

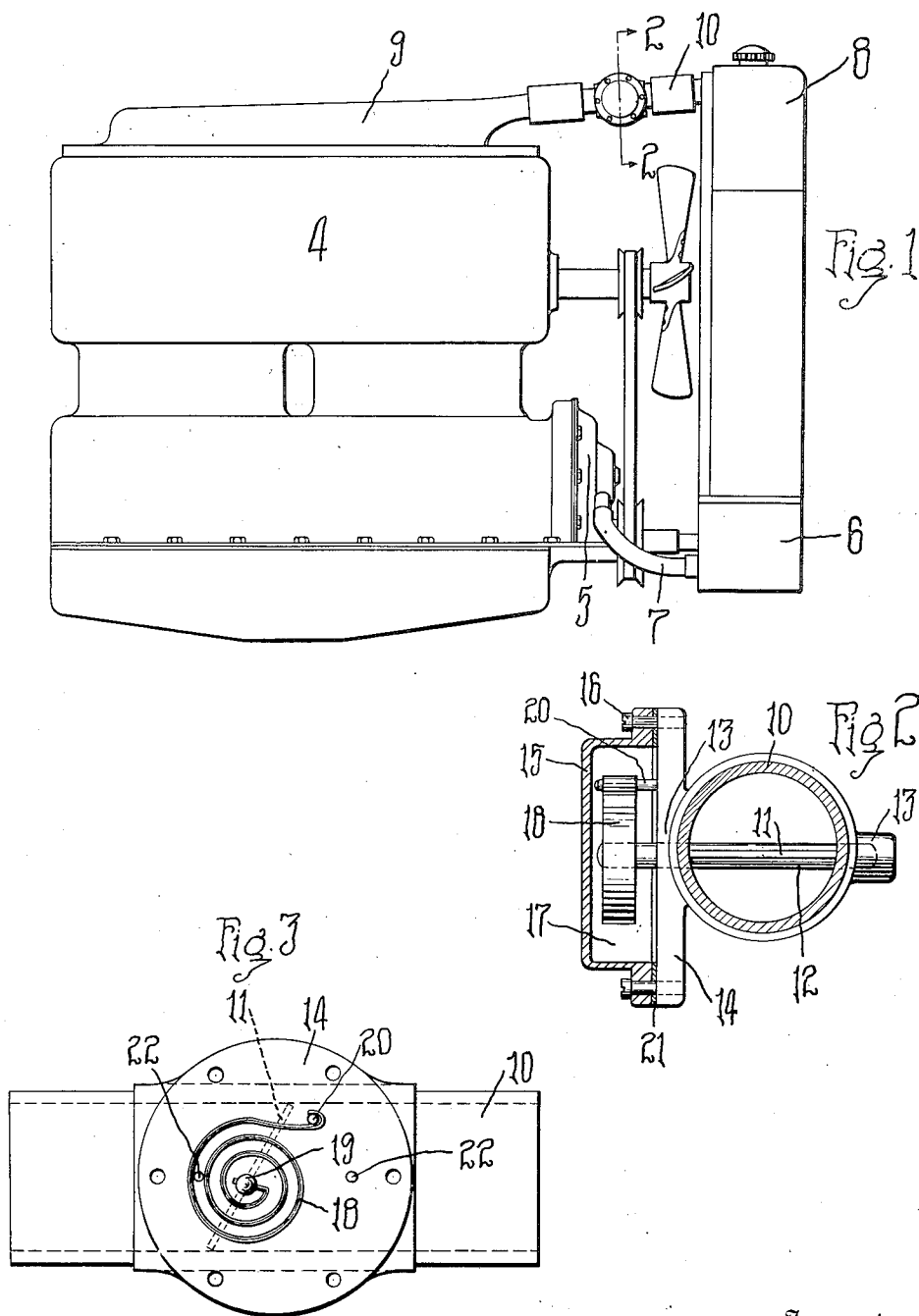
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COOLING SYSTEM FOR INTERNAL COMBUSTION ENGINES

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COOLING SYSTEM FOR INTERNAL-COMBUSTION ENGINES.

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To all whom it may concern:

Be it known that I, FRED E. ASELTINE, a citizen of the United States, and a resident of Detroit, county of Wayne, 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, concise, and exact description, such as will enable others skilled in the art to which the invention relates to make and use the same, reference being made therein to the accompanying drawings, which form a part of this specification.

My invention relates to internal combustion engines adapted for use with automobiles and similar self-propelled vehicles for driving the same, and particularly to the cooling systems of such engines whereby the water or equivalent cooling liquid which cools the engine is itself cooled by means of a suitable radiator through which it circulates after passing through the cooling jacket space of the engine.

The principal object of my invention is to provide improved means for automatically regulating the flow of cooling liquid throughout the cooling system of the engine; the regulating means in question acting to throttle the flow of cooling liquid when the temperature thereof tends to become too low, and to permit a more free flow of the cooling liquid when the temperature thereof tends to rise.

A further object of my invention is to provide an improved cooling system of the type above referred to wherein the temperature of the cooling liquid is maintained substantially constant when the device is in use; the said end being attained by means of a thermostatically controlled throttle valve which acts to throttle the flow of cooling liquid when the temperature tends to fall, and to permit a more free flow of the said cooling liquid when the temperature rises, whereby a substantially uniform temperature is maintained when the engine is in operation and the engine is caused to operate at the predetermined temperature at which it will operate the most efficiently.

Further objects of my invention will appear from the following description thereof, and from the drawing accompanying and forming a part of this specification; it be-

ing appreciated, however, that while the form thereof illustrated and described is the preferred form of my invention the same may be variously modified without departing therefrom; the distinguishing features of the said invention being set forth at length in the concluding claims.

Referring now to the drawing:

Figure 1 is a view showing the engine and radiator of the power plant of a motor driven vehicle in side elevation, and the connection of my invention therewith.

Figure 2 is a view upon an enlarged scale showing a section upon a transverse plane indicated by the line 2-2, Figure 1.

Figure 3 is a view showing the flow regulating mechanism of my invention in side elevation, with the cover removed to better show the thermostat thereof.

Referring to the drawing, the reference numeral 4 designates an internal combustion engine having the usual jacket space through which a stream of cooling liquid is made to flow by means of a pump 5 which derives its supply from the lower water chamber 6 of a radiator of any form or type, the pump and the said water chamber being connected with one another through a conduit 7. The upper water chamber 8 of the radiator is placed in communication with a manifold 9 secured to the upper end of the engine through and by means of a conduit 10, within which conduit a thermostatically controlled throttle valve which is included in and forms a part of my invention is located; the said valve being shown as an oscillating valve 11 carried by a shaft 12 the ends of which are supported in bearings 13, 13 formed in the side wall of the conduit 10. The valve 11 is preferably contained within and forms a part of a unitary hollow valve casing or fitting provided for it and which casing is included in and forms a part of the water passage or conduit through which the cooling liquid passes from the engine to the upper liquid chamber 8 of the radiator, and then downward through the cellular structure thereof and to the lower water chamber.

The hollow fitting within which the valve 11 is located is provided with a supporting disk 14 located to one side of and formed preferably as an integral part thereof, and a separable cap member 15 is detachably se-

cured to said disc as by means of screws 16 spaced about the periphery thereof. Located within the chamber 17 provided by the cup 15 is a thermostat 18 shown as comprising two strips of metal having unequal coefficients of expansion and which thermostat is shown as made in the form of a spiral, the inner end of said thermostat being operatively connected with the shaft 12 which carries the throttle valve, as shown at 19, while the outer end thereof is secured to a pin 20 carried by the disc 14 above referred to. A suitable gasket 21 is commonly provided between the cover 15 and the disc 14 to thereby make the chamber 17 a water tight chamber, and the cooling liquid whereby the cooling of the engine is accomplished flows into and out from this chamber through holes 22 leading from the interior of the conduit through which said liquid flows into the said chamber; from which it follows that the thermostat within the chamber in question is surrounded by liquid of substantially the same temperature as that of the liquid flowing through the conduit in which the throttle valve 11 is located.

The oscillating shaft 19, see Figure 3, is offset somewhat from the axis of the conduit 10 through which the cooling liquid flows, so that a greater area of the butterfly throttle valve 11 lies above the said shaft than below the same and, the flow of cooling liquid being toward the right and the arrangement of the parts being as shown in said figure, it follows that the pressure due to the stream of cooling liquid established by the cooling liquid circulating pump 5 tends to open the said valve which opening movement, however, is opposed by the thermostat; the unbalanced part of the force due to the stream of cooling liquid and the thermostat 18 regarded merely as a restraining or opposing element or force acting in opposition to one another. Changes in temperature which necessitate a more free flow of cooling liquid, then, will reduce the opposing force due to the thermostat and permit the predominating and unbalanced force of the stream of cooling liquid to open the valve, whereas temperature changes which require a reduction of the velocity of flow in the system act to close the throttle valve against the force of the stream; thus providing a controlling device which is quickly and effectively responsive to temperature changes, and one in which a cheap and exceedingly simple form of thermostatic element may be employed.

In view of the premises it will be appreciated that the position of the throttle valve 11 will be controlled by the thermostat 18, and that the throttling action of the said valve will be dependent upon the temperature within the chamber 17 within which the said thermostat is located. The adjustment

and arrangement of the parts will be such that a rise in temperature of the cooling liquid flowing through the cooling system will be accompanied by an opening of the valve 11, thus reducing the throttling action and permitting a more free flow of cooling liquid through the radiator with a resulting lowering of the temperature thereof; as the temperature of the cooling liquid is obviously dependent upon the rapidity of the flow thereof through the radiator of the system, and the rapidity at which the heat of the said liquid is dissipated by the radiator and communicated to the air which is caused to flow through the cellular structure thereof. On the other hand a fall of temperature in the cooling liquid will be accompanied by a closing movement of the throttle valve, thus reducing the rate of flow throughout the cooling system and producing a rise of temperature in the cooling liquid because the heat imparted thereto by the engine is not dissipated so rapidly at the radiator. The action of the system as a whole will therefore be to regulate the flow of cooling liquid in such a manner as to secure a substantially uniform temperature thereof, thus avoiding both over-heating of the engine as well as excessive cooling thereof, and securing the operation of the engine under predetermined temperature conditions such that maximum efficiency of the power plant may be secured.

Having thus described and explained my invention, I claim and desire to secure by Letters Patent:

1. In a cooling system for internal combustion engines and in combination with an engine to be cooled, a radiator for effecting the cooling of the liquid whereby the engine is cooled, and conduits connecting the upper and lower ends of the radiator with the engine and through which conduits a circulation of cooling liquid is maintained between the engine and the radiator; an oscillating shaft supported in bearings in the wall of the upper of said conduits and one end of which shaft extends into a chamber which is in open communication with the interior of said conduit, so that a portion of the cooling liquid flowing in the system may flow through said chamber; a valve carried by said oscillating shaft and located within said upper conduit for controlling the flow of cooling liquid therethrough; and a thermostat located within the said chamber and operatively connected with said valve.

2. In a cooling system for internal combustion engines, a valve casing having a passage extending therethrough; an oscillating shaft supported in bearings in the walls of said casing; a disc formed integrally with said casing and located at one side of said passage, and through which disc one end of said shaft extends; a valve carried by said

shaft and located within the passage aforesaid; a cover plate secured to said disc to thereby provide an enclosed chamber; holes provided in said disc and leading into said chamber to thereby permit cooling liquid to flow into and out from said chamber; and a thermostat formed from strips of metal having unequal coefficients of expansion located within said chamber, one end of said thermostat being secured to a fixed abutment and the other end thereof being secured to the end of the oscillating shaft aforesaid.

3. In a cooling system for internal combustion engines and in combination with an engine to be cooled, a radiator for effecting the cooling of the liquid whereby the engine is cooled, and conduits connecting the upper and lower ends of the radiator with the engine and through which a circulation of cooling liquid is maintained between the engine and the radiator; an oscillating shaft supported in bearings in the wall of the upper of said conduits and one end of which shaft extends outward from said conduit, the axis of said shaft being off-set relative to the axis of the conduit through which it extends; a valve carried by said oscillating shaft and located within said upper conduit for controlling the flow of cooling liquid therethrough; and a thermostat located outside said conduit and operatively connected with the extending end of said oscillating

shaft to thereby control the position of said valve.

4. In a cooling system for internal combustion engines and in combination with an engine to be cooled, a radiator for effecting the cooling of the liquid whereby the engine is cooled, and conduits connecting the upper and lower ends of the radiator with the engine and through which conduits a circulation of cooling liquid is maintained between the engine and the radiator; an oscillating shaft supported in bearings in the wall of the upper of said conduits and one end of which extends through said wall and into a chamber which is partitioned off from but which is in open communication with the interior of said conduit so that a portion of the cooling liquid may flow through said chamber, and the axis of which shaft is off-set relative to the axis of the conduit whereby it is supported; a valve carried by said oscillating shaft and located within said upper conduit for controlling the flow of cooling liquid therethrough; and a thermostat comprising two strips of metal having unequal coefficients of expansion and shaped in the form of a spiral, the inner end of said thermostat being operatively connected with said oscillating shaft and the other end thereof being secured to a fixed abutment.

In testimony whereof I affix my signature.
FRED E. ASELTINE.