H. B. SCHOFIELD.

COOLING SYSTEM FOR INTERNAL COMBUSTION ENGINES.

APPLICATION FILED AUG. 15, 1919.

1,404,796.

Patented Jan. 31, 1922.

2 SHEETS—SHEET 1.

Fig. 4.

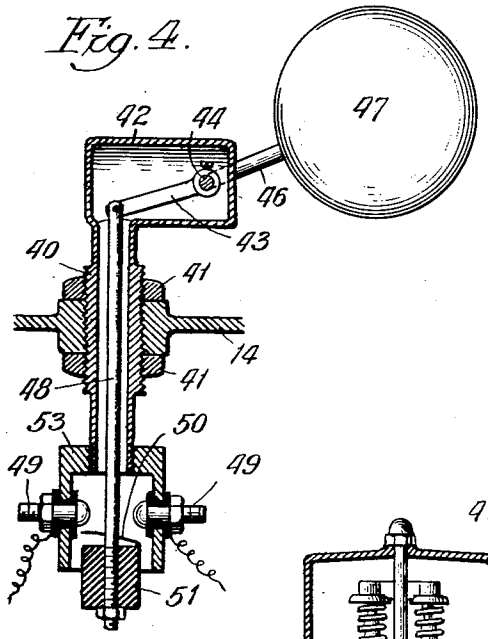


Fig. 1.

Witness:
John Enders

Inventor:
Harold B. Schofield
by Fred Gerlach
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2 SHEETS—SHEET 2.

Fig. 2.

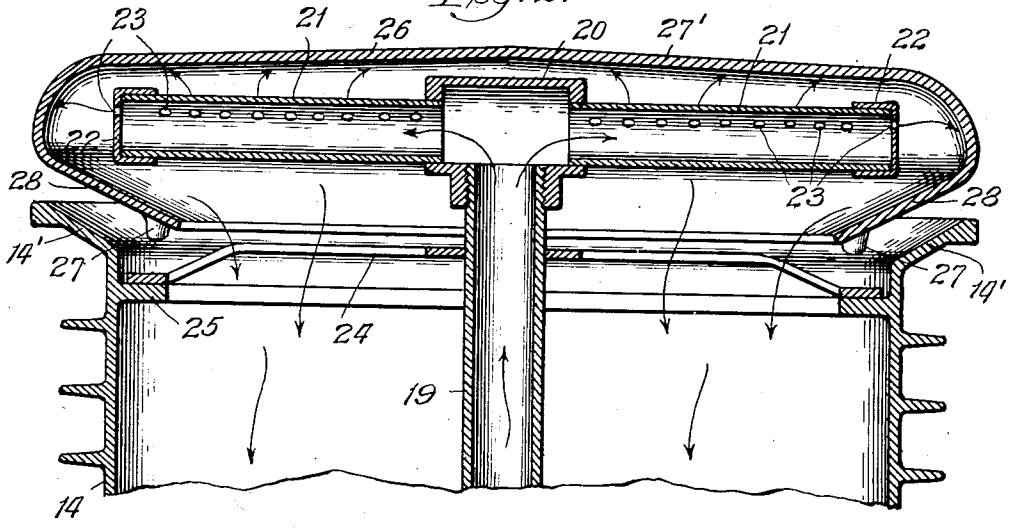
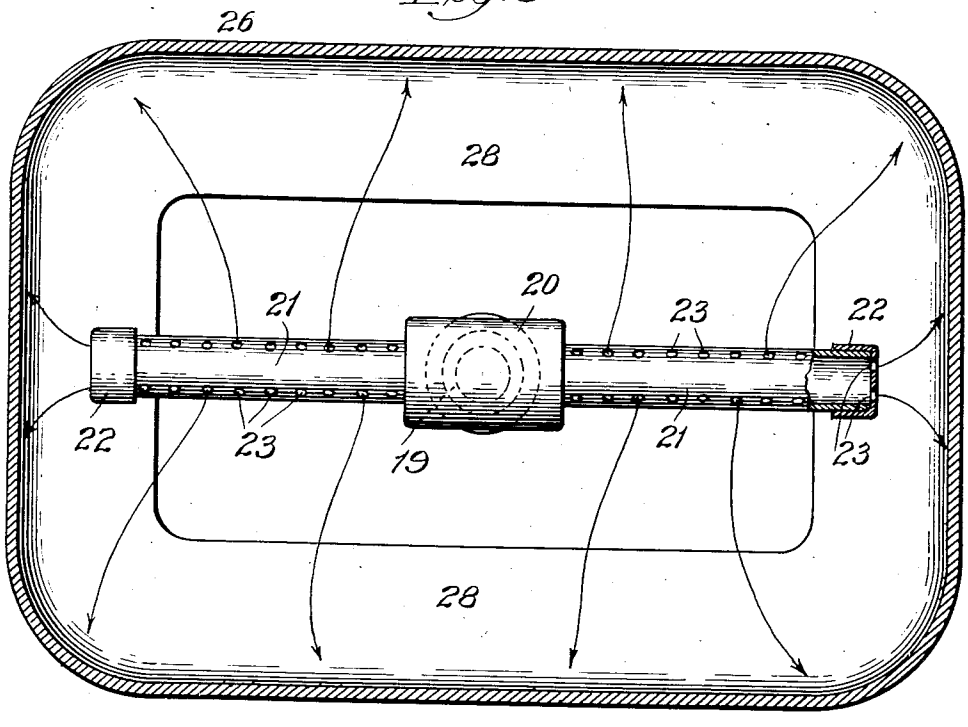


Fig. 3.



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UNITED STATES PATENT OFFICE.

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COOLING SYSTEM FOR INTERNAL-COMBUSTION ENGINES.

1,404,796. Specification of Letters Patent. Patented Jan. 31, 1922.

Application filed August 15, 1919. Serial No. 317,654.

To all whom it may concern:

Be it known that I, HAROLD B. SCHOFIELD, a citizen of the United States, and a resident of Ludington, in the county of Mason and State of Michigan, have invented certain new and useful Improvements in Cooling Systems for Internal-Combustion Engines, of which the following is a full, clear, and exact description.

The invention relates to cooling systems for internal combustion engines.

One object of the invention is to provide an improved cooling system in which the water is condensed as distinguished from cooling by convection. When kerosene is used as a fuel in an internal combustion or explosive engine, it is desirable to keep the combustion cylinder at a temperature approximating the boiling point to effect thorough combustion of the fuel and to keep the temperature from rising substantially beyond that point, and the present invention is particularly adapted for this purpose.

Another object of the invention is to provide improved means for controlling the motor so that if the water supply in the cooling system becomes deficient the motor will be automatically stopped.

The invention consists in the several novel features hereinafter set forth and more particularly defined by claims at the conclusion hereof.

In the drawings:

Fig. 1 is a section of an explosive engine embodying the invention.

Fig. 2 is a section on line 2—2 of Fig. 1.

Fig. 3 is a detail of the nozzle-pipe which discharges the water into the condenser.

Fig. 4 is a detail section of the float-controlled switch.

The invention is illustrated as applied to an internal combustion engine comprising a casing 6, a crank-shaft 7, a combustion cylinder 8, a piston 9 working in said cylinder, a pitman 10 between the crank-shaft and the piston, a spark-plug 11 and a water-jacket 12 around the cylinder. The engine may be of any suitable construction as well understood in the art.

The improved cooling system comprises a water-tank 14 which is suitably supported by a hollow supporting member or fitting 15. This tank is adapted to contain a supply of cooling water and the lower end is open to, and in communication with, a chamber 16 in supporting-member 15. A duct 17 communicates with chamber 16 and is connected to deliver water by gravity into the lower portion of the water-jacket 12. A duct 18, formed in member 15 and within the upper portion of chamber 16, communicates with the upper portion of the water-jacket which is usually formed in the cylinder-head 8′ and with the lower end of a pipe 19 which is fixed in the wall 18^a of duct 18. Pipe 19 extends upwardly through the tank 14 and is connected to a T-fitting 20 to which laterally extending spray-pipes 21 are secured. The outer ends of pipes 21 are provided with caps 22 and perforations 23 are formed in said pipes to discharge water upwardly and laterally therefrom. A spider 24 is secured to a flange 25 formed on the tank 14 to support the upper end of the pipe 19. A hollow condenser-head 26 is supported on the upper end of the tank by lugs 27 and in spaced relation to the tank. The top 27′ of the head 26 of the condenser-head is closed and an inclined bottom flange 28 extends inwardly and downwardly from the periphery of the head to direct the water of condensation back into the tank 14 which is formed with an inclined flange 14′ at its top. A filling-plug 29 is provided in the top 27 of the condenser-head.

The operation of the cooling system will be as follows; when the temperature of the water in the cylinder-jacket rises approximately to the boiling point or above it, the hot water and steam formed in the upper portion of the water-jacket will surge or be forced by the pressure of the main body of water in the tank through the duct 18 and pipe 19 into the spray-pipes 21. Being under pressure, the water and vapor will be forcibly discharged through the openings 23 into and against the walls of the condenser-head 26 and thence the water of condensation will be directed downwardly by the wall 28 into the tank. The space between the top

of the tank and the condenser permits air to enter the top of the tank for the purpose of cooling the condensed water.

The discharge of the water through pipe 19 into the condenser is through the path of least resistance for the escape of steam and water and results in causing the water to gush into the condenser. This cooling system allows the motor to operate safely at a temperature approximating the boiling point with a lesser volume of water in the main tank than when convection or radiation is depended upon for the dissipation of the heat.

Another feature of the invention consists in providing a safety cut-out controlled by the supply of water in the tank 14 so that the motor will be stopped when the supply of water becomes excessively low. This device consists of a sleeve 40 extending through the bottom of the tank 14 and secured therein by nuts 41. A chamber 42 at the upper end of the sleeve contains one arm 43 of a lever which has its fulcrum 44 extending through a packing-box 45 in one side of chamber 42 and has an arm 46 at the outside of said chamber carrying a float 47. A rod 48 is connected to the inner end of lever-arm 43 and extends through sleeve 40. A pair of contacts 49 are suitably connected to render the ignition system inoperative by short-circuiting when they are directly and electrically connected by a brush-contact 50 which is secured to a block of insulation 51 on the lower end of rod 48. Contacts 49 are insulated from a housing 53 which is secured to the lower end of sleeve 40. The operation of this device will be as follows: when there is sufficient water in the tank 14 to properly operate the cooling system, it will raise float 47 and operate the lever to lower rod 48 and hold the switch 50 away from contacts 49. When the supply of water becomes excessively low, the float will fall and operate the lever to lift rod 48 and establish a circuit through contacts 49 and switch 50 which will cut out the ignition to close a signalling system to give an alarm to notify the operator that the supply of water for the cooling system is becoming or has become deficient.

The invention is not to be understood as restricted to the details set forth, since these may be modified within the scope of the appended claims, without departing from the spirit and scope of the invention.

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

1. A cooling system for internal combustion engines comprising a tank having an open top, a supply-connection between the tank and the water-jacket of an engine, a return connection through which the water will be forced by the pressure of the water in the jacket, and a condenser to receive fluid from the return connection and deliver it into an open air space above the top of the tank whereby partial cooling of the fluid is effected as it falls from the condenser through the open air space into the tank.

2. A cooling system for internal combustion engines, comprising a tank having an open top, a supply-connection between the tank and the water-jacket of an engine, a return connection through which the water will be forced by the pressure of the water in the jacket, extending through the tank, and a condenser to receive fluid from the return connection and deliver it into an open air space above the top of the tank whereby partial cooling of the fluid is effected as it falls from the condenser through the open air space into the tank.

3. A cooling system for internal combustion engines comprising a tank having an open top, a supply-connection between the tank and the water-jacket of an engine, a return-connection through which the water will be forced by the pressure of the water in the jacket, and a condenser-head mounted upon and above the open top of the tank to receive fluid from the return connection and deliver it into an open air space above the top of the tank whereby partial cooling of the fluid is effected as it falls from the condenser through the open air space into the tank.

4. A cooling system for internal combustion engines comprising a tank having an open top, a supply-connection between the tank and the water-jacket of an engine, a return-connection through which the water will be forced by the pressure of the water in the jacket, a spray-pipe on the return-connection and a condenser-head above the tank to receive fluid from the spray-pipe having an open bottom to deliver the water into the tank.

5. A cooling system for internal combustion engines comprising a tank having an open top, a supply-connection between the tank and the water-jacket of an engine, a return-connection through which the water will be forced by the pressure of the water in the jacket extending through the tank, a spray-pipe on the return-connection, a condenser-head having a closed top and side and an inwardly extending flange to reecive fluid from the spray-pipe and discharge water into the tank.

6. In a cooling system for internal combustion engines, the combination of a tank, supply and return-connections between the tank and the water-jacket of an engine, a switch, a sleeve extending through the wall of the tank and provided with a chamber at its upper end, a lever, a float in the tank

and connected to said lever, and a switch comprising contacts supported on said sleeve.

7. In a cooling system for internal combustion engines, the combination of a tank, supply and return-connections between the tank and the water-jacket, a switch, a sleeve extending through the wall of the tank and provided with a chamber at its upper end, a lever fulcrumed and provided with an arm in said chamber, a float in the tank and connected to said lever and a switch comprising contacts supported on said sleeve.

HAROLD B. SCHOFIELD.