

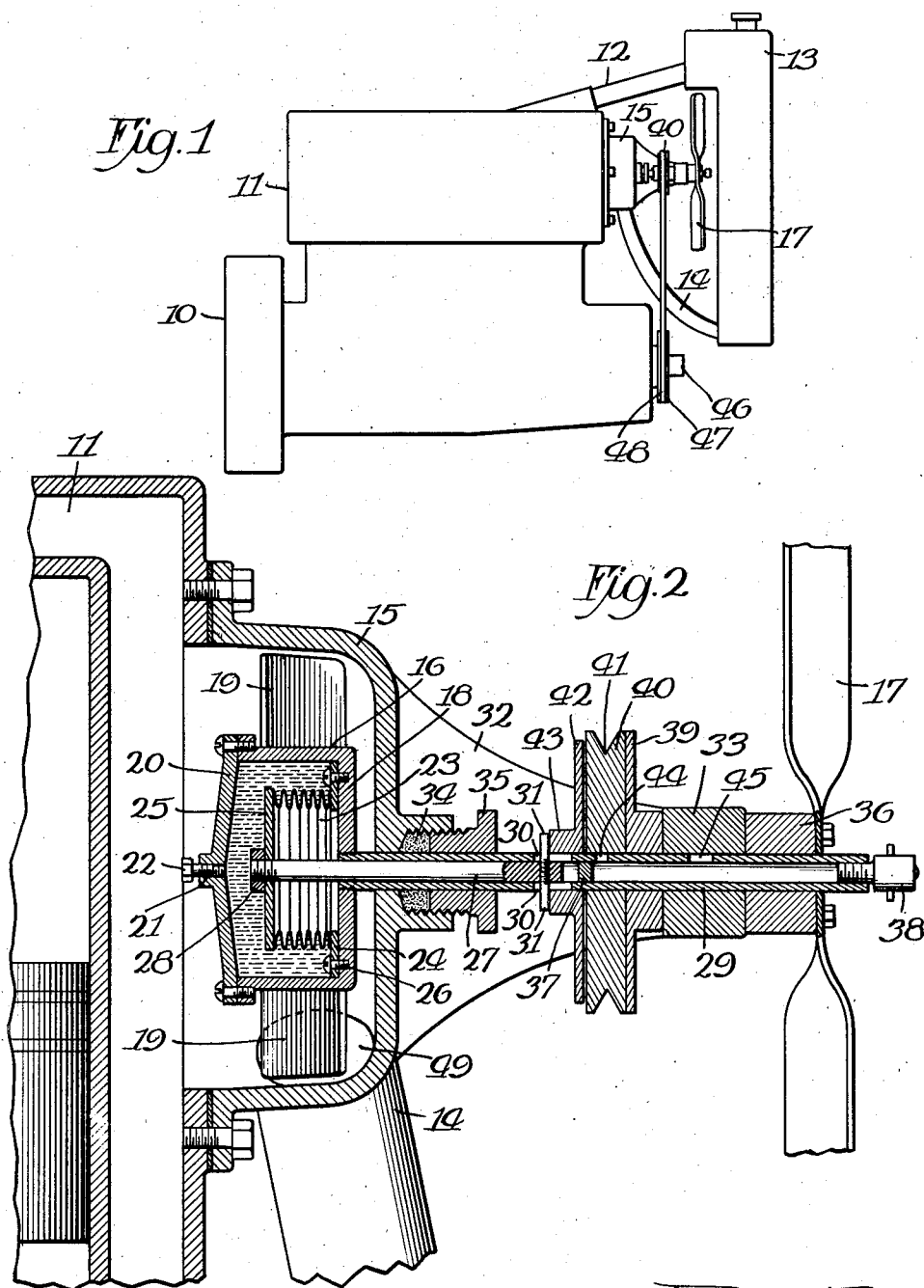
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TEMPERATURE REGULATOR

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UNITED STATES PATENT OFFICE

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TEMPERATURE REGULATOR

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This invention relates to improvements in temperature regulating devices for internal combustion engines.

