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COOLING APPARATUS FOR INTERNAL COMBUSTION ENGINES.

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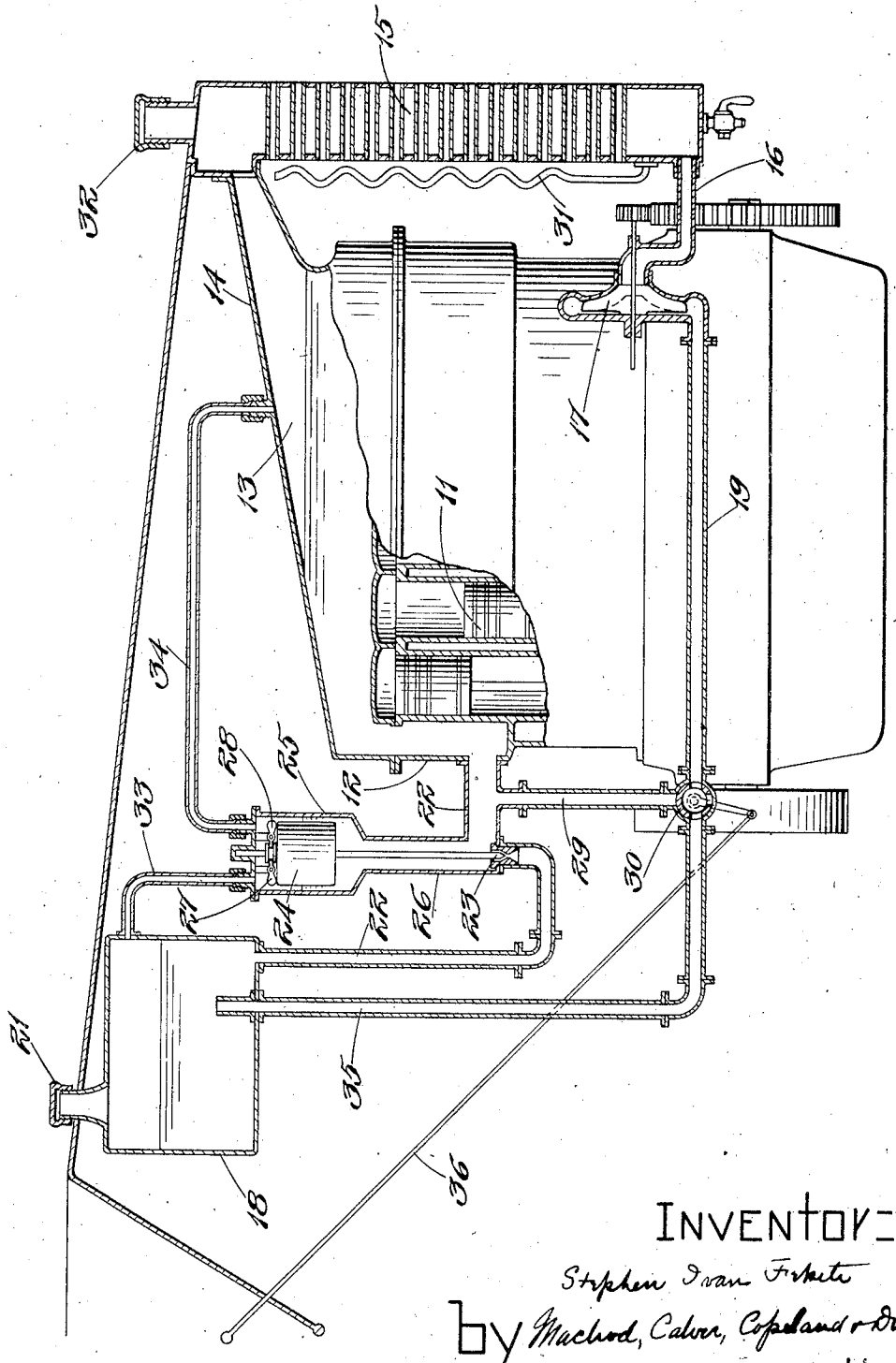

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UNITED STATES PATENT OFFICE.

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COOLING APPARATUS FOR INTERNAL-COMBUSTION ENGINES.

1,338,722. Specification of Letters Patent. Patented May 4, 1920.

Application filed June 2, 1916. Serial No. 101,423.

To all whom it may concern:

Be it known that I, STEPHEN IVAN FEKETE, a citizen of the United States, residing at Detroit, county of Wayne, State of Michigan, have invented a certain new and useful Improvement in Cooling Apparatus for Internal-Combustion Engines, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention has for its object a new and improved cooling system for use in internal combustion engines. For convenience of illustration I have shown my invention as applied to the ordinary automobile engine but it will be understood that it is applicable to internal combustion engines to be used for other purposes. It is well understood that to obtain the best thermal efficiency of an internal combustion engine particularly with fuels containing a considerable proportion of the heavier oils, the temperature of the engine must be kept as high as possible consistent with proper lubrication. Heretofore, so far as is known to me, the cooling system of internal combustion engines has always been arranged to circulate water through the radiator and therefore the temperature has been kept below the boiling point of water. There has always been wide variation in the temperature in the cylinder jackets which has ranged from 40 to 212 degrees Fahr. according to the design of the cooling system, the external conditions, the speed and load of the engine, and other conditions not necessary to be mentioned.

My present invention operates on an entirely different principle. The apparatus embodying it is so constructed that during normal operation the water in the cylinder jackets and above the cylinder heads is allowed to boil, the vapor passing into the radiator and being condensed and returned to the cylinder jackets. The temperature in the cylinder jackets is therefore always, except when the engine is being started, that of the boiling point of water and is uniform. This temperature being considerably above that heretofore ordinarily employed greatly increases the fuel economy of the engine. It also makes it possible for the engine to operate always under unvarying temperature conditions, regardless of changes in external conditions or of load or carburetion. The apparatus is also so constructed that when desired it can be converted into a water circulation cooling system, water instead of steam flowing through the radiator and condenser.

The apparatus embodying my invention is simple in construction and automatic in its operation and no more expensive to construct than the ordinary water cooling system.

My invention will be fully understood when taken in connection with the accompanying drawings and the novel features thereof will be pointed out and clearly defined in the claims at the close of this specification.

In the drawings, the figure is a vertical section of the cooling system embodying my invention as applied to an ordinary automobile engine.

Referring to the drawing, at 11 is shown the engine having water jackets 12, about the cylinders. The water jacket above the cylinder heads is constructed to form a reservoir 13 which communicates by a radiator inlet pipe 14 with a condenser or radiator 15. The radiator or condenser is of ordinary construction and has a fill cap 32. The bottom of the radiator or condenser is connected by an outlet pipe 16, through the pump 17 and pipes 19 and 35, with a tank 18, the effective part of which is above the level of the cylinder head reservoir 13. At 21 is a fill cap, by means of which water is introduced into the system. A discharge pipe 22 leads from the tank 18, to the cylinder jackets 12. To control the flow of water from the tank 18 to the cylinder jackets 12, I provide a valve 23, operated by a float 24, located in a chamber 25 on the upper end of a stand pipe 26. The level in the float chamber 25 will be the same as the level in the cylinder head reservoir 13, and the float 24 will operate to regulate the flow of water from the tank 18, and thus to maintain a constant predetermined level in the cylinder head reservoir 13. The float 24 is movable vertically on the valve stem 23, which is counterbalanced by two weighted levers 27 and 28 in the manner of the ordinary float valve of a carbureter. At 33 is shown a pipe connecting the top of the float chamber 25 with the tank 18, and at 34 is shown another pipe likewise connecting the float chamber with cylinder head reservoir 13.

These pipes insure that the pressure in float chamber, the tank 18 and the cylinder head reservoir will always be uniform so that the float will operate properly in spite of slight variations in pressure in the system.

For convenience, I provide a by-pass 29 which connects the pipe 19 with the pipe 22 entering the latter at a point between the float valve 23 and the cylinder jacket. A three-way valve 30 is provided by which the pipe 19 may be connected to the pipe 35, this being the normal condition. In the other position of the three-way valve 30, the by-pass 29 is connected to the pipe 19, and communication with the tank is shut off. By setting the three-way valve in this position and introducing sufficient water to fill the radiator, through the radiator fill cap 32, the system can be converted into a water cooling system which will work in the ordinary manner. At 36 is shown a rod leading to the dash board, by which the operator can move the three-way valve. At 31 is shown a vent pipe leading upward from the bottom of the radiator to a point above the water level, by which ingress or escape of air or steam is permitted to maintain the system at atmospheric pressure at all times. Since it is always maintained at atmospheric pressure a radiator and condenser of light, frail construction may be employed; otherwise such a radiator would be burst by the internal pressure or collapsed by the external pressure. The vent pipe is preferably wavy to insure that any moisture will condense and run back to the bottom of the radiator.

The operation of the apparatus embodying my invention is as follows: When the engine is started, the heat generated boils the water in the cylinder jackets 12, and the steam rises into the reservoir 13, thence the steam passes through the radiator inlet pipe 14 into the top of the radiator. Here the steam is condensed and falls in the form of water to the bottom of the radiator. It is then pumped by the pump 17 into the tank 18. From the tank 18, it is fed into the cylinder jackets 12, by the float valve 23 which admits water just fast enough to compensate for the amount carried over into the radiator in the form of steam.

The vent 31 allows air to enter the system to compensate for the loss of volume due to the condensation of the steam after the engine is stopped. It also permits the air to be forced out by the expansion into steam when the engine is started. The result is that the system is always maintained at atmospheric pressure and therefore the temperature in the cylinder jackets is constant.

In the foregoing description, I have described my invention in the best form known to me, but I do not limit myself to this embodiment of my invention, and accordingly intend to claim it in the broadest possible manner.

What I claim is:

1. In combination with an internal combustion engine, a cooling system including a tank and a condenser vented to the atmosphere, said system being arranged for use so that the cooling shall take place therein either wholly by condensation or wholly by water circulation.

2. In combination with an internal combustion engine, a cooling system comprising cylinder jackets, a radiator and condenser, a circulating pump, a tank, and a by-pass to permit flow of water not through the tank whereby the system may be converted from a condensing system into a water circulation cooling system, said radiator and condenser being of frail construction and being vented to the atmosphere so that the interior thereof will always be at substantially atmospheric pressure.

3. In combination with an internal combustion engine, a cooling system comprising cylinder jackets, a radiator and condenser vented to the atmosphere, a circulating pump, a tank, means for maintaining a constant level of water in the jackets, and a by-pass to permit the flow of water not through the tank whereby the system may be converted from a condensing system into a water circulation cooling system.

4. In combination with an internal combustion engine, a cooling system comprising cylinder jackets, a radiator and condenser, a circulating pump, a tank, a float-valve and chamber operating to maintain a constant level of fluid in the cylinder jackets, and connections from the cylinder jackets to the float chamber and from the tank to the float chamber to maintain uniform pressure throughout the system.

5. In combination with an internal combustion engine having a water jacket, a reservoir above the said water jacket means for maintaining constant level of cooling fluid in the cylinder jackets and reservoir, a radiator and condenser, said radiator or condenser being partly above and partly below the water level in the cylinder jackets and reservoir, said radiator and condenser being vented to the atmosphere to permit expansion and contraction of the contents and to maintain it at atmospheric pressure.

In testimony whereof I affix my signature in presence of two witnesses.

STEPHEN IVAN FEKETE.

Witnesses:
W. H. DEDOW,
C. A. POPPLESTONE.