June 26, 1934.

J. I. HORTON

RADIATOR SHUTTER CONTROL

Original Filed March 21, 1929

INVENTOR

JOHN I. HORTON

BY

Sydney J. Rossotti

ATTORNEY
RADIATOR SHUTTER CONTROL

John I. Horton, Chicago, Ill., assignor to Pines Winterfront Company, a corporation of Delaware

Application March 21, 1929, Serial No. 348,728 Renewed July 15, 1932

9 Claims. (Cl. 123—174)

This invention relates to a radiator shutter control for closures used with automobile and like radiators, and is particularly applicable to the well known automatic type in which radiator shutters are operated by a thermostat in response to changes in engine temperature. In devices of this type, the thermostat operates to open or close the shutters by degrees as the engine warms or cools. Hence, when the motor is warm and the motor is stopped, as when the car is parked, the shutters will stay open until the motor is comparatively cool. For this reason usual automatic types of radiator closures give comparatively little protection to the engine after it has stopped.

It is the general object of the present invention to provide mechanism which will insure closing of the radiator shutters immediately after stopping of the engine, so that the motor will stay warm for a greater time after stopping thereof.

Another object is to provide such means which will be applicable to radiator closures of the automatic type and which will not interfere with automatic operation thereof when the motor is running, but which will insure closing of the shutters the moment the engine stops. Other objects are to provide mechanism which automatically operates to close the radiator when the engine stops, despite inaction on the part of the hand or automatic closure operating means by which the closure is operated during running of the motor, or the absence of such means. Other objects are to provide simple and effective means for insuring action of the shutters as above and the production of means for controlling closing of the shutters from the suction of the engine manifold.

With these and other objects in view, the invention consists in certain constructions and combinations hereinafter fully described and then set forth in the hereunto appended claims.

In the accompanying drawing in which like characters of reference indicate the same or like parts:

Figs. 1, 2 and 3 are plan views, partly in section, of a device embodying the invention;

Fig. 4 is a front view of the same with the closure shell broken away; and

Fig. 5 is a detail section on the line 5—5 of Fig. 4.

In carrying the invention into effect, there is provided in a closure for automotive engine radiators, the combination with shutters adapted to be opened and closed, of engine controlled mechanism for immediately closing the shutters when the engine stops. The best constructions also include thermostatically controlled means governing the action of the shutter while the engine is running. Preferably, the engine controlled mechanism includes a suction device operated from the manifold of the engine.

Referring to the drawing, the invention is shown applied to a conventional automobile engine 6 having the usual intake manifold 7 and a fan 8 for drawing air through a radiator 9. In front of this radiator is a position to control the flow of air through it is the radiator closure provided with a frame or shell 10 supported from the radiator and having a series of shutters 11 pivoted to the frame and provided with arms 12, linked together by a bar 13 which is pulled up by a spring 14, as shown in Fig. 6, so that the shutters are constantly urged towards closed position. Suitable shutter operating linkage is provided consisting of a bell crank 15 pivoted at 16 and having one arm connected to the bar 13 and the other arm connected to the link 17, which in turn is pivotally connected to one arm of a bell crank 18 pivoted at 19 and carrying on its other arm the roller 20. Through this train of operating linkage, outward pressure from the direction of the radiator on the roller 20 will cause the shutters to open against the action of spring 14, and withdrawal of such pressure will immediately permit the shutters to close.

The closure selected to illustrate the invention is provided with a conventional thermostat 21 of the type commonly used for automatic radiator closures, which expands in response to an increase in the engine temperature and contracts on cooling. This thermostat is secured at one end to a frame 22 fastened to the frame 10, and carries on its other or moving end an operating roller 23 which is positioned opposite the roller 20, forming part of the shutter operating linkage already described. The roller 23 is so positioned that there is a small space between it and the roller 20, even when the motor is hot and the thermostat expanded.

The structure already described would be sufficient to operate the shutters satisfactorily while the engine was running, but would fail to close the shutters immediately after the engine stopped running and thus permit dissipation of the engine heat when it is most desirable that it be conserved.

There is, therefore, provided means controlled by the engine for insuring that the shutters shall be closed immediately on stopping of the engine. This means consists of a generally wedge shaped element 24 interposed wedgewise between the
rollers 20 and 23 and carried by a stem 25 fast to a piston 26 operating in a cylinder 27 having limited pivotal movement on the frame 10 and in communication through suitable flexible tubing 15 with the manifold of the automobile engine. This piston is spring pressed towards its upper limit of movement against the effect of suction from the engine manifold, by a spring 29.

Thus, when there is no suction due to stopping
10 of the motor, the wedge shaped member will be in its uppermost position with the narrow portion of the wedge, which portion is a little less in width than the space between the rollers, as shown in Fig. 3, in which position there will be no pressure exerted by the thermostat on roller 20, even though the thermostat is expanded by the heat of the engine. The stopping of the motor, therefore, results in rendering inoperative the connecting mechanism between the thermostat and the shutters, and permits the shutters to immediately close.
20 While the engine is going, however, the suction of the engine will draw the piston against the spring to the position shown in Figs. 1 and 2, with the wedge in lowered position with its broadest part between the rollers 23 and 20. In this position, any expansion of the thermostat will exert pressure on the roller 20, thereby through the shutter operating linkage operating the shutter an amount proportional to the expansion of the thermostat. It will, therefore, be seen that the thermostat governs the action of the shutters while the engine is running, and when the engine stops, this thermostat control is incapacitated and the shutters are immediately closed.

While in the particular embodiment shown the invention has been applied to a radiator closure of the automatic thermostatically controlled type, it will be apparent that the invention may be used with other radiator closures, either of the hand operated type or of a type having no other operating means than that provided by the invention. For instance, if a simplified closure without automatic control when the engine is running is desired, the thermostat which actuates the roller 23 may be omitted and the roller fixed in its outer position.

As best seen in Figs. 1, 2 and 3, the sides of the wedge shaped element 24 have substantially parallel faces 30, adjacent the base of this element. The parallel faces 30 provide a certain freedom of movement of the wedge shaped element at running speeds without any effect on the position of the shutters determined by the thermostat 21. During normal operation of the engine, the manifold vacuum varies considerably, with the result that the piston 26 moves to a certain extent within the cylinder 27. During the normal running of the automobile the parallel faces 30 remain in contact with the rollers 20 and 23 so that the shutters do not respond to the variations of manifold pressure, but remain in the position determined by the thermostat 21. Thus, the particular structure selected to illustrate the invention is but one of many possible concrete embodiments of the same. The invention, therefore, is not to be restricted to the precise details of the structure shown and described.

What I claim is:
1. In a closure for automotive engine radiators, the combination with a frame adapted to be supported from the radiator, of shutters supported by said frame and adapted to be opened and closed, means supported by said frame for closing said shutters when the engine is stopped, mechanism for opening said shutters in varying amounts in accordance with variations in the engine temperature while the engine is running, and a device supported by said frame and governed by suction from the manifold of the engine and cooperating with said mechanism to enable the latter to open said shutters while the engine is running and permitting said means to close the shutters when the engine temperature is outside the range entered into by said mechanism, said mechanism and said device including a cylinder pivoted on said frame and connected to the manifold of the engine, a spring pressed piston in said cylinder, and a generally wedge-shaped member rigidly connected to said piston.

2. In a closure for automotive engine radiators, the combination with shutters adapted to be opened and closed, of means for closing the shutters when the engine is stopped, mechanism for opening said shutters in varying amounts in accordance with variations in the engine temperature while the engine is running, and a device governed by suction from the manifold of the engine and cooperating with said mechanism to enable the latter to open said shutters when the engine is running and permitting said means to close the shutters when the engine temperature is outside the range entered into by said mechanism, said device including a cylinder connected to the manifold of the engine, a spring pressed piston in said cylinder, and a generally wedge shaped member rigidly connected to said piston, and said mechanism including linkage connected to said shutters and a thermostat adapted to actuate said linkage to open said shutters, said wedge shaped member being interconnected between said thermostat and said linkage.

3. A radiator shutter comprising a frame and shutter elements pivotally mounted therein, means carried by the frame for actuating said shutter elements, thermostatic means located within the frame and responsive to radiator temperature, a cylinder pivotally mounted on said frame and adapted to be connected to the intake manifold of the engine, a piston in said cylinder, and a wedge shaped element rigidly carried by said piston and adapted to connect said means operatively when the engine is running.

4. A radiator shutter comprising a frame and shutter elements pivotally mounted therein, a spring tending to close said shutter elements, means adapted to be operated to open said shutter elements, thermostatic means responsive to engine temperature, a cylinder having a pivotal mounting adapted to be connected to the intake manifold of the engine, a piston within the cylinder and a wedge shaped element rigidly carried by said piston and adapted to connect operatively the thermostatic means and the shutter opening means when the engine is running.

5. A radiator shutter including pivotally mounted shutter elements, a spring tending to close said shutter elements, means adapted to be operated to open said shutter elements, thermostatic means responsive to engine temperature, a cylinder adapted to be connected to the intake manifold of the engine, a piston within the cylinder, and a wedge shaped element connected to said piston and adapted to connect operatively the thermostatic means and the shutter opening means when the engine is running, said wedge shaped element having its sides adjacent the base substantially parallel to permit a certain degree of movement of said element without affecting the degree of opening of the shutter.
6. A radiator shutter including pivotally mounted shutter elements, a spring tending to close said shutter elements, means adapted to be operated to open said shutter elements, thermostatic means responsive to engine temperature, a pivotally mounted cylinder adapted to be connected to the intake manifold of the engine, a piston within the cylinder, and a wedge shaped element rigidly carried by said piston and adapted to connect operatively the thermostatic means and the shutter opening means when the engine is running, said wedge shaped element having its sides adjacent the base substantially parallel to permit a certain degree of movement of said element without affecting the degree of opening of the shutter.

7. A radiator shutter including pivotally mounted shutter elements, a spring tending to close said shutter elements, means adapted to be operated to open said shutter elements, thermostatic means responsive to engine temperature, a cylinder adapted to be connected to the intake manifold of the engine, a piston within the cylinder, a wedge shaped element connected to said piston and adapted to connect operatively the thermostatic means and the shutter opening means when the engine is running, said wedge shaped element having its sides adjacent the base substantially parallel to permit a certain degree of movement of said element without affecting the degree of opening of the shutter, and anti-friction means on said thermostatic means and said shutter opening means adapted to facilitate the movement of the wedge shaped element.

8. A radiator shutter including pivotally mounted shutter elements, a spring tending to close said shutter elements, means adapted to be operated to open said shutter elements, thermostatic means responsive to engine temperature, a pivotally mounted cylinder adapted to be connected to the intake manifold of the engine, a piston within the cylinder, a wedge shaped element rigidly carried by said piston and adapted to connect operatively the thermostatic means and the shutter opening means when the engine is running, said wedge shaped element having its sides adjacent the base substantially parallel to permit a certain degree of movement of said element without affecting the degree of opening of the shutter, and anti-friction means on said thermostatic means and said shutter opening means adapted to facilitate the movement of the wedge shaped element.

9. A radiator shutter including pivotally mounted shutter elements, means for actuating said shutter elements, thermostatic means responsive to radiator temperature, a pivotally mounted cylinder adapted to be connected to the intake manifold of the engine, a piston in said cylinder, a wedge shaped member rigidly carried by said piston and adapted to connect both said means operatively when the engine is running, and anti-friction devices carried by both said means adapted to facilitate the movement of the wedge shaped member.

JOHN I. HORTON.