The principal object of the invention is to control the cooling system of an internal combustion engine to the end that it quickly reaches a maximum desired temperature which will thereafter be maintained therein.

Another object of the invention is to provide a unitary fan and pump attachment for an internal combustion engine.

A further object of the invention is to thermostatically control the water pump and fan of the cooling system in a water cooled internal combustion engine.

Referring to the drawings in which the same numerals indicate like parts,

Fig. 1 is a side view of an internal combustion engine connected to a radiator, the whole being set in the frame of an automobile; and

Fig. 2 is a vertical, sectional detail of my improvements shown in Fig. 1.

A multi-cylinder internal combustion engine 10 is provided with a water jacket 11 surrounding the cylinders. From the upper part of water jacket 11, a discharge pipe 12 conveys heated water to the upper part of a radiator 13, while a pipe 14 conveys cooled water from the lower part of radiator 13 to the inlet side of a casing 15 fastened to the front end of water jacket 11, which casing 15 encloses a pump 16 for withdrawing cooled water through the pipe 14 and forcing the same rearwardly through the water jacket 11 and then upwardly through pipe 12 to the radiator 13 to be further cooled, as is usual in such constructions.

The circulation of cooling water, or other equivalent cooling fluid, through the water jackets of an internal combustion engine and through a cooling system including a radiator, is well known and may be of many different forms, but in general, such circulation is by two principal methods, one of which is known as a thermo-siphon system wherein a mechanically driven pump has no part, the second being a circulating system wherein a mechanical pump causes the circulation.

By my invention, I practically eliminate the thermo-siphon effect and use a mechani-

cally operated pump system to the end that when an internal combustion engine is cold, the circulation of cooling water will be substantially prevented, and when a maximum desired temperature is reached, a proper circulation of cooling fluid will be induced whereby said maximum desired operating temperature will be substantially maintained.

As is well understood in automobile practice, a fan 17 is provided for drawing a cooling fluid, i. e. air, through the radiator 13 whereby heat from the cooling water is given up, the air then being circulated around engine 10, and I now arrange that pump 16 and fan 17 will not come into action until such time as a predetermined operating temperature is substantially reached in water jacket 11.

It is common practice in automobile construction to provide a unitary structure comprising a fan and water pump driven by one shaft, but such fan and pump operate continuously with the engine operation and irrespective of the engine temperature. Modifying constructions are in use, such as the use of thermally controlled shutters for the front of radiator 13 and thermally controlled valves for the passage of water through pipe 12.

But, by my invention, I arrange a thermally controlled unitary attachment for an internal combustion engine whereby the fan and pump are positively inoperative until a desired engine temperature is reached and this construction has resultant advantages for quick heating and running, and my attachment can readily and quickly replace the usual unitary structure of pump and fan.

In one embodiment of my invention for a thermally controlled unitary attachment, pump 16 is therefore, arranged to comprise a circular impeller body 18 on the periphery of which a plurality of impeller vanes 19 are arranged, said vanes being set on the periphery of body 18 at a slight angle to force liquid rearwardly of body 18 from pipe 14 in a well-known manner when body 18 is revolved and the open end of body 18 is hermetically closed by a cover 20 having an orifice 21 therein closed by a plug 22.

Interiorly of body 18 is secured a metal bellows 23, one end of which is fastened liquid tight to an annular flange 24 which in turn is secured by screws 26 to the body 18, the other end of bellows 23 being closed by a cap 25, through which passes a rod 27 securely held in cap 25 by lock nut 28.

A hollow shaft 29 is fastened securely to body 18, and rod 27 is adapted to freely slide in the interior of shaft 29 and permitting air to enter the interior of bellows 23, shaft 29 containing a plurality of slits 30 through which are adapted to slide a plurality of fingers 31 affixed to rod 27.

On one side of casing 15 is extended a portion 32 which terminates in an outboard bearing 33 adapted to support shaft 29 at one end while the other end of shaft 29 is supported in casing 15 and made liquid tight therein by means of packing 34 held in place by a packing nut 35.

Fan 17 is securely fastened to a block 36 which in turn is securely fastened to shaft 29 and shaft 29 is plugged at a predetermined point with a plug 37 to the end that a high pressure greasing nipple 38 may be fastened in the outer end of shaft 29 for the purpose of receiving and holding grease therein.

A driven clutch disc 39 is securely fastened to shaft 29 and a driving pulley 40, having a groove 41 therein, floats freely on shaft 29. A driving clutch disc 42 also floats on shaft 29 and has a boss 43 thereon adapted to receive pressure contact from fingers 31. A greasing hole 44 serves to convey grease from the interior of shaft 29 to lubricate pulley 40 and a greasing hole 45 serves to lubricate shaft 29 in bearing 33.

The engine crank shaft 46 has a grooved pulley 47 securely fastened thereto, and a belt 48 seats therein being adapted to also encircle pulley 40 for driving pump 16 and fan 17 under predetermined conditions.

Upon assembling the afore-described mechanism in a vertical position, plug 22 will be removed and pressure will be placed upon fingers 31 in order to distend the bellows 23 a predetermined amount whereupon the interior of body 18 will be filled through orifice 21 with a preferred form of expansible liquid such as alcohol, carbon di-sulphide, or the like, preferably a non-freezing liquid having a predetermined coefficient of expansion, and when body 18 is so filled, plug 22 will be replaced and the pressure taken away from fingers 31. This in effect, is a thermostat and the action described has the effect of maintaining a distension of bellows 23 at a predetermined temperature, the effect whereof being more fully explained hereafter.

The mechanism described is then fitted in casing 15 and the same fastened as a whole to water jacket 11 and belt 48 whereby pulley 40 is continuously driven by pulley 47 when engine 10 is operating.

This arrangement is such that, until a predetermined maximum desired temperature is reached, the contraction of expansible liquid in body 18 will cause such distension of bellows 23 that fingers 31 will exert no pressure on driving disc 42. Therefore, pulley 40 will simply be driven by pulley 48 as an idling pulley when engine 10 is cold, the thermo-siphon circulation of cooling liquid from radiator 13 through pipe 14 being practically prevented because impeller vanes 19 are of such number as to restrict very substantially the discharge 49 of pipe 14 to the interior of casing 15. At the same time, fan 17 is still and not causing any circulation of air through radiator 13.

In this manner, it will be seen that by restricting the movement of cooling liquid through water jacket 11 from radiator 13, that there is a minimum loss of heat from the cylinders of engine 10 when the same is started below predetermined temperatures, and this localization of heat is of great benefit during the "warming-up" period of an internal combustion engine.

Upon continued operation of engine 10, the water in jacket 11 and casing 15 will increase in temperature, the heat being transmitted through the walls of body 18 to the expansible liquid therein for causing expansion of said liquid whereby the distension of bellows 23 will decrease until fingers 31 exert such pressure upon driving disc 42 that the same forces pulley 40 into strong engagement with the driven disc 39, and when sufficient pressure has thus been exerted, shaft 29 will start to be revolved, thus revolving fan 17 and impellers 19.

The filling of body 18 with liquid while bellows 23 is distended provides a safety measure whereby engine 10 may never become overheated because it will be seen that if the liquid in body 18 escapes, bellows 23, being spring bellows, will resume their normal figure and cause the engagement of discs 39 and 42 with pulley 40. A similar effect may be had by filling body 18, when bellows 23 is in a normal position, with liquid heated to a predetermined degree, which may be the desired maximum temperature. When the temperature drops, this liquid will contract and cause distension of bellows 23, thus permitting pulley 40 to run free.

A circulation of air is thus brought about through radiator 13, and a circulation of liquid is also thus brought about by circulating liquid through water jacket 11 and radiator 13, and a maximum desired temperature is substantially maintained, because when the temperature in water jacket 11 drops below said desired temperature, the liquid in body 18 will contract and cause the driving disc 42 to release pulley 40 from contact with the driven disc 39.

By my invention, I thus provide quick

warming up for an engine with constantly increasing engine power. This is especially noticeable during cold weather because I now add to the engine output, the power required to drive the fan and water pump. In present practice, where the fan and water pump are continuously operating, not only is the engine temperature held down in cold weather thereby reducing the engine output, but the power deducted for driving the fan and water pump is quite appreciable, and may approach four to five horse power at certain speeds. It will thus be seen that an appreciable economy at certain speeds is effected.

By mounting the control in the fan housing, the parts may be constructed to form a unitary structure or attachment which may be readily attached to that type of automobile engine in which the pump housing is integral with the fan supporting bracket. The device is adapted to be manufactured and sold as an attachment. In applying it to engines in which the pump housing and fan supporting bracket are integral, it is only necessary to remove the pump housing and fan by removing the cap screws holding the housing to the cylinder block and then secure the attachment in position by the reverse operation.

I claim as my invention

1. An attachment for a water cooled internal combustion engine comprising a casing containing a fluid pump, a shaft fastened to the pump and extending through the casing, a fan fastened to the shaft, a thermostat, and clutch mechanism connected with the shaft and actuated by the thermostat.

2. An attachment for a water cooled internal combustion engine comprising a casing containing a fluid pump, a shaft fastened to the pump and extending through the casing, a fan fastened to the shaft, a thermostat within the casing, and clutch mechanism connected with the shaft and actuated by the thermostat.

3. An attachment for a water cooled internal combustion engine comprising a casing containing a fluid pump, a hollow shaft fastened to the pump and extending through the casing, a fan fastened to the shaft, a thermostat within the casing, a rod sliding in the shaft actuated by the thermostat and clutch mechanism connected with the shaft actuated by said rod.

4. The combination with an internal combustion engine having a water jacket of a radiator, a unitary structure comprising a water pump and connected fan detachably connected to the water jacket, a connection from the water jacket to the radiator, a connection from the radiator to the water pump, means for driving the pump and fan, and means responsive to the engine temperature for controlling said driving means.

5. An attachment for a water cooled internal combustion engine comprising a casing containing a fluid pump, a hollow shaft fastened to the pump and extending through the casing, a fan fastened to the shaft, a thermostat within the casing, a rod sliding in the shaft actuated by the thermostat and clutch mechanism connected with the shaft actuated by said rod; said clutch mechanism including a driving member, a driven member and an operating member between said other two members.

6. An attachment for an internal combustion engine comprising a bracket, a pump and a fan journaled on said bracket, a driven member journaled on said bracket for operating said pump and fan, and a thermally controlled clutch for connecting said fan and pump to, and disconnecting the same from, said member.

7. An attachment for a water-cooled internal combustion engine comprising a casing containing a fluid pump, means for detachably connecting said casing to said engine, said pump having a closed recess therein, a thermostat within said recess, a hollow shaft fastened to the pump and extending through the casing, a fan fastened to the shaft, clutch mechanism for operating said shaft, and means controlled by the operation of said thermostat for operating said clutch.

8. In combination with an internal combustion engine having a liquid cooling system comprising a radiator, a pump for circulating the cooling liquid through said system, a fan for directing air across said radiator, means including clutch mechanism controlled by the temperature of the cooling liquid, for operating said fan and pump when said mechanism is at one limit of its movement, said means being incapable of operating said pump and fan when it is at the other limit of its movement.

9. In combination, an internal combustion engine, a cooling system for said engine, said system comprising a radiator, a fan for directing air across said radiator, a pump for circulating a cooling fluid through said radiator, temperature-controlled means for operating said pump and fan, only when the temperature of said fluid rises above a predetermined minimum.

In testimony whereof I affix my signature.
CHARLES L. STOKES.