufficiently on the warmest summer day. As a result, this provides a radiating surface greatly in excess of requirements during colder weather. It is not only necessary to keep the cylinder walls below a certain temperature which is usually determined by the lubricating oil employed, but it is most desirable that the temperature shall be as high as possible without burning the lubricating oil and without changing the conformation of the parts. Any temperature of the walls below the maximum allowable subtracts from the efficiency of the engine by chilling the exploded charge, thus cutting down the effective pressure. It is therefore most desirable to keep the temperature of the circulating liquid as nearly uniform as possible, at all times.

While a radiator of a given design may be proper for a temperature of 100 degrees in the sun, and at that temperature will keep the circulating liquid passing to the engine at about 180 degrees, this same radiator, at zero temperature, will chill the water passing to the engine to perhaps 50 degrees, and thus reduce the effectiveness of the engine as much as from twenty to even fifty per cent. The construction designed to overcome this difficulty and to insure a comparatively even temperature of the circulating water passing to the engine is illustrated in the accompanying drawings, in which—

Figure 1 is a plan of a part of the driving mechanism of an automobile with the radiator controlling mechanism in position. Fig. 2 is a view of a radiating coil and tank, the latter in cross section. Fig. 3 is a side view of the circulating liquid controlling valve. Fig. 4 is a longitudinal cross section of the same.

Similar reference characters refer to like parts throughout the several views.

Fig. 1 shows a part of the running gear and motor of a light car in which 1 is the radiator, 2 the tank, 3 and 4 are circulating water pipes and 5 the engine cylinder. A T fitting 6 connects the short pipe 7 leading to the tank with the pipe 4 and the radiator. The pump 8 on the engine shaft 9 drives the circulating water through the pipe 3 to the radiator. Connected between the end of the pipe 3 and the radiator is a three-way valve 10 having a pipe 11 connecting to the tank. A vane, 12, having a stem 13 and lever 14, is mounted in this valve and its position controls the flow from the pipe 3 through the tank and radiator, the position of the vane 12 determining whether the flow shall pass entirely through the tank, entirely through the radiator, or partially through both. Extending through the head 15 of the tank 2 is the tube 16 of the thermostat 17, the diaphragm 18 of which has connected to it a guide rod 19 with spider 20 at its inner end, and an operating arm 21. A pin 22 in the outer end of this arm is operative in the slot 23 in the outer end of the lever 14 of the valve 10. Increase of temperature within the tank will cause expansion of the operative fluid 25 in the ther-

mostat, causing the diaphragm 18 to move outward and the vane 12 to partially open the passage between the pipe 3 and the radiator, at the same time partially closing the passage to the tank. It will thus be seen that until the cooling water reaches a predetermined temperature it will pass through the tank 2 alone, and as this tank has some radiating capacity, will require no other cooling surface during very cold weather. But with increasing temperature, the passage to the radiator opens, permitting a portion of the water to pass through the same to the pipe 4. So long as the water in the tank remains above a predetermined temperature, the valve 10 will cause all circulation to be through the radiator, and when the water in the tank cools, the opening of the valve will send part of the circulating water through the tank. A point of equilibrium is soon established.

This construction may be adapted for any style of engine, the thermostat may be replaced by any other of proper design, and the proportions of the parts varied to meet requirements of service. The tank and radiator are here shown merely as types of two parts of a cooling system having relatively greater and lesser radiating capacity, and any other desirable forms of radiating receptacles may be substituted therefor. It will be observed that while this construction has been described with reference to a flow of the cooling liquid to the engine through the pipe 4 and from the engine through the pipe 3, the direction of the flow may be reversed without changing the efficiency of the apparatus or the position of any of the parts.

Having now explained my improvements, what I claim as my invention and desire to secure by Letters Patent is:

1. A cooling system for explosion engines, comprising a radiator, a tank, and pipes connecting the same to the engine, and means controlled by the temperature within the tank for regulating the flow of the cooling liquid through the tank and radiator.

2. In a cooling system for explosion engines, the combination of a plurality of radiators of greater and less radiating capacity, pipes connecting the engine with said radiators, and means controlled by the temperature of the cooling liquid for regulating the flow through each of the radiators.

3. In a cooling system for explosion engines, the combination of a radiator, a tank, pipes connecting the engine with the radiator and tank, a valve in said pipes adapted to regulate the amount of flow of cooling liquid through the radiator, and means controlled by the temperature of the cooling liquid for operating said valve.

4. In a cooling system for explosion engines, the combination of a tank for the cooling liquid, a radiator, pipes connecting the engine to each end of the radiator and each pipe having a connection to said tank, a valve at one of said connections whereby the cooling liquid may be caused to flow entirely through said radiator, entirely through said tank, or partly through both, and means mounted on said tank and controlled by the temperature of the liquid in said tank, for operating said valve.

5. In a cooling system for explosion engines, the combination of a system of radiators, connections between the engine and radiators, and means to cause the flow of the liquid from the engine through one of the radiators to vary according to the temperature of the cooling liquid.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

ERNEST E. SWEET.

Witnesses:
CORA PEW,
W. C. LELAND